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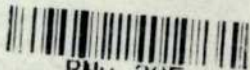
VOLUME 27

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# ENCYCLOPEDIA OF LIBRARY AND INFORMATION SCIENCE

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**VOLUME 27**

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**SCIENTIFIC AND TECHNICAL LIBRARIES  
TO SLAVIC PALEOGRAPHY**

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# SCIENTIFIC AND TECHNICAL LIBRARIES

## Introduction and History

Science covers the broad field of human knowledge concerned with facts and principles. It attempts to explain how and why things happen. Thus, under these broad definitions, medicine is included in both science and technology. Similarly, in this article on scientific and technical libraries, medical libraries are included. In most cases information centers are included in the general category "libraries."

The first half of this article provides background information on the development of scientific and technical libraries; an overview of their role, functions, and objectives; an examination of the varied types and organizational patterns of scientific and technical libraries; and a general discussion of the users, the content (information sources), the collection development, and the services of scientific and technical libraries. It also deals with the personnel, the management, and the problems faced by scientific and technical librarians. This naturally leads into a discussion of the challenges facing these institutions and the future trends of scientific and technical libraries. The second half of the article provides more specific discussion of the organizations (international, national, and local) which promote the development of scientific and technical libraries and brief descriptions of selected scientific and technical libraries and information centers around the world. In the latter, the presentations are divided by geographic areas first, then by country. Due to the large number of scientific and technical libraries available in every part of the world, the coverage is extremely selective and, in most cases, is limited to a discussion of selected national scientific and technical libraries in certain countries.

The article is followed by an extensive reference list which follows the order of the presentation. Over 150 pertinent references are provided.

The history of libraries parallels the history of writing. For over 5,000 years humans have made pictorial and/or written records of their ideas, their environments, and their discoveries, on various types of materials—clay, metal, wood, papyrus, bone, silk, parchment, leather, paper, etc. During all stages of development, these records have been collected in various libraries.

As to the earliest recorded scientific and technical writings, they are also in the form of inscriptions on clay tablets, papyri, and parchment (*1*). These early records are often fragmentary and many are presently untranslatable. They document the fact that the early civilizations were highly developed. Many cuneiform tablets of Babylonian origin have been discovered which deal with mathematics, some of these dating to 1800–1600 B.C. The excavation of the Library of Ashurbanipal (668–628 B.C.) revealed about 20,000 cuneiform tablets, more than one-third of

them devoted to science (2). The Chinese developed a sophisticated civilization far back in ancient times; a full documentary study of all branches of science, technology, industry, chemistry, biology, agriculture, and medicine is succinctly presented in Needham's monumental multivolume work *Science and Civilization in China* (3). Early Egyptian papyri reveal a scientific interest in such subjects as the production of metals and dyes, mathematics, and veterinary medicine (4). Ancient Sanskrit astronomical tables and works on chemistry and mathematics have been uncovered in India (5). The most complete scientific writings are from ancient Greece, many of which are still extant. This scientific activity culminated in the library at Alexandria (about 300–100 B.C.). Much of this Greek learning was transmitted to the Arab world of the eighth, ninth, and tenth centuries through translations into Syriac and Arabic (6). The Arabs also contributed much literature in the fields of medicine, astronomy, mathematics, chemistry, physics, etc. (7). These Arabic texts were later translated into Latin by monks and copied onto parchment. These Latin manuscripts on scientific subjects represent the highest state of the art of diffusion of information until the invention of printing about 1450 (8).

It was the invention of printing from movable type in the middle of the 15th century, however, which made the wide and rapid diffusion of knowledge possible. Thus, it is one of the most significant developments both in the history of science and in the history of scientific and technical libraries.

The proliferation of private materials prompted the establishment of various early private collections. Examples are the astronomy collection of Conrad Gesner (1516–1565) and the collection of Dr. John Dee (1527–1608), mainly consisting of works of medieval science. Various scientists maintained large collections. Among these were the collections of Sir Charles Scarborough, M.D. (1616–1634), Robert Boyle (1627–1691), Robert Hooke (1635–1703), Edward Bernard (1638–1696), Sir Isaac Newton (1642–1727), Martin Folkes (1690–1754), and the enormous collection of Carl Linnaeus (von Linne; 1707–1778). Later private collections of note included that of Benjamin Franklin (1706–1790); a natural history collection of Sir Joseph Banks (1743–1820); the collection of Nathaniel Bowditch (1773–1838), mainly devoted to mathematics and astronomy; the collection of Charles Darwin (1809–1882); and the collections of Alexander von Humboldt (1769–1859), John Thomas Groves (1806–1870), and Francis Joseph Cole (1872–1959), who amassed an important zoology collection (9).

Another significant development in the history of scientific and technical libraries was the rise of scientific societies. These societies were instrumental in the creation of experimental science as we know it. The predecessors of these modern scientific societies were the schools of ancient Greece (such as the schools of Thales, Pythagoras, and Plato) and the museums and libraries of Alexandria founded by the Ptolemies. These "schools" resurfaced in the 16th century in Italy. In 1560 Della Porta organized the Accademia del Segreti in Naples. In 1603 the Accademia dei Lincei was founded in Rome; it included Galileo and Della Porta. Another important academy (which still exists) was founded in 1652, the Academia Naturae

Curiosorum, which fueled the growth of science in the German states. One of the most important academies was the Royal Society founded in 1662 in London. It produced the highly influential *Philosophical Transactions* as well as its *Proceedings* (10). Societies sprang up in France, Germany, the United States, Scotland, Ireland, etc.

The publication of the various proceedings of these scientific societies gave birth to another significant development in the history of scientific and technical libraries—the growth of periodical literature. The first literature—such as the *Philosophical Transactions* of the Royal Society and the *Journal des savans*, both first published in 1665—was very general in scope. By the end of the 18th century, however, the scientific and technical journals began to treat very specific topics in science. Since then, these journals have been sponsored and published by a variety of sources. In the last 200 years the number of these specialized journals has grown to astronomical proportions. Estimates of the number of current scientific and technical periodicals vary greatly, ranging from 35,000 to 100,000 titles (11). This proliferation has prompted the creation of all kinds of abstracting, indexing, and cataloging services and has also created the need for specialized personnel to deal with this wealth of information.

With the advent of advanced technology in the mid-20th century, this development also naturally fueled the efforts toward library automation. In the area of library organization of knowledge, computer applications are numerous, such as MARC tapes, the OCLC system, etc. In the last 15 years, computers have been more and more widely used for information storage and retrieval, particularly in science and technology. Numerous machine-readable data bases have been generated for multiple purposes, which include the computerized production of journals, indexes, and abstracts and the easy and speedy retrieval of stored information by both users of information and information specialists. Williams and Rouse identified, in 1976, 301 data bases produced in the United States and Europe alone (12). More than two-thirds of them are in science and related technical fields. Currently, many of these data bases are readily accessible to U.S. scientific and technical libraries and information centers through commercial vendors such as Bibliographic Retrieval Service (BRS), Lockheed, System Development Corporation (SDC), and federal government agencies such as the National Library of Medicine (NLM). Some of them are also available in several countries around the world. Besides data bases, it is necessary to mention the trend toward use of nonprint materials. An appreciable number of scientific and technical journals, reports, books, etc. are available in both print and nonprint forms (film, videotape, slide, audio-cassettes, records, etc.). Some are available exclusively as nonprint materials. Since time is essential to scientists in their process of seeking needed information, more and more applications of high technology in the information communication process can be expected. Some information scientists, such as F. W. Lancaster of the University of Illinois, have discussed the possibility of having “paperless” libraries. This may not be a farfetched expectation, particularly in light of scientists’ information needs.

### Role, Functions, and Objectives of Scientific and Technical Libraries in the Scientific Information Communication Process

Figure 1 shows a simple information theory model which can and should explain clearly the role of a scientific and technical library (although it cannot fully reflect all of the segments of the total delivery system for scientific and technical information). Essentially the library serves as the broker between the available knowledge records and the seekers of those records. In order to transmit information to the intended destination, the transmitter has to do its job well. In the case of the library, in order to perform well as a transmitter, it must function well in at least four broad areas: selection, acquisition, organization, and dissemination of information resources. These functions are not necessarily equally important, and the weight of each component is generally determined by the objectives of a given library. Looking back in time, some of the early private scientific libraries were intended mainly to serve as museums, whose main concern was to save precious and perishable items. The collections were generally used by the owners, sponsors, and their friends. Thus, the role of these libraries was mostly passive and the dissemination function was greatly de-emphasized. On the other hand, the current scientific and technical libraries play aggressive and dynamic roles as transmitters, or brokers, between available information resources and their users. Thus all functions are important in their own right, since the ultimate goal is efficient, effective, quick, and maximum transmission of relevant and needed information to the information seeker. Further elaboration on the functions of scientific and technical libraries is provided in a later section.

Thus, the objectives of all libraries—whether scientific and technical or nonscientific and nontechnical—are essentially the same: “To acquire bibliographic materials related to the interests of a particular user population, actual or potential, to organize and display these materials in various ways; and to make them available to users. In a wider context, libraries are part of the entire process of transferring information via the published record” (13). This interface function has been

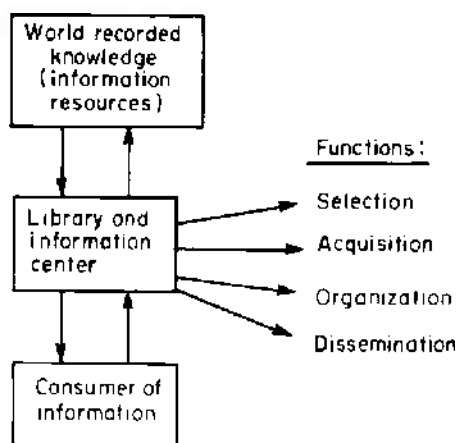


FIGURE 1. *The interface role of the library.*

discussed in detail by many scholars, including King and Bryant and, most recently, Lancaster. From an examination of this interface role, as pointed out by Lancaster (14) and as enunciated in the studies by Hamburg and his associates (15,16), it is clear that scientific and technical libraries should take a dynamic role in achieving the following objectives:

- To maximize accessibility of materials to users
- To maximize exposure of users to materials

It is essential to point out specifically that communication of scientific and technical information occurs in a variety of formal and informal modes:

1. informal communication among invisible colleges (17) by telephone and correspondence; and face-to-face talk in laboratories, at conferences;
2. meetings and conferences;
3. in-progress reports of research;
4. through formal and semi-formal publications, such as professional journals, conference proceedings, books and reprints;
5. preprints;
6. correspondence, news releases, television, on site visits to research facilities;
7. etc. (18).

Detailed discussions on this topic can be found in numerous bibliographic sources listed under "Scientific and Technical Communication" in Chen's recent book, *Scientific and Technical Information Sources* (19), which include the well-known SATCOM Report of 1969 (20). Libraries and information centers thus serve as one important type of transmitter, mainly for recorded knowledge.

## CHARACTERISTICS AND TYPES OF SCIENTIFIC AND TECHNICAL LIBRARIES

In a broad sense, scientific and technical libraries (sci-tech libraries) frequently are considered as special libraries, even though they are part of general academic and research institutions. This is primarily because scientific and technical libraries deal with information sources in specific subject areas and because they serve a restricted clientele with a rather narrow range of interests and with specific needs for particular pieces of information.

Another characteristic of scientific and technical libraries which distinguishes them from other libraries is the nature of the collections. In the fields of science and technology, primary information sources are considered to be most important to scientists. Thus, the collections in scientific and technical libraries generally contain more periodicals, and surely more technical reports, than those of public libraries or humanities academic libraries. These forms predominate because of their currency and specificity.

A third distinguishing characteristic of sci-tech libraries is that they tend to be more dependent on automated services, such as machine-readable data bases, than other libraries (21), as discussed earlier. This is specifically evident in most scien-

tific and technical libraries, some of which are part of the institution's system center.

There are numerous possible locations of scientific and technical libraries. These have also been outlined by Strass (22), Langner (23), and others; they are:

- In an academic institution
- In a research institution
- In an industrial organization or company
- In a governmental organization or agency, such as the libraries of the U.S. Geological Survey and the National Library of Medicine
- In a specific institution, such as a hospital library
- As a division of a professional society, such as the library of the Engineering Society in New York City
- As a division of a trade association

This is very similar to the groupings of libraries included in a recent report of the National Commission on Libraries and Information Science (24).

While there are many similarities among all these types of scientific and technical libraries, each type of library is distinct—because of its objectives, organizational structure, collection size, subject scope, orientation, and the specialization level of its users' interests, etc. For example, a large academic scientific and technical library—such as the Science Library or the Barker Engineering Library of the Massachusetts Institute of Technology—differs greatly, in every aspect, from the scientific and technical library of a small industrial manufacturing company. Looking at the collection alone, distinctive comparisons can be made easily. The former library has a large collection of primarily highly research-oriented materials (over 200,000 volumes of books, a couple of thousand journal titles, etc.) which encompass multiple scientific and related disciplines; while the latter has a very limited and nonresearch-oriented collection (with heavy emphasis on practical application), on a narrow subject, and is possibly as small as a few hundred books, a handful of journals, and several hundred reports, standards, patents, etc.

Besides the libraries mentioned above, one should keep in mind the following types of centers which also fulfill the storage and distribution functions of scientific and technical information transfer (25):

1. Information Service Centers: Information service centers tend to acquire more of the newer, special purpose files—often in computerized form—than libraries. More computerized bibliographic search activities are conducted.
2. Information Analysis Centers: Information analysis centers repackage information from their holdings, while libraries and information service centers do not. They may also generate new documents from what they have.
3. Data Centers: These centers collect and store data as opposed to documents. Frequently their outputs are in numerical form.

## ORGANIZATIONAL PATTERNS OF SCIENTIFIC AND TECHNICAL LIBRARIES

The organizational patterns of scientific and technical libraries in public libraries, industrial organizations, professional societies, trade associations, and specific



institutions are generally predictable and simple. For example, most scientific and technical libraries in public libraries function as departments of the total library system. The organizational patterns of scientific and technical libraries in academic and large research institutions and in governmental organizations are more complex. In general, they can be classified into three categories: centralized, decentralized, and miscellaneous systems (somewhere between the two extremes) (26). Each type has its own pros and cons; thus, it is difficult to flatly endorse one type over the others, although the trend seems to be toward more consolidation rather than decentralization. Numerous factors can certainly determine the desirability of one type of organizational structure over the others. These include the total library budget, the availability of qualified library personnel, the collection, the physical layout of an institution, the geographical location of the library, etc. As observed by Cooper, "the organizational patterns of science and technology libraries result from compromises between the needs of users, as they see them, and the practical requirements of budgets and administrative control, as seen by the librarians" (27).

Generally speaking, the most attractive feature of decentralization to the library user is convenience, since most decentralized libraries are situated in nearby locations, if not in the same buildings where the users work. Time is an important factor in the scientist's process of information seeking (17), thus the distance of the library is an essential and determining factor of the frequency of library visits. In other words, because of the convenience of the location of a decentralized library, the frequency of visits by users is normally greater than the frequency of visits to a centralized library. This results in better acquaintance with the library collection and the library staff and creates an "informal atmosphere which many users prefer to the more impersonal ambience of some centralized units" (28).

The main reasons for the trend toward centralization are those related to library budgetary concerns and intra- and interlibrary cooperation. Consolidation can save the library a great deal of money in numerous ways; these include: fewer library units to manage, fewer total hours the library must be open to users, less duplication of library collections, smaller library staff, etc.

Since the late 1960s, librarians have been facing increasingly serious financial problems, and many of the "luxuries," in terms of convenience, etc., have had to give way to sheer survival. Coupled with the increasing proliferation of published materials, this has made it financially impossible for any scientific and technical library to provide its users all or even a great majority of relevant and needed information sources. Thus, in almost every aspect of library operations and functions, librarians are forced to apply various managerial techniques to maximize their limited resources and to provide their users the best possible services at the least cost (29). In terms of information resources, a great deal of emphasis has been given to pooling all available resources among various related libraries and to establishing various information networks. Various studies have been conducted to examine the properties of scientific and technical subject literature and to investigate scientists' information needs and use patterns (30), so that better collection development policies can be developed and more library cooperation can be initiated. In this climate, the argument for having centralized scientific and technical libraries tends to be quite persuasive.

Despite some of the advantages of centralized scientific and technical libraries described here, they are usually less convenient to their users than decentralized ones, particularly in large academic and research institutions, where buildings are far apart. Because of that, recent surveys, such as that of Mount (31), have shown that the price for users' acceptance of consolidated scientific and technical libraries has been the additional creation of small departmental reading rooms that are administered by the main scientific and technical library but are situated in the same building as the department. These reading rooms generally are restricted to the departmental users, with a small number of core journal titles in the main subject fields and a very limited number of essential reference tools and core texts. Some departmental reading rooms also experiment with various new methods for providing information, within the scope of their limited resources. For example, the Chemistry Reading Room at MIT, from the very beginning in the early 1970s, has provided hard copies only of the current year of the approximately 70 journal titles in the chemistry subject fields; the back volumes of these periodicals are available on microfilm. Cassette film readers also provide the capability for duplicating needed pages, and thus the arrangement has been favorably received by all the users of the reading room (32).

#### USERS AND USER NEEDS

Users of scientific and technical libraries are as varied as the types of libraries they patronize. In each library environment and in each type of scientific and technical library, library users can generally be grouped into four categories:

1. **Professional:** This group includes members of university faculties, scientific researchers, and practitioners such as engineers and medical doctors, etc.
2. **Semi- and Preprofessional:** This group consists primarily of students in academic institutions, technicians, assistants working for scientists, engineers, and medical researchers.
3. **Professional:** This group includes mainly professionals in other fields who are interested in scientific information, such as lawyers, environmentalists, consumer advocates, etc.
4. **Nonprofessional:** This group consists mainly of members of the general public who do not belong to the above three classes.

This classification of users is essentially similar to that used by Cunningham in the 1940s to categorize individuals who sought reference aid in a medical library (33).

The information needs and demands of these groups of users in each scientific and technical library environment differ quite substantially. For example, the users of a large academic institution naturally are more inclined to seek research-oriented information; thus, it is essential that the library collection is up to date and comprehensive, in order to meet the users' needs. On the other hand, this type of collection would be mostly irrelevant and incomprehensible to library users at a technical vocational college. In the following discussion on scientific and technical library collection development, this point is further elaborated.

Given the interface role and function of a scientific and technical library (as described earlier), it should be obvious that—in order to achieve the objectives related to accessibility/exposure of needed materials—the user population of each library must be studied and user needs and demand must be explored. Library literature is full of studies on this topic, and readers are referred specifically to references listed in the bibliographies of use studies, such as that of Atkin (34), and to the reference lists of several recent works on library evaluation studies, such as those of Chen (35) and Lancaster (36).

In order for a library to take a dynamic interface role between the information and user, it is important to note a situation suggested in Figure 2. Of the total number of the potential library-user population, a great majority is in the nonuser group. Strenuous diagnostic studies must be conducted to find out why, and possible measures must be taken to maximize the actual user population. Simple studies to merely describe the state of the art—which are referred to by King and Bryant as “macroevaluation” (37)—are not sufficient.

As to the large number of use studies available to date, a great majority of them are macroevaluative studies, and almost all concern user population. Furthermore, most of them are really macroevaluative investigations of user demand rather than user need. For example, most use studies have been conducted based on actual circulation data, photocopy request forms, interlibrary loan requests, etc. These generally do not provide accurate measures of unexpressed needs of the user population.

## CONTENTS OF SCIENTIFIC AND TECHNICAL LIBRARIES

As discussed earlier, in a wider context, scientific and technical libraries are part of the entire process of transferring scientific and technical information to the user via the published record. Thus, the “contents” of scientific and technical libraries are their collections of scientific and technical information sources.

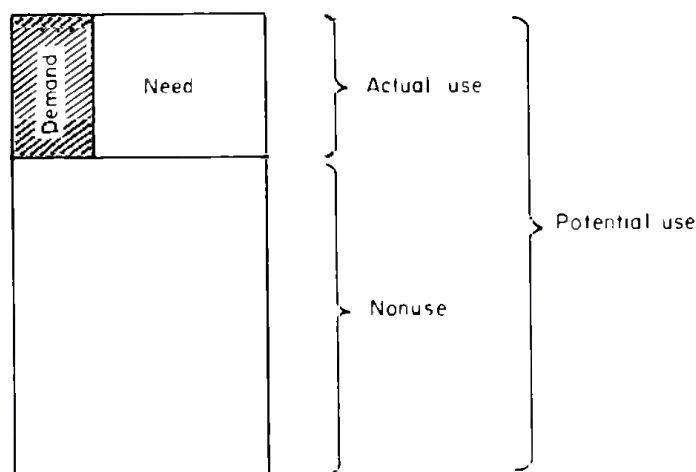


FIGURE 2. *Library use and nonuse.*

*Types of Scientific and Technical Information Sources*

Rawski, in his scholarly discussion of the properties and characteristics of subject literature, stated clearly that each type of subject literature is intended for very distinctive purposes (38). For example, abstracting and indexing journals, though in serial format, do not serve the same purposes as the primary journal literature. There are numerous reference guides to the literature of scientific and technical libraries (39). Most of them, unfortunately, arrange all materials by subject discipline rather than by types of information sources; and they limit their coverage predominately to typical reference materials such as encyclopedias, handbooks, dictionaries, etc., which are not primary sources of information for scientists. The most recent effort intended to remedy this situation resulted in Chen's reference tool entitled *Scientific and Technical Information Sources*. In this book, scientific and technical information sources are categorized in the following 23 groups:

1. Selection tools
2. Guides to the literature
3. Bibliographies
4. Encyclopedias
5. Dictionaries
6. Handbooks
7. Tables, almanacs, data books, and statistical sources
8. Manuals, source books, laboratory manuals and workbooks, and how-to-do-it manuals
9. Guides and field guides
10. Atlases and maps
11. Directories, yearbooks, and biographical sources
12. History
13. Important series and other reviews of progress
14. Treatises and monographs
15. Abstracts and indexes and current-awareness series
16. Periodicals
17. Technical reports and government documents
18. Conference proceedings, translations, dissertations and research in progress, preprints, and reprints
19. Patents and standards
20. Trade literature
21. Nonprint materials
22. Professional societies and their publications
23. Data bases

Some of the above categories include more than one type of source. Grogan categorized the literature of scientific and technical libraries into the following broad areas (40):

1. The primary sources: The bulk of this category is made up of the original reports of scientific and technical investigations. Some of these records may be largely observational (such as reports of scientific expeditions) or descriptive (such as trade literature). The primary literature represents new knowledge and

- the most up-to-date information. It consists of materials included in categories 16–20 of Chen's grouping.
2. Secondary sources: They are compiled from the primary sources. They include materials covered in categories 4–10 and 12–15 of the former grouping.
  3. Tertiary sources: These are essentially aids to facilitate the use of both primary and secondary sources. They represent materials included in categories 1–3, 9, and 11.

Unquestionably, due to the originality and the timeliness of information covered, primary sources are considered by scientists as the most important information sources among all available publications. Of all the primary sources, the periodical is undoubtedly the most essential type of literature to scientists, as substantiated in various studies (17, 20). Some types of information sources (such as nonprint materials), and also data bases, are more often used in information centers and the more automated libraries than in the traditional libraries. Some others, such as the tertiary sources (selection tools, guides to literature, etc.), are probably more useful to scientific and technical librarians than to scientific and technical library users.

#### *Use of Scientific and Technical Literature*

Various studies have been conducted on the use of scientific and technical literature. Davis and Bailey provided a list of 438 use studies published up to 1963 (41). Dewese added 109, to supplement Davis and Bailey's list, in 1967 (42); and Atkin provided a bibliography of some 700 titles of such surveys issued during the period 1950–1970 (34).

Since then, many more studies have been made available and these can easily be traced by using *Library Literature* or *Library and Information Science Abstracts*. Although not all use studies are exclusively on the use of scientific and technical literature, a high percentage of them are related to scientific and technical libraries and/or literature. These studies range greatly from simple descriptive ones to highly sophisticated and inferential investigations. They also range from the study of the use of scientific and technical literature in general (43) to that of specialized materials, such as the application of operations research techniques to study the use of medical monographs (35). Generally, the nature of these use studies depends greatly on the definition of "use" and the criteria employed to judge use. For example, use of scientific and technical literature can be considered as a count of those materials looked at, checked out, photocopied, requested, read, or cited by their users. Accordingly, different types of use data can be collected to analyze the types of use and to understand how the various kinds of user needs and/or demands can be met by the available information sources. The types of data include recorded use statistics on materials left on the library tables, circulation slips, photocopy request forms, interlibrary loan requests, reserve slips, and citations appearing in publications. The various approaches applied to the study of subject literature and related to "the assembling and interpretation of statistics relating to books and periodicals" were earlier called "statistical bibliography," by Raisig (44) and by Pritchard (45). The term statistical bibliography was used as early as 1923 (46);

the area of investigation acquired its new name, "bibliometrics," in 1969, as "the application of mathematics and statistical methods to books and other media of communication" (45), or, as Fairthorne put it, the "quantitative treatment of the properties of recorded discourse and behavior appertaining to it" (47). One should keep in mind that whatever approach is utilized by library investigators, there is no perfect one.

Imperfect as these studies are, they nevertheless provide us enormous insight into the properties and characteristics of subject literature and into scientists' information-seeking patterns, as discussed in Donohue's book *Understanding Scientific Literature: A Bibliometric Approach* (48). The byproducts of these studies should not be underrated. For example, the studies on citation characteristics led Eugene Garfield to the creation of one of the most useful bibliographic tools, *Science Citation Index* (49). Citation analysis of subject literature has also been used to identify the core source literature of a subject field, for example, the study on the literature of health sciences librarianship by Chen (50). Price believes that citation study can establish a conceptual map of current scientific literature, and that:

With such a topography established, one could perhaps indicate the overlap and relative importance of journals and, indeed, of countries, authors, or individual papers by the place they occupied within the map. . . . (51).

The single most important and the most frequently mentioned phenomenon related to literature analysis has to do with Bradford's "law of scattering." Bradford, a distinguished British documentalist and librarian, discovered a method, in 1934, to identify the core literature of a subject field to the user. He stated:

If scientific journals are arranged in order of decreasing productivity of articles on a given subject, they may be divided into a nucleus of periodicals more particularly devoted to the subject and several groups or zones containing the same number of articles as the nucleus, when the numbers of periodicals in the nucleus and succeeding zones will be as in  $1:n:n^2$  (52, 53).

Bradford demonstrated an empirical phenomenon, but the real mathematical foundation was not provided. Several information scientists have attempted to do this, such as Vickery (54) and Fairthorne (55). Most recently, in 1976 Morse compared the Bradford distribution with the geometric one (56), and he and Leimkuhler worked out the mathematical properties of the Bradford distribution (57). Interestingly, they found that use data based on citations and references—such as the analysis by Kendall of articles on operations research in various journals, as reported in the *ORSA Bibliography of Operations Research* (58)—tend to show a better fit with the Bradford distribution; while the use data based on recorded library use (circulation, in-library use, photocopy requests, etc.)—such as Chen's study on the use of physics journals at the MIT Science Library (59)—tend to fit the geometric distribution better.

A substantial number of quantitative and analytical studies of scientific literature

have examined the obsolescence of the subject literature. The term "half-life" has been used frequently in relation to this topic for quite some time; it started in 1960 when Burton and Kebler examined obsolescence in scientific literature using the analogy of the half-life of radioactive substances. They defined the half-life of scientific periodical literature as "the time during which one-half of all currently active literature was published" (60). This technique has since been modified by several library researchers, such as Brookes (61). Although the half-life of scientific journals varies greatly from one field to another (for example, geology journals have a much longer half-life than chemistry ones), on the whole, it is shorter than that of nonscience journals. The half-life concept is generally considered to be a very useful indicator for library journal collection development purposes.

In the nonjournal literature area, age of book materials is also an important determining factor in terms of collection development to meet the needs of the library user. Generally, it has been found that the use of library materials decreases exponentially in time. However, age should not be the only consideration. In every field there are always so-called classical materials which can stand the trial of time and will be useful continuously for a long time to come. Furthermore, there are also materials which were not popular before but which become popular because of the rise of new fields; examples from recent years are books on environmental studies, pollution, and energy. Because of this, the analytical methodology most worth noting on the study of book use should be Morse's "Markov Model on Book Use" (62), which was further extensively tested and modified by Chen (35,63). The greatest advantage of these probabilistic models is their capability for predicting future use. Although these models were developed and tested originally in a science library (MIT; Ref. 62) and a large medical library (Harvard's Countway Library of Medicine; Ref. 35), they have since been tested in other types of libraries.

It is impossible to cover all the major approaches and methodologies used in the various bibliometric studies of science and technical literature now available. The sketchy discussion presented here should provide a good illustration of the topic.

### *Collection Development*

Keeping in mind the interface role of a scientific and technical library, one can understand that the library collection is the *raison d'être* of a library. It is the librarian's foremost responsibility to develop a collection which can best fulfill both the current and future needs of the library's users.

The collection objectives should be defined carefully and clearly for each scientific and technical library. They differ greatly from one type to the other. For example, a large research library tends to need a more comprehensive research collection than a small industrial scientific and technical library. However, it is necessary to keep in mind that, at this time, almost all libraries, whether research oriented or not, are financially pressed; therefore, "comprehensiveness" has mostly given way to "selectivity." Most of the large scientific and technical research libraries are in academic institutions, and the support for these libraries is not keeping pace with inflation in information source prices, increases in library personnel costs, and

rising library operation and maintenance costs; many suggest that "this trend may well persist through the 1980s when student enrollments, upon which most financial support is ultimately based, are expected to decline even further" (64). On the other hand, the body of scientific and technical literature is growing constantly. Take scientific periodicals as an example: although the estimated total number of scientific and technical journal titles varies greatly, the *World List of Scientific Periodicals* contains 25,000 entries in its first edition, published 1925–1927; 36,000 titles in the second edition, issued in 1934; over 50,000 items in the third edition, published in 1953; and over 60,000 items in its fourth edition (65). In 1963 Gottschalk and Desmond, in their census study of the world's scientific and technical serial literature, conservatively estimated the total population to be close to  $35,000 \pm 10\%$  (66), and since then the growth rate of scientific and technical journal literature is estimated to be about 2% annually in the United States (with a higher rate worldwide) (67). As far as monographic literature is concerned, *Publishers Weekly* has indicated that 8,000 new scientific and technical books have been added in the United States each year since early 1970 (68). Obviously then, no scientific and technical library can possibly have all or even a great majority of the published material needed by its users. To respond to this changing environment, science librarians must develop and utilize various managerial techniques in their process of collection development and management; they must employ and rely on the available advanced technology in order to maximize the limited available resources and to provide the most service tailored to user needs, with the least cost; and finally, they must find ways to rearrange their priorities in terms of collection acquisition, and in a cooperative spirit develop information networks for resource sharing.

Some of the techniques and approaches discussed earlier, such as operations research, Bradford's law of scattering, and citation analysis, are a few among the many systems approaches which can be enormously useful to librarians in terms of collection development: acquisition, matching the collection with user needs, identification of core collections, duplication of needed materials, and weeding the less-used or potentially useless materials. For more discussion of this topic, readers are referred to Chapters 7–9 of Chen's book, *Application of Operations Research Models in Libraries* (Chapter 7 on Budgetary Allocation; Chapter 8 on Book Selection, Collection Development, and Duplication Policy; and Chapter 9 on Weeding Policy; Ref. 69).

It should be pointed out that most of the discussions in Chen's book are on scientific and technical book collection development. As stated earlier, journal literature is considered to be the most important type of information source for scientific users. Most scientific and technical libraries allocate about two-thirds of their collection budget to journal literature. Chen's study of physics journal use at MIT found that 22.3% of the total journal titles accounted for 90% of use (59) and that the distribution of journal titles in terms of frequency of use was geometric (57). Thus, core journal collections in terms of percentage of satisfied user demands can be identified. In her article, the author further discussed policy on journal duplication and subscription cancellation, and the trade-off for borrowing rather than buying certain journal titles (the concept of resource sharing). Similar



results on a more comprehensive scale can be found in the recent University of Pittsburgh study of 301 journals in physical sciences (70). King and his associates were able to utilize the results of both earlier studies (59, 70), and they developed various statistical indicators to assist librarians to determine at what point, in terms of use, a library should either acquire a journal title or obtain the needed information from interlibrary loan sources (71). Almost all sharing of journal resources is made possible by the provision of photocopies of needed articles, since few libraries lend hard copies of their journals. Statistics from the recent national library survey of library photocopying in the United States—conducted by King Research, Inc., for the National Commission on Library and Information Science (NCLIS)—showed that in 1976, of the total 113.9 million photocopy transactions, 76.1 million were for local users, 27.3 million were for intrasystem loan, and 10.5 million were for interlibrary loan (72).

### SERVICES OF SCIENTIFIC AND TECHNICAL LIBRARIES

As illustrated in Figure 1, librarians, both scientific and technical and non-scientific and nontechnical, are involved primarily in the following major activities:

- Acquisition (selection and collection development)
- Organization (classification and identification of materials)
- Dissemination (presentation of information materials to library users in a variety of forms)

In order to perform these activities well, and to satisfy the objectives described earlier, a library generally is organized into technical services and public services. No exception is found in scientific and technical libraries. Lancaster provides an excellent diagram in his book (73), and it is reproduced here as Figure 3. This figure illustrates clearly the “behind the scenes” services in the technical services areas and the “front” services in the public services areas. The former interfaces directly with the universe of bibliographic resources and the latter with the user population.

It should be kept in mind that the traditional technical and public services are in a state of flux because of the automated procedures applied to many of them, particularly in the larger libraries. Many classical services are provided in “modern modes” (74). In the technical services area some examples include: the Library of Congress MARC tapes used in many scientific and technical libraries; the Ohio College Library Center (OCLC) system’s on-line capabilities for shared acquisition, cataloging, and projected interlibrary loan; Conversion of Serial Data Bases (CONSER), an effort by the United States and Canada to build an on-line international data base for serials in the MARC format; and various on-line access facilities for the machine-readable files of the National Library of Medicine CAT-LINE (Cataloging On-Line), SERLINE (Serials On-Line), INPROC (On-Line In-process File), etc. In the public service area, some examples include the computerized selective dissemination of literature (SDI) services for current awareness

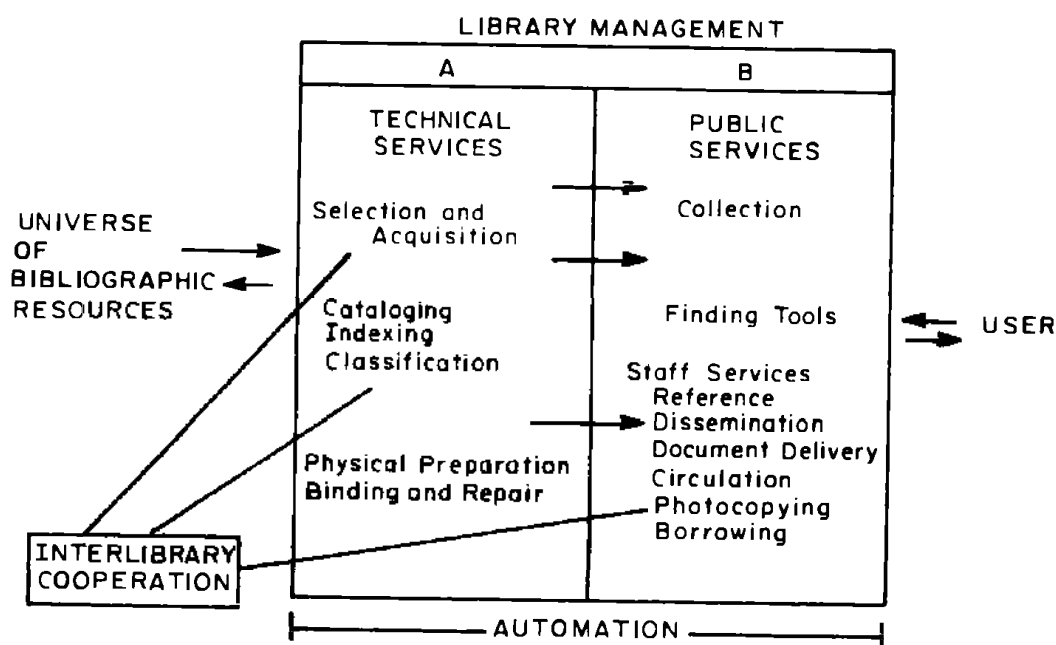


FIGURE 3. *Organization of a library to serve the interface function. Reproduced from The Measurement and Evaluation of Library Services, by F. Wilfrid Lancaster, Copyright © 1977 by Information Resources Press, a division of Herner and Company. (Reproduced by permission of the publisher.)*

purposes, on-line retrieval of scientific and technical data bases (see Ref. 12 for a complete listing), and various speedy methods for transmitting interlibrary loan requests. These include the potential use of OCLC systems and the recent experimental referral system (started in 1975 at the National Library of Medicine) named DOCLINE (Document Delivery On-Line), which utilizes telex to transmit selected unfilled interlibrary loan requests to the British Library Lending Division in Boston Spa, England (75).

Photocopying is probably one of the most heavily used services in a library. It relates to the delivery of documents to both local users and users of other libraries. King's recent study (76) shows that, in 1976, 113.9 million items (906 million pages) were photocopied by the library administrations in 21,280 libraries using 35.3 thousand machines in the United States alone, and a high percentage of these copies were made in scientific and technical libraries. In light of the new Copyright Law of 1976 (77, 78) and the guidelines set forth by the National Commission on New Technological Uses of Copyrighted Works (CONTU) (79), this service may have to be curtailed by a significant number of scientific and technical libraries. This is elaborated later.

It is also worthwhile to point out that scientific and technical libraries have interfaced more and more with nonprint bibliographical resources. Audiovisual services have been provided to support various scientific programs related to education, research, and practice. The best example is the National Medical Audiovisual

Center (NMAC), established in 1967 as a component of the National Library of Medicine and dedicated to the communication of health sciences information and the development and distribution of effective learning materials (80).

## PERSONNEL OF SCIENTIFIC AND TECHNICAL LIBRARIES

The staffs in scientific and technical libraries, similar to those in other libraries, are generally grouped into two major categories:

1. Professionals: Those with graduate degrees in the fields of library and information sciences or advanced subject degrees in related scientific and technical fields.
2. Nonprofessionals: Those without graduate degrees in library and information sciences. This group can include preprofessionals with a college preparation, clerical assistants, student assistants, etc.

The number of library staff in a scientific and technical library varies greatly, from one person in a small industrial or institutional library, to several hundred in a large national scientific and technical library such as the National Library of Medicine. In multistaff situations, one generally finds that the ratio of professionals to nonprofessionals is at least 1:2 or higher. Of the libraries of small scientific and technical institutions and companies, a substantial percentage are administered by people without formal library training. For example, in 1971, over 70% of hospital libraries in the United States were found to be managed by staff without graduate degrees in library science (81, 82). A more recent study in New England in 1976 found that the situation had changed drastically (83).

One of the problems in the staffing of scientific and technical libraries is finding people with the appropriate background and qualifications. It is difficult to generalize about the appropriate background and qualifications of scientific and technical professional librarians; the type and the size of the library and the job content of the position are all determining factors. For example, in a library where computerization activities are important and the position is heavily related to computer literature search, etc., one's background and experience in science and computer science become essential. On the other hand, there are many professional jobs in scientific and technical libraries which can be performed well by staff without a science background. In fact, in most cases, motivation, willingness to learn, and personality should be given appropriate weight in the selection of new staff for scientific and technical libraries. It should be noted that the current tightening job market has stimulated employers' increased interest and capability in hiring staff with science backgrounds for scientific and technical libraries.

Another problem in the staffing of scientific and technical libraries is determining the size of the staff that is necessary to adequately meet the needs of the users. Due to the stringent financial situation, most libraries are understaffed; thus, finding ways to enable the optimal utilization of available manpower and the assignment of priorities in terms of tasks to be performed become administrative challenges.

It seems necessary to point out that on the international scene, finding suitable staff with appropriate backgrounds and experience for scientific and technical libraries is a grave problem. In some parts of the world the difficulty is compounded by the problems of low pay and low social status which librarians receive; in these situations the recruitment of qualified librarians is a very difficult task.

### **MANAGEMENT OF SCIENTIFIC AND TECHNICAL LIBRARIES**

The management of a scientific and technical library is not any different from that of a nonscientific and nontechnical one. Thus, materials on basic principles of management, whether library oriented or not, should be useful to all scientific and technical library administrators. Because of the types of users served by scientific and technical libraries, scientific management techniques are more commonly utilized by them than by nonscientific and nontechnical libraries. Particularly in profit-making institutions, organized approaches to library problem-solving are commonly utilized; this includes the use of industrial engineering and management tools and techniques, such as systems analysis, operations research, market research, etc. These special libraries have had to justify their existence and have had to seek ways to provide maximum services with optimal efficiency and minimum cost for quite some time; therefore, they are significantly problem and output oriented.

Since the late 1960s, as libraries have increasingly faced serious financial cut-backs, the above-mentioned systems and scientific approaches to library management have become more and more useful to all types of libraries. In order to compete for the scarce resources allocated to library and nonlibrary programs, statistical methods and quantitative measurements have been heavily used to evaluate almost all aspects of library operations and functions with the hope of improving cost-effectiveness and the cost-benefits of library services (36). Furthermore, library management has been more user oriented, as discussed earlier. Various modern analytical techniques have been increasingly utilized to not only measure how users' needs and demands have been met, but also to predict the future needs and demands. These findings have proved to be very helpful to library managers in their various decision-making processes (such as budgetary planning and allocation, collection development, staff planning, new service initiation, etc.) (35).

It seems necessary to stress the importance of collecting usable statistical data. Libraries are generally found to compile plenty of statistics for report purposes, but many of them are not analyzed to assist library managers in making administrative decisions. A careful examination will show that much of the data collected cannot really be used and that much of it isn't really necessary. To effectively use staff time in this kind of operation, one must always identify the problem areas and the relevant variables first, and examine the objectives of the data collection. Methodologies must be carefully developed, and modern sampling techniques, such as random sampling, must be utilized to economize the time involved. Thus, for each type of statistic collected, there are justifiable reasons for doing so, and there are established ways for using the data collected (84).

While scientific management techniques are stressed here, one should keep in mind the importance of contemporary management theories related to leadership, communication, participatory management, group dynamics, public relations, personnel management, organizational structure, development planning, etc. Tasks are to be completed by human beings, thus effective and maximum utilization of staff, or human resources management, should be the prime concern of all managers.

Finally, the importance of fiscal management should be greatly emphasized, particularly in the current stringent economic environment. Libraries need adequate budgets to support sufficient collections, space, staff, and services. Thus, the process of budgeting should be seen as a process of organizational planning and review. Some budgeting systems, such as a traditional line budget, are certainly not as attractive as those which are output oriented—which force managers to open up communication among staff members and require a systematic examination of organizational objectives, a review of existing services, and assignment of priorities. The latter include the Program Planning Budgeting System (PPBS; 85, 86) and the recent Zero-Base Budgeting System (ZBB; 87, 88).

ZBB is one of the most exciting and dynamic approaches to financial planning and management today. The ZBB process involves constructing a budget without making reference to what has happened in the past. It subjects all activities and expenditures to close scrutiny and requires justification of everything that is done or is going to be done. The system was conceived at Texas Instruments, Inc., by Peter Pyhrr (87) and picked up momentum after President Carter, then governor of Georgia, adopted it for that state governmental system (89).

This system has not yet been applied in any significant number of libraries. Currently, the Canadian federal governmental libraries (as part of the government departments) are adopting the "A-Base Review" system, which is essentially tailored after the ZBB. It is expected that ZBB will be increasingly used in libraries, including scientific and technical ones. Those interested in this topic are specifically referred to the "cookbook" on ZBB by Chen and Hoffman (88).

## PROBLEMS OF SCIENTIFIC AND TECHNICAL LIBRARIES

In 1967 Overhage stated that the science library field had an intellectual crisis (90). A decade has passed since then, and although some old problems may have been relieved through the use of new technology and the changing patterns of scientific communication, etc., many of the old difficulties have remained (some of which have been touched upon throughout the discussion thus far), while new problems have surfaced.

As the 1980s approach, the scientific and technical library crisis has at least the following four general aspects:

### *Physical Crisis*

The problem is the sheer bulk of scientific and technical material, both old and new, available each year (69). This problem was mentioned in the section on scientific and technical literature. No adequate means has been developed for

coping with the steadily increasing rate of scientific publication. The other side of the physical crisis coin in the 1980s will involve the variety of types and forms of scientific and technical information sources. The changing patterns of communication have promoted various types of important primary sources, such as preprints, conference proceedings, private reports, ad hoc serials, etc., and also informal communication channels (17, 69). Moreover, libraries are confronting a much wider diversity of materials, including printed matter, nonprint materials, computer tapes, etc. While the nonprint materials, for example, may help to solve some of the space and financial problems, they have created new difficulties.

### *Operational Crisis*

As stated by Overhage, it still takes too long and costs too much to process library materials (in whatever form and type) for the ready use of library users (90). As described earlier, despite the numerous systems and analytical evaluative studies on library operations and use, there are still library operational and managerial problems.

### *Financial Crisis*

The library financial crisis started in the late 1960s and there is no sign of improvement in the foreseeable future. The cut-backs of funds—coupled with inflation and the sharp increase in material costs (for example, prices for chemistry and physics journals increased 86% between 1967 and 1972, Ref. 91, and a higher rate has been reported since 1972), space costs, equipment costs, and in salaries, etc.—require librarians to face their library operational problems with a totally new approach.

### *Intellectual Crisis*

Although information scientists have developed various methods, particularly in the United States, to electronically describe, store, and retrieve scientific and technical documents (such as the numerous on-line data bases), at this time (1978) the systems are not fast and simple enough to serve the needs of information users. The use of scientific and technical information has no geographical boundary; yet, the dissemination of scientific and technical information is a problem not only in various scientific and technical libraries in the United States, but it presents grave difficulties in the impoverished and/or technologically underdeveloped nations.

In the following section, future trends in scientific and technical libraries are discussed at greater length. One should keep in mind that the environment of libraries is changing constantly and that problems of different natures and magnitudes are continually arising. It is mandatory for library managers to identify those problems as soon as possible and to develop ways of dealing with them. For example, in a succinct recent article by Richard M. Dougherty, there is a discussion of how library activities are affected by network services (92). Among the many problems generated, he cites specifically (a) resource reallocation, (b) per-

sonnel problems, and (c) resource imbalances. All of these problems have profound implications for library managers.

## PROSPECTS OF AND FUTURE TRENDS IN SCIENTIFIC AND TECHNICAL LIBRARIES

With the preceding discussion of the problems facing scientific and technical libraries in mind, it is not difficult to delineate their prospects. Overcoming each aspect of the crisis is not an easy task; it is a continual challenge to scientific and technical librarians, information scientists, and managers.

### *Mechanization—New Technology, New Applications*

In order to solve many of the problems that are encountered in today's library operations, new technology will continue to be utilized and new applications for libraries will be explored. Despite the new copyright law (77, 78), photocopying machines will continue to be used extensively. Teletypewriters, electronic data processing, computer terminals, etc., will continue to flourish in libraries. There will be more SDI on-line and off-line bibliographical searches for library users as the number of data bases increases and the cost of searches decreases. One of the outstanding results of the application of new technology has been the creation of numerous bibliographic networking modules available in science and technology. By way of example, a few of these network systems familiar to librarians are: the NLM's Medical Literature Analysis and Retrieval System (MEDLARS); the International Nuclear Information System (INIS) of the International Atomic Energy Agency; the on-line RECON System of the U.S. National Aeronautic and Space Administration; and the commercial interactive information systems, such as BRS, Lockheed, and SDC.

In terms of operations, librarians will rely more on various computerized systems, such as the OCLC system, as the capabilities of these systems increase (for example, from shared acquisition and cataloging practices to interlibrary loan). Various nonprint materials will also be used more.

In addition, as new technology develops and scientists' patterns of communication change, new information communication channels (such as closed-circuit, two-way, and microwave television systems; satellites; mini-computers; etc.) will be increasingly utilized to transmit information faster and to remote locations. For example, the Lister Hill National Center for Biomedical Communication, an organizational component of NLM, has been working since July 1970 with Dartmouth College and the University of Vermont on the New Hampshire-Vermont Medical Interactive Television Network, called INTERACT. Since 1971 the center has also been involved in a series of experiments and demonstration projects which use two National Aeronautics and Space Administration Application Technology Satellites (ATS), ATS-1 and ATS-6, in Alaska, Montana, and Idaho (Project WAMI). As a result, a coordinated tele-medicine and health information system was developed in remote areas of Alaska; and an interactive audio/data/video tele-

vision network of regional medical education was established, with the University of Washington as the site for Project WAMI (93).

### *Cooperation, Information Networks, and Resource Sharing*

Because of the physical and financial crises described earlier, it is impossible for any scientific and technical library to own every document or all the nonprint materials required by its users. In this economically stringent situation, cooperation among libraries seems to be the only way to survive. The old controversy of centralization versus decentralization collapses as the information transfer network spreads throughout the entire scientific community. Information networks are of various complexities, depending on the needs and resources of the network members. For example, one of the most highly organized networks is certainly the National Biomedical Communication Network (NBCN), or Regional Medical Library Network, which operates under the leadership of the NLM. The model for the NBCN is hierarchical (see Figure 4), with each higher-level facility acting as the primary source of information for the echelon below. The concept of a national interactive Regional Medical Library Network is obvious from Figure 5, which was taken from the NLM's Bicentennial Report (94).

Resource sharing is one of the most important concepts of this network, therefore, document delivery is the principal activity involved. However, in order to avoid over-dependency of the "basic unit" libraries on the high-level "resource libraries," various types of consortia of basic unit libraries have been formed (95). Most recently, a unique experimental project has been undertaken to provide

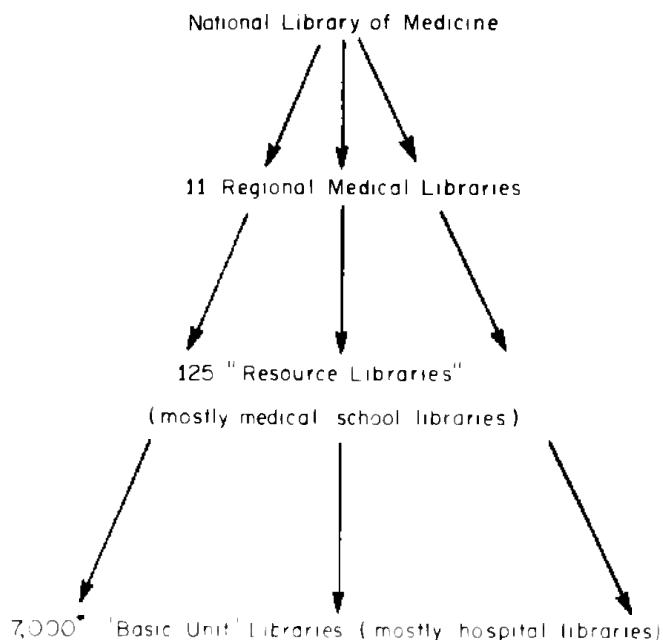


FIGURE 4. *Hierarchical structure of the National Biomedical Communication Network.*



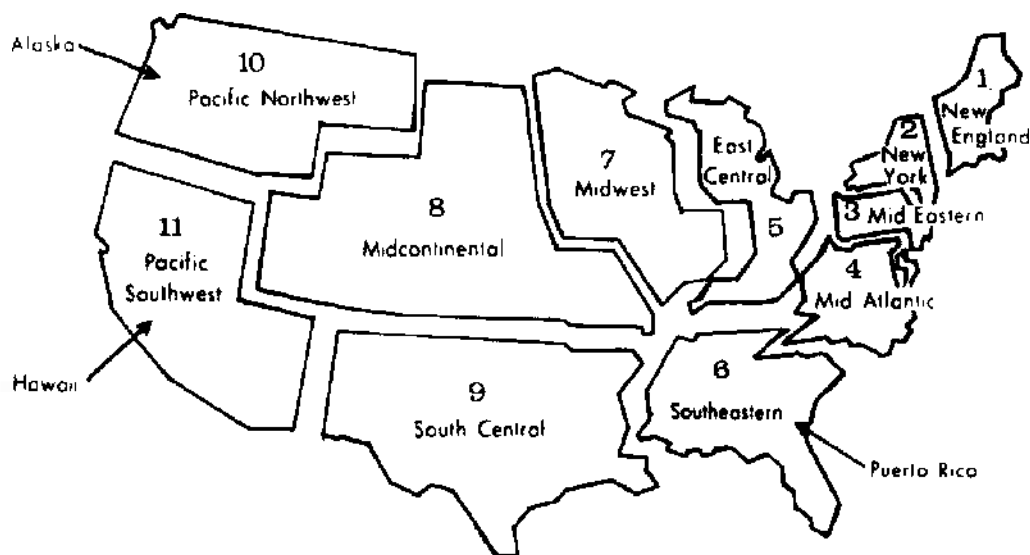


FIGURE 5. *The Regional Medical Library Network in the United States. From Ref. 94.*

access to health-related information for community-based users. This is the Community Health Information Network participated in by six community-public libraries and the Mount Auburn Hospital Library in Cambridge, Massachusetts, which is funded through the Massachusetts Bureau of Library Extension with Title III funds of the Library Services and Construction Act and a grant from the NLM. Thus, the biomedical information network is extended to libraries (public in this case) outside the NBCN. In other fields of science and technology, national networks of libraries are also forming, such as the national networks of biological-agricultural libraries under the leadership of the National Agricultural Library (96), but none is as sophisticated and formalized as the NBCN. In addition, countless smaller consortia and information networks among academic, industrial, and governmental libraries are reported in the library literature. Recently, Susan Martin listed an impressive number of organizations which are currently involved with networking in various parts of the country (97). Again, the impetus for this development has come mainly from attempts to reduce duplication and effort and to provide optimal information services to library users with the least cost through resource sharing (98). Because of this trend, change is evident in many areas of library operations, notably in collection development, cataloging, inter-library loan, reference work, document delivery, etc. (92).

#### *National and International Scientific and Technical Information Systems*

Information is a national resource. Effective access to and optimal utilization of information in the present global environment requires the creation and growth of various information networks, such as the communication and bibliographic networks already discussed. In the areas of science and technology, several factors—

such as the rapid growth of scientific and technical information, the costs associated with obtaining and processing new knowledge, and the international pressures for information sharing and cooperation—have contributed to the growth of national and international scientific and technical information systems.

In 1975 Aines and Day provided an excellent overview of this topic and reviewed the national scientific and technical information plans in Canada, France, West Germany, Japan, the U.S.S.R., the United Kingdom, and the United States (99). It is clear that governments are the major or the coalescing force for national planning. In the United States, for example, NCLIS was established by Public Law 91-345, July 20, 1970, with the responsibility of advising the president and Congress on the implementation of national policy for libraries and information needs. The commission recommended a national program for libraries and information services (24). The Committee on Scientific and Technical Information (COSATI) of the Federal Council for Science and Technology and the Federal Library Committee (FLC) share responsibility and concern for the development of comprehensive information and library networks. Libraries are considered to be one essential component of a national information system, and COSATI interest has been focused primarily on the interface of technical libraries with other extralibrary information systems within the context of a national scientific and technical system or network (100).

Internationally, there is an emerging, worldwide, political recognition of the importance of scientific, technical, and especially technological information for social and economic development, particularly in the Third World countries. Despite the difficulties faced by impoverished and/or technologically underdeveloped nations, there is a firm commitment on the part of their leaders to develop scientific and technical information services. This calls for stricter coordination by the UN agencies: UNISIST (elaborated in next section), UNESCO (United Nations Educational, Scientific and Cultural Organization), UNIDO (UN Industrial Development Organization), and UNCTAD (UN Conference on Trade and Development) and its programs (101).

To increase international transfer of scientific and technical information, Burchinal suggested that the following goals should be fostered:

- Development of national capabilities for acquiring, assessing, and applying information;
- Stimulation of regional cooperation;
- Recognition of networking and sharing of resources across national borders;
- Better services, coordinations and encouragement from U.N. agencies (101).

## SAMPLE INTERNATIONAL AND NATIONAL ORGANIZATIONS RELATED TO SCIENTIFIC AND TECHNICAL INFORMATION SYSTEMS

### *International*

International organizations can be divided into at least two categories: those that focus on developing an international information system dealing with a specific

subject literature (such as nuclear information) and those that attempt to promote and coordinate international science and technology information activities in general. Naturally, the efforts of these two kinds of organizations overlap and reinforce each other.

*UNISIST (United Nations Information System in Science and Technology)*. In 1967 UNESCO began a joint project with the International Council of Scientific Unions (ICSU) to do a feasibility study of the establishment of a world science information system (UNISIST).<sup>\*</sup> This report was published in 1971 (102). It concluded that such a system was feasible, and Resolution 2.13 of UNESCO (Paris, 1972) launched a long-term intergovernmental program to facilitate the transfer of scientific and technical information for the economic and social development of nations, to be known as UNISIST. Adams stated the four objectives of this program as:

1. Improvement of the tools of systems interconnection
2. Strengthening of the institutional components of the information transfer chain
3. Strengthening of manpower resources
4. Assistance for developing countries (103)

Toward this end, a computerized system for the exchange of information among member states (numbering 58 in 1977) is being developed, known as SPINES. The SPINES system is still at the pilot project stage, but between 1972 and 1975, a SPINES thesaurus (containing 10,500 terms) was compiled and it was published in English in 1976. This thesaurus of science and technology terms will provide a means for indexing sci-tech literature on an international basis (104).

As of 1977, UNISIST activities included the following (105):

1. Assisting member states to develop national focal points of sci-tech information services (as of 1977 there were 86 such centers in the 58 member states).
2. Assisting developing countries to train information manpower (about two-thirds of the UNISIST budget goes to the poorer nations).
3. Compiling an "International Directory of Ongoing Research and Information Systems and Services."
4. Participating in the establishment of a number of international information systems, such as DEVSIS (Development Science Information System), POPINS (International Population Information System), GEMS (Global Environmental Monitoring System), etc.
5. Developing a broad system of ordering (BSO), which is a means for switching between different classification schemes and thesauri.
6. The creation of a World Data Referral Center in Paris in 1976, which is doing such things as compiling a "master list of referral resources."
7. Extending the scope of UNISIST to include the social sciences. Toward this end UNISIST is developing a computerized Data Retrieval System for the Social and Human Sciences (DARE).

<sup>\*</sup> UNISIST is an acronymic term which stands for both the feasibility study and the recommended future program to implement its recommendations.

One of the problems still encountered at this time is a lack of coordination and cooperation among the various United Nations agencies dealing with scientific and technical information. As discussed earlier, there has been confusion and duplication of effort between UNISIST and UN groups such as UNIDO and UNCTAD.

*UNIDO (United Nations Industrial Development Organization).* UNIDO assists developing countries in gathering technical information. It has created a clearinghouse for industrial information which provides direct service from Vienna to its member states. It publishes a *Newsletter* and *Industrial Development Abstracts* and has proposed the development of an "international industrial information data bank." It provides technical assistance for the development of national or regional facilities for industrial information (106).

*OECD (Organization for Economic Cooperation and Development).* OECD is made up of 24 countries, predominately Western European. It has two information groups: the Information Policy Group and the Computer Utilization Group.

*IAEA (International Atomic Energy Agency).* The IAEA was created in 1957 to "accelerate and enlarge the contribution of atomic energy to peace, health, and prosperity throughout the world" (107). Its information services are fivefold (108):

1. **Scientific Meetings and Conferences:** The IAEA organizes 12–16 major conferences or symposia every year, and many smaller meetings throughout the world.
2. **Publications:** The publication of the proceedings of these conferences and many related reports constitutes an important source of primary literature in the field of atomic energy. The agency publishes the major indexing journal, *ATOMINDEX*, on the subject of nuclear science and technology, and other scientific periodicals including *Nuclear Fusion*, *Atomic Energy Review*, and *International Atomic Energy Bulletin*. The agency also publishes catalogs of its publications and lists of recent acquisitions, films, and future meetings on atomic energy.
3. **Library and Documentation:** The IAEA library was established in 1958. As of 1976 its holdings included 25,000 books, 12,000 bound serials, 227,000 technical reports, 10,200 bound UN documents, 1,600 periodical subscriptions, and 600 film titles. The IAEA library in Vienna has computerized many of its operations (109). There are computer files of acquisition lists, book catalogs, special bibliographies, conference proceedings, film catalogs, serials, etc., and of the relevant indexes. The library puts special emphasis on reference works and abstracting journals. The library offers interlibrary loan, photocopying, film-lending, and limited SDI services.
4. **INIS:** The computer-based International Nuclear Information System (INIS) has been operational since 1970. It is a cooperative effort among member states of the IAEA "to make nuclear information more rapidly available" (110). Member states forward information to the agency, which stores it on magnetic tapes and publishes references to it twice a month in the abstracting journal *INIS ATOMINDEX*. The INIS Clearinghouse provides microfiches of abstracts and of full reports cited in *ATOMINDEX*.
5. **Computer Services:** Since 1967 IAEA has been providing electronic data processing services. Teleprocessing is being planned. These services are operated in cooperation with UNIDO; they include "Nuclear Program Abstracts" and

"Computing Facilities." Various newsletters are published by the Computer Program Library (111).

### *National*

Each country has different agencies responsible for national scientific and technical information systems. Readers are referred to Aines and Day (99) for information on several leading countries in this area, such as Canada, France, West Germany, Japan, the Soviet Union, the United Kingdom, and the United States. Further information is incorporated in the second half of this article, where selected scientific and technical libraries around the world are presented. Here we merely list a few selected U.S. organizations for the purpose of illustration:

CCLN	Council of Computerized Library Networks
COSATI	Committee on Scientific and Technical Information
FCST	Federal Council for Science and Technology
FLC	Federal Library Committee
LC	Library of Congress
NAG	Network Advisory Group, Network Development Office, Library of Congress
NAL	National Agricultural Library
NCLIS	National Commission on Libraries and Information Science
NFAIS	National Federation of Abstracting and Indexing Services
NLM	National Library of Medicine
NSF-OSIS	National Science Foundation-Office of Science Information Service
SATCOM	Committee on Scientific and Technical Communication, National Academy of Science

## **Selected Scientific and Technical Libraries Around the World**

### INTRODUCTION

The preceding general discussion of scientific and technical libraries is presented with a heavy emphasis on the American scene. While some aspects can be viewed as common denominators of all scientific and technical libraries around the world, others are far from applicable. The application of new technologies to libraries, for example, is something which cannot be expected in many parts of the world in the foreseeable future. If one categorizes scientific and technical library development by level, one finds that there is a very wide range of activity. A brief discussion of scientific and technical libraries by geographical area follows.

### AFRICA

Scientific services in Africa are rather uneven. On the whole, the African region has very little bibliographic activity in comparison with other regions of the world. This is paradoxical, considering the fact that as a slowly developing area, it has an acute need of information resources. While worldwide organizations carry out

information activities, there exists no regional or continental counterpart in Africa. Yet it is in such underdeveloped areas that information sharing is crucial. There is a need for a pan-African library with two primary goals: to supply the information needs of research and development and to act as a consultant for individual nations developing their information activities.

The concept of an African Bibliographic Center (ABC) was proposed in 1973 and was endorsed by 11 African countries in 1976. The ABC would allow these countries to pool their resources in order to support the scientific and technical development of this region. An *ABC Newsletter* was begun in 1974 as the African "medium for communication of developments in national and international information systems, networks, and documentation and bibliography" (112).

Until the ABC project is realized, bibliographic activity in this region will continue to be isolated. Some of the wealthier countries, such as Egypt and South Africa, have major documentation centers to back up scientific and industrial research. Other countries have just begun efforts to create national centers of science and technology information services.

The more substantial scientific collections in Africa can be found in institutions such as the Egyptian National Information and Documentation Center (NIDOC). NIDOC was established in 1954, and it has been renamed the Arab Information and Documentation Center. It serves the scientists at the National Research Center and also those in other research institutions. As of 1971 the center reported a holding of 3,500 periodical publications. It publishes *U.A.R. Science Abstracts*, the *Union Catalog of Serials*, the *Directory of Scientific and Technical Libraries*, and the *Documentation Bulletin*. The center also offers translation services (113, 114).

In North Africa, as reported in the January/February 1977 issue of *UNESCO Bulletin for Libraries*, UNESCO consultants visited both Libya and Algeria in the summer of 1976. An evaluation of the present state of information and library services in Libya was made, including the national and university libraries of Tripoli and Benghazi. A long-term plan for establishing a national information system in Libya was also prepared. In Algeria, the Centre National de Documentation Economique et Sociale (CNDES) is currently implementing two important projects: the publication of a directory of documentation centers, libraries, and archives and the preparation of a union catalog of periodicals. One of the most serious and permanent problems related to information services in Algeria is the lack of qualified manpower to provide information services. CNDES will give priority to seeking a possible solution to this problem.

In Western Africa, Ghana, for example, has several well-organized special libraries, most of which are in research institutes of the Ghana Academy of Sciences. Except for their subject specialization, the technical libraries were found not to differ from the general libraries (115). The Central Library of the academy had 650 periodicals in 1967. As of 1973 the journal collection had increased to 1,000 titles, and the book collection was 5,000 volumes. Its services include retrospective literature search, scanning of scientific literature, automated retrieval, photoduplication, etc. The *Union List of Current Scientific Periodicals in Ghana*

*Libraries* has been published since 1966, and services for other countries in West Africa are possible. In addition, the National Institute of Health and Medical Research branch of the Ghana Academy of Sciences has a substantial collection: 7,000 volumes and 400 periodicals (in 1973) (116).

In South Africa, there are several major libraries. For example, the main library of the South African Council for Scientific and Industrial Research (CSIR) in Pretoria has about 79,000 volumes. One of its major projects is producing, in machine-readable form, *Periodicals in South African Libraries*. In addition, there are substantial scientific and medical collections at the University of Capetown (117), and the Transvaal Museum has a strong collection in the natural sciences (118).

## LATIN AMERICA

Latin America includes Mexico and all the countries south of it, to the southern tip of South America. Most of the people of this region share a common background. Their language, religion, arts, science, and customs originated largely from Spain, Portugal, and France. As to the transfer of scientific and technical information, the Latin American region has benefited from its proximity to the United States and from the efforts of several international organizations, such as the Institute for Inter-American Affairs, the Agency for International Development (AID), and UNISIST. In the words of Adams, "for nearly forty years support of the transfer of scientific and technical information to the countries of Latin America has been a modest feature of United States foreign policy" (119). United Nations agencies such as UNESCO and UNIDO have been active in this region, helping countries to develop collections, automate library systems, and train personnel, and by supplying technical experts, etc. UNESCO's first action in this field was the sponsorship of the International Conference on Indexing and Abstracting in the Biological and Medical Sciences, in 1948. In the early 1950s UNESCO encouraged the development of national scientific documentation centers in Mexico City, Mexico, and in Rio de Janeiro, Brazil (120). Later, UNESCO's UNISIST initiated several worthwhile projects in Argentina, Colombia, Mexico, Chile, and in the Andean Pact countries.

UNESCO's Department of Documentation, Libraries, and Archives (DBA) has also initiated a number of programs in Latin America, such as the planning and development of the national infrastructures of libraries, documentation centers, and archives (NATIS). The DBA has supported a number of projects dealing with the mechanization of specialized documentation and information services and the training of personnel in Latin America to run these services.

UNESCO has also supported the development of the Bogota Regional Book Development Center (Centro Regional para el Fomento del Libro en America Latina), which is a "common market" for books for the 13 member states (121).

The United Nations Industrial Development Organization (UNIDO) assists developing countries to gather technical information. It has created a clearinghouse for industrial information which provides direct service from Vienna to its member

states. UNIDO provides technical assistance for the development of national or regional facilities for industrial information and has been active in this regard in Latin America since 1970 (122).

There has also been much regional cooperation in this area—the Organization of American States (OAS) and the Pan-American Health Organization (PAHO) have both been active in developing science and technology information services in Latin America.

Adams distinguishes three main functions of the OAS (123). The first is the support and promotion of the library development program for Latin America. This program has focused on the procurement of library materials for Latin American libraries. It has also created the Inter-American Library School in Medellin, Colombia, which is increasingly orienting its studies to the role of libraries in Latin American science. The second function is represented by the Department of Scientific Affairs of the OAS. This department has produced a review of scientific and technical information services in Latin America. It also is involved in many programs related to information transfer, and it provides monetary assistance to technical information centers in Latin America. The third principal activity of the OAS is its Pilot Project for Technology Transfer, whose objective is to “experiment with national and regional mechanisms, to improve the transfer of technology to and within Latin America.” This 2-year project was considered a success as of 1975 in that it made specific recommendations to the individual participating countries as to improving technical information transfer in and between those countries.

PAHO, in cooperation with the U.S. National Library of Medicine, has developed the highly successful regional network of health sciences information, the Biblioteca Regional da Medicina (BIREME), centered in São Paulo, Brazil. BIREME is the principal back-up resource of health information for the member states of PAHO. It has access to the NLM MEDLARS data bases.

In addition to the activities of OAS and PAHO, Latin America itself has programs which have been initiated by the Economic Commission for Latin America, by the OAS conference on the Application of Science and Technology to Latin American Development, and by the Andean Pact countries.

A common thread that runs through the plans of the countries of this region is the recognition of the importance of a national system of scientific and technical information. However, a lack of money and of trained information personnel is a problem in each nation. The information services that are most highly developed are in the critical areas of health science, industry, and agriculture. We have already mentioned BIREME, and it is also worth noting some of the agricultural information systems:

1. The Instituto Inter-Americana de Ciencias Agricolas (IIACA) in Turrialba, Costa Rica (created by the OAS) has succeeded in developing agricultural libraries and information services throughout Latin America. Its training programs and various publications have resulted in an agriculture information network.
2. The Inter-American Association of Agricultural Librarians and Documentalists



(AIBDA) is a nongovernmental organization which has compiled a "who's who" of agricultural librarians and documentalists in Latin America. The association is attempting to develop libraries and documentation centers of agricultural sciences in Latin America.

3. The Inter-American System of Information in the Agricultural Sciences (AGRINTER) attempts to coordinate, at the national level, all agricultural information services of the region (124).

Most of the nine countries examined (Argentina, Brazil, Chile, Colombia, Ecuador, Mexico, Peru, Uruguay, and Venezuela) have experimented with library automation. More detail is provided in the following sections on each individual country of the region.

### *Argentina*

See Ref. 125 for a background source on Argentina.

In 1958 Bernardo A. Houssay, Nobel Laureate in physiology, established the Consejo Nacional de Investigaciones Cientificas y Tecnicas (CONICET) as the center of scientific activity in the country. Although it is the principal source of scientific and technical information, CONICET has no power to set national policy with respect to science and technology. This power lies in the hands of a government agency, the Consejo Nacional de Ciencia y Tecnica (CONACYT). CONICET has a Center for Scientific Documentation (Centro de Documentacion Cientifica) which has recently compiled a national union catalog of scientific and technical periodicals in the libraries of Argentina.

The Center for Scientific Documentation runs a telex network which is both a national interlibrary loan system and a means to obtain photocopies of literature from cooperating libraries in the United States. The center has a translation service for scientists associated with CONICET and inputs journal data into the International Serials Data System (ISDS).

Another important source of information in Argentina is the National Institute of Industrial Technology (INTI; Instituto Nacional de Tecnologia Industrial). INTI has laboratories which provide scientific services, and also applied research centers. INTI has a documentation center which is used by INTI researchers. This center services Argentine industry with information. It houses a library of technical publications and translations.

INTA (Instituto Nacional de Tecnologia Agropecuaris), the equivalent of INTI in the field of agriculture and cattle-raising, is supported by a tax on agricultural and livestock operations. "While INTA has no central library, it supports the Faculty of Agronomy and Veterinary Science of the University of Buenos Aires which, with its 80,000 books and 3,800 journals, reportedly is the best agricultural library in Argentina" (126). The University of Buenos Aires has a computer center which is experimenting with the development of automated library services. The Medical Library of the University of Buenos Aires can provide computerized searches of the health literature through a cooperative arrangement with the Regional Medical Library, BIREME, in São Paulo and its MEDLINE services.

*Brazil*

In Brazil, the Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPQ) is the national science agency; it is under the Planning Secretariat of the Presidency of the Republic. This agency is charged with the responsibility of developing a national system of scientific and technological information and is allotted money to do this (127).

This National System of Scientific and Technical Information (SNICT) was in the planning and development stage as of 1975. It is coordinated and operated by CNPQ, with support services provided by the National Library and through the Instituto Brasileiro de Bibliografia e Documentação (IBBD) in Rio de Janeiro.

IBBD, the Brazilian Institute of Bibliography and Documentation, collects, prints, and disseminates bibliographies in the physical and social sciences. The data are processed by computer and distributed in Brazil. IBBB houses both a reprographic laboratory and a printing plant (128). The Regional Library of Medicine (BIREME) has been mentioned as a support service of the Pan-American Health Union.

The Instituto de Pesquisas Espaciais (INPE; the Institute for Space Research) is located in São José dos Campos. It is active in applying modern communications technology to the problems of information transfer, such as the development of a telex network among Brazilian libraries (129).

*Chile*

Reference 130 identifies an important source on Chilean libraries.

The Comisión Nacional de Investigación Científica y Tecnológica (CONICYT) is responsible for coordinating a national program of scientific development in Chile. CONICYT attempts to achieve this end by coordinating the activities of the universities, the scientific and technical institutes supported by the government, and industry.

Within CONICYT is the Centro Nacional de Información y Documentación (CENID), the agency which is responsible for developing and maintaining a national system for scientific and technological information and documentation. CENID is an information center created in Santiago, Chile, in 1963 through the joint efforts of U.S. and Chilean academies and with AID money.

Because of the Chilean government's recent concern with research and development and concomitant information services, it has been channeling money to CENID through CONICYT for the development of a national information network. This national information network is not yet a reality, however. The network, now known as SIDOC/CHILE, is still at the feasibility-study level. CENID has initiated programs aimed at laying the groundwork for such a network, for example: the preparation of a national union catalog of periodicals; a listing of Chilean researchers; promotion of training programs for librarians and documentalists; studies of user needs; and joint efforts with other departments of CONICYT to pool resources in an attempt to make the national science and technology information network a reality.

Although there is no national information network in Chile at this time (1978),

there is a well-developed industrial information service, the Instituto Tecnológico de Chile (INTEC), which will be a vital part of the proposed network someday. INTEC provides consultation services and industrial information to the food, metallurgical, chemical, electronics, and leather and shoe industries of Chile. INTEC conducts training programs in the use of industrial information at various Chilean universities, indexes various unpublished technical reports, and reviews foreign publications for their potential application to Chilean industry.

A biomedical science information network has also been proposed for Chile. CENID has studied the possible user publics for such a network. Apparently, the Library of the Faculty of Medicine of the University of Chile, which has close contacts with BIREME in São Paulo, Brazil, would be the center of this proposed network.

### *Colombia*

See Ref. 131 for background information on Colombia.

In Colombia, the Fonda Colombiano de Investigaciones Científicas y Proyectos Especiales (COLCIENCIAS) is responsible for the development of a national policy of science and technology. According to Adams, "Colombia has the most highly developed conceptualization of a national information system of any Latin American country" (131, p. 38).

By government decrees of 1973 and 1974 COLCIENCIAS is responsible for coordinating the development of a National Information System (SNI). COLCIENCIAS intends to do this through a national center of information and documentation, the Centro Nacional de Información y Documentación (CINDOC). Helping COLCIENCIAS is the Instituto Colombiano para el Fomento de la Educación Superior (ICFES), which is responsible for creating a research library network among Colombian university libraries.

ICFES is also attempting to develop a national union catalog of serials, to improve national interlibrary loan service, to provide a national catalog of dissertations, and in general to standardize library practices in Colombia, with UNESCO assistance. ICFES is experimenting with library automation, and it also trains technical personnel for Colombian libraries and offers technical advice.

The private, nonprofit Fundación para el Fomento de la Investigación Científica y Tecnológica (FICITEC) is the principal agency in Colombia that provides information and consultation services to industry. It maintains close contacts with INFOTEC in Mexico.

### *Ecuador*

Ecuador is the least developed of the eight countries examined by Adams (132). There is no basic research in progress, and there is no national plan for the development of science and technology services. In June 1975, however, there was a seminar on science and technology information with participants from various governmental agencies and university centers. This seminar proposed the creation of a

national system of information that would dispense agricultural information, promote industrial and technical standards, and aid library development.

However, Ecuador already has a Center for Technical Agricultural Communications (CENCOTAP) and an Ecuadorean Institute of Standardization (INEN). And, as in Chile, the most developed information service is that concerned with industrial development. This industrial information system was created in 1972 by an Ecuadorean government agency, the Centro de Desarrollo Industrial del Ecuador (CENDES), which attempts to stimulate national development. This information system has a current awareness bulletin which offers technical reports pertinent to Ecuadorean industry. The Technical Information Service cooperates with INFOTEC in Mexico and with the National Technical Information Service (NTIS) in the United States.

### *Mexico*

In 1970 the Consejo Nacional de Ciencia y Tecnología (CONACYT) was created to develop a national system for science and technology. In 1977 an office was created within the Ministry of Programming and Budget (SPP) with the responsibility for the overall National Information System, of which CONACYT is a subsystem responsible for science and technology (133).

As of the present time, no real national information system for science and technology has been developed. There are libraries and documentation and information centers, and there have been attempts to develop indexes and data bases. But these resources have not been put together in one network (133, 134). An example of one of CONACYT's scattered projects is its attempt to establish an SDI service based on CAN/SDI, which was evaluated by Enzo Molino for UNESCO in December 1976 (135).

One of Mexico's most successful efforts with respect to science and technology information is an industrial information service (INFOTEC-CONACYT), started in 1975. Another fruitful effort of CONACYT has been the creation of a union list of serials in the libraries of Mexico (133).

CONACYT runs a technical information service, Servicio de Información Tecnológica (SIT), which consists of various information centers throughout Mexico. Each of these centers provides a specific category of information, for example, chemical information, livestock information, metallurgical information, etc. (134).

In addition to the information service sponsored by CONACYT, there are several other information sources. The Library of the Mexican Institute of Social Security dispenses health information, and the National Agricultural Library of Mexico handles agricultural information. The Mexican Petroleum Institute (PEMEX) is concerned with information relating to subsoil, petroleum, and petrochemicals, and the Mexican Institute of Technological Research (IMIT) deals with information related to natural resources (135). The science libraries of the universities are also essential sources for scientific and technical information.

One of the prime reasons that the national system of scientific and technical information has not become a reality in Mexico is the scarcity of trained personnel to run such a network. There are only three main library schools in the whole coun-

try, but CONACYT has promoted two programs in support of education and training activities (133).

### *Peru*

Reference 136 provides a general source on Peruvian libraries.

The Consejo Nacional de Investigaciones (CONI) is responsible for science and technology research and development. According to Adams, Peru has less money and fewer people concerned with R&D than any other Latin American country. A subdivision of CONI, the Centro Nacional de Informacion y Documentacion Cientifica y Tecnologica (CNIDCT) is the national center of science and technology information services. CNIDCT is inadequately funded and staffed.

With aid from OAS, specialized information services are being developed: in the electric power industry, ELECTRPERU; in mining, MINEROPERU; in fishing, PESCAPERU; and in the petroleum industry, PETROPERU. There is also a general information service to industry in Peru, the Instituto de Investigaciones, Tecnologia Industrial y de Normas Tecnicas (ITINTEC), which provides translation and technical consultation services, among other activities.

There is a national council of Peruvian universities, the Consejo Nacional de Universidades Peruanas (CONUP), which is attempting to develop university research libraries and to coordinate their cooperation on a national basis.

### *Venezuela*

See Ref. 137 for Adams's survey of libraries in Venezuela.

In Venezuela, the Consejo Nacional de Investigaciones Cientificas y Tecnologicas (CONICIT) is responsible for the development of science and technology. An important part of CONICIT is the national center for scientific and technical information founded in 1971, the Centro Nacional de Informacion Cientifica y Tecnica (CNICT). A 1974 study concluded that this center is grossly underfunded. CNICT has, however, published a union catalog of periodicals in Venezuela and a directory and bibliography of scientific and technical information sources. It has also indexed technical reports issued in Venezuela.

CONICIT has promoted consultation and technical information services to Venezuelan industry. It agreed in 1974 to help establish a national information service for agriculture, SININCA, which would be the Venezuelan link to the Pan-American system AGRINTER. CONICIT has also agreed to help establish a national health information service that would be connected with BIREME.

Venezuela has a geology and petroleum information center (CAIGOMIN) and a large science library in Caracas, the Library of the Instituto Venezolano de Investigaciones Cientificas (IVIC), which offers photocopy and reference services.

### *Uruguay*

The National Center for Documentation and Information in Medicine and Health Sciences (CENDIM) was established in 1974 as a combined effort of the Ministry

of Public Health and the Pan-American Health Organization/World Health Organization (138). CENDIM forms a part of the Pan-American Biomedical Communications Network with a clearinghouse at BIREME, in São Paulo, Brazil.

CENDIM operates from the National Medical Library (BINAME), using that library's resources (the most extensive collection in Uruguay) and those of the 140 biomedical libraries which are part of the national system. The purposes of CENDIM are:

1. Organization and coordination of biomedical information at all levels
2. Collection, retrieval, and dissemination of information relating to health care
3. Updating of the national *Union Catalog of Biomedical Publications*
4. Consolidation of acquisitions
5. SDI
6. Compilation of the *National Medical Bibliography*
7. Integration of audiovisual materials in collections and programs
8. Organization of an interlibrary loan system
9. Promotion of advanced training in librarianship

CENDIM has the communications media necessary to carry out its directives: post, telephone, telex, and data-processing equipment. Plans call for installation of a MEDLINE terminal.

## NORTH AMERICA

In the first part of this article, the discussion is based mainly on North American scientific and technical libraries. Therefore, the presentations in this section are brief.

### *The United States*

In the area of scientific and technical information transfer, it is obvious that the United States is one of the most advanced and developed countries. The 1976/77 volumes of the *American Library Directory* listed 6,563 special libraries, most of which are science and technology oriented, and over 2,000 medical libraries. In addition to the large number of scientific and technical libraries, there are an estimated 200 information analysis and data centers in the United States (139). Besides these sources, scientific and technical information can also be obtained from nonscientific libraries of many types. For example, a general public library or college library might have substantial scientific and technical materials.

One should not attempt to equate the U.S. scientific and technical libraries and information centers—national, regional, and local—with those existing in other parts of the world, particularly in the developing countries. Take national libraries, for example: The size of the collections, the service programs, and the diversity of information activities in U.S. libraries (such as the National Library of Medicine, the National Agricultural Library, and the Library of Congress) cannot be compared with the national scientific libraries in most of the countries discussed in this article. Because of the complexity of the currently existing American scien-

tific and technical information systems, there is still a long way to go to reach a total and well-organized national program, although the problem of national planning of information systems received much attention during the 1960s and early 1970s.

### *Canada*

The National Science Library of Canada (NSL) began in 1924 as a collection to serve the scientists of the National Research Council (NRC) of Canada. Passage of the National Library Act in 1953 gave the NRC library a directive to strengthen its science and technology resources, which resulted in its formal recognition as the National Science Library in 1966. Through a 1970 Cabinet directive, the NSL was mandated to develop a national scientific and technical information (STI) system. In 1974 the NSL became the Canada Institute for Scientific and Technical Information (CISTI). CISTI was developed to help the NRC operate a national network of STI services.

In 1969 the Canadian Selective Dissemination of Information Program (CAN/SDI) was begun as a computerized current awareness service. This was augmented in 1974 by the Canadian On-Line Enquiry system (CAN/OLE), a second network designed for on-line retrospective bibliographic searching with both French- and English-language access (140). CISTI is the organization through which these systems are coordinated. CISTI's activities include (141):

1. Unified Literature Search Service (ULSS): This involves manual bibliographic searching as well as accessing data bases and consultation with NRC experts.
2. Health Sciences Resource Center (HSRC): The center is responsible for coordinating health sciences information within CISTI and nationally, with the assistance of the 16 medical school libraries in Canada. HSRC is also responsible for the use of MEDLINE at 43 centers, and it operates staff training for MEDLINE services.
3. CAN/SDI: There are 17 data bases available for searching. Through CAN/SDI, CISTI is also helping UNESCO members to develop their own national SDI systems.
4. CAN/OLE: The on-line enquiry is operated through 240 terminals. In addition to CAN/OLE, CISTI is testing an on-line document-ordering system, CAN/DOC.
5. Interlibrary loan: A national document delivery service is provided, "with a search and alternate location service" for industry, higher education, and government.
6. Photocopying.
7. Inventory of Pollution-Relevant Research (IPRR) in Canada: This is compiled by CISTI and the Division of Biological Sciences of the NRC. CISTI also coordinates the International Referral System for Sources of Environmental Information (IRS) of the United Nations Environment Program (UNEP).
8. The Information Exchange Center for Federally Supported Research in Universities (IEC) offers data on research projects.
9. Technical Information Services (TIS): This is an industry-oriented agency of CISTI. It provides information "to help solve manufacturing problems, to improve industrial productivity, to identify opportunities resulting from

technological developments and to promote the utilization of research results in industry" (142). CAN/TAP (Technological Developments Sections) provides current awareness services for industrial users.

10. On-line cataloging: CISTI is experimenting with use of the UNICAT/TELECAT data base.
11. Publications: The following are a few examples of the numerous publications issued by CISTI:

*Conference Proceedings in the Health Sciences*  
*Canadian Locations of Journals Indexed in Index Medicus*  
*Directory of Federally Supported Research in Universities*  
*Health Science Libraries in Canada, Serials, News, Notes*  
*Publications of the National Research Council of Canada*  
*Standards and Specifications Directory*  
*Union List of Scientific Serials in Canadian Libraries*

CISTI's extensive collection consists of more than 1 million volumes, 22,000 serial titles, and 800,000 microfiche. Current journal subscriptions number 14,000.

Besides the national CISTI, the country has extensive scientific and technical collections located in every part of the country, notably the numerous collections in universities (such as the University of Toronto, McGill University, McMaster University, and the University of British Columbia), in industries, in governmental agencies, etc. In some of the activities described here, new technologies have been utilized in very sophisticated ways for quite some time. Because of the geographical proximity of Canada and the United States, and the compatibility of their scientific and technical research and development, there is close cooperation between the two countries in promoting effective transfer of scientific and technical information.

## ASIA

Asia covers almost a third of the world's land area. It includes 41 countries, among them some of the world's largest (such as China) and smallest (such as Singapore) nations in area and population. The nations of Asia have a great variety of political systems, cultural backgrounds, and religions. The economic development and industrialization varies greatly from one country to the other. Consequently, scientific and technical information services and systems may differ greatly from one region and/or one country to another in Asia. To facilitate readers' better understanding of the state of the art of scientific and technical information transfer in this part of the world, the discussion is divided into the following four groups by region: East Asia, Southeast Asia, South Asia, and West Asia.

### EAST ASIA

This area covers most of the People's Republic of China, as well as Korea, Japan, the Republic of China (Taiwan), and the British crown colony of Hong Kong. Unquestionably, Japan, one of the world's major industrial countries, has the most sophisticated scientific and technical information systems in this region and in Asia.



*China*

China covers more than 90% of East Asia. Politically, it is divided into two countries—the People's Republic of China (PRC) and the Republic of China (ROC; commonly known as Taiwan).

It has been reported that the national library system in Mainland China (the PRC) consists of six components:

1. Public libraries
2. University and school libraries
3. Scientific research libraries
4. Labor union libraries
5. Special libraries
6. Armed forces libraries (143)

Each component has been developed and supervised by a branch of the central government. Scientific and technical libraries are numerous and exist in most of the six components of the national system. Many of them have large and excellent collections; but mechanization in scientific and technical library systems is not common, thus library services tend to be quite traditional. Readers are referred to Fang's article entitled "People's Republic of China, Libraries in," in Volume 22 of this encyclopedia, for further information (144).

The situation in the ROC (Taiwan) is different. A considerable amount of effort has been expended on library automation. The country has a substantial number of extensive scientific and technical library collections scattered in numerous colleges and universities, in industrial research centers and industrial companies, and in governmental agencies and their research institutions; these are found in almost every part of the island. Many of these scientific and technical libraries are quite self-sufficient in the traditional sense. For example, National Taiwan University (the oldest and largest university of the ROC, which has over 10,000 students) and National Tsing Hua University (which has a nuclear reactor on the campus) have strong science collections and several departmental scientific and technical libraries on their campuses. On the whole, the concept of information services is still traditional. Library cooperation and networking among libraries have been discussed for quite some time; however, the results are far from ideal.

In an effort to centralize and to disseminate all science and technological information among research centers, academic institutions, and industry, coordination responsibility has been placed on the Science and Technology Information Center (STIC). STIC was established in 1973 by the National Science Council with a view to the stimulation of scientific and technological research and development in the ROC, so as to satisfy the needs of a rapidly expanding economy. Thus, STIC is charged with the following responsibilities: to collect, analyze, and abstract scientific and technological R&D information; to provide reference, referral, translation, reproduction, and other services to local scientific and industrial users; to cooperate with domestic and foreign scientific and technical institutions for information exchange; to collect and edit data on publications of Chinese scientists and

technical experts; etc. (145). STIC provides a wide range of information services: reference, referral, searching, SDI, duplication, etc. To facilitate the dissemination of current scientific and technical information, the center is involved in an active publication program. The publications vary greatly—from major tools such as the *Union List of Scientific Periodicals in Libraries of the ROC*, to current awareness services such as *Current Contents of Selected Scientific Periodicals* (which is published weekly in multiple categories), to materials for industrial technology development, such as the monthly *Technical Information* on standards, specifications, new products, etc.

Since its beginning in 1973, STIC has made substantial progress in promoting both national and international cooperation on information exchange. Domestically, the center coordinates interlibrary loan activities among two dozen major academic and research institutions in science and technology. Since the industrial information needs are quite different from those of academic and research environments, a separate information network for industries (in various components: electrical and electronic, mechanical and metal, food, chemical, etc.) has been formed.

In the area of library automation, the leader in the ROC is the Chung-Shan Institute of Science and Technology (CSIST), which is a government research center with a library, established in 1965. The CSIST Library holds approximately 40,000 volumes of books, 1,500 periodical titles, and 80,000 technical reports. CSIST acknowledged the advantages of a computerized library system and initiated one in 1972, in three stages:

In the first stage, the CSIST Library set up a bibliographic data bank based on five categories—that is, S.T.U.V.Z., which were selected from the MARC II tapes received by subscription from the U.S. Library of Congress. This data bank was used for cataloging references through the on-line search. The computerized system, after checking the holding file, effectively produced catalog cards, accession lists, and new book announcements. In the second stage, technical reports were entered into the system holding file in punch-card form. A huge number of catalog cards were produced from this source. In the third stage, still on the drawing board, acquisition and circulation will be automated, and serials control will be implemented as well.

### *Hong Kong*

A 1972 survey of Hong Kong libraries (including public, school, college and university, governmental, special, and others) showed that there were about 300 libraries in Hong Kong (146). A substantially high percentage of these libraries are science and technology oriented. The most significant scientific and technical libraries in Hong Kong are in the three largest academic institutions: the University of Hong Kong, the Hong Kong Polytechnic, and the Chinese University of Hong Kong.

The University of Hong Kong has a general library and two branch libraries (medicine and law). The general library has a collection of ½ million volumes and about 4,000 journal subscriptions. A substantial part of this extensive collection

deals with science and technology. The medical library is housed in the Medical Faculty, 2 miles away from the general library. Its collection numbers more than 40,000 volumes, including bound periodicals and current journals, which number about 600 (146, 147).

The Hong Kong Polytechnic Library was established in 1972 when the I.C.I. Library of the Hong Kong Technical College was handed over to the polytechnic. The new library building was opened officially in February 1977. The collection now numbers 70,000 volumes, with a projected growth rate of 25,000 volumes per year. Over 3,500 journal titles are on current subscription. The collection on standards is extensive, including those from Britain, the United States, and Japan (148). A computer-printed catalog lists library books and periodicals and also nonprint materials. This is one of the largest scientific, technological, and business libraries in the British Commonwealth (148). It is also one of the few where audiovisual materials and services are greatly emphasized.

For a number of years, the larger libraries in Hong Kong have practiced inter-library loan and have enjoyed a good relationship. However, the traffic has not been as heavy as one might think. In reference to library automation, as one head librarian told the author, there is a "lot on paper and in theory, but not much in practice." Currently, the Hong Kong Polytechnic has the most activity in this area. It produces a computerized catalog (batch-processing), and its plans call for computerized acquisition and circulation systems in 1978 or 1979.

No library in Hong Kong, to the present time, has paid much attention to computerized information retrieval (through the use of data bases, either on-line or off-line). Strangely, money is not the consideration. Little interest has been shown by the users of scientific and technical information in computerized searches, thus on-line information systems have not been developed.

### *Japan*

Japan is one of the most important industrial countries in the world. Therefore, the scientific and technical library collections in this country are extensive and the information services are numerous. Aines and Day (99) have presented an excellent overview of the national planning of scientific and technical information services in Japan, and readers are specifically referred to that article for further material on the topic.

The following is merely a brief outline of the scientific and technological information activities in Japan (149):

*Governmental Institutions.* Five of the Japanese governmental institutions are discussed here.

Science and International Affairs Bureau, Ministry of Education: This functions as a central administrative agency for general science activities in Japan. Its services relating to science and technological information are as follows:

1. Planning for the implementation of an information-processing system in Japan
2. Diffusion of knowledge and information on documentation

3. Compilation of the *Union List of Scientific Periodicals*, etc.
4. Cooperative activities in association with UNESCO programs, particularly the UNISIST programs

Science Council of Japan: This was established in 1949 as a representative organization of Japanese scientists. It coordinates research activities in Japan. It publishes the *Directory of Learned Societies in Japan*, the *Directory of Research Institutes and Laboratories in Japan*, etc.

Council for Science and Technology: It was established as an advisory organ for the prime minister on national policies on science and technology. In October 1969 the council submitted to the prime minister a plan for a National Information System for Science and Technology Information (NIST).

Science and Technology Agency: This was established in the Prime Minister's Office with the general aim of looking after science and technology administration in Japan. Its activities include: (a) promotion of the NIST plan, (b) supervision of the Japan Information Center of Science and Technology (JICST), and (c) liaison with international organizations.

Agriculture, Forestry, and Fisheries Research Council: It produces a computer retrieval system called the "Retrieval System for Current Research in the Agricultural Sciences" (RECRAS). The council also cooperates with the International Information System for Agricultural Science and Technology (AGRIS).

*National Diet Library (NDL)*. The NDL was established by law in 1948 as the sole national library in Japan. It has three basic functions: (a) service to the Diet, (b) service to government agencies, and (c) service to the public. The library serves as a depository for copies of all materials published in Japan, and it also has a comprehensive collection of foreign books, periodicals, and reports. The library furnishes general library and bibliographical services. Circulation of library materials is limited to in-house use except for interlibrary loan purposes.

The NDL has a Science and Technology Division, whose collection of scientific and technological materials consists of over 200,000 Japanese and 120,000 foreign books, 3,500 Japanese periodicals and current subscriptions to about 7,000 foreign journals, and approximately 1.5 million technical reports. The division's main reference services are provided to industrial users.

The NDL has an extensive publication program; the following are only a few of the major tools related to science and technology published by the NDL:

*Monthly List of Foreign Scientific and Technical Publications*  
*Japanese Periodicals Index: Science and Technology* (monthly)  
*Directory of Japanese Scientific Periodicals*  
*Science and Technology Information Service* (quarterly)

The NDL is also the Japanese national center for the International Serials Data System (ISDS), one of UNISIST's programs (150-152).

*Japan Information Center of Science and Technology (JICST)*. See Refs. 151, 153, and 154. JICST was established in August 1957 by a legislative act, as a special nonprofit-making and semigovernmental organization. The center is under the

executive control of the Science and Technology Agency of the Prime Minister's Office, which is responsible for half of its financial support. The other half of the center's budget comes from income made on its publications and activities. In contrast to the NDL, which is totally supported by the government and is mainly responsible for library activities, JICST acts as a central information center for science and technology information in Japan. Thus, JICST offers no library circulation service.

JICST is charged with three major responsibilities: to collect worldwide scientific information comprehensively and to process it systematically; to disseminate information rapidly and appropriately; and to offer far-reaching information services to Japanese scientific and technical communities. Toward these ends, JICST—which has a working collection of approximately 8,500 journal titles from more than 20 countries and also the principal technical reports—performs a variety of services. These include photoduplication, translation, search for literature and computer-based search from several data bases, and publication of journals of abstracts in the physical sciences and engineering.

JICST's main work is to prepare the *Current Bibliography on Science and Technology (CBST)*, a comprehensive abstract journal containing about 4 million articles annually (from 8,500 journals). Kanji (Chinese-character) teletypewriters and flexowriters are used to keypunch the data, which are then fed to the HITAC-8450 computer. The output is 10 subseries of *CBST* by broad subjects; their frequency of issue ranges from one to three times a month.

JICST's computer-based search files include JICST's own *CBST*; MEDLARS, provided by the U.S. National Library of Medicine; and CA Condensates of the Chemical Abstracts Service (U.S.A.). Approximately 1,000 searches are made of these three files annually. Since 1975 MEDLINE (MEDLARS On-Line) has been operational.

*Special Information Centers.* There are numerous scientific and technical information centers in Japan, such as the Division of Technical Information of the Japan Atomic Energy Research Institute (JAERI) in Tokai, the International Medical Information Center in Tokyo, the Japan Pharmaceutical Information Center in Tokyo, and the Japan Patent Information Center in Tokyo. Many of them are large centers with quite extensive collections, and they provide far-reaching specialized services. Many of them also serve as the Japanese center for international establishments. For example, the Division of Technical Information of JAERI is the technical information center for research and development of nuclear energy in Japan. Its library collection, as of the beginning of 1976, comprised 42,000 books, 450 Japanese and 850 foreign journals, 245,000 technical reports, etc. Since 1963 it has published *Nuclear Science Information of Japan (NSIJ; formerly Nuclear Science Abstracts of Japan, NSAJ)*, and it issues many other materials. *NSIJ* is exchanged for materials from 281 research institutions in 62 countries and 16 international organizations (see Figure 6). Furthermore, JAERI is the Japanese center for IAEA's INIS (Vienna, Austria). Japan is in the sixth place (as of 1974 statistics) among INIS contributors, providing about 4% of the total inputs to INIS, and JAERI is responsible for this operation (155, 156).

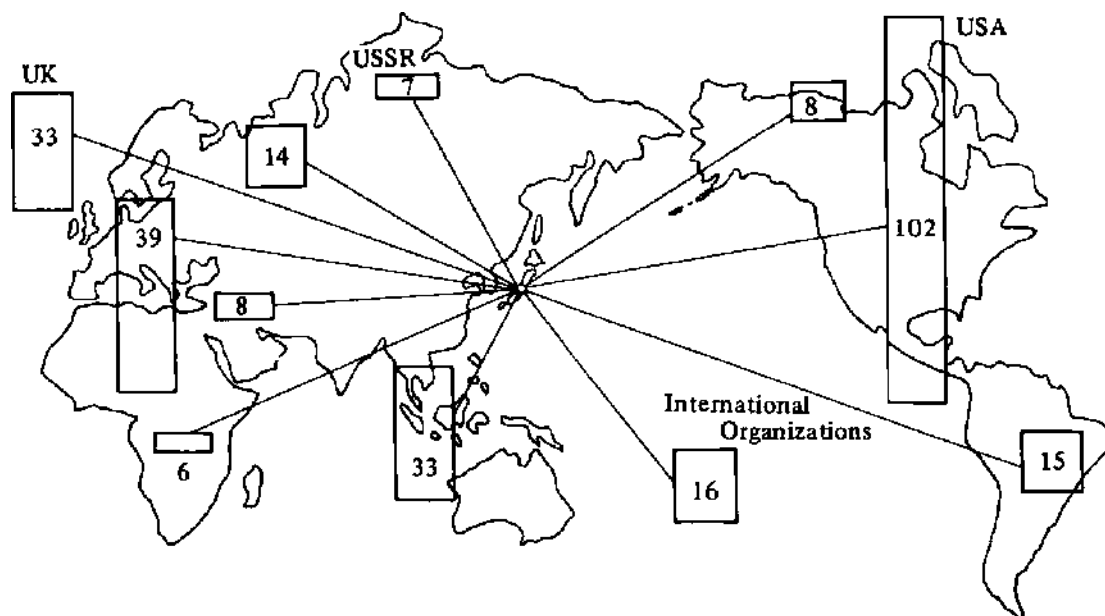


FIGURE 6. JAERI's exchange of materials with other countries.

Space limitations prevent further discussion of other information activities in science and technology in Japan. However, readers are reminded that there are a great number of sophisticated types of scientific and technical information activities existing in universities, industries, data centers, etc. It is also worth stressing Japan's full participation in and cooperation with international organizations, such as the International Federation of Documentation, the International Organization for Standardization, and the International Council of Scientific Unions; and with international information systems, such as UNISIST, ISDS, INIS, AGRIS, MEDLARS, and INPADOC (International Patent Documentation Centre). Within the country itself, various specialized information networks have been developed rapidly. For example, the Japan Medical Library Association has set up a document delivery service with 71 institutional members (as of 1975). The network completed 153,000 interlibrary loan transactions and handled almost 1 million requests for photocopies in 1973/74 (157). The complexity of scientific and technical information networks and systems in Japan should be a great and continuous challenge to the governmental plan for a national information system for science and technology (NIST), proposed by the Council for Science and Technology to the prime minister in 1969 (99).

#### *Korea (South)*

The most important Korean scientific and technological information organization is the Korea Scientific and Technological Information Center (KORSTIC) (158). It was established in January 1962 and is under the supervision of the Ministry of Science and Technology. The objective of the center is:

... to contribute to the promotion of Korean Science and Technology and to the development of national industry. To attain this objective, KORSTIC is devoted to collect, process, and store scientific and technical information comprehensively and systematically, and disseminate necessary information to industries, academic circles, R&D institutes, government organizations, and individuals on a nonprofit basis (158).

KORSTIC's collection has an emphasis on journal and patent acquisitions. It consists of about 6,500 journal titles, technical reports, standards, patents, etc. Its information activities—similar to its counterparts in Taiwan, STIC, and in Japan, JICST—are summarized in Figure 7. Like STIC and JICST, KORSTIC publishes a great variety of materials, including the *Technical Information Bulletin*, in 15 categories by type of industry; *Current Contents of Journals in Science & Technology*, in five subject series; *Current Contents of Journals in Medical & Social Sciences*, in three subject series; and others. KORSTIC also provides computer-based information retrieval services in an off-line mode. This SDI service is limited to CA Condensates at the present time.

The Korean counterpart of JAERI is the Korean Atomic Energy Research Institute (KAERI), incorporated in 1973. Its library has an extensive collection on nuclear energy, which includes over 800 journal titles, 32,000 hard-copy technical reports, and over 180,000 reports in microform format.

Besides the science collections in various Korean universities, there are a considerable number of special libraries (over 160 in 1974) (159). Many of them are science and technology oriented. Recent developments in Korean special libraries can be characterized by two parameters: larger collections and more cooperation among libraries. For example, KORSTIC, KAERI, and four other special scientific and technical libraries—the libraries of the Korea Institute of Science and Technology (KIST), the Korea Development Institute (KDI) for economic development, the Agency for Defense Development (ADD), and the Korea Advanced Institute for Science (KAIS)—have formed the Joint Library Committee of Seoul Science Park and have pooled their resources in terms of interlibrary loan, copy services, union catalog, and cooperative technical services (159).

## SOUTHEAST ASIA

This region covers the area south of China and east of India. It is still a developing region with various problems and difficulties: political, economic, and others. At the present time, integrated library and information services do not exist at the national level in most of the Southeast Asian countries. However, because of the limitation of resources and the increasing needs for information, there is a growing awareness in this region of the benefits of regional cooperation. This awareness, with the encouragement of international organizations and the stimulation of such systems as UNISIST, INIS, and AGRIS, has resulted in the development of several regional centers and joint bibliographical projects in the region. Foremost among these international agencies are the many regional offices of the specialized agencies of the United Nations, such as FAO, UNICEF, the UNESCO Regional Office

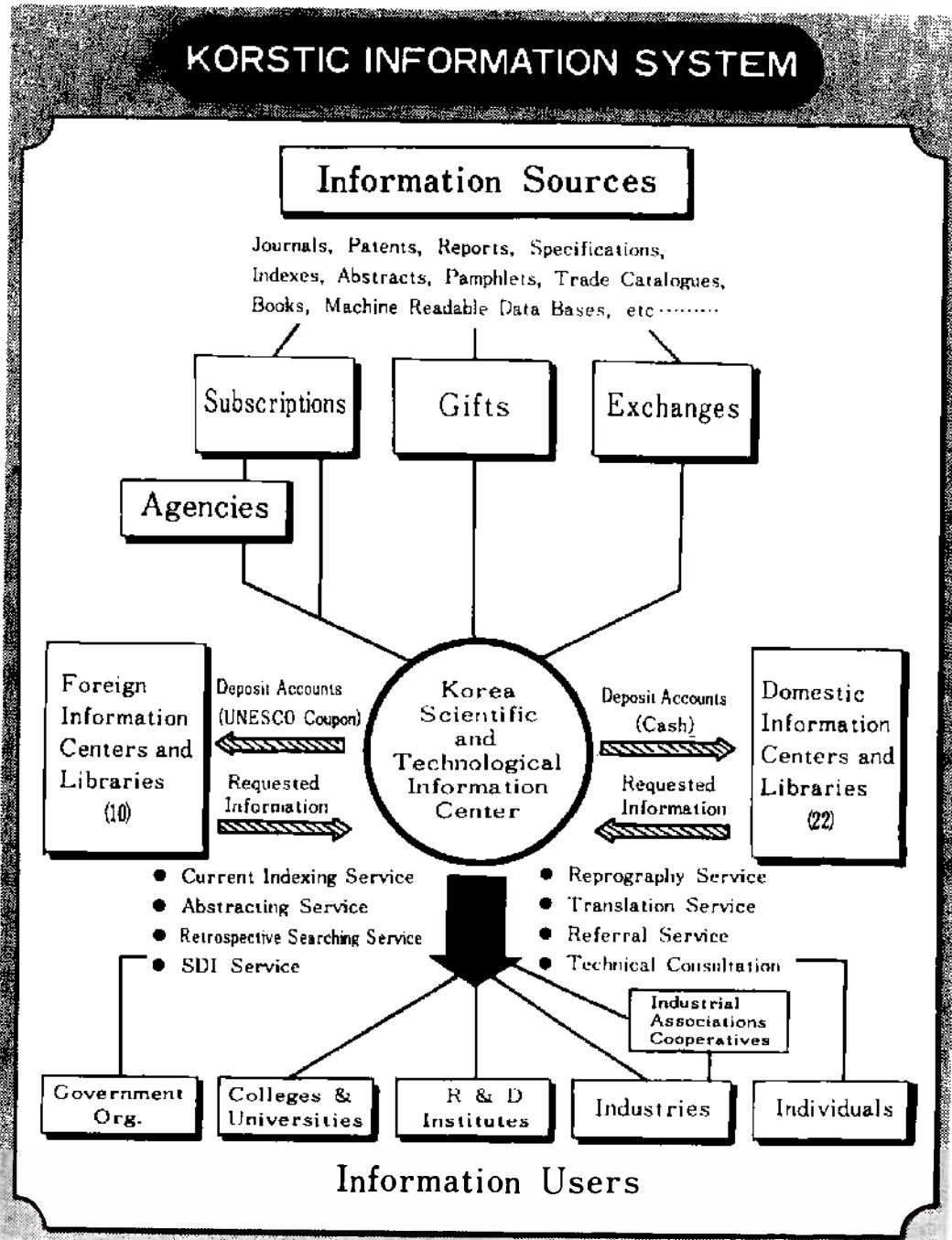


FIGURE 7. Information activities of KORSTIC.

for Education in Asia, and the Asian Institute for Economic Development and Planning, all in Bangkok; the UNESCO Regional Offices for Science and Culture in Jakarta; the Asian Development Bank in Manila; and the Asian Center for Development Administration, Kuala Lumpur, Malaysia.



*Regional Projects*

The following are a few of the major scientific and technological regional projects (160, 161).

The Southeast Asian Ministers of Education Organization (SEAMEO) was established in 1965. It has six regional centers:

1. The Center for Tropical Biology (BIOTROP), in Bogor, Indonesia
2. The Center for Educational Innovation and Technology (INNOTECH), in Saigon, Vietnam
3. The Regional Center for the Teaching of Science and Mathematics (RECSAM), in Penang, Malaysia
4. The Regional English Language Center (RELC), in Singapore
5. The Southeast Asia Regional Center for Agriculture (SEARCA), in Los Banos, the Philippines
6. The Center for Tropical Medicine (TROPMED) in Bangkok, Thailand

All SEAMEO member countries contribute toward the operation of these centers, which provide library and documentation services, including interlibrary loans, abstracting, indexing, current awareness and selective dissemination of information (SDI) services, and reprographic services. In addition, they also undertake research and training.

One of the recent projects, which deserves specific mention, is the Agricultural Information Bank for Asia (AIBA) of SEARCA in Los Banos, the Philippines. AIBA serves as the nerve center for the exchange and dissemination of agricultural information produced from worldwide sources (162). It functions as a regional input center for AGRIS in Vienna. To date, AIBA is responsible for 5,700 title citations in AGRINDEX. AIBA coordinates the agricultural information activities of national institutions in nine Southeast Asian countries. The volume of literature for the region is estimated at 10,000 items per year. AIBA allows participating countries in the region to pool their information resources and to have access to the output of AGRIS. Participating countries include nine countries of the region—the Philippines, Indonesia, Malaysia, Thailand, and Singapore, among others. Bangladesh, Korea, and Sri Lanka also cooperate. AIBA's services include an agricultural literature service, the *Union Catalogue of Agriculture Filipiniana 1963–1975* (being compiled), the planning of a bibliographic data bank for Southeast Asia, production of special bibliographies and abstracts, and the compilation of an Asian thesaurus of economically useful plants in 10 languages (being undertaken) (163).

An Asian Mass Communication Research and Information Center (AMIC) was established in 1971 in Singapore. It serves as a clearinghouse in the field of mass communication. It provides indexing, abstracting, and bibliographic services as well as current awareness services, referral, and reprographic services.

The Regional Microfilm Clearinghouse operates at the Institute of Southeast Asian Studies (ISEAS), in Singapore.

Technonet Asia is a major network sponsored by the International Development and Research Center situated in Singapore. It is a network for industrial technology information and extension services, including 11 organizations in 9 Asian coun-

tries, concerned with improving the quality and efficiency of their countries' small and medium-scale industrial enterprises. The original members were eight organizations in Southeast Asia and Hong Kong.

In 1973 an Asian Information Center for Geotechnical Engineering (AGE) was set up at the Asian Institute of Technology in Bangkok, Thailand.

The Asian Packaging Information Center (APIC) is sponsored by the International Development Research Center in Singapore and the World Packaging Organization (WPO). The center provides computerized information on the technology, marketing, and other aspects of packaging on an ad hoc or profile basis.

An International Serials Data System (ISDS) Regional Center for Southeast Asia was created in Bangkok, Thailand, in 1976.

Besides the above-mentioned regional scientific and technical information networks and systems, each Southeast Asian country has its own scientific and technical library facilities and collections. They vary greatly in size, scope, and sophistication of programs.

### *Burma*

Since industrialization came to Burma after 1948, special libraries have developed to keep pace with information demands. In Rangoon, the Applied Research Institute Library had a considerable collection on science and technology at an earlier date, and it was capable of disseminating such information (164). Political instability has prevented the development of a cohesive library policy, and currently it is the Central Science Library, a part of the Central Research Organization, which is responsible for meeting science and technology information needs. This library suffers from lack of materials and, due to the shortage of foreign exchange, growth is predicted to be very slow. At present, the total number of different scientific journals on order for all Burmese libraries is less than 1,000 titles (165).

The Library of the Department of Medical Research coordinates all the medical libraries in Burma. The library has established a union list of holdings and is compiling reports of medical research in Burma. Funds are relatively plentiful in the biomedical area, so medical libraries do not suffer the dearth of materials that plagues the other sciences and technologies (165). Demand for these materials originates from the three medical schools and from persons affiliated with medical institutes, such as the Department of Medical Research, the National Health Laboratory, the Union Tuberculosis Institute, teaching hospitals in Rangoon and Mandalay, and smaller hospitals throughout Burma.

The Library of the Department of Medical Research (Rangoon) services medical research workers, therefore its collection primarily concerns basic medical sciences and research methodology. It currently holds more than 350 journal titles, with 100 obtained through gifts and exchange programs. The library is able to use the WHO Headquarters Library in Geneva for MEDLARS searches. In addition, there are several medical libraries with substantial collections. These include the Library of the Institute of Medicine I in Rangoon, with 118 journals; the Library of the In-

stitute of Medicine II in Rangoon, founded in 1963, with 158 journals; and the Library of the Institute of Medicine in Mandalay (the only medical library outside of Rangoon), with 162 journal subscriptions. These libraries cooperate through interlibrary loans and coordinated acquisition (166).

### *Indonesia*

Indonesia is a large country of 3,000 islands whose development is hampered by its geographical situation and by language barriers. It recognizes the importance of a science and technology information system to its economic development. In 1971 it set up the Center for a Scientific Information Network, which has experienced difficulties because of limited funding and a scarcity of trained personnel. Since 1971 four National Documentation and Scientific Information Network Centers have been created:

1. National Network Center on Science and Technology
2. National Network Center on Biology and Agriculture
3. National Network Center on Health and Medicine
4. National Network Center on Social Sciences and Humanities

Since 1974 special emphasis has been placed on upgrading the Health and Medicine Network (167). Toward this end the Central Health Library of the Ministry of Health has been made the center of this network. It cooperates with other Indonesian libraries, which act as resource and local libraries. These various libraries pool their resources via interlibrary loan to offer basic bibliographic services in health and medicine, such as the reproduction of articles. The network is being strengthened with the expert advice of consultants from the World Health Organization (WHO).

The problems encountered by the health and medicine network are representative of the problems facing the other science and technology information networks. These include:

1. A lack of health and medical literature (Indonesia still has no deposit act)
2. A lack of trained personnel
3. A lack of awareness on the part of Indonesian scientists, researchers, educators, etc., of the importance of using scientific information in their jobs

### *Philippines*

When the U.S. government occupied the Philippines at the end of the 19th century, it set up research institutions to develop the natural resources of the area. These research institutions included Bureaus of Forestry, Weather, Science, etc., each with its own library. The Bureau of Science library, established in 1902, had the most complete science and technology collection in the country. This library was, unfortunately, completely destroyed in the war of liberation in 1945. The library was rebuilt, and in 1958 it became the Division of Documentation of the Na-

tional Institute of Science and Technology. It has benefited from UNESCO assistance (168).

After World War II, the U.S. government pumped money into the Philippines in an effort to rehabilitate the country. Money was channeled through the Philippine Council for U.S. Aid (PHILCUSA) to revive government agency libraries. Out of these efforts came the Interdepartmental Reference Service Project (IDRS), which did such things as compile union catalogs and union lists of serials of government agency libraries. Under the sponsorship of the IDRS, the Association of the Special Libraries of the Philippines (ASLP) was formed in 1954.

IDRS and ASLP, foreign aid, and the efforts of the Philippine government have all contributed to the development of scientific and technical libraries in the Philippines. These libraries embrace medicine, agriculture, mining, engineering, etc. There are 7 state universities, 33 privately owned universities, and 22 private colleges in the country (169). Many of these universities have separate branch libraries in science and technology. The University of the Philippines, founded in 1908, has a most comprehensive collection (the total university library holding is about 700,000 volumes). The University of Santo Tomas (the oldest institution of learning, established in 1611), the Silliman University Library, and others all have branch libraries devoted to science and technology.

Government research libraries that serve the public are those of the International Rice Research Institute (IRRI), the Philippine Atomic Energy Commission (PAEC), the National Institute of Science and Technology (NIST), and many others (169). Other sci-tech libraries in the Philippines include two U.S. libraries: the Military Information Division Library of the U.S. Army and the U.S. Agency for International Development Central Resources Library.

### *Singapore*

A general discussion of Singapore libraries which have scientific and technical collections can be found in Anuar's article "Scientific-Technical Literature Resources in Singapore" (170). However, since the article was published in 1970, there have been a considerable number of developments and changes.

*Governmental Libraries.* There are about 40 governmental libraries in Singapore; the largest one is the National Library. In 1966 the Joint Standing Committee on Library Cooperation and Bibliographical Services (JSCLCBS) of the Library Association of Singapore (PPS) and the Library Association of Malaysia (PPM) initiated the *Union Catalog of Scientific and Technical Serials* in Malaysian and Singapore libraries, and the National Library played a big role in the project. This project later was carried out in cooperation with the Singapore Institute of Standards and Industrial Research (SISIR).

The most significant governmental agency related to Singapore's industrial growth is SISIR, which is one member of Technonet Asia. The Singapore government realizes that as it develops its economy around the trade and manufacturing sectors, it becomes increasingly important for these sectors to operate under conditions which are conducive to increased productivity, improved product quality, and in-

novative ventures. SISIR was created with two primary objectives: (a) to provide service to meet the needs of existing industries both big and small, and (b) to look ahead and plan programs and facilities that will cater to the needs of future industries. It therefore provides technical and advisory services to government, commerce, and industry. There are four professionals attached to the Industrial Technical Information Services division (ITIS). ITIS provides the Computerized Current Awareness Service which is used by nations that participate in Technonet Asia—400 industrial journals are scanned and pertinent information is stored in the computer. The computer is also used to update client profiles and to monitor services rendered (171). This has assisted the institute in planning future programs. Monthly off-line SDI printouts are sent to over 900 paid members, in the fields of architecture, production, engineering, etc., in Singapore. Since SISIR is a government-sponsored organization, the subscribers pay only a flat fee for the service.

*Academic Institutions.* The University of Singapore has probably the largest and most comprehensive science holdings in Singapore (total library collections number 600,000 volumes). Besides the main library, there are five branches: Chinese, law, medicine, engineering, and architecture. A central library building is due to be completed soon on the new campus in Kent Ridge. The Engineering Library has a basic collection of 14,000 books and over 200 journal titles related to engineering. The Medical Library has a total of 85,000 volumes, about two-thirds of which are bound periodicals. It subscribes to over 1,000 journals. Besides the routine library reference and bibliographical services, computer searches are provided to its users through the use of Australian MEDLARS and the MEDLINE service operated by the WHO Library in Geneva (172–174).

Nanyang University, established in 1955, has no engineering faculty (only sciences are taught). The library holds 260,000 books and subscribes to 2,000 journal titles; about one-third of the total collection is in science and technology. The library is Singapore's input center for FAO's AGRINDEX. Currently, the serial system is the only computerized library operation (175).

Singapore places heavy emphasis on applied technology in terms of the country's technological information needs, and the library of Singapore Polytechnic has emerged since 1959 as the only major library largely devoted to scientific and technical literature. Its collection consists of 90,000 books, 650 journals, and numerous reports, standards, and patents in all aspects of applied engineering.

Library cooperation has not been a problem. The small geographical area of the country has made communication among libraries easy.

### *Thailand*

Scientific and technical libraries in Thailand fall into a number of categories: libraries dealing with agriculture, health, science, economics, and manufacture (176).

The outstanding science libraries are the Department of Science Library of the Ministry of Industry and the Faculty of Science Libraries of Chulalongkorn University and Mahidol University. The health science libraries are located in the medical schools of the major universities. Several of these have been able to develop their

collections through the assistance of the China Medical Board of the Rockefeller Foundation. These libraries provide traditional services; they answer queries, prepare bibliographies, and provide photocopies. The library of the National Institute for Developmental Administration (NIDA) and the Thailand Information Center (TIC) of Chulalongkorn University provide resources in the social sciences.

The special engineering library of the Asian Institute of Technology (AIT) is a pioneer in Thailand in the area of library automation. The library has a computerized serials and acquisitions system. The AIT library is planning to serve as the regional information center for science and technology in Southeast Asia. The AIT library is doing a feasibility study of the use of MARC tapes and is currently preparing an Automated Union List of Serials.

The Thai National Documentation Center (TNDC) was created in 1964 to service the needs of researchers in Thailand. Sci-tech information needs are met via bibliographies, document procurement, microfilm and photocopy services, translation services, etc. TNDC is currently cooperating with UNESCO in a pilot project to mechanize its information services using computers.

Most scientific and technical libraries in Thailand are still isolated and there is little cooperation among them.

## SOUTH ASIA

In this region, almost all countries have their own national scientific and technical information centers. The national information networks and systems vary greatly from one country to the other. Because of the political differences among them, cooperation among countries in the region is minimal.

### *India*

An excellent overview of the present state of scientific literature generation, scientific and technical libraries, and documentation services in India; and an outline of the principal mission-oriented information systems are provided in Kamath and Malwad's article "Need-Based Mission-Oriented Information Systems" (177). For the readers' convenience, some useful information is extracted from that article and updated in the following presentation.

As pointed out by Kamath and Malwad:

India is unique in many respects among the developing countries. It is the second most populous and the seventh largest country in the world. . . . Though its economy is still predominately agricultural, it is among the top ten industrialized countries. . . . Though its gross national product is tenth highest in the world, its per capita income is among the lowest. Though India's literacy is hardly 30%, its scientific and technical manpower is the fifth largest in the world (177).

Thus, the output of Indian scientific literature generated by scientists and engineers affiliated with scientific organizations and institutions is very substantial indeed. This is obvious from the following statistics:

*Scientific Literature Produced in India*

Number of scientific periodical titles	1,500
Number of new scientific books per year	1,600
Number of new doctoral theses per year	300-400

*Scientific Institutions in India*

Number of universities	99
Number of institutions offering engineering courses	325
Number of agricultural universities and colleges	102
Number of medical colleges	99
Number of nonacademic organizations	1,500

*Scientific Manpower in India*

Number of scientific and technical personnel	1.5 million
Number of personnel in R&D establishments	90,000

To serve the information needs of the 1.5 million scientific and technical personnel in the country, over 800 scientific and technical libraries exist with collections ranging from 10,000 volumes and up. Among them, the following are specifically worth noting:

- The National Science Library of INSDOC
- The National Medical Library of the Ministry of Health
- The Library of the Indian Agricultural Research Institute
- The Science Library wing of the National Library in Calcutta

There are numerous discipline-oriented information centers in various national and research laboratories, but the most important information centers in India are mission oriented. They include the following:

The Indian National Scientific Documentation Center (INSDOC) was established in 1952 in Delhi with help from UNESCO. The activities of INSDOC include translation and reprographic services and the publication of *Indian Science Abstracts*. The center's National Science Library cooperates with other libraries in acquiring materials and disseminating them. A Union Catalog of holdings is being compiled. A Russian Science Information Center has been set up in INSDOC, which publishes an accession list and a contents list of Soviet technical and scientific literature. There is a regional center in Bangalore which services southern India.

There is also a Defense Science Information and Documentation Center (DESI-DOC) in Delhi, which provides information services to India's defense establishment. Among these services are the publication of various science journals, publication of abstracts, SDI services, etc. Two other prominent documentation centers are the Small Enterprises National Documentation Center (SENDOC) and the Social Science Documentation Center (SSDC).

India also has a National Medical Library in Delhi, which collects medical literature from all over the world and publishes the *Index to Indian Medical Periodicals*. The Indian Agricultural Research Institute (IARI) Library in Delhi has excellent reprographic facilities and publishes the *Indian Bibliography of Agriculture*. There

is also a proposed Patent Library and Information Center which will collect Indian and foreign patents and do literature searches. The Indian Standards Institution (ISI) in Delhi maintains a file of world standards literature and publishes related subject bibliographies.

Because the Department of Atomic Energy (DAE) is one of the major scientific institutions in India, the Bhabha Atomic Research Center (BARC; the principal R&D unit of the DAE) has a sophisticated Library and Information Services (L&IS) division. The heart of this division is the BARC library, which houses a large collection of nuclear literature, including 50,000 books, 1,600 periodical titles, and over 300,000 technical reports. It provides information services to the various nuclear establishments in India (see Figure 8). There are excellent reprographic and printing facilities that are utilized to publish about 200 technical reports a year from the work being done at the center. The L&IS activity of BARC is the national link to INIS and it is thus able to access INIS's resources. The L&IS of BARC has been experimenting with computerization of many of its functions. An Automation for Storage and Retrieval of Information (AFSARI) system is being developed for SDI services, utilizing an H-400 computer programmed in COBOL. There is also interest in RECON (remote console) on-line retrieval systems that would use telecommunications facilities to give users in India access to resources of such groups as ESRIN in Europe.

The Indian government is planning to link its numerous and diverse science and

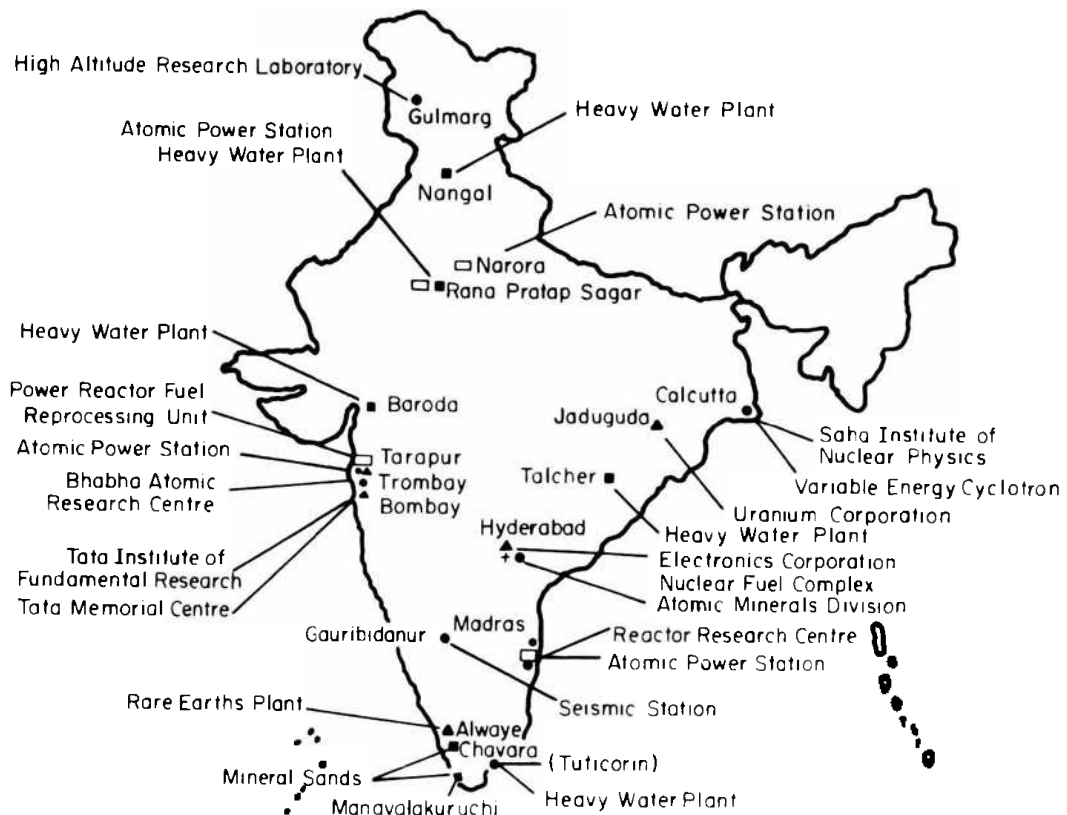


FIGURE 8. Atomic energy establishments in India.



technology information services into one national information system for science and technology (NISSAT). These plans were originally expected to be developed in the 1974–1975 period. This system would coordinate information needs on a national level, such as making the Central Food Technological Research Institute (CFTRI) into a sectional information center (178), and would facilitate the development of a strong Indian link to UNISIST.

### *Pakistan*

The library and information systems and networks in Pakistan are far smaller in scope than those in India. Haider estimated that, in 1974, there were approximately 60 scientific and technical libraries in Pakistan, attached to research establishments of governmental agencies, universities and colleges, and research institutions (179). These libraries, with the exception of university libraries, vary in size from 1,000 to 15,000 volumes. In addition, Aslam has stated that there are 110 special libraries in science and technology, scattered in the five regions of the country. Most of them are in the regions of Punjab (42 libraries) and Sind (45 libraries). The total holdings of these 110 libraries number 805,771 (180).

The most important scientific information center in the country is the Pakistan Scientific and Technical Information Center (PASTIC), formerly known as the Pakistan National Scientific and Technical Documentation Center (PANSDOC). PANSDOC was established by the government of Pakistan in 1957 with the technical and financial assistance of UNESCO. The main function of the center is to provide Pakistani scientists and engineers with access to the world's published scientific and technical literature through its document procurement, translation, and bibliography compilation services. PASTIC's publications include *Pakistan Science Abstract* and the *Union List of Scientific and Technical Libraries of Pakistan*.

There are other libraries of note in the science and technology field. These include the following:

- The University of Engineering and Technology Library, at Lahore
- The Library of the Pakistan Atomic Energy Commission, in Lahore and Dacca
- The Jinnah Post-Graduate Medical Center Library, at Karachi
- The Library of the Pakistan Council of Scientific and Industrial Research (PCSIR),  
in Karachi
- The Geological Survey of Pakistan Library, at Quetta
- The Zoological Survey Department Library, at Karachi
- The Forest Research Institute
- The West Pakistan Agriculture University Library, at Lyallpur

### WEST ASIA

This region—with the addition of Egypt and the Sudan—is generally known as the Middle East. It is one of the most troubled areas politically. The sophistication of scientific and technical research and development varies greatly from one country to the other.

*Israel*

Israel is probably the most advanced country in this region in terms of science and technology information services. This is partly a result of the political situation, since Israel has felt the necessity to develop advanced and new technologies and nuclear energy. To support research and development in the field of nuclear energy, the library and the Technical Information Department (TID) of the Soreq Nuclear Research Center were founded about 1952, after the establishment of the Israel Atomic Energy Commission. As of 1972, the collection was comprised of 25,000 volumes, 700 current journal titles, 20,000 bound periodical volumes, and 160,000 technical reports. It serves as a depository for the atomic energy agencies of the United States, Britain, France, and other countries. The collection serves scientists throughout Israel, in addition to those of the Soreq Nuclear Research Center. Accession lists are prepared and circulated to other scientific libraries in Israel, as current awareness bulletins. TID publishes reports of the research center, and it also offers translation services. TID is currently participating in INIS projects. The efforts of the library and TID are hampered by several factors, which include the geographic isolation of Israel from the major scientific and technical centers of the world, and the fact that the official language of Israel, Hebrew, is inadequate for scientific and technical literature (181).

The most important organization related to scientific and technical information is the National Center for Scientific and Technological Information (COSTI), in Tel Aviv, which was established in 1961 as a department in the National Council for R&D, headed by the prime minister. The objectives of COSTI are:

1. Promoting, improving, and coordinating scientific and technological information in Israel.
2. Advising the Government on the national information policy and the implementation of scientific and technological information services in Israel.
3. Planning information services and initiating and conducting the R and D necessary for their implementation.
4. Providing information services to the National Council for R and D and to scientists, engineers, physicians, etc. in Israel, according to their specific interests and needs.
5. Disseminating information from sources both in Israel and abroad.
6. Developing and operating computerized and other information systems.
7. Training the professional manpower needed for information work.
8. Promoting the application of technological and scientific information among the scientific and industrial communities.
9. Compiling and publishing pertinent sources of information of national interest (182).

To achieve these aims, COSTI has a dual function: As a government planning agency it is responsible for researching and developing a national information network, and as a service agency it is responsible for providing technical information services. Among these services are SDI services, clearinghouse functions, bibliographic functions, data bank services, the publication of journals and directories, and the training of library technicians. As a government agency COSTI has devoted

much time and effort to planning a national technical information network that will meet Israel's special needs as a small, isolated country. Its general policy is that Israel will not have a central library system such as the United States or Britain in the foreseeable future (thus the importance of the network) and that Israel will be dependent on access to information stores elsewhere in the world (thus its participation in UNISIST) (182).

It is worth noting that Israel has a great number of substantial science and technology library collections available in various governmental institutions, universities, and industrial organizations. For example, both the Hebrew University, in Jerusalem, and the Israel Institute of Technology (called the Technion), in Haifa, are noted for their extensive scientific and technical collections. Israel sees clearly that it is impossible to establish a central library system similar to the British Library or a national library system similar to the one existing in the United States. The alternative solution is to draw the principal libraries and information centers into one network, and COSTI will continue to play its leadership role in working toward this goal.

### *Iran*

Circumstances have also necessitated the development of the base for a sophisticated technical information network in Iran. In Iran's case the circumstances were not political but economic—exploiting the country's rich oil resources. The growth in national income in Iran in recent years has led to the need for information and research in many areas of science and technology. In order to provide for this demand, libraries and research organizations have proliferated (183), and library collections have increased greatly in size.

Most universities—such as the University of Tehran, the University of Pahlavi (in Shiraz), and Arya Mehr University (in Tehran)—have substantial science and technology collections of over 20,000 book volumes and over 1,000 journal titles. In the field of medicine, the Faculties of Medicine at the Universities of Tehran and Pahlavi are known for their excellent libraries. The former has more than 36,000 volumes and about 600 periodicals (as of 1977), and the latter contains a collection of 12,000 volumes and 800 periodicals (as of 1976). The importance of better library service has been increasingly recognized by the government, thus almost every ministry has its own library. In the industrial sector, many special libraries, such as that of the National Iranian Oil Company, have outstanding library collections.

The existing libraries were not able to successfully meet the information needs of Iranian scientists. Therefore, the Iranian Documentation Center (IRANDOC) was established in 1968. It has 6,000 journal titles.

The major functions of IRANDOC are: (1) to collect, organize, develop, and service the national research library in science and social science; (2) to provide modern, quick, and intensive literature analysis services for Iranian scientists and professors; (3) to publish bibliographic and reference material useful to the scholarly world; (4) to serve as the Iranian link in a future West Asian information net-

work; and (5) to encourage cooperation and coordination among Iran's research and special libraries and information centers (183).

IRANDOC's activities include:

1. Maintaining the interlibrary loan system (60 cooperating libraries)
2. A photocopy service
3. On-request bibliographies
4. Lists of Iranian scientists and scientific research institutions
5. Abstracting and indexing services
6. Collecting and indexing Iranian government and nongovernment institutional publications and university theses

IRANDOC's publications include the *Science and Social Science Abstracts Bulletin*, the *Iranian National Union List of Serials*, and many others (184).

The sister organization of IRANDOC is TEBROC, also established in 1968 and controlled by the same government agency. It is the first cooperative book-processing center in Asia. Its basic purpose is to provide technical services to Iranian libraries. Among these services are:

1. Acquisition and cataloging services, i.e., the acquisition and processing of foreign materials, the preparation of catalog cards for Iranian libraries using AACR, the establishment of subject headings for national materials, classification activities (every book currently published in Iran is cataloged and classified),
2. Consultation services, i.e., planning of library design and work,
3. In-service-training programs for librarians in Iran,
4. Library bibliographic service—it compiles the *Iranian National Union Catalogue of Books* and many others (185).

Finally, it is worth noting that in October 1975, the Pahlavi Library of Medicine (PLM) was established in Tehran. This library will be part of the Great Pahlavi National Library of Iran, to be completed by the mid-1980s. The PLM is linked with the U.S. National Library of Medicine and thus is able to provide MEDLINE searches. The on-line data bases will soon include the NLM's TOXLINE and CHEMLINE. NLM's CATLINE will also be used to process medical materials.

### *Jordan*

In May 1970, a Royal Scientific Society (RSS) was created in Jordan to meet the scientific and technical needs of the country.

The RSS established a library to service the RSS and the Jordanian government. The library provides reference, lending, photocopying, and general bibliographical services.

The library's documentation services include:

1. Preparing accession lists, bibliographies, union catalogues, indexes, etc..
2. Current awareness services (mainly contents lists of journals),
3. Inter-library loan services with other Jordanian libraries and foreign institutions.

4. Plans for microfilm/microfiche services and computerization of various functions (using IBM 1130) (186).

During May 1976, a survey of the present situation in the documentation and library fields in Jordan was carried out by a UNESCO consultant. A national documentation center is in the making; however, there are several prerequisites that need to be fulfilled (187).

### *Turkey*

The Scientific and Technical Research Council of Turkey (TUBITAK) was created in 1963 to encourage basic and applied research in science, to train the manpower for such research, and in general to provide support services for scientific research, such as establishing a documentation center, organizing conferences, publishing proceedings, etc.

TUBITAK's documentation center (TURDOC) was established in 1967 and in 1975 had a staff of 40 (188). TURDOC houses a library of 8,500 monographs and 710 periodicals. It also has a photocopy service which cooperates with the British Lending Library (BLL), the Centre National de la Recherche Scientifique (CNRS), the U.S. Department of Agriculture, and the U.S. National Library of Medicine.

TURDOC's principal publication is *The Key to Turkish Science*, which is composed of abstract bulletins in English covering the basic and applied sciences.

TURDOC cooperates with the Industrial Relations Unit of TUBITAK, founded in 1972, in supplying industrial information to researchers and industries in Turkey. It also cooperates closely with IRANDOC of Iran and PASTIC of Pakistan.

### *The Arab Countries*

Several international groups, such as UNISIST and the International Council of Scientific Unions (ICSU), recently (1976) sponsored efforts to encourage the various countries in this area to pool their resources and establish an Arab regional science and technology information network. For example, the International Conference on National and Regional Planning for Scientific and Technological Information Systems and Services for Development in the Arab Countries was held in Tunis in April 1976. The conference was sponsored by various Arab groups and by ICSU and UNISIST. The conference resulted in the following recommendations (189-191):

1. Each Arab country needs a national focal point for STI services, to coordinate services on a national level, to serve as a link in an Arab regional STI network, and to be a local input into UNISIST.
2. A regional network of STI activities in the Arab world should be encouraged to pool resources:
  - a. to coordinate and systematize translations of sci-tech literature into Arabic
  - b. to standardize terminology and the use of computerized systems

- c. to train information specialists and familiarize sci-tech personnel with the use of information systems
3. For an effective exchange of STI, as well as for the purpose of transfer of technology at all levels, modern communication and transportation facilities within and between Arab countries must be developed and existing services must be improved.

One should keep in mind that in this region, the world is witnessing the emergence of a number of developing countries. These countries, because of their vast oil resources (which are essential to their economies), have suddenly become rich and affluent. Their vast financial resources put them in a position to import the most sophisticated technologies (177) and to employ foreign experts to create instant information systems for them.

### AUSTRALIA AND NEW ZEALAND

Comprehensive accounts of libraries in Australia and New Zealand are available in several recent publications, such as:

Balnaves, J., and P. Biskup, *Australian Libraries*, 2nd ed., Bingley, London, 1975.

Borchardt, D. H., and J. I. Horacek, *Librarianship in Australia, New Zealand and Oceania*, Pergamon Press, Sydney, 1975.

Bryan, H., and G. Greenwood, eds., *Design for Diversity: Library Services for Higher Education and Research in Australia*, University of Queensland Press, Brisbane, 1977.

Bryan, H., and R. McGreal, *The Pattern of Library Services in Australia*, National Library of Australia, Canberra, 1972.

All of these sources contain sections on scientific and technical libraries. In addition, there are numerous articles in this encyclopedia—such as that on Australian libraries—which can be very helpful to readers who are interested in a good introduction to the general situation or the specific Australian and New Zealand library scene. Materials from Australian and New Zealand professional library organizations are also plentiful; some of them provide up-to-date information on scientific and technical libraries, such as the *Australian Special Library News*. Therefore, the discussion here is brief.

In Australia, the most important library in science and technology is the Australian National Scientific and Technological Library (ANSTEL), a part of the National Library of Australia (NLA). ANSTEL was established in 1973 as a result of the recommendations made by the STISEC (Scientific and Technological Information Services Enquiry Committee) of the Council of the NLA. ANSTEL's aim is to provide improved library services, both traditional and computer-based, in the field of science and technology to institutions and organizations in the Australian community (192).

ANSTEL's activities currently are:

1. The establishment and maintenance of a life sciences network
2. A continuing investigation of industrial information needs

3. Activity as the national focal point of UNISIST
4. Continuing liaison with other national and international groups to further develop an information network

The user community includes about 900 organizations in industries, universities, colleges, hospitals, government departments and agencies, professional associations, societies, research institutes, and state and public libraries, and many thousands of individuals (193).

ANSTEL now has three units in operation: Life Science, Industry, and General Science and Technology. All these units operate to meet demonstrated national needs and all supplement the services available from other libraries. It plans to develop 10 specialized information networks: general science and technology, life sciences, manufacturing industry and primary industry, mathematics, physical sciences, chemistry, earth sciences, environment and conservation, engineering, and management.

The heart of the Life Science Network is the MEDLARS center at the National Library of Australia in Canberra. This center cooperates with similar units in Brazil, France, Germany, Japan, Sweden, the United Kingdom, and the United States to form an international biomedical communications network. MEDLARS services include both retrospective searches and current awareness (SDI) services. Other data bases in the Life Sciences Network include Biosis Previews, Psychological Abstracts, and Sociological Abstracts. Searches of SCISEARCH (Science Citation Index) and NTIS (National Technical Information Services) are also available.

The National Library offers many computerized information services, particularly in the chemical and physical sciences; engineering and technology; the biological, agricultural, and environmental sciences; and the life sciences. Recent additional data bases include a geoscience data base, pollution abstracts, the Pharmaceutical News Index (PNI), etc. Since November 1976 ANSTEL has been linked to the Lockheed Dialog Information Retrieval Service (Palo Alto, California, U.S.A.) and its many data bases (194).

The document back-up functions of ANSTEL are handled by its National Lending Services (NLS), established in 1975. The NLS attempts to meet all requests for sci-tech information within 24 hours of receipt of the request (which can be made to ANSTEL via telex). Photocopies, loans, or microfiche copies are provided. In addition to its own holdings, the NLS cooperates with the British Lending Library, the National Technical Information Service (U.S.; NTIS), the U.S. Energy Research and Development Administration (ERDA), and the International Nuclear Information System (INIS) (195).

ANSTEL provides a reading room which offers open access to the most important parts of the National Library of Australia's sci-tech collection. The total collection includes 80,000 monographs, 25,000 periodicals, 350,000 technical reports, and other materials.

An integral part of ANSTEL's recent efforts (1977) to provide reference and referral services is the monthly publication of about 100 information bulletins in science and technology fields. These contain relevant references retrieved from its data bases.

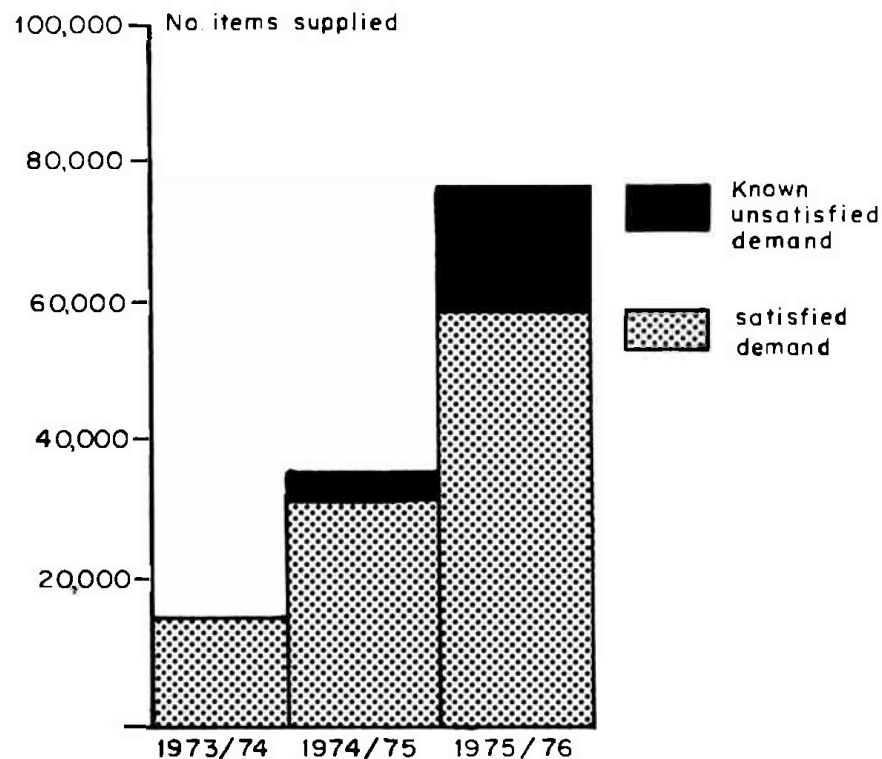


FIGURE 9. Items supplied nationwide by ANSTEL in response to requests (includes computer-based lists, other information services, and photocopy requests). Note: Figures not available for unsatisfied demand in 1973/74.

Statistics provided by ANSTEL, as shown in Figure 9, demonstrate clearly the rapid growth rate in use of ANSTEL services (193). Specifically, for example, computer-based searches have increased; a study of the pilot services prior to its opening showed an increase from 123 in 1969/1970 to 56,518 in 1975/1976 (196, 197).

The paradigm for ANSTEL's sophisticated conglomerate already exists in the form of a network of special libraries which services the Commonwealth Scientific and Industrial Research Organization (CSIRO).

CSIRO is Australia's largest scientific body, a semigovernment institution responsible to the minister for science. It is financed in part by the government treasury and in part from contributions from industry. In all, CSIRO spends some \$2.5 million a year on the provision of library and information services (198). The CSIRO library system is built around the Central Library and Information Services (CLIS) (199). It is based on the Central Library of East Melbourne, which consists of 65 libraries attached to a division, laboratory, or field station. Each library is a specialist collection; for example, the National Standards Laboratory has a unique collection of physical sciences literature as well as material relating to



standards of measurement. The Central Library is essentially an information transferral agency (200).

The CSIRO network has over 1,000,000 volumes, with 122,000 monographs. There are currently 27,000 serial titles, of which 6,000 are received through subscription. CLIS maintains complete files of national and international abstracting and indexing services, on the order of 400 titles. CSIRO maintains four major catalogs: *Scientific Serials in Australian Libraries*, the CSIRO union catalog, catalogs of CSIRO-published works, and the Commonwealth index of scientific translations. It also published *CSIRO Abstracts*, *Scientific and Technical Research Centres in Australia* (an annual directory), *Technical Journals for Industry: Australia*, bibliographies, etc. (200).

In New Zealand, the counterpart of the network of scientific and technology information services of CSIRO is a smaller network of special libraries of the Department of Scientific and Industrial Research (DSIR). The DSIR and other organizations have created a technical information service in Auckland, New Zealand's largest city. The Auckland Commercial and Technical Information Service (ACTIS) services industry in the Auckland area (201).

Generally speaking, besides these networks, special libraries have as yet not developed to any significant level in Australia or New Zealand. Both countries face problems resulting from a lack of funding and staff (202).

## EUROPE

The discussion on European scientific and technical libraries is divided into two sections: the U.S.S.R. and Eastern Europe, and the West European countries.

### THE U.S.S.R. AND EASTERN EUROPE

The scientific and technical information services of the Soviet Union and Eastern Europe have benefited greatly from the socialist emphasis on centralization and planning. Since 1927 the Soviet Union has been planning and developing a national network of science and technology libraries to facilitate the growth of Soviet science and industry. This kind of overall planning and coordination is naturally more difficult in less centralized countries. The various Eastern European countries certainly do not offer the very sophisticated and elaborate bibliographic services available in the Soviet Union. Many of them (like Poland and East Germany) have not been able to rebound as quickly as the Soviet Union from the ravages of World War II. There is increased cooperation among these countries, however, and with the Soviet Union. Most of the Eastern European countries (Bulgaria, Yugoslavia, Czechoslovakia, Hungary, etc.) are at the stage of creating national scientific and technical information networks (something the Soviets have been at for 50 years!). These efforts are being aided by the International Center for Scientific and Technical Information founded in 1969 in the Soviet Union.

The center cooperates with the Council for Mutual Economic Assistance (of the various Eastern European countries), and with UNISIST, the International Standards Serials Center, and many other international organizations.

### *The Soviet Union*

The Soviet STI network is the largest in the world and it serves the most users (985,000 scientists, 2.7 million engineers, and about 10.6 million specialists) (99). Since its creation in 1927 it has always been planned and centrally coordinated. The basic structure of the system embraces:

1. Nine all-Union central resource agencies based in Moscow, which support the national system
2. Industrial information networks
3. Fifteen information centers servicing the entire U.S.S.R.
4. Territorial "interbranch" institutes
5. STI services of research institutions
6. Scientific and technical libraries

The structure of this network is determined by the interconnection of territories and branches (203, 204). The principal information service of the Soviet STI system is VINITI (All-Union Institute of Scientific and Technical Information). One of the copyright depositories of the Soviet Union, the institute processes, analyzes, and selects literature in the scientific and technical fields. (It has close ties with the U.S. Library of Congress and has exchange arrangements with 192 U.S. organizations; Ref. 205). VINITI's holdings comprise 19,000 foreign journals, 8,000 foreign books, 6,000 Soviet periodicals, and 10,000 Soviet books. In 1969 VINITI began developing a unique and pioneering Integrated Information System (IIS) called ASSISTENT (Automated Reference Information System for Science and Technology). This system is being designed to function as a research "assistant" with a planned capacity to process  $3 \times 10^6$  scientific and technical publications per year. Its services will include SDI, retrospective searches, etc., of scientific and technical information published in *all* languages, and it will have the capability for full-text article retrieval from its data bases.

Another important component of the Soviet STI system is the State Public Scientific and Technical Library of the U.S.S.R. (GPNTB), which is a network of the major national research libraries in the Soviet Union. The focus of this network (consisting of 25,000 technical libraries) is the State Public Library for Science and Technology in Moscow. The scientific and technical libraries are called ONTI (Otdel Nauchnoi i Tekhnicheskoi Informatsii). The State Public Library has collaborated with the All-Union Institute for Scientific and Technical Information in the mechanization of library routines and in acquisitions and processing, mechanical information retrieval, and cataloging. In its institutional reference service, the library uses telegraph, telephone, and teletype communications (206).

There is also an elaborate industrial information network in the Soviet Union, with STI centers in the 15 union republics (207).

As of January 1, 1976, there were 64,000 scientific, technical, and special libraries in the Soviet Union. This includes the libraries of the U.S.S.R. Academy of Sciences and the academies of sciences of the union republics. As of January 1, 1977, this network of libraries comprised 582 libraries, including 18 central scientific libraries and 564 libraries in scientific research institutes. The network offers centralized acquisition and cataloging of scientific publications. SDI and retrospective search services are also offered (208).

The largest collection of scientific literature in the various republics is that of the Latvian S.S.R. Academy of Science Central Library. It has a collection of 2.5 million items (209).

### *Bulgaria*

The Academy of Sciences of the People's Republic of Bulgaria was founded in 1869. The Academy Library did not fully develop its scientific collection until the 1947 reorganization, which resulted in a single library network of the academy, with the Central Library as director.

The Central Library has devoted much attention to exchanges with other nations, especially with the Soviet Union and other socialist countries. There has also been a program of exchange with Arab nations. The Central Library's holdings (which include those in the network libraries) number over 850,000 volumes (209).

### *Czechoslovakia*

In 1959 a government decree was published to improve STI, and in 1966 the National Center for Scientific, Technological, and Economic Information (VTEI) was created. It is controlled by the Board of STI of the State Commission for Technology. The center is the highest body of centralized management and coordination of the national network of STI (210). The structure of the STI network in Czechoslovakia is as follows:

1. The central institution responsible for the management and development of STI is the State Commission for Technology, which fulfills this position through its operational organ, the National Center for Scientific, Technical, and Economic Information.
2. The center connects the STI network.
3. Every ministry has, within this framework, its own network of STI centers organized on three levels:
  - a. at the top of every ministry network is the "disciplinary center of STI"
  - b. individual disciplines of science or technology may organize their "branch centers of STI"
  - c. practically all industrial enterprises and their independent units have "primary information centers."

In the late 1960s the national network of STI included almost 250 discipline and branch STI centers. In industrial enterprises there were over 1,000 primary centers. The number of these centers is much greater now.

In order to conform to the Library Acts of 1959, the head of this system is still the State Library of the Czechoslovak Socialist Republic. As stated, each ministry has its own network of STI centers, which comprise the following: a regulatory center, branch centers for individual disciplines of science and technology (government related), and the information center for industrial concerns. Some of the more important of these types of information centers are the Institute for Scientific and Technical Information, the Central Agricultural and Forestry Library, and the State Institute for Medical Documentation and Library Service.

Basic research in Czechoslovakia is carried on within the various institutes of the Czechoslovak Academy of Sciences and in universities and colleges. The Czechoslovak Academy of Sciences (CSAV) was formed in 1952, and the Slovak Academy of Sciences (SAV), in 1953. While both have their own information services, the CSAV coordinates them both. The academy has a committee for scientific information which directs information activities, generally acting as an advisory board (211).

### *Hungary*

The national information system in Hungary is made up of three sections: financial information; statistical information; and technical, economic, and marketing information. It has been run by the state since 1949. Documentation systems for technology, economics, and medicine each have their own center and library and are coordinated by a central agency in the Hungarian Academy of Sciences. In 1962 the Ministry of Technical Development came into being, assuming responsibility for information services. As a result of scientific and technical progress, the Hungarian Central Technical Library and Documentation Center (OMKDK) was established (212). OMKDK has been designed to serve as the central technical information-handling agency for the country. It is supervised by the National Commission for Technical Development (213). Many branch systems were set up for most aspects of industry but these were of varying quality, and in 1972 the ministry appointed a coordinating body consisting of representatives from appropriate government departments to standardize the service, to eliminate unnecessary duplication in procuring foreign journals, to ensure the monitoring of technical literature, and to encourage cooperation both internally and with other Warsaw Pact countries.

Besides the STI network described above, it is worth noting the library of the Hungarian Academy of Sciences. Its development parallels that of the academy, founded in 1825. It is one of the oldest and largest libraries in Hungary. Since the academy directs scientific endeavors in Hungary, the library has had to reflect those research interests.

The library holds more than 1 million items, including 8,000 current periodicals. Most of the library's services are directed toward academic scientific researchers, although some help is given to other researchers. These services include lending,

dissemination of information, bibliographic research, publishing, and photocopying (214).

The Central Library of Szeged Medical University is considered the unofficial library of southeast Hungary. The library assists university-related clients through conventional reference work, translations, and compilation of subject bibliographies; and it assists smaller libraries in a network through methodological consultation and centralized acquisitions and cataloging. The Central Library also coordinates interlibrary loan and serial subscriptions and provides photocopies of needed materials for clients (including practicing physicians). In order to share resources, there is close coordination of acquisition activities among major medical libraries, including the Central Library of the University of Arts and Sciences and the Research Institute for Biology of the Hungarian Academy of Sciences. A union catalog of specialized periodicals is planned (215).

### *Poland*

The scientific and technical libraries of Poland were devastated in World War II and have had to be rebuilt since then.

Each polytechnical institute has a central library which coordinates the activities of the various faculty libraries at the institute and serves as a link in the network of scientific and technical libraries and information services in Poland.

The central libraries of the polytechnical institutes pool resources via interlibrary loan. They also cooperate with regional documentation centers and are linked by a network of teleprinters with institutions that have general catalogs, such as the National Library in Warsaw (BN), the Institute of Scientific, Technical, and Economic Information (IINTE), and the Polish Committee for Standardization (PKN). The central libraries also publish union catalogs of foreign periodicals.

Each central library has a Scientific Information Department (OIN) which offers SDI services and prepares bibliographic tools such as indexes and abstracts. The OINs cooperate with the national institute, IINTE.

The Academy of Sciences of Poland created a Scientific Information Documentation Center (ODIN-PAN) in 1967, which publishes various information sources (216).

Information services in Poland are developing in two directions: (a) storage and dissemination of secondary sources in the form of union catalogs, location lists, microfiches, and magnetic tapes; and (b) supply of data and other primary material. Since this type of material frequently has to be assembled from a number of sources, cooperation is essential. In 1971 the Council of Ministers issued a decree calling for the creation of scientific and technical information centers and experimentation with library automation. The coordinating body is CİNTE (Center for Scientific, Technical, and Economic Information), which works in liaison with government departments, scientific organizations, and libraries. It has overall responsibility for improving information services by the use of computer techniques, maintaining

an exchange of information with counterparts abroad, training information scientists, and publicizing the service. An advisory body met for the first time in Warsaw in 1974, and its recommendations have been significant for the development of information science, especially through the introduction of computer methods early in 1975 (217).

#### *Yugoslavia*

Due to scientific and technical developments in Yugoslavia, there is a need for an information system. Presently, Yugoslavia's progress in this area lags behind that of other industrial nations; there are no organized networks, and little use of advanced technology for information retrieval. The reasons for this are that there has been no appraisal of the contribution of information in scientific development, and that insufficient funds have been invested in this area.

A plan for library cooperation has been implemented. Use of data bases is part of this proposed decentralized system, which will emphasize SDI and retrospective literature searches. Yugoslavia has also decided to participate in international networking efforts (218).

#### WESTERN EUROPE

The level of scientific and technical information systems and services is very uneven in Western Europe. The services range from the very sophisticated Internationale Dokumentationsgesellschaft für Chemie m.b.H. (IDC) in West Germany, which is an important link in a worldwide chemical information system; to strong national centers of scientific and technical information and documentation in other countries, such as France, Belgium, and Great Britain; to separate, uncoordinated, scientific and technical information activities in countries such as Italy. The scientific and technical information services of many other countries, such as Austria, Switzerland, Norway, etc., fall within the range defined by these three levels of activity.

The current trend toward networking and international cooperation in information services is reflected in a new information network, called EURONET. EURONET is a European on-line network for scientific and technical information among nine member countries of the European Economic Community (EEC), projected to begin operation in 1978 (see Figure 10). This network will integrate computerized on-line information retrieval services and provide a user anywhere in the EEC direct access to the data bases and "live" information data banks. EURONET will utilize the most sophisticated telecommunications hardware available. For a detailed discussion of this network, readers are referred to a recent article by Ungerer (219).

#### *Austria*

Vienna is the home of such international organizations as the IAEA (International Atomic Energy Agency) and its very sophisticated information system, INIS (International Nuclear Information System). Austria's STI services certainly must have

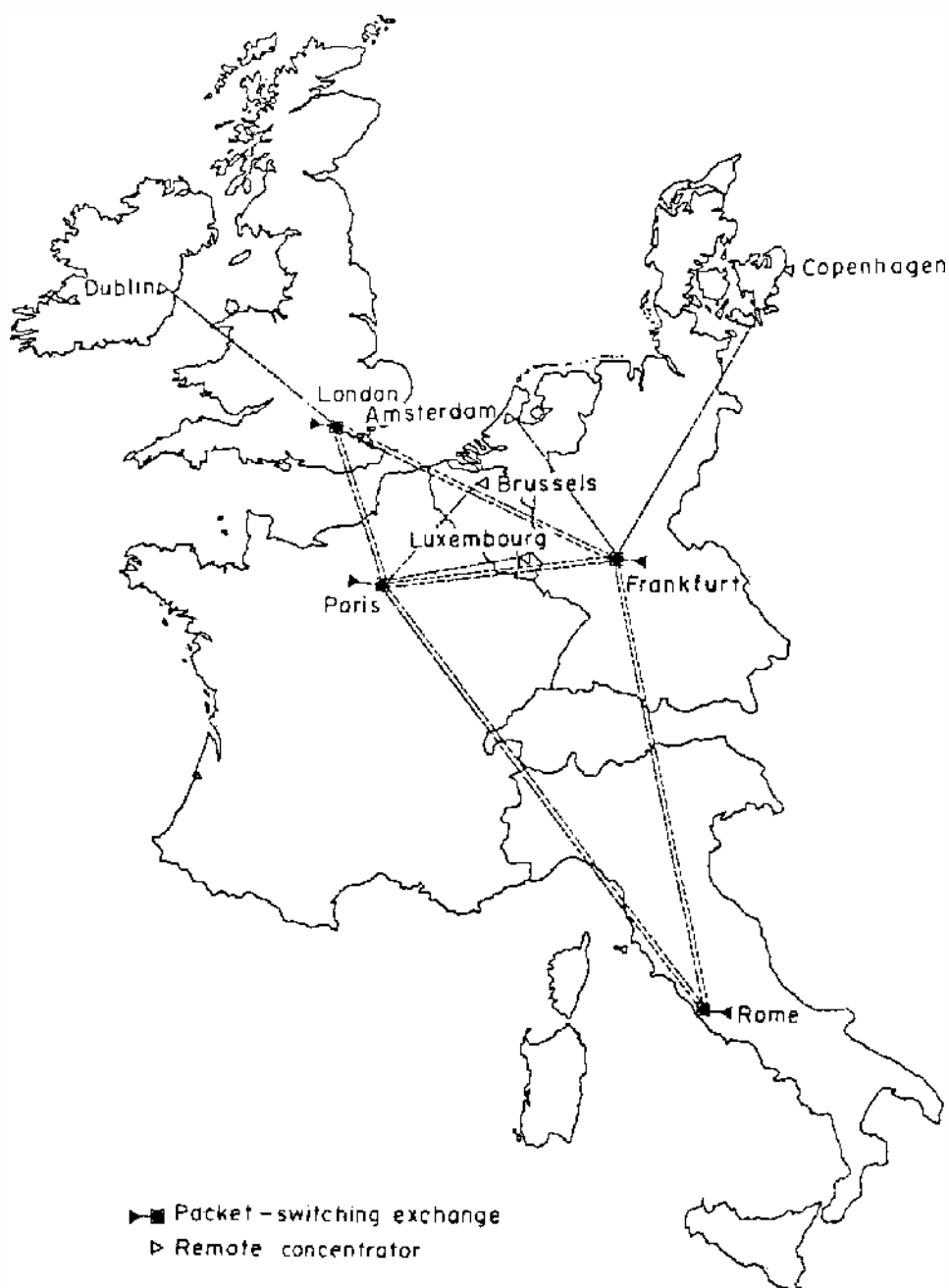


FIGURE 10. *EUNET outlay.*

benefited from the proximity and spin-off of such an advanced information system.

The Ministry of Science and Scientific Research of Austria set up a study group in the early 1970s to examine the problems and advantages of a national network of automated scientific libraries (220). The findings and conclusions of the study include:

1. Computers are used in library work to improve service and to simplify work. In the past, computer applications were not thought of in a networking sense.

It is more efficient for several libraries to pool their resources so that data common to all of them are processed by a central computer.

2. Problems which result from thinking of computerization only on an individual basis include the incompatibility of existing computers, programs, and data.
3. Librarians in some countries have decided to approach computerization in a cooperative sense. Some of these projects include LIBRIS in Sweden, PICA in the Netherlands, and the DBLP in France.
4. One of the significant problems in organizing a network computer system is that the cost and effort involved in this type of system are much greater than the initial cost and effort involved in implementing computers in individual libraries. In the long run, however, the pooled approach is less costly.

As a result of this study, in early 1970, a master plan for an Austrian network of automated scientific and technical libraries was proposed. The plan cites the following advantages of such a system:

1. Standardization and speeding up of library work.
2. Supplying users with recent catalogs and SDI services.
3. Computerization of the Austrian national bibliography.
4. Construction of a central data bank of foreign titles.
5. Shared cataloging, which is planned to utilize three main files: national bibliography, central national file of all the libraries in the network, and a central file of foreign material not in the central national file.

Standard format will be a necessity for this network if it is to interface successfully with other established formats such as the U.S. MARC facilities and the French MONOCLE services. The ministry signed a second contract with the Computer Center of Graz (RZG) in 1973 to establish an Austrian format for an automated library network.

The use of data bases such as CA Condensates and MEDLARS will be an integral part of the network.

### *Belgium*

The National Center for Scientific and Technical Documentation (NCSTD) was created in 1964 in Brussels, in close association with the Royal Library Albert I (221).

The principal purposes of the center are to provide information searches and to procure materials relating to medicine, physics, chemistry, engineering, agriculture, and information science.

The NCSTD's activities are:

1. Publication of the *Belgium and Luxembourg Union Catalog of Foreign Periodicals*
2. Publication of the *Directory of Belgium Research Centers*
3. Provision of translation services
4. Consultation services for special libraries and documentation centers
5. Provision of referral services



6. To represent Belgium in the international scientific and technical information community
7. To conduct research into information science problems (such as automation of the center)
8. Provision of SDI and on-line retrospective retrieval services

The SDI and on-line retrieval services are realized through NCSTD's computer (Siemens 4004/135) and via NCSTD's concentrators to ESA/SDS (European Space Agency/Scientific Documentation Service) and to DIMDI (Deutsches Institut für Medizinische Dokumentation und Information). NCSTD is able to access such data banks as MEDLARS, NASA (STAR and IAA), Nuclear Science Abstracts, NTIS, etc.

NCSTD is working closely with other European Common Market countries to realize the European network of scientific and technical information services (EURONET).

### *France*

The center of French scientific and technical information is the Délégation Générale de la Recherche Scientifique et Technique at the Centre National de la Recherche Scientifique (CNRS). In addition to coordinating STI and documentation programs in France, CNRS has as its primary focus the promotion and coordination of research conducted by government agencies, industry, and private citizens. Some of its new developments include indexing methods, specialized thesauri, and mechanical bibliographic retrieval techniques. As of 1970 the CNRS prepared 400,000 documents per year, distributing 300,000 of them in photocopy or microfilm.

There are other information centers which coordinate their activities with those of the CNRS and with each other. These include the Centre de Documentation de l'Armement (CEDOCAR) of the Department of Defense, the Commissariat à l'Énergie Atomique (CEA) of the nuclear energy agency, the Centre National d'Études Spatiales (CNES) of the space industry, and the Office National d'Études et de Recherche Aérospatiales (ONERA) of the Air Force.

Regarding agricultural information, there is some duplication of effort. The Institut National de la Recherche Agronomique (INRA) publishes a monthly bibliography; while CNRS publishes a monthly bulletin, *Bulletin signalétique*, which also contains information on agronomy, biochemistry, and biology. Other institutions and universities assist in bibliographic research in this area. Some of these centers cooperate with European and American services under various arrangements.

The CNRS documentation center is the most active service in the medical sector, examining more than 3,200 medical periodicals. Some SDI services have been instituted for special topics. MEDLARS is utilized at the Institut National de la Santé et de la Recherche Médicale (INSERM), a government organization.

In 1973 the National Committee of Documentation (CND) was replaced by the National Bureau for Scientific and Technical Information (BNIST). BNIST is

under the Ministry of Industrial and Scientific Development. This bureau has primarily an advisory function that extends to aspects of information essential to scientific and technical development. It is supposed to serve as the coordinating agency for a French scientific and technical network with the following responsibilities: defining national policy, coordinating documentation organization as part of a national network, promoting research concerning information science and techniques, standardization, training of specialists, and international cooperation (99, 222).

Automation of information processes is widespread in France and has been encouraged by the Association Nationale de la Recherche Technique (ANRT).

France is an integral part of the new EURONET system as well as the home of UNESCO (based in Paris), whose UNISIST programs are mentioned frequently throughout this article.

### *West Germany*

At the present time there is no single national library in the Federal Republic of Germany (FRG). Large central state libraries are supplemented by central specialist libraries in the fields of technology and medicine. Some of these are:

The Technische Informationsbibliothek (TIB; Technical Information Library), in Hanover, was founded in 1959, in connection with the technical university in that city. The two libraries together receive over 10,000 current periodicals (223).

The Zentralbibliothek der Landwirtschaft (Central Agricultural Library), in Bonn, was established in 1962. It has a collection of 176,000 volumes and 2,200 current journals (223).

The Medizinische Zentralbibliothek (Central Medical Library), in Cologne, is closely linked with the German Institute for Medical Documentation and Information. This is now the Central Medical Library for the FRG, with a collection of about 145,000 monographs, 160,000 dissertations, and 2,200 current periodicals (224).

Various special libraries and information centers contain scientific and technical collections. The Institute for Documentation, Frankfurt, established in 1961, is part of the Max-Planck Society for the Advancement of Sciences, the largest research organization in the republic. This may serve as a national information agency in the future. The institute is responsible for implementing the government's development Program for Scientific and Technical Information and Documentation (1974-1977) (225).

This program was started by the Federal Department of Science and Technology with the goal of a national information system in science and technology. The government funds allocated for this program for the period 1974-1977 concentrated on Specialized Information Systems (SIS) which focused on processing industrial information. The SISs are accessed locally through regional libraries and information offices. They provide SDI and retrospective searches (manual and computer-based). The SISs also provide back-up documentation and translation services that are not available from the regional sources.

The West German government's program calls for the eventual integration of five differing institutions into an Information and Documentation Association (GID). This will carry on R&D in information, train information specialists, and standardize information activities and procedures on a national basis.

STI activities in West Germany are also affected by the Library Plan of 1973, which calls for a national library network. Part of this plan involves a network of the central scientific and technical libraries of the 11 German states. These central libraries are assigned clearinghouse functions in cooperation with less specialized libraries and information centers. Supporting this network are libraries such as those mentioned above, which concentrate on one subject area and which naturally provide national coordination of the bibliographic activities (such as the publication of contents lists of journals) in their field (99).

The Library Plan of 1973 is an effort of the West German government to reduce the duplication of bibliographic activities by centralizing such functions as acquisitions, cataloging, telex, SDI services, etc.

Finally, it is worth mentioning a sophisticated computer-based chemical information system, the Internationale Dokumentationsgesellschaft für Chemie m.b.H. (IDC), created in 1967 by several major European chemical companies. Since 1975 this system has been linked with the information system of the American Chemical Society in the United States. The IDC has an extensive data base (including the GREMAS system in organic chemistry). The IDC has been working closely with the West German government, which is attempting to coordinate a network of information systems to serve the West German scientific and technical community, as discussed above (226).

### *Great Britain*

As in the United States, there is no single source or focus of information and library planning in Great Britain, yet the information service in this country is very advanced (99). Instead of elaborate national planning, the thrust has been toward consolidation and improvement of existing information programs and services. There are several organizations which play important roles in the transfer and provision of scientific and technical information. These include:

- The British Library—and its Science Reference Library
- The National Lending Library for Science and Technology, in Boston Spa
- The British Museum Library
- The Office for Scientific and Technical Information (OSTI), now a part of the British Library (since 1974)

The National Lending Library (NLL) plays a major role in the documentation delivery process. Besides its domestic activities, in cooperation with over 3,000 information facilities in the United Kingdom, it also cooperates with foreign libraries and agencies, such as the U.S. National Library of Medicine, in experimenting with new resource-sharing projects.

The British Library has concluded a contract with UNESCO to set up a UNISIST Center for Bibliographic Descriptions. The center will be located in the British Library Research and Development Department in London and will be responsible for the distribution and maintenance of the UNISIST Reference Manual for Machine Readable Bibliographic Descriptions. This manual is to facilitate the international exchange of scientific and technical information (227).

The Research and Development Department of the British Library is also cooperating with representatives of other European Common Market countries to develop EURONET.

The Science Reference Library is part of the British Library. There are two branches: the Holborn Branch, with industrial and patent collections, and the Bayswater Branch, with literature supplementing Holborn. Since 1975 the latter has been the headquarters for MEDLINE services. The services of the Science Reference Library include photocopying (about 2 million copies per year), computerized information services, and publication of various guides, news bulletins, etc. (228).

Great Britain earlier had an Industrial Liaison Center Service (ILS), started in 1964. This service consisted of a number of centers attached to technical colleges and their libraries, which provided information services to local industry. The ILS covered 82,000 manufacturing and industrial establishments. In 1973 a Small Firms Information Center Service (SFIC) replaced the ILS. This service is aimed at functioning as a referral service for all of the United Kingdom's small firms (1¼ million). Ten regional centers will be able to access a national data bank containing detailed information about technical personnel, research, etc., in industry (229).

Great Britain has numerous advanced STI systems; some of them are among the most sophisticated in the world. These include INSPEC (an information system for physics and engineering) and the Derwent services for patents.

It is estimated that there are 3,000 scientific and technical information facilities in the United Kingdom.

### *Italy*

Although Italy does have the advantage of having the headquarters of the Food and Agriculture Organization (FAO) of the United Nations located in Rome, it suffers from lack of a national scientific and technical information system.

A 1965 census lists 1,517 scientific and technical libraries and documentation centers in Italy, and there is reason to believe that the present number is much greater. This scattering of the sources for scientific research and the present economic conditions in Italy have promoted new library cooperation programs, despite the lack of government spending in this area.

The Italian National Research Council (CNR) was established in 1923 to promote, coordinate, and control scientific research. It advises the government on scientific and technical matters, provides technical standards, and studies scientific and technical problems. Since 1928 the CNR has been a depository for publications, Italian and foreign, of interest to scientists and technologists. The CNR library,

established at the same time as the council, has extended its service over the years to include all scientists. Its collection includes approximately 350,000 books, 4,000 current journals, and 6,000 back titles. Although this library was intended to become the Central Library for Science and Technology, inadequate financial investment and lack of official regulation have decreased the library's impact as such.

In 1968 the Laboratory for the Study of Research and Documentation was established in Rome. It was also intended to study the problems of scientific and technical research in Italy, and to coordinate national and international documentation activity in the scientific and technical area.

All of these previous attempts at coordination were either limited or failures. One of the problems in coordination has been the splitting of scientific and technical libraries under various separate ministries. For example, the national libraries, the state libraries with special functions (including the medical library at Rome), and 12 central university libraries are all under the General Office for Academic Institutions and Libraries for Cultural Affairs of the Ministry of Public Education; while libraries of scientific institutes, such as CNR, are under the Council of Ministers (230).

What Italy needs is a national scientific and technical library and a network under central government administration. Plans for such a network have been drawn up by the Special Libraries Group of the Italian Library Association. The possible products of such a national library network include: a union catalog, a central interlibrary loan agency, machine-readable updating of the union catalog, and the transfer of retrospective material to a central depository.

### *Switzerland*

Switzerland benefits from the fact that Geneva is the location of the headquarters of the World Health Organization, as well as institutions of several other United Nations organizations. Domestically, the development of scientific, technical, and medical libraries in Switzerland has not been uniform. However, the university libraries contain substantial collections in the sciences. Subject collections are available in numerous libraries and information centers. Chemical literature, for example, is collected in depth primarily by the chemical industries in Basel. There is a chemistry documentation center there that has access to such sources as RINGDOC, etc.

Both university and hospital libraries collect medical literature. DOKDI, the documentation service of the Swiss Academy of the Medical Sciences, gives on-line access to the large data banks of foreign countries.

Technical literature is collected by the ETH-B (Library of the Swiss Federal Institute of Technology, Zurich), which is Switzerland's principal scientific and technical library, as well as by industrial concerns. These industrial libraries have small holdings, but good dissemination of information. Some of them, such as Sulzer and Winterthur, have on-line connections with foreign data banks.

The ETH-B has (as of 1977) 2,000,000 volumes, 8,000 current periodicals, and an annual increase of about 140,000 units, of which one-third are microtext. The

library collaborates with the Swiss library network. The ETH-B has a completely automated list of serials and a computerized accessions list. The library is compiling a trilingual thesaurus and is experimenting with automation of some of its technical services (cataloging, etc.). It is connected to a telex network and offers full photocopy services for its journal collection, which is naturally a primary source of scientific and technical literature.

### *Scandinavian Countries*

The so-called Scandinavian (or Nordic) countries—Denmark, Finland, Iceland, Norway, and Sweden—have a great deal in common, and they are generally looked upon as family states. Thus, the cooperation among these countries is good. Since 1967, the availability of a Nordic Cultural Fund (government funds) has made more cooperative projects possible.

In the fields of documentation and library activities, several organizations have contributed greatly to the cooperation among Nordic countries. These include NORDDOK (since 1970), the Nordic Research Librarians Association (NRLA; since 1947), and the Nordic Research Librarians Committee of Cooperation. One of the most important cooperative projects developed by NRLA since 1967 is the NOSP project (Nofdisk Samkatalog over Periodika), which coordinates the acquisitions in research libraries and plans for a union catalog of serials in Danish, Finnish, Norwegian, and Swedish libraries. NOSP will be based on national systems of serials registration in the Nordic countries (231).

Each Scandinavian country has its own scientific and technical information system and network. The structure is quite similar in all countries. It generally has the following components:

1. Numerous special libraries of industrial science and technology, called information and/or documentation centers.
2. Numerous large research libraries, including the country's national library, university libraries, and libraries in large institutions.
3. A national scientific and technical information and documentation center, which is a government agency. Its activities generally include the coordination of the nation's scientific and technical information transfer, utilizing both traditional and advanced computerized methods. This national agency also coordinates and develops computerized scientific and technical information networks.
4. Professional organizations related to scientific and technical information personnel.

Cooperation among Nordic countries is good and the development of scientific and technical information work seems to be well coordinated in the whole region. Because of the similarity of the Scandinavian systems, already mentioned, it would be redundant to discuss each country separately. To follow the components outlined above, one can take any country as an example and extrapolate the state of the art of scientific and technical information systems and services in other Nordic countries. One should, however, make allowances for the differences among them in terms of the level of sophistication in pure and applied scientific research.

For a detailed account of libraries of the Scandinavian countries, readers are referred to books such as Harrison's *Libraries in Scandinavia* (232) and to separate articles in this encyclopedia—such as “Denmark, Libraries in,” “Finland, Libraries in,” etc.—which are also helpful. For illustration purposes, a discussion of Sweden is given here:

In 1969 it was reported that there were over 67 special libraries in Sweden, most of them in and around Stockholm (233), and the present number is much greater than that. Sweden is a very advanced country in terms of scientific and technical research. There are numerous significant university and research libraries. The most prominent one in science is the Library of the Royal Swedish Academy of Science. The two most important technical libraries are the Library of the Royal Institute of Technology and the Chalmers Technical Institute Library. These two may be considered central technical libraries for Sweden. The Royal Institute of Technology in Stockholm has many SDI tapes, from ERIC to Nuclear Abstracts. The Agricultural Institute at Uppsala handles agricultural information. The central library for medicine is the Library of the Royal Caroline Medico-Cherurgical Institute. Research libraries in specialized areas, with very comprehensive collections and services, are also available, such as the library of AB Atomenergi, at Studsvik, Sweden.

The activities of these organizations and groups are stimulated by SINFDOK (the Swedish Council for Scientific Information and Documentation). This is a government agency which carries on such projects as sponsorship of research in information systems. SINFDOK also sponsored LIBRIS (Library Information System), which is a national computer service. LIBRIS allows Swedish research libraries to share automated cataloging and other bibliographic services. SINFDOK sponsored the establishment of SCANNET (the Scandinavian computerized information network), which is the Swedish SDI service.

The SDI tapes of SCANNET are divided among several specialized universities in Sweden. The Karolinska Institute, for example, handles the tapes dealing with medicine, and it has access to MEDLINE (234).

SINFDOK cooperates with its counterparts in other Nordic countries; and the Scandinavian network is connected to EURONET through the Danmark Tekniske Bibliotek med Dansk Central for Dokumentation (the Danish Technical Library and Documentation Center), in Copenhagen.

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CHING-CHIH CHEN

## SCOTLAND, LIBRARIES IN

Although Scotland is a relatively small country with a population of around 5 million (less than 10% of the population of the United Kingdom), it is fiercely independent and zealous of its nationhood and traditions. One of these traditions is that of book learning, in which libraries have played an important and increasing part since the 14th century.

### National Library

Scotland did not have a national library until 1926 when the library of the Faculty of Advocates in Edinburgh, founded in 1680, was transferred to the nation and by an act of Parliament became the National Library of Scotland. The Advocates' Library had since 1709 the legal right under the Copyright Act to claim a copy of every publication entered at Stationer's Hall. It was technically a private



library but had become recognized as a place of deposit for material relating to the history and literature of Scotland. The National Library has continued to enjoy the privilege of legal deposit under successive Copyright Acts, and emphasis has always been placed on the acquisition of Scottish material. The present building on George IV Bridge in Edinburgh was opened in 1956.

### University Libraries

Four university libraries have provided reading materials to students and others, from the 15th century: Glasgow (founded 1451), Aberdeen (1495), Edinburgh (1580; Ref. 1), and St. Andrews (1611/12). These libraries enjoyed the privilege of legal deposit from 1709 but surrendered that right in 1836 in exchange for an annual compensatory grant, leaving the National Library of Scotland as the only Scottish library entitled to receive a copy of every book, periodical, and newspaper published in the United Kingdom.

While the University of St. Andrews dates from 1411, its library was not founded until 1611/12. There are, however, some indications of a pre-Reformation common library, and the idea of a university library was considered as early as 1415. The Priory Library, which was founded in 1144, was closely linked with the history of the university library (2, 3). The present library building was opened as recently as 1976.

The library of the University of Glasgow was founded with the university in 1451, and its present building was opened in 1968 (4, 5). The university library of Aberdeen dates from the university's founding in 1495. The youngest of the older Scottish university libraries is that of Edinburgh (6), founded in 1580 and now the largest university library in Britain after Oxford and Cambridge. Its present building (7), opened in 1968, provides 8 acres of floor space with 4,000 places and is the largest single academic library building in Europe.

In the education explosion of the 1960s there was a considerable increase in the number of new universities created to meet the demand for advanced academic studies and research. These new universities, unhampered by tradition and out-dated practices, soon established good working libraries. Some emerged from existing educational establishments which were accorded university status. The University of Strathclyde in Glasgow emerged from the Royal College of Science and Technology, which originated in Anderson's Institution. Its library, appropriately named the Andersonian Library, was founded in 1796 (8), although it did not become a university library until 1964. In the same year the Scottish College of Commerce merged with the university and its library has now been incorporated with that of the university.

University College, Dundee, founded in 1883, was attached to the University of St. Andrews until it was accorded independent university status as the University of Dundee in 1967, and the Heriot-Watt College in Edinburgh became Heriot-Watt University in 1966. The libraries of both these new universities developed out of college libraries. The only completely new university is that at Stirling, which

dates from 1967. This new university library has had to develop its own traditions.

The Scottish universities, like their English counterparts, are financed by the University Grants Committee, and allocations are made for the maintenance of the university libraries and the numerous departmental and special libraries attached thereto.

Of the many departmental libraries attached to the universities, one of the most outstanding is the New College Library, which formerly belonged to the Church of Scotland and is now the library of the Faculty of Divinity of the University of Edinburgh. It has an extensive collection of books on theology and related subjects.

The older university libraries contain many fine collections, and in their earlier days they became the repositories for private libraries and deposited collections. Although the National Library has now assumed responsibility for saving such collections for the nation, these older university libraries still continue to attract donations of important material. Although they are the custodians of many treasures, the principal function of these libraries is to meet the needs of their staffs and students in current scholarship and research.

### Special Libraries

Respect for books and learning has long been a Scottish characteristic which is reflected in the country's library resources, and there is a wide range and variety of libraries covering all subjects and catering for all interests.

In the current edition of *Library Resources in Scotland* (9), no fewer than 373 libraries are listed. In addition to the national, university, and public libraries, many different types of libraries are reflected in the following list extracted from this publication:

	No. of Libraries
Colleges	52
Colleges of education	8
Development corporations	4
Government departments	20
Hospitals	16
Industrial	49
Local government departments	5
Newspapers	4
Nursing and pre-nursing colleges	18
Parish	2
Private	2
Research establishments	24
School library services	20
Societies and institutions	54
Theological libraries	11

The libraries of the Royal College of Physicians of Edinburgh (founded 1681) and the Royal College of Physicians and Surgeons of Glasgow (1698) both maintain

extensive collections of medical books and periodicals. The Royal College of Surgeons of Edinburgh (1505) and the Royal Society of Edinburgh (1783) have libraries which contain important collections of medical and scientific material. One of the largest law libraries outside of the National Library is the Signet Library (1722) of the Society of Writers to H. M. Signet in Edinburgh (10). The Royal Botanic Garden Library in Edinburgh is rich in material on botany and related subjects (11), while the library of the Royal Scottish Academy of Music and Drama (1929) specializes in music and dramatic art.

Recent years have witnessed an upsurge in the establishment of colleges of higher education and central colleges, in each of which the library has an integral role to play. The eight colleges of education have professionally administered libraries, the largest being that of Jordanhill College in Glasgow (12).

There has been a dramatic increase in the number of hospital and medical libraries in Scotland (13), particularly those in nursing training colleges. The majority of these are now administered by professional librarians.

The increased need for technical information following the First World War led to the establishment of government and grant-aided research associations and the setting up of libraries and information departments. Since the Second World War there has been a rapid increase in such provision both by the government and by industrial organizations. The National Engineering Laboratory (1951) at East Kilbride is an example of the former.

### Early Libraries

Although the public library movement in Scotland did not commence until 1853, there were many earlier libraries designed for public use. The Innerpefferay Library near Crieff dates from 1680 and is still in existence (14, 15), while the town library of Kirkwall in Orkney (16), established in 1683, received contributions from the rates from the mid-18th century. Almost every Scottish burgh had its reading room, and there were village, parish, and Sunday school libraries, many sponsored by the church, in the 18th century.

The first circulating library was established in Edinburgh in 1725 by Allan Ramsay, the poet and bookseller, and a similar library was established by John Smith, the bookseller, in Glasgow in 1753. Reading societies were operating in certain villages, the most famous being those in Leadhills (17) and Wanlockhead (18), and there were public subscription libraries in towns such as Kelso and Duns in the mid-18th century. These libraries anticipated the public library by almost a hundred years.

The early itinerating libraries pioneered by Samuel Brown of Haddington could be described as the forerunners of the county libraries (19). They originated in East Lothian in the early years of the 19th century. Prior to the Public Library Act of 1850, the mechanics institutes (pioneered by John Anderson) had developed, and by that year there were 55 such institutions in which a library was an integral feature.

### Public Libraries

It was a Scottish M.P., William Ewart, the member for Dumfries, who moved in the Commons the appointment of a select committee to consider the establishment of public libraries. He was appointed chairman and the committee's report was published in 1849 (20). Out of this emerged the Public Library Act of 1850, which was extended to Scotland in 1853.

The burgh of Airdrie was the first authority to adopt the act in Scotland, in 1853, and the following year the maximum levy for public library purposes was raised from ½d to 1d on each £1 of rateable value (21). Dundee was the first of the four Scottish cities to adopt the act (1866). In the remaining three there was opposition and adoption was delayed until 1884 in Aberdeen and 1886 in Edinburgh (22). Although the Mitchell Library had been established as a public reference library in Glasgow in 1874 (23), the Public Library Act was never adopted by the city. The City Corporation resorted to including a clause in a local act pertaining to tramways in 1899, which allowed it to levy a rate for the administration of public libraries. To compensate for its late development, the provision of branch libraries in Glasgow during the years 1900 to 1907 was unsurpassed in the country; 13 large libraries were opened in that period (24).

The history of the Scottish public library movement is very much the history of Andrew Carnegie's benefactions. In Scotland alone, 50 out of 77 towns benefited from grants provided by this Dunfermline-born man. At that time there was little evidence of a demand for public libraries, and it was left to the efforts of progressive and public spirited citizens, assisted by benefactors such as Carnegie, to lay the foundation of the public library movement which we have today.

The lack of adequate finances was a recurring problem in those early years. For 65 years the rate limit for library purposes remained at 1d per £1 valuation, although certain libraries overcame this through local acts. In 1919 the rate limit was removed in England and Wales. In Scotland it was raised to 3d per £1 in 1920, and it continued at that level for the next 35 years, when it was finally removed.

While the development of libraries in the cities and burghs continued, the problem of library provision in the rural areas remained unresolved until the establishment of the county libraries between the years 1919 and 1926. The impetus was created by the Carnegie United Kingdom Trust (25), which had been founded in 1913 and which had commissioned Professor Adams to prepare a report on library provision (26). This report advocated the foundation of rural libraries and the recommendations were accepted by the trust, which proceeded to make grants for this purpose. This action commended itself to general approval and was embodied in the Scottish Education Act of 1918.

The county library services were administered by the county education committees, and by the end of 1926 they were operating in every county except Argyll. Financial assistance was provided by the Carnegie United Kingdom Trust until 1935 when this support was discontinued. The trust had disbursed £500,000 in the 20 years in which it had been active, and the county library services were well established. Complete provision, however, was not realized until 1947 when Argyll County Library began operations.

The spread of the county libraries embraced the smaller burghs which were not independent library authorities. It was generally accepted that urban communities with populations of less than 30,000 could not effectively establish and maintain library services.

A number of burghs, particularly the smaller, decided to forfeit their independence as library authorities and integrate their services into the county service. The amalgamation of services in Dumfriesshire (27) and Clackmannanshire was to the mutual benefit of burgh and county. Several burghs viewed such amalgamations with distrust and feared absorption by the county education authority. It was not until the reorganization of Scottish local government in 1975 that the situation was resolved with the dissolution of the counties and the establishment of new library authorities.

Prior to 1975 there were 80 library authorities in Scotland. They served the 4 cities, 30 counties, and 50 burghs, ranging in population from 945,000 to 1,000. Of these, 55 had populations of under 50,000 and 37 had populations of under 20,000.

In the reorganization of local government in Scotland (28–30), where a two-tier system was adopted, libraries became a responsibility of the district councils in all but three areas of the country—the Borders, the Southwest, and the Highlands, where they are the responsibility of the regional councils. The island councils are all-purpose authorities. The effect of reorganization on libraries was to reduce the number of library authorities to 40, comprising 3 regional, 34 district, and 3 island councils. With the exception of the island authorities (which because of their low populations must be considered as special cases) more than half of the library authorities in Scotland now have populations in excess of 100,000. Only six have populations of under 50,000 (Table 1).

One of the most serious effects of the reorganization of local government in Scotland has been the administrative separation of the public and school libraries (31). School libraries are the responsibility of the education authorities, and prior to reorganization these were the four cities and the county councils. With the abolition of the counties and the removal of responsibility for education from the cities, the provision of school libraries has been assumed by the regional councils, while the district councils are responsible for public libraries. Only in three regional councils and the three island councils do the library services run concurrently.

This has resulted in the establishment of separate educational library services by the remaining five regional councils. It is permitted for a regional authority to enter into an agreement with a district authority to operate its school libraries on an agency basis, and such local arrangements do operate in certain parts of the country. The provision of libraries in schools was encouraged by the obligation upon education authorities to make provision for a separate library room in every new secondary school.

Following the passage of the Public Libraries and Museums Act of 1964, which applies in England and Wales but not in Scotland, the Scottish Education Department set up a working party to examine the public library service in Scotland and to make recommendations (32, 33). These recommendations followed very closely those contained in the Roberts Report (34, 35), but up to the present they remain

TABLE 1  
 Scottish Public Library Authorities: Estimates of Expenditures, May 1975-March 1976\*

Name of authority	Population	Expenditures (£)					Capital expenditure
		Total gross expenditure	Books and binding	Non-book materials	Salaries		
Glasgow District	983,942	3,044,554	467,073	64,440	1,179,964	1,432,000	
Edinburgh District	448,682	1,117,480	201,560	4,500	449,413	110,625	
Kirkcaldy and Northeast Fife	236,089	362,495	97,400 <sup>a</sup>	—	175,470	20,000	
Aberdeen District	213,000	535,665	138,000	16,000	287,710	—	
Renfrew District	204,000	502,000	118,700	10,400	245,200	62,000	
Dundee District	196,400	485,058	84,875	9,170	215,139	236,268	
Highland Region	178,000	343,675	89,875	—	197,734	20,952	
Motherwell District	163,000	341,170	61,500	5,100	126,690	50,000	
North East of Scotland Library Service	160,000	284,500	76,000	8,600	75,150	12,000	
Dumfries and Galloway Region	143,711	258,300	70,200	—	134,900	—	
Falkirk District	142,058	327,790	83,350	6,200	147,350	—	
Cunninghame District	129,050	171,630	44,500	4,000	90,500	84,500	
Dunfermline District	126,000	222,885	58,800	2,450	102,360	6,500	
West Lothian District	122,000	229,390	30,000	1,400	99,090	—	
Perth and Kinross District	117,911	216,384	68,970	—	105,780	—	
Kyle and Carrick District	113,611	292,100	69,130	1,900	134,870	105,190	
Inverclyde District	110,000	340,800	77,100	8,500	135,400	—	
Monklands District	110,000	221,251	71,240	7,650	114,078	26,000	
Hamilton District	104,629	287,355	54,475	9,295	127,530	815	

<b>Borders Region</b>	100,000	243,190	65,580	3,600	87,000	—
Angus District	82,000	208,802	58,580	2,000	66,667	77,684
<b>Kilmarnock and Loudon District</b>	81,000	149,033	38,600	1,800	85,800	—
Strathkelvin District	81,000	223,592	65,000	6,700	112,532	54,535
East Kilbride District	80,000	198,400	49,400	5,390	98,900	—
<b>Midlothian District</b>	80,000	174,230	47,620	500	97,685	4,000
Moray District	79,211	267,450	66,675	12,425	117,700	25,520
Dumbarton District	78,900	246,880	48,370	1,000	125,170	24,000
East Lothian District	78,000	160,150	48,800	4,600	—	60,000
Stirling District	77,000	247,645	54,420	965	94,790	30,000
<b>Argyll District</b>	60,000	—	—	—	—	—
<b>Clydebank District</b>	59,200	190,222	22,250	3,800	71,585	—
<b>Cumbernauld and Kilsyth District</b>	55,000	137,455	25,683	2,381	61,000	—
Lanark District	53,109	172,000	28,790	3,010	90,140	35,000
Eastwood District	50,017	162,810	39,875	3,000	69,880	—
<b>Cumnock and Doon Valley District</b>	49,000	100,628	13,780	2,189	44,000	10,000
Clackmannan District	45,546	66,280	22,000	10,880	33,400	—
<b>Bearsden and Milngavie District</b>	38,000	119,345	35,400	400	58,000	—
<b>Western Isles Islands Council</b>	31,000	55,562	20,000	1,000	28,512	—
<b>Shetland Islands Council</b>	17,853	—	—	—	—	—
<b>Orkney Islands Council</b>	17,254	56,780	16,500	500	30,600	—

\* Source: Scottish Library Association.

† Includes books, binding, and nonbook material.

recommendations with no legal backing. In England and Wales there is a legal obligation upon authorities to provide an adequate library service but no such obligation applies in Scotland.

Nevertheless, local authorities in Scotland have recognized the value of and the need for public libraries, and the entire country from the Shetlands to the Solway is covered by a network of rate-supported public libraries. Each library authority caters in its own way for the needs of its public.

The first mobile library was operating in Perthshire in 1920. The advantages of such provision in rural areas were soon recognized, and mobile libraries became an integral part of county library service. Edinburgh was the first urban area to use mobile libraries, in 1949, followed by Aberdeen.

Glasgow, in 1916, was the first British city (other than London) to open a Commercial Library as a department of its library service (36). It is also the Scottish depository library for patents specifications.

The introduction of the lending of gramophone records was pioneered in Scotland by Motherwell, and most library authorities now operate a lending service for records and tapes.

Arrangements for services to the disadvantaged—that is, the blind, hospital patients, prisoners, residents in homes for the aged, and the housebound—have been made by certain libraries, but the pattern of such provision is still erratic.

One of the most significant developments has been in work with young people. The establishment of children's departments in many libraries and the training of staff as children's librarians have encouraged a new approach to interesting children in books through projects of many kinds (37). This supplements the work of the school librarian.

Cooperation among libraries of all types has long existed on an informal basis. Formal cooperative schemes have been established in certain areas and all libraries participate in the national interloan scheme. This scheme originated in Scotland with the establishment in 1921 of the Central Library for Students by the Carnegie United Kingdom Trust, which was modeled on that in London for the provision of technical and specialized literature which individual county libraries were unable to acquire. Although this service was initially restricted to the counties, it was extended in 1923 to cover all libraries. Out of this emerged the Scottish Central Library, which the trust established in new headquarters in the Lawnmarket, Edinburgh, in 1953. Although the interlending of books between public libraries had been practiced for many years, it was not until the Public Library (Scotland) Act of 1955 that it was legalized. In 1975 the services provided by the Scottish Central Library were taken over by the National Library of Scotland and financed out of government funds. This has opened up new areas of cooperation among all types of libraries in Scotland.

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## SCOTLAND, NATIONAL LIBRARY OF

### History

The National Library of Scotland is successor to the historic Advocates' Library. It has inherited all that library's collections of books and manuscripts with the exception of the law books and manuscripts, to which, however, it has full access.

The Advocates' Library was founded in the late 17th century by the Faculty of Advocates (the Scottish bar) on the initiative of the king's advocate, Sir George Mackenzie of Rosehaugh. At the beginning it was intended to be principally a legal library. But, almost at once, Mackenzie and his fellow advocates found that history, criticism, and rhetoric had to be admitted to a place on the shelves—they were, as Mackenzie called them in his speech at the formal opening of the library in 1689, the handmaidens of jurisprudence—and by the time the first catalog was printed, in 1692, the library was clearly more than the working library of practicing lawyers. In 1710, by an Act of Parliament of Queen Anne entitled "For the Encouragement of Learning," it obtained the right of copyright deposit, and this has been confirmed by succeeding copyright legislation down to the present day. The exercise of the copyright privilege by itself, however, would not have been enough to create more than a reflection of British publishing.

Fortunately, the Faculty of Advocates included at one time or another men like Sir George Mackenzie, Lord Hailes, James Boswell, Lord Kames, and Sir Walter Scott, and in the course of the 18th century the library became, it is not too much to say, one of the intellectual centers of Scotland. Keepers such as Thomas Ruddiman and David Hume—by their administration and by the service they gave not only to faculty members but also to scholars in general—established the library as the national library of Scotland in all but name. Hume initiated a policy of buying the best works of continental scholarship (especially French) to supplement copyright deposit, which culminated in the early 19th century in the purchase of two great collections: the library of the Icelandic scholar Grímur Thorkelin, with its Icelandic and Scandinavian books and manuscripts, and the Spanish library of the noble family of Astorga.

During the 18th and early 19th centuries three independent volumes and a supplement were issued, making up the library's second printed catalog; the third printed catalog, in six volumes and a supplementary volume, begun by Samuel Halkett and completed by J. A. Hjalteín, was published from 1867 to 1879. It contained about 260,000 entries.

From the start, the faculty was concerned to acquire manuscripts, and in 1698 its first large collection, that of Balfour of Denmilne, was purchased. By setting this precedent, too significant to be ignored, the faculty prepared the way for the making of an invaluable collection, particularly of manuscripts illustrating all aspects of Scottish history and the activities of Scotsmen all over the world.

However, the burden of these efforts, added to the copyright privilege, became very great. By the 1820s it was clear (from Sir Walter Scott's *Journal*, for example)

that the problems of policy and administration, maintenance of a steady purchasing policy, and at the same time providing accommodation for the collections, were beginning to be difficult to solve and would eventually become impossible. By the middle of the 19th century it was evident that the private resources of the Faculty of Advocates were insufficient to enable it to run the library on the old scale. Efforts were made to obtain help from the government. Testimony to the work of the library was gathered in support of these efforts. Thomas Carlyle in 1874 declared that essentially the library belonged to Scotland at large and that it fairly deserved all reasonable help and support from whatever called itself a government in that country. But all efforts were unavailing until as late as 1922. In that year the faculty offered to present the library to the state, reserving only its professional collection of legal books and manuscripts. The government, pleading poverty, was unable to accept the offer; it did, however, agree that the reconstitution of the library as a national library was something that ought to be achieved, and as an interim measure it made an annual grant of £2,000. In 1923 Sir Alexander Grant of Forres came forward with £100,000 as a permanent endowment for a national library. The offer of the Faculty of Advocates was accepted, and the transfer of the library to the state took place in 1925 under the National Library of Scotland Act of that year. In 1974 the Scottish Central Library, responsible for interlibrary loans in Scotland and for the maintenance of the Scottish union catalog, merged with the National Library, which assumed its responsibilities.

### **Buildings**

The first home of the Advocates' Library was in a house at the northeast corner of Parliament Close. In 1699, when the problem of space in the first home was becoming acute, the faculty considered whether it should buy the neighboring house of Sir Thomas Hope of Craighall, or build a new, well-contrived library. They came to the conclusion that it was better to have a library built according to the best model and that neither Craighall's nor any other old house designed for a dwelling-house was convenient. A year after this decision had been made, the buildings in Parliament Close were largely destroyed by fire, and the library was saved only by the self-sacrifice of the Keeper, who left his own private possessions to burn while he rescued the books of the faculty.

There is no further word of a specially built library; the faculty turned back to one of its earlier ambitions, to obtain the use of a room under the Parliament Hall, and this time efforts were successful. In 1701 the Faculty of Advocates was granted the use of the south end of the Laigh Parliament Hall, to the fourth stone pillar thereof, the rest of the hall being occupied by Public Records. In 1790, when the records were transferred to the new Register House, the library became sole occupant. It soon came to acquire additional premises, and for a short time it occupied the splendid room which is now the upper hall of the Library of the Society of Writers to the Signet.

In the course of the 19th century the growing library was accommodated piecemeal, and, even before the transfer of the library to the state was completed, it was

agreed that a new building was urgently required, to provide all the facilities expected of a large library. Money was again a difficulty, and again Sir Alexander Grant removed it by giving £100,000 to the government as a building fund, provided the government would match that amount pound for pound. What site the new building should occupy was, for a time about 1930, the subject of great controversy, but the trustees of the library held to their original view that the site should be the one the building occupies today. It has the particular advantage, among others, of being central, not merely for readers but in relation to other libraries. In 1956 the new building, begun in the late 1930s and based on the plans of Dr. Reginald Fairlie, was opened by the Queen (see Figure 1). In 1974 it became necessary to move part of the reference collection of books to an annex and to transfer the Map Room to the same building, situated about a mile away from the main library.

### Constitution

In terms of the National Library of Scotland Act of 1925 (15 and 16 Geo. 5. Ch. 73), the library is governed by a board of trustees, 33 in number, representing principal sections of the Scottish establishment: crown, government, Parliament,

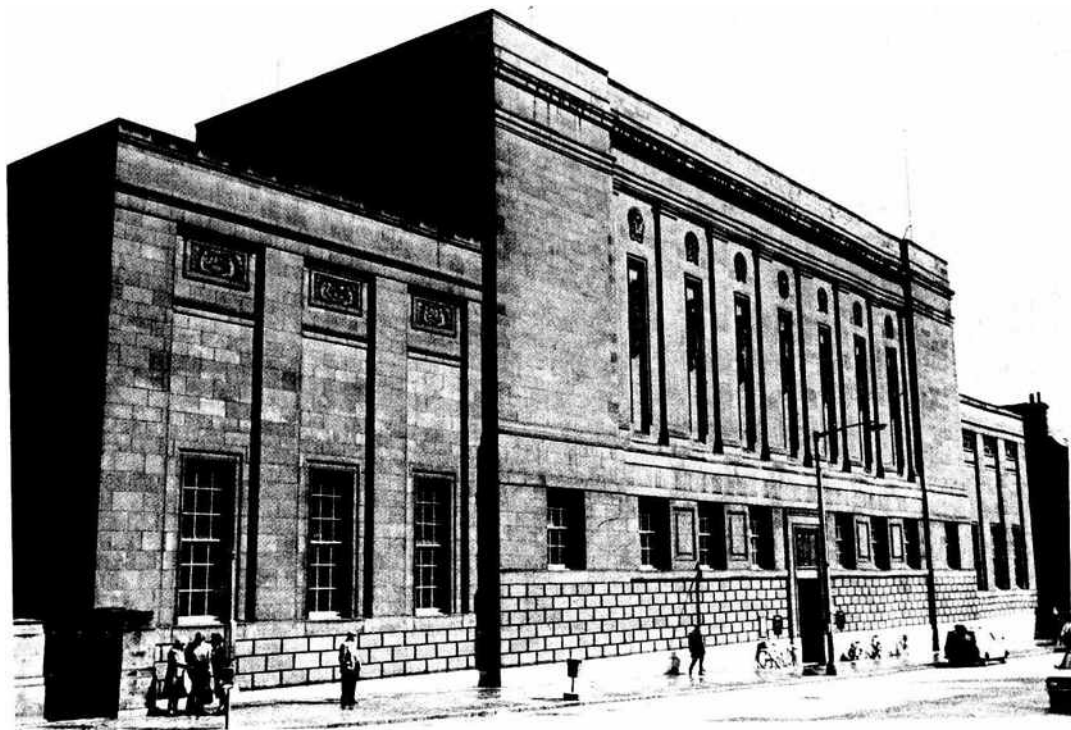


FIGURE 1. *National Library of Scotland. The main building on George IV Bridge, Edinburgh, opened in 1956.*

law, church, local government, universities, and organized labor. The board meets four times a year. It also appoints a number of committees to deal with various aspects of the library's administration and functions. One of these, the Library Cooperation Committee (representing the various classes of libraries in Scotland: academic, special, and public), is responsible for all aspects of library cooperation, particularly the policy of the library's lending services. This committee has been recognized by the secretary of state for Scotland as an advisory body akin to the Library Advisory Councils for England and Wales.

### **Special Characteristics**

Like other large nonspecialist libraries, the National Library of Scotland is an appropriate place for reference and research of any kind that may be undertaken through the medium of the printed book; the catholicity of its accessions of modern books from copyright deposit alone makes it extremely well equipped for this purpose. Its special characteristics derive from its status as a national and copyright deposit library. First, as the national library, with its rich collections of Scottish manuscripts and of books printed in or relating to Scotland, it is preeminently a center of research in all aspects of Scottish literature, history, and culture. Its national status also gives it special responsibility for Scottish bibliography, both historical and current, and for interlibrary lending. Second, because it is one of the British copyright libraries, and because many of its manuscripts are of British rather than purely Scottish significance, it can provide ample material for research in the wider context of Great Britain. Deposit also ensures that it receives and preserves a vast amount of popular or ephemeral material not normally found in other libraries. Finally, it is especially well provided with the literature of foreign countries, although most of its foreign material is limited to European languages and to the humanities.

### **The Collections of Printed Books**

There are now nearly 3 million printed books in the National Library. These include the largest number of Scottish books to be found together in one library, beginning with the only surviving copies of the earliest examples of Scottish printing, the nine tracts printed by Walter Chepman and Andro Myllar in the Southgait of Edinburgh in 1508 (Figure 2). As a result of copyright deposit, the collection of British books as a whole is probably more extensive than that of any library except the British Library and the libraries of the Universities of Oxford and Cambridge. In addition there are the foreign books acquired by the Advocates' Library over a period of nearly two and a half centuries, of which the greatest treasure is an illuminated copy of the Gutenberg Bible (1453-55?), the first fruit of the invention of printing by movable types. Since 1925 foreign books have continued to be acquired in large numbers by donation and purchase.

The ballade of ane right noble victorious & myghty lord Barnard Stewart lord of Aubigny erle of Beaumont roger and bonastre constaloure and chafflane ordinaire to the maill hee maill excellent & maill cryslyn prince Loys king of france knyght of his ordoure Capitane of the heppyn of his body Conquerour of Naples and vniuersible cōfiable general of the saime Comptie be Maister Wyllyam dumbar at the said lordis cōyng to Edinburghe in Scotland sendin ane ryght excellent embassat fra the said maill cryslyn king to our maill Souuerane lord and victorious prince James the ferde kyng of Scottis.

Dubais powder of the dorne & honoure  
Is infynite false & eddis was does  
As in the principall mentiō of the messe  
All thir sayd thingis reforme as thou best thinkest  
Dubis ar degradit for pure pitee redress  
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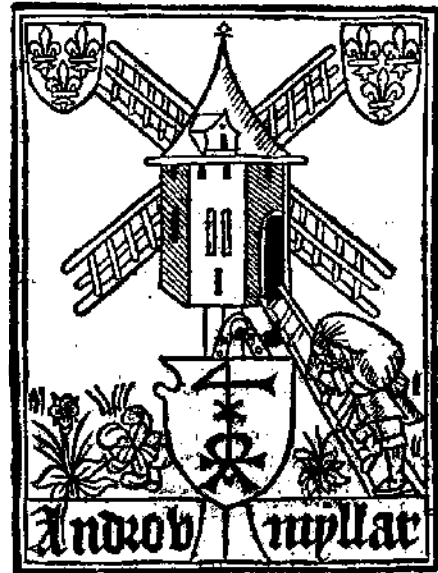


FIGURE 2. *Chepman and Myllar prints, from the National Library of Scotland. The volume contains 11 poetical tracts in unique copies. Nine of them, printed in Edinburgh by Chepman and Myllar in or about 1508, are the earliest known examples of printing done in Scotland.*

## COPYRIGHT DEPOSIT

The privilege of copyright deposit was first granted to the Advocates' Library by an Act of Parliament in 1710. The latest legislative provision is that of the Copyright Act of 1911 (1 and 2 Geo. 5. Ch. 46), Section 15, which was left untouched by the more recent Copyright Act of 1956. By this provision, insofar as it concerns the National Library of Scotland, the publisher of every book published in the United Kingdom must, if written demand is made before the expiration of 12 months after publication, deliver within 1 month of receipt of that demand, to a named depot in London, a copy of the book for use in the library. The term "book" is defined to mean every part of a book, pamphlet, sheet of letterpress, sheet of music, map, plan, chart, or table separately issued. Second or subsequent editions must be delivered only if they contain additions or alterations. Three other libraries, the Bodleian Library (Oxford), Cambridge University Library, and the Library of Trinity College (Dublin), enjoy the same privilege; the British Library



has one that is different in certain respects, and that of the National Library of Wales is slightly less extensive. By reciprocal legislation, British libraries have similar rights in the Republic of Ireland.

British publications obtained by copyright deposit constitute the largest portion of the library's printed books. From the earliest period of deposit, large numbers of books were received and these have increased with the years. However, up to the end of the 19th century and even later, the somewhat different statutory arrangements under which the library had to exercise its privilege, together with a rather more restricted view of what was worthy of preservation, meant that many books were missed. Many of the books missed have since been acquired by gift or purchase, but it would still not be true to say that copies of the entire output of British printing and publishing in the two centuries that followed the 1710 act are to be found in the library.

In more recent times conditions have altered, and current accessions now represent an almost complete coverage of British (and Irish) publications. Copyright deposit includes at present an appreciable number of books that are primarily American publications but have also been published in Great Britain. The guiding policy in the past was to take all scholarly, scientific, and technical periodicals, together with a very extensive selection of popular magazines, but nowadays nearly every new periodical, whatever its intellectual level, is claimed. A large number of newspapers, both national and Scottish local, are received. All music and maps that are due by deposit are taken.

### SPECIAL CLASSES AND COLLECTIONS

The following account of special classes and collections of printed books in the National Library of Scotland can only be selective.

Books printed in Scotland in the 16th and 17th centuries have been collected by the library throughout its history. Their representation was notably increased by two collections: the many books printed in Scotland that are part of the Rosebery Collection, presented by the collector, the fifth earl of Rosebery, in 1927; and by most of the books presented by Dr. F. S. Ferguson in 1954.

The library of St. Mary's College, Blairs, deposited by the trustees of the college in 1974, includes books that survive from the libraries of the Scots Colleges founded on the Continent for the instruction of Scottish Catholic priests after the Reformation. It contains many Scottish books, including a number of early books printed in Scotland, although its chief interest is for Roman Catholic theology and related subjects. The Gray Collection—nearly all bequeathed by John Gray, minister of Aberlady, to his native town, Haddington, in 1729—was deposited by the Town Council in 1961. It contains many 16th- and 17th-century books, mainly of theology, printed in Scotland and England and also abroad. The Grindlay Collection, the library of an Edinburgh merchant of the late 18th century, presented by the Royal High School of Edinburgh in 1964, contains many books printed in Scotland and England in the 18th century and earlier. A substantial part of the Lauriston

Castle Collection, bequeathed by Mr. and Mrs. W. R. Reid of Lauriston Castle in 1926, is of books on Scottish literature, antiquities, and topography, although the collection contains many English and French books also. The collection of chapbooks formed by John A. Fairley represents a very large part of the vast output of inexpensive popular literature that was published and read in the 17th, 18th, and 19th centuries, not only in Scotland but throughout the British Isles.

Two incidents in Scottish history about which much has been written, the Jacobite Risings of 1715 and 1745, are the principal subjects of the Blaikie Collection of Jacobite pamphlets, broadsides, and proclamations, which was presented in 1928. Scottish Gaelic, folklore, and antiquities, and Celtic languages in general are the subjects of the Hew Morrison Collection, bought in 1935; the Blair Collection, presented by the Duke of Atholl in 1958; the Campbell Collection, bequeathed with his manuscripts by John Francis Campbell of Islay in 1885; and the Ossian Collection, presented by J. Norman Methven in 1941. The first two of these collections are mainly of books in Gaelic and other Celtic languages; the Campbell Collection is mostly of books on folklore, folk tales, and poetry; and the Ossian is of editions of and works relating to James MacPherson's *Ossian*, its influence in European literature and the controversy regarding its authenticity. Coming nearer to the present day, the deposited printed papers of a number of trade unions provide material for Scottish labor history.

The general collection of books in English is supplemented by much in the collections already described and in those that follow, but there are a number of special collections that are predominantly of English works. The Hugh Sharp Collection is of first or early editions of many of the classics of English and American literature in copies notable for their fine condition. Of the very greatest value is the Bute Collection of English plays from the 16th to the 19th centuries. The kernel of this collection is made up of copies that belonged to Lady Mary Wortley Montague, but it was built up by her grandson, the first marquess of Bute, and increased by his descendants. This collection was purchased from Major Michael Crichton Stuart in 1956. A smaller collection of English plays was presented by John Maitland Thomson in 1912. These collections, together with the large number of plays in the Halliwell-Phillips and Drummond Collections in Edinburgh University Library, make Edinburgh a major center in which the history of English drama can be studied. The Durdans Collection, selected from the library of the fifth earl of Rosebery at Epsom and bequeathed by his daughter, Lady Sybil Grant, in 1956, contains many books about horses, local history, travel, political affairs, and historical memoirs, and also some notable French classics. The Newbattle Collection, the major portion of the rich library of the marquesses of Lothian, consisting of books in European literature and on the history of the 16th, 17th, and 18th centuries, was bequeathed by the eleventh marquess. Although its books are entered in the library's catalog of printed books, the collection is in the care of the present marquess and books from it can only be consulted upon application made well in advance. Many of the books printed by the private or semiprivate presses that came into existence in the late 19th and early 20th centuries under the stimulus of the ideas of William Morris were statutorily deposited or presented at the time.

They were kept together and form a collection that illustrates very fully the scope of this important movement in the history of printing.

Theology and related subjects are well represented in the general collections and by special collections: in the Blairs, Gray, Jolly, Dowden, Protestant Institute, Cox, Cowan, and Haxton Collections; and by the Dieterichs and Crawford Lutheran tracts.

Foreign books begin with most of the nearly 500 15th-century books now in the library. As early as 1695 the library had received the gift of a collection made up very largely of continental books, the library of Lord George Douglas, presented in memory of the collector by his father, the first marquess of Queensberry. Italian books preponderated in this first special collection, and there are many Italian books in other collections, particularly the Urquhart, Renwick, and Purves Collections (mostly books of the 16th and 17th centuries), and in the McCurdy Collection (on Leonardo da Vinci). It was the 18th-century acquisitions that made French books preeminent, after British books, in the library. There is a high proportion of French books of all periods in some of the large collections acquired in recent years (Lauriston Castle, Durdans, Newbattle). The Nicol Smith Collection, illustrating the relations between French, Italian, and English literature and criticism of the 16th–18th centuries, was presented by Professor David Nichol Smith in 1959. Many French books, including many memoirs of the 18th and 19th centuries, were among the volumes purchased from the library of the late Professor Charles Sarolea in 1954. The Astorga Collection, purchased by the Faculty of Advocates in 1826 on the advice of John Gibson Lockhart, provided a very solid base on which the library's very large and growing Hispanic collection is built.

The Thorkelin Collection, "illustrating the history, literature, and jurisprudence of the northern nations," has been (like the Astorga) the foundation of extensive modern acquisitions in a particular group of languages, in this instance, Scandinavian and Icelandic. German books are represented in the general collection and also by the Lutheran tracts mentioned above. These were purchased in 1819 as part of the enormous collection of over 100,000 university theses and dissertations formed by Count Georg Septimus Dieterichs of Ratisbon.

In special collections, recent bequests of two outstanding collections—the Lloyd and Graham Brown, coupled with a very substantial fund left to maintain and add to the latter—give pride of place to Alpine and mountaineering literature. The library now has printed resources of exceptional importance for the study of that subject.

The history of bookbinding, in particular, is extremely well illustrated by the many fine bindings in the library. These begin with the oldest known Scottish binding (and the oldest British binding signed in full), made for the Haye Manuscript about 1480 by Patrick Lowes (deposited by the Faculty of Advocates as trustees of the Abbotsford Library); and they include a large number of the distinctive Scottish bindings of the 18th century, to which Major J. R. Abbey in 1966 added some notable examples from his collection. Work by contemporary Scottish binders has been commissioned from time to time in order to complete the range of Scottish fine binding represented in the library.

### Maps

The collection comprises the historic collection of the Faculty of Advocates; the maps received by copyright deposit, of which the main source is the Ordnance Survey; and the maps and atlases acquired by donation and purchase. Although its emphasis is on Scottish maps, the collection is also richly equipped with other British and foreign maps, both old and modern. Recent and current acquisitions have now made it possible to provide an almost worldwide coverage of maps in scales that are adequate for most purposes of research, and this coverage is becoming increasingly comprehensive.

Early maps of Scotland begin with the 16th- and 17th-century manuscript maps of Timothy Pont and Robert Gordon, on which the Scottish section of Blaeu's *Atlas* was based, and they include copies of nearly all the printed maps and town plans published down to the beginning of the Ordnance Survey. Among manuscript maps are the Board of Ordnance collection of 18th-century military maps, General Roy's military survey (in photostatic copy), and a growing number of 18th- and 19th-century estate plans in the original or in photographic copy. To the many roadbooks of the 18th and early 19th centuries that the library already possessed, the Newman Collection has been added (acquired from the estate of Professor S. T. M. Newman, Reid Professor of Music in the University of Edinburgh); and this has made the library extraordinarily rich in this kind of material.

### Music

Copyright deposit includes music as well as printed books, and much of the music collected by the Advocates' Library since it began to acquire music in the 1820s was received in this way. The 19th-century copyright music consists mostly of music for solo instruments, drawingroom ballads, and topical songs, with some vocal scores of oratorios, operas, and operettas. Deposited music of the present day ranges from orchestral and vocal scores and chamber music, through educational music for school orchestras and choirs, to dance band arrangements and pop songs. The music collection of John Glen and those of A. W. Inglis and John Murdoch Henderson have made the library appropriately rich in Scottish music. The Inglis Collection contains English as well as Scottish music of the 18th and 19th centuries. The library possesses exceptionally large collections of the printed music of three great composers, the Balfour Handel Collection and the Hopkinson Berlioz and Verdi Collections.

### The Manuscript Collections

Of some 4,000 manuscripts possessed by the Advocates' Library in 1925, three-quarters were transferred to the ownership of the National Library. The law manuscripts, which made up the fourth quarter, were (like the law books) retained by the faculty, but they are housed in the library and are available to readers. Since

1925 manuscripts acquired by gift and purchase have increased the national collection to more than five times its size in that year.

Although the library possesses manuscripts that do not relate to Scotland in any way, the great bulk of its collection is Scottish in one sense or another. However, the collection also has a wider significance. Since many eminent Scotsmen of the 18th, 19th, and 20th centuries whose papers are in the library have been concerned in British literary, social, or political life and in imperial administration or military service in many parts of the world, much of the collection's subject matter has an equal interest for English literature, British history, and the history and culture of other countries. In particular, it contains important material relating to India, Africa, and America.

### ADVOCATES' MANUSCRIPTS

Apart from two important groups (the Scandinavian manuscripts of the Thorkelin Collection and the medieval manuscripts of English and continental provenance), the manuscripts transferred to the library in 1925, now collectively known as the Advocates' Manuscripts, are mostly Scottish. (See Figure 3.) These fall into two broad categories, literary and historical. The former include important texts like the unique "Wallace" by Blind Harry; Barbour's "Bruce"; the Bannatyne anthology; and Scott's "Marmion," "Waverley," and "Redgauntlet." The latter include most of the surviving cartularies of the Scottish religious houses; two collections of state papers of the 16th and 17th centuries (the Balcarres and the Denmilne papers); the papers of the Darien Company; the papers collected and written by Robert Wodrow to document the 17th-century church; the family papers of the Oliphants of Gask and of the Dundases of Dundas; the papers of Sir George Murray, Wellington's quartermaster-general in the Peninsula; and many papers of genealogical and antiquarian content, with which the names of Sibbald, Chalmers, Paton, Riddell, and Macfarlane are associated. Belonging to both these categories are the Gaelic manuscripts, including early texts, among them the "Book of the Dean of Lismore," and the texts of folk tales collected by John Francis Campbell of Islay. The law manuscripts deposited by the faculty comprise a unique collection of material bearing on the development of a code of law and a legal system in Scotland. They range from early manuscripts of medieval texts like "Regiam Majestatem" to contemporary copies of the classic statements of the institutes of Scots Law of the 17th and 18th centuries by jurists such as Stair, Mackenzie, and Baron Hume.

### MANUSCRIPTS ACQUIRED SINCE 1925

Among manuscripts acquired since 1925 there are some medieval manuscripts, but the main concern of the Manuscript Department has been with Scottish manuscripts in the widest possible sense—that is to say, manuscripts written by Scotsmen; manuscripts written in Scotland, whatever the subject; and manuscripts written about Scotland and Scottish affairs, whether by Scotsmen or not. Scottish authors who are now well represented in the department by their works and corre-

lay sont ceux d'avez l'ambro sans voir dire  
 pour une d'orne qui a esté nommée tres chrestienne  
 ce meurt chatoilue desnece de toutz les biens  
 devant a mon filz ce le vous recommande autant  
 quel le méritera car se quez vous respondre  
 par pris la parbesse le vous envoie de quel  
 prieres vous pour la tante vous la desirant  
 par sainte amme seigneurie Monquie vous les  
 receparez comme de vostre tres affectionnée  
 belle seur mourante ce vous rendant témoignage  
 de son bon cuer ce vous vous redonne recommande  
 encore mes services vous redonne si il vous  
 plaît que pour mon ame ce soit parue de  
 parfy de ce que me de bien - c'est d'iceu l'heure  
 de freres Corist le quel ie prouvé de mayn a  
 ma mort pour vous me laissez de quel fonder  
 un obit ce faire ces amonnes requises  
 ce mercredi a deux heures apres midi

Vostre tres affectionnée et bien  
 bonne seur M. M. R.

FIGURE 3. Letter of Mary, Queen of Scots, to Henry III of France, written a few hours before her execution, 1587. From the National Library of Scotland.

spondence are Drummond of Hawthornden, David Hume, Burns, Stevenson, Barrie, George Douglas Brown, and many poets and novelists of the present day. The papers and correspondence of Sir Walter Scott and his circle and of Thomas and Jane Carlyle in particular are unrivaled in extent and completeness. Besides the creative writers, there are collections on scholars and men of letters such as William Robertson (the historian), Principal John Lee, John Hill Burton, John Stuart Blackie, Sir Herbert Grierson, David Nichol Smith, and John Dover Wilson.

Among men of action and affairs whose papers are now in the library (most of them as nearly as possible complete) are Henry Dundas (first Viscount Melville), Sir Robert Liston, Lord Stuart de Rothesay, David Livingstone, the fifth Earl of Rosebery, and Viscount Haldane. The papers of other men of affairs—some, like those already mentioned, of great eminence, others of more modest achievement but hardly less important for the study of history—are part of their family archives. These include correspondence within and beyond the family, diaries, commonplace-books, travel journals, maps and sketches, lecture notes, domestic account books, recipes, music, and (of great significance for economic history) extensive records of estate management and of business ventures. Such collections are too numerous to be listed individually here, but the papers of the Elliots of Minto, the Hays of Yester, and the Fletchers of Saltoun are perhaps worthy of special mention. The Scot abroad, already well represented in such family collections, is also exemplified by Charles Steuart, receiver-general of the American Board of Customs; by sailors such as Admiral Sir Alexander Forrester Inglis Cochrane and his son; and by soldiers such as Lord Lynedoch, General Sir George Brown, and the first Earl Haig.

In addition to the papers of individuals and families, there are also institutional and business archives. These include: the letter-books of the Church of Scotland Foreign Mission Committee up to 1929; the papers of the cloth manufactory of William Wilson of Bannockburn; the records of the Kinleith paper mill; and the papers of many trade unions, friendly societies, and cooperative societies. Among important archives relating to publishing, the Blackwood and the Oliver and Boyd papers reflect a wide range of literary, social, and political activity throughout the 19th and into the 20th century.

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NATIONAL LIBRARY OF SCOTLAND STAFF

## SCOTLAND. UNIVERSITY OF STRATHCLYDE, DEPARTMENT OF LIBRARIANSHIP

The Department of Librarianship was established in the University of Strathclyde in 1964, when the Royal College of Science and Technology and the Scottish College of Commerce merged to form the second university in Glasgow. The department had its origins in the Scottish School of Librarianship, one of the original schools promoted by the Library Association in 1946; and at that time it was part of the Glasgow and West of Scotland Commercial College, which became the Scottish College of Commerce in 1956.

Like all the other early schools, it prepared students for the examinations of the Library Association. The courses consisted of 1 year's study leading to the Registration Examination and 1 further year of study for the Final Examination; these qualified students, respectively, for the Associateship and the Fellowship of the Association, after appropriate practical experience had been completed. The first head of the Scottish School was William B. Paton, who left in 1950 to become the county librarian of Lanarkshire, and who, on his retirement from that post in 1972, returned to the department as visiting professor. He was succeeded in 1950 by William E. Tyler. Since 1970, when the chair in librarianship at the university was established, Tyler has been professor and head of department. He was also, from August 1972 until July 1978, dean of the School of Arts and Social Studies, of which the department is a member.

It was as a result of the changes which took place in higher education in the United Kingdom in the early 1960s, following the proposals of the Robbins Committee, that the two colleges were joined to form the University of Strathclyde. The School of Librarianship, which had existed in that form for almost 20 years, became the Department of Librarianship, and thereafter its character changed radically. The courses related to the Library Association syllabus and examinations were withdrawn, and new degree and postgraduate courses were established in their place. The undergraduate courses leading to the award of Bachelor of Arts were the first degree courses in the United Kingdom to include librarianship as a principal subject, and they were the first to be approved by the Library Association as an alternative to its own examinations qualifying for the Associateship of the Association. Similar approval was given at the same time to the course leading to the award of the Postgraduate Diploma in Librarianship. From 1967 onward the department has also offered a research program for master's degrees and Ph.D.'s, and so far over 30 higher degrees have been awarded to students preparing on a full-time or part-time basis.

The courses offered at the undergraduate level follow the pattern which is in operation throughout all the departments of the School of Arts and Social Studies. Entry in the first year is to the school, and it is not until the second year that students are attached to the departments in which they will pursue their principal subjects. In the first year, students take a general course of five classes chosen from the basic classes offered by departments. Thereafter the classes are selected



from those of two departments, one of which is the Department of Librarianship, and these become the principal subject areas. This combination of principal subjects continues into the third year for Pass Degree students and into the fourth year for Honors students. The choice of academic subjects is wide, and librarianship may be linked with any other academic study within the school, including English Studies, Philosophy, Psychology, Modern or Economic History, Geography, Sociology, Politics, Economics, Administration, Communication Studies, French, German, Italian, Spanish, and Russian. At present there is no combination with any of the science or technology subjects at the principal subject level, though certain individual classes may be taken, and such recruitment is achieved through the Postgraduate Diploma course.

In the undergraduate courses there is no attempt to relate the academic studies specifically to those areas of librarianship where they might seem appropriate. It has been the policy of the department throughout to allow librarianship students to pursue the academic side of their training as fully as those taking these studies as their major principal subjects, so that they may be as richly qualified in academic areas as all those who study them. It is felt that they may then draw upon a much wider experience in relating these studies in their future practice of librarianship. On the other hand, Bibliographic Studies, which begin as a general study in the first year, are later related to the academic principal subjects chosen by students, and this produces a very full and intensive coverage of both general and specialized bibliography. Courses in Management of Libraries and Organization of Knowledge are sequential, moving from general to specific areas of study, until in the Honors year students take advanced classes in two of the three main areas of study: Comparative Studies in the Management of Libraries, Advanced Bibliography and Analytical and Descriptive Bibliography, and Information Retrieval.

The department is fortunate in enjoying the wide facilities offered by a large and expanding university. There are good library, computer, and audiovisual services upon which it may draw, and in addition there are a large number of varied library services within the Central Belt of Scotland which provide opportunities for practical experience.

The course leading to the Postgraduate Diploma in Librarianship, which may be awarded *simpliciter* or with distinction, is a 1-year course which offers the same coverage and specialization as in the librarianship classes at the undergraduate level, but on a much more intensive basis.

In both undergraduate and postgraduate courses, final examinations and course work and projects are assessed, and Honors students must also present a dissertation on an approved topic. For higher degrees the thesis is examined by an appointed external examiner, who also conducts a viva voce examination before the award is made. Entry to both undergraduate and postgraduate courses is highly competitive. Since entry at the undergraduate level is to the school and not the department in the first year, candidates wishing to take librarianship as a principal subject must compete for places with all candidates wishing to enter the school, no matter what special area of study they wish to pursue. In the post-

graduate courses, the candidature is such that only one in eight applicants gains entry. The effect has been to raise the standard of entry to librarianship courses far beyond what was generally achieved prior to 1964.

W. E. TYLER

## **THE SCOTTISH ARTS COUNCIL**

The Scottish Arts Council is the government's main agency for supporting the arts in Scotland. From 1947 until 1967 it was the Scottish Committee of the Arts Council of Great Britain, which is an independent body and not a branch of the Civil Service. In 1967 it became the Scottish Arts Council, with a council of its own and virtual autonomy over the allocation of its block grant-in-aid. It still forms part of the Arts Council of Great Britain, however, and shares the aims of its Royal Charter:

- To develop and improve the knowledge, understanding and practice of the arts;
- To increase the accessibility of the arts to the public throughout Great Britain; and
- To advise and co-operate with government departments, local authorities and other bodies on any matters concerned directly or indirectly with these objects.

Government patronage of the arts thus started on a British basis, and substantial devolution later occurred with the Arts Council of Great Britain itself.

The Scottish Arts Council consists of 22 members appointed by the Arts Council of Great Britain, subject to the approval of the secretary of state for Scotland. The chairman and members of the Arts Council of Great Britain are themselves appointed for a period not exceeding 5 years by the secretary of state for education and science, after consultation with the secretaries of state for Scotland and Wales. The chairman of the Scottish Arts Council is appointed by the Arts Council of Great Britain from among its own membership, again subject to the approval of the secretary of state for Scotland. Currently two other Arts Council of Great Britain members are also members of the Scottish Arts Council. It is important to note that members of the Scottish Arts Council are appointed for their personal knowledge and experience of the arts, not as representatives of any interests, groups, or organizations. No payment is made to them for their services, which include, besides the council itself, membership in at least one of the council's committees. The council is continuously advised in the various art forms by specialist panels and committees, composed predominantly but not exclusively of council members. The professional staff is headed by a director, who is assisted by a deputy director and four art-form directors (of art, music, drama, and literature), each of whom has a small staff.

### Council Policies on Support to the Arts

Although the policies of the Scottish Arts Council differ in some respects from those of the Arts Council of Great Britain, much of the underlying policy is common. When the Arts Council of Great Britain was established in 1945 as a result of efforts by Lord Keynes, it owed a great deal of its rationale to the success of the wartime CEMA (Council for the Encouragement of Music and the Arts), whose twofold objective was to provide the people of Great Britain with opportunities to see and hear great works of art, and to contrive a framework in which artists could continue to work in wartime. It was an imaginative and farsighted step of direct intervention, achieving high standards and causing a genuine lift in morale. Although the practical methods used to achieve the objectives changed fundamentally soon after the establishment of the Arts Council of Great Britain, the CEMA philosophy has remained a powerful influence over policy. The change in question was from direct promotion of arts events to indirect influence through the support of independent organizations: "Most of the Council's funds are used as subsidies for independent arts-promoting bodies" (1).

However the means altered, the objectives remained comparable: to ensure that the arts were practiced and performed according to a high standard, and that they were made available to the public. It follows from this that most attention has been paid to the professional artist and, above all, to the professional arts-producing and arts-promoting organizations: "The Council's policy is to have regard mainly to the professional aspects of the arts. Its work is therefore largely concerned with the subsidising of professional arts activities to which the public has access" (1).

Like the Arts Council of Great Britain, the Scottish Arts Council works mainly through support of independent organizations and individual artists. Some major institutions receive annual revenue grants to enable them to carry on a full year's work on a continuing basis, other organizations are assisted for specific projects. Creative artists—authors, poets, painters, sculptors, playwrights, designers, directors—are awarded bursaries (grants) or are helped by means of commissioning schemes.

There is an important exception (again like the Arts Council of Great Britain) to the Scottish Arts Council's principle of working through other agencies: the mounting and promotion of exhibitions.

The policy of working indirectly and/or responding to initiatives of the various independent agencies active in the field has enabled the Scottish Arts Council to produce extremely good value for its money. The following represent by no means the sum of the output of the Scottish Arts Council's grant-in-aid: the seven professional repertory theater companies; the Scottish National Orchestra; the Scottish Philharmonic Society with its three orchestral combinations; the Scottish Opera; the Scottish Ballet; the Edinburgh Festival; major arts centers at Stirling, Kirkcaldy, and Inverness; 175 music clubs and arts-promoting societies scattered throughout Scotland; 25 or so touring exhibitions a year; and the publication of many books and magazines of new Scottish writing. They amount to an achievement which, it is safe to say, well justifies the investment and the rationale. Any analysis of the subsidy

given to arts organizations in Scotland, and in Britain as a whole, demonstrates how cheaply the taxpayer is still getting his or her principal arts amenities.

The professional arts depend upon an axis, represented by the art work itself, between two groups of people: the producers (creative and interpretative artists) and the consumers (audience, exhibition attenders, readers, purchasers of works of art or tickets to attend performances). The Scottish Arts Council has seen the business of arts patronage primarily as supporting the organizations which bring these two groups together, and for this reason it has concentrated the greater part of its human and financial resources on subsidizing the intermediary agencies: the producing and promoting companies. The more complex the operation (running a festival or a theater, opera, ballet, or orchestral company is a very complex operation, indeed), the more substantial the management organization needs to be, and the more insistent are its demands upon the Scottish Arts Council's financial support.

In addition to giving increasing support to the performing arts (some 60% of its annual budget), the council has in recent years turned its attention to the problems facing the individual creative artist. As well as helping to maintain galleries in Glasgow and in Edinburgh, the council's art department gives considerable assistance to the contemporary artist by holding exhibitions and by purchasing works of art for public collections. There has been a flowering of opportunity in Scotland for visual and plastic artists to create their work and to have it on public display. Ten years ago this would have been impossible, as patronage of the artist tended to lie in the hands of individual private galleries.

The same is true of the book world. Up until the 1960s the publisher's greatest patron was the librarian. Unless a reasonable sale to public and to institutional libraries was available, a book of literary quality would not be worth publishing. The large-scale library and educational cutbacks have meant that many works of literature are now in danger of not being published, and a whole sector of literary publishing is placed in jeopardy. At the same time, academic books, especially those of minority interest, become more risky propositions for publishers faced with the spectre of ever-rising production costs.

The Scottish Arts Council's literature department was established as a department within the council in 1971 with a budget of £23,000. Its mandate was to discover ways and means of assisting contemporary Scottish writing, both its publication and its distribution. In 1977 the literature budget had risen to £208,000. The following sections discuss the main areas of expenditure.

### **Areas of Council Expenditures for Literature**

#### **THE WRITER**

The writer is the main cog in the council's work of patronage for literature in Scotland. A substantial sum of money is set aside each year to give bursaries to writers to enable them to concentrate on their work or to complete projects. Some

80 bursaries have been awarded and a wide variety of writers, poets, novelists, and critics have been assisted.

Writers Fellowships are maintained at the Universities of Dundee, Edinburgh, and Glasgow. They allow the writer a year's employment in a dignified ambience, where they can hold workshops, seminars, and creative writing classes. There is also a Writers in Schools scheme, operated by the council in association with the Scottish Education Department, which gives writers the opportunity of working in secondary schools throughout the country.

Book Awards of £400 each are awarded annually to books of literary merit published by Scottish authors or writers resident in Scotland. It has been the custom of the council to give special awards or honors to those writers who have added distinction to Scottish letters, for example, poets such as Hugh MacDiarmid and Sydney Goodsir Smith.

### THE PUBLISHER

Support for the writer is meaningless if the work that is written is not published. The council therefore supports eight literary magazines, each with a different editorial viewpoint and each with a different readership. Due to the cutbacks in library expenditure, the council has cooperated with the library authorities by giving free subscriptions to these magazines to selected public and college libraries in Scotland.

Books of cultural interest which may be commercial risks can receive grants from the council. Publishers may apply for grants covering up to 40% of their production costs. These grants enable the book to be published, often at a more attractive selling price.

Publishing in Scotland suffered a decline after its heighday in the 19th century, when firms like Blackwood and Chambers were still active general publishers. There has, however, been a substantial growth of new publishing houses in Scotland that are able to produce a wide range and variety of books, and in 1974 they formed a professional body, the Scottish General Publishers Association. The association is responsible for acting as a liaison group, and under its auspices several publishers have attended international book fairs to sell the rights to Scottish books.

### GAELIC

A recent census report (Census 1971, Scotland, Gaelic, HMSO, 1975) shows that there were 89,000 Gaelic speakers in Scotland in 1971. Although this represents only 2% of the population, the literature of that language continues to thrive. The council apportions some 12% of its annual literature budget for the support of organizations which promote the language and its literature.

The principal organization is the Gaelic Books Council, which was formed in 1968 to encourage the publication of new and out-of-print books in Gaelic. It also operates a mobile book shop in the areas of Scotland (the western islands and the northwest mainland) where Gaelic is still spoken.

The council also cooperates with other bodies working in the area of Gaelic

studies, such as An Comunn Gaidhealach, the School of Scottish Studies, and the BBC.

### THE PUBLIC

Many writers enjoy the opportunity of talking about their work in public. Poetry readings and literary discussions are popular in Scotland and many are staged with the council's support. The National Book League in Scotland is also active in this field and it puts on several exhibitions of books for educational use as well as organizing "Meet the Author" seminars and literary festivals.

The reading public, too, benefits from the wide availability of books and magazines which have been published at economy prices, as noted in the section on publishers.

### INTERNATIONAL

The council has long felt that it should maintain contact with similar bodies in other countries. It is hoped that a Scottish/Canadian Fellowship can be founded jointly with the Canada Council. During the past several years, writers from several countries have visited Scotland as the guests of the council, and at the same time, Scottish writers have been given the opportunity to travel abroad to attend conferences or to complete research projects.

The major Scottish international prize, the Neil Gunn Fellowship, is awarded by the Scottish Arts Council every 2 years to novelists of international distinction. It is named after the late Neil M. Gunn (1891–1973), and it has been awarded to Heinrich Böll (1973), Chinua Achebe (1975), and Saul Bellow (1977).

### Conclusions

Patronage of the arts, once in the hands of wealthy individuals and the prerogative of the nobility and industrialists, is now in the hands of national expenditure. The Scottish Arts Council, however, does not exist in isolation, and although it receives its annual grant from the government, it is not the only body to spend money on the arts. The central government funds the national libraries, museums, and art galleries. Local authorities, in addition to aiding the arts through libraries and education, play a substantial part in funding the performing arts, in partnership with the Arts Council.

There is a continuing necessity not only to fund the arts but also to make the arts available to the widest possible audience. The clearest statement of the importance of the arts in society is contained in *The Gulbenkian Report on Help for the Arts*:

The arts represent much of the finest achievement of the human spirit in all ages. Enjoyment of the arts is not confined to those who have themselves outstanding

artistic gifts: it is something which in varying degrees brings insight, delight and pleasure to countless men and women. We believe that this latent power of enjoyment is far more widespread than are the opportunities for awakening it and that when awakened it can open channels of communication between individuals and groups who share few intellectual or social sympathies and who are unsuspecting of the powers which they possess (2).

The work of the Scottish Arts Council, whether it be involved in the production of grand opera or in a poetry reading in a remote village hall, should be seen in that particular context.

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2. *The Gulbenkian Report*, p. 63.

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TREVOR ROYLE

## SCOTTISH BOOKBINDING

The history of Scottish bookbinding is the most unusual in Western Europe in that it begins with a definite date and the examples begin with a masterpiece. The date is 1432, shown in an inventory of the library of Glasgow Cathedral where it was noted that one of the volumes was being bound by Richard Air, evidently a cleric, since he was referred to as "Dominus." Another clerical binder of the century whose name is known, James Chalmer, clerk of the Chapel Royal, was paid £10 15s in 1460 for repairing the books of the chapel.

The earliest surviving binding accepted as Scottish is on the Haye Manuscript,

which is now in the National Library of Scotland and was at one time owned by Sir Walter Scott. The manuscript is a translation of three medieval works into Scots by Sir William Haye. It is dated 1456, but was probably bound about 30 years later. (See Figure 1.) The binding, most of which has survived, is now mounted on a much later binding. It was originally decorated with no fewer than 33 stamps (the 12 apostles, nine word stamps, and sacred and other stamps). These are arranged in a pattern consisting of a central rectangle of closely massed stamps, surrounded by a wide border largely left plain except for a few scat-

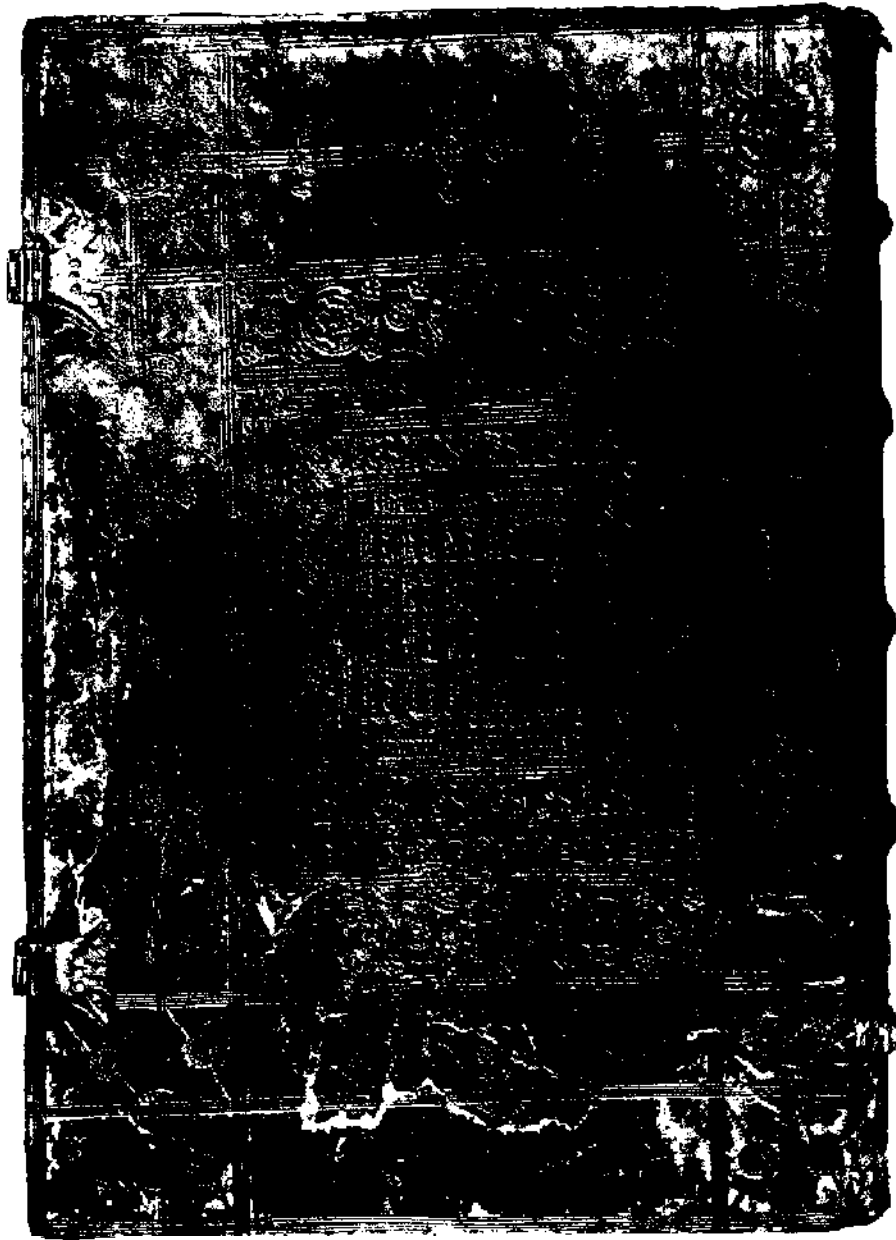


FIGURE 1. *Binding by Patrick Lowes, about 1485.*



tered stamps. G. D. Hobson has shown that this type of decoration originated in Erfurt or Cologne and that the tools came from Erfurt. Among the name stamps are three with the words *Patricius — Lowes me — ligavit*, that is, Patrick Lowes bound me. Patrick Lowes was also a cleric. Apart from the fact that this is the earliest Scottish binding, it is of unique interest in that it is the only fully signed binding executed in the British Isles before 1500, and it is the only 15th-century European binding decorated with as many as 33 stamps. In Aberdeen University Library there is what may be another binding by Patrick Lowes, on a volume printed in Cologne in 1479. The original calf of this binding, now mounted on a 19th-century Aberdeen binding, is decorated with 14 tools, nine of which appear on the Patrick Lowes binding. Unfortunately, the stamps bearing the name of Patrick Lowes are not included.

What is perhaps a Scottish binding occurs on the *Burgh Court Book of Dunfermline* for 1488–1584, a folio bound in calf over a washleather lining and an inner vellum cover. The binding itself is of the “blank-book” type, with (originally) a flap over the fore edge and a strap and buckle meeting over the upper cover. Only this cover is decorated in blind, in a unique way, with three stamps. Each is a segment of a circle 90 millimeters deep: the Virgin and Child between St. Barbara and St. Catherine, the Adoration of the Magi, and a mysterious stamp showing a fireside scene with a dog stealing a chicken from a spit while a woman sitting beside the fire is asleep.

Also dating from the last quarter of the 15th century is a binding on a volume containing three works printed in the Netherlands about 1475, now in Cambridge University Library. Known as the Henry Barry binding, from the original owner, it is of black leather on wooden boards. The blind decoration consists of a rectangle divided by double fillets into lozenge compartments, in each of which is a conventional flower, a type of design common on contemporary Netherlandish, Lower Rhine, and English bindings. A similar design is seen on a volume of Duns Scotus (Venice, 1505), which has been in Aberdeen (now in the University Library) since 1507, and which the author believes was bound there. This is also in black calf on wooden boards, and in each lozenge compartment is one of five flower or leaf tools, rather crudely cut, perhaps from wood or ivory. Of the same type is a binding in St. Andrews University Library, on a book printed in Basel in 1539. Five floral tools are used on this binding, one of them a thistle.

It is a curious fact that Scottish binders have not used panel stamps, except for two examples: One is on a book printed in Paris in 1501 and now in St. Andrews University Library. Again the binding is black calf on wooden boards, decorated with a panel stamp of the Crucifixion flanked by the Virgin Mary and St. John. Internal evidence (now gone) showed this to be of local origin. The only other panel stamp is floral, on the King's College, Aberdeen, *Album Amicorum* of 1640.

During the early years of the 16th century three binders were recorded as working for King James IV: William Bonkil, David Traill, and an anonymous monk of Culross in Fife, all clerics. Royal accounts from later in the century contain details of a number of embroidered bindings for King James V and his queen, but none of these have survived.

Armorial stamps for a number of Scots, mostly clerics, appear in the middle of the 16th century, but the bindings on which they are used appear to be French, probably Parisian. However, the earliest mention of a bookstamp for a Scot appears to be that of one for Bishop William Elphinstone of Aberdeen, who died in 1515. But in the entry referring to it in an inventory of St. Machar's Cathedral, dated 1549, it is not clear whether the bishop's arms appeared on the binding itself or on the clasp. A fairly well-known monogram of reversed *M*'s and a Greek  $\Phi$  is often said to be used on books belonging to Mary Queen of Scots; however, this cannot be so, since it is known on books printed between 1580 and 1695.

A binding with the arms of Mary Queen of Scots is on a copy of the *Actis of the Realme of Scotland* (Edinburgh, 1566), now in the British Museum. The arms were originally in gold and colors; but they are a copy of the arms on the title page, and it is doubtful if the volume ever belonged to Mary.

Generally accepted as Scottish is a binding executed for King James VI on a manuscript of *Ane Abbregement of Roland Furious* (ca. 1585), by John Stewart of Baldynneis. This is elaborately gilt with small tools with an outer frame and inner frames with right-angled ornaments at the corners; in the center are the crowned initials IR surrounded by a wheel design, with a semis of very small trefoils filling the area between that and the frames. A manuscript note states that "King James ye first Brought this Book with him out of Scotland." One English expert thinks it more likely that the binding was executed in London or in France, but H. M. Nixon has stated that "Wherever it was bound, it was not in England, and it does not look French either."\*

During the last quarter of the 16th century a binder (whom the author has called "the Shield Binder"), who apparently worked in Edinburgh, showed for the first time certain characteristics which remained typically Scottish until well into the following century. He owned four roll tools: two of Renaissance ornament, a diaper roll, and a foliage roll. He applied these in a formula of once at the sides and twice at the head and foot, or twice at the sides and thrice at head and foot, a formula which had been used earlier in Cologne. He bevelled some of his boards on the outside, but he also had a trick of bevelling some of his boards on the inside only and of running a tool up the bevel.

The Reformation reached Scotland in 1560 and its effect was quickly seen in bookbinding, as the monastic or clerical binder disappeared and his place was taken by the professional binder, usually a burgess or guild brother of his town and often a printer and bookseller as well as a binder. Most of the binders of the latter part of the 16th century worked in Edinburgh, which then assumed the leading position in the craft that it has held ever since. Among the binders whose names are known were Robert Lekprevick, Thomas Bassandyne, Andro Hart, and Francis Van Hagen. Binders who were burgesses were jealous of their rights: two foreign binders, one French and one English, were proceeded against in 1580. The Frenchman, Thomas Vautrollier, returned to London, but the English-

\* The opinions of H. M. Nixon quoted in this article were expressed to the author verbally during the Historical Binding Course arranged by the Standing Conference of National and University Libraries held in the Bodleian Library, Oxford, in September 1970.

man, Robert Woodhouse, became a naturalized Scot and continued to work in Edinburgh until his death in 1632.

The name of Andro Hart, printer and binder, seems to be associated with a type of binding consisting of a centerpiece and cornerpieces, the rest of the cover being filled with a semis of small tools; on one such binding the edges are gauffed in a design which includes a heart, recalling the printer's punning device of a capital *A* and a heart. The Shield Binder's formula of once or twice at the sides, twice or thrice at head and foot to form a series of concentric frames is seen on many bindings of the late 16th and early 17th centuries. On some of these there are particularly attractive and well-engraved roll tools, including hunting scenes.

A simple but effective form of decoration is seen on a number of volumes bound in Edinburgh between 1618 and 1630, either in the library of William Drummond of Hawthornden or associated with him. This consists of a frame of a fillet with an ornament at each outer corner, with an oval ornament in the center; the decoration is in gold.

Two bindings (on volumes originally the property of Aberdeenshire owners) should be mentioned, as they may show that gold tooling was being done in Aberdeen in 1611 and 1612. The binding dated 1611 is on a songbook bound for Alexander Forbes of Tolquhon and bearing his initials; these and the letters of the word *Cantus* have dots in the serifs, which are also found on other Aberdeen bindings which are mentioned later. The other binding (now in the U.S. Library of Congress) is on a manuscript collection of poems collected by David Melvill in 1612. It later belonged to Robert Ogilvie, whose name appears on the covers. The main decoration is an oval medallion of Justice on the upper cover and a similar medallion of Lucrece on the lower.

Dating from 1621 or shortly afterward is another very elaborate binding recalling the Stewart of Baldynneis binding already mentioned. The 1621 binding is on a copy of the *Acts of the 23rd Parliament of James VI* of that year, now in the National Library of Scotland. It is of brown calf on pulp boards, with four bands and two ties. The endpapers and pastedowns are of the same paper as that on which the book is printed. The gold decoration is very elaborate: there is an outer frame of small stamps flanked by an indented fillet, and an inner frame of small tools and a continuous series of lozenges originally stained with copperas; at each corner of the central panel is a series of tools making a corner ornament, and in the center they are used to make a circular ornament. The rest of the panel is filled with a semis of quatrefoils and dots. In spite of the fact that the endpapers are of the same paper as that used in the book itself, some authorities do not agree with the ascription of this binding to Edinburgh, mainly on the ground that it is too elaborate; but, again according to H. M. Nixon: "It is certainly not English."

By far the greatest number of bindings which can be associated with one binder at this period are those done by Francis Van Hagen in Aberdeen between 1626 (the date of a manuscript inscription in one of his bindings) and 1636. He may have been a son of the Francis Van Hagen already mentioned, who worked in Edinburgh at least from 1585 until the early years of the 17th century. The younger Francis first appears in the records of Aberdeen in 1628 when he rented a shop,

and he seems to have died before 1637, when the shop was tenanted by his son Peter. He bound books for the library of Marischal College (The Toun's College), as entries in the accounts show, and for other owners including King's College (until 1860 these were two separate universities).

No fewer than 120 Van Hagen bindings are known, most of them in Aberdeen University Library. Most are in leather, a few in vellum. All are blind tooled with one or more of the three roll tools which he owned (a bird-bee-flower roll which recalls one belonging to John Reynes, the London binder of the previous century; a cresting roll; and a narrow diaper roll), and the contraction **ABD** appears on the books he bound for Marischal College. These letters show the dots in the serifs seen on the 1611 Cantus binding already mentioned, making one wonder if Van Hagen obtained them when he went to Aberdeen. (See Figure 2.)

The pattern of the application of rolls on many of the bindings recalls that on the Shield Binder's work (already mentioned), and Van Hagen uses the same trick of bevelling the boards on the underside only and running a roll tool along the bevel. It is therefore possible that the Shield Binder was the elder Francis Van Hagen. The younger Francis apparently died about 1636, but various members of his family are mentioned in the town records until 1669 (when his widow, Isobel Spens, was burned at the stake as a witch) and until 1673 (when Patrick Van Hagen, his grandson, left Aberdeen for Edinburgh as an apprentice stationer).

Bindings of the second half of the 17th century that are known to the author have little originality, the decoration consisting for the most part of a frame of a roll tool with corner ornaments, usually gilt. However, in the 18th century a remarkable transformation took place in Edinburgh; binders between the beginning of the century and 1720 began to use morocco leather stained red, green, or black, and tooled in gold. Most of the bindings were decorated simply with a frame of a roll tool, usually floral; but many of them, particularly on Bibles and on presentation copies of medical or legal theses for Edinburgh University degrees, were decorated much more elaborately in one of two styles, known as the "wheel" and "herringbone" designs.

The wheel bindings are a development of the "fan" bindings produced during the previous century on the Continent; these had a circular design made up of small tools in the center of the cover with quarter circles in the corners. However, in most of the Edinburgh bindings, the quarter circles are replaced by sprays of leafwork and the central wheel is much larger, occupying most of the cover. (See Figure 3.) There are many variations of the herringbone design, but the essential part is a vertical line with lines, or floral or leafwork tools, projecting from it on both sides. (See Figure 4.) Occasionally the central vertical line is replaced by interlinked circles, or the line and the projecting leaves may be bounded by a lozenge of a fillet. Little can be said here about the tools used on these bindings, except that they are small and usually floral or leafwork, though an unusual heart-shaped tool occurs occasionally.

Bibles, including the Metrical Psalms, were usually bound in two volumes, divided at the Book of Proverbs so that both volumes would be of the same size. Because of the great use made in Scotland of the Psalms, the second volume (which included



FIGURE 2. *Binding by Francis Van Hagen, Aberdeen, between 1626 and 1636.*

them) always bears evidence of greater wear or is occasionally missing altogether.

Unfortunately, the binders of these examples from what is literally the Golden Age of Scottish bookbinding were content to remain anonymous. Most of the endpapers and pastedowns in these wheel and herringbone bindings are of the so-called Dutch gilt type, in colors and gold with floral designs, birds, etc. The names of the papermakers, which are occasionally left on the margins of the papers used, show that these were made for the most part in Augsburg.

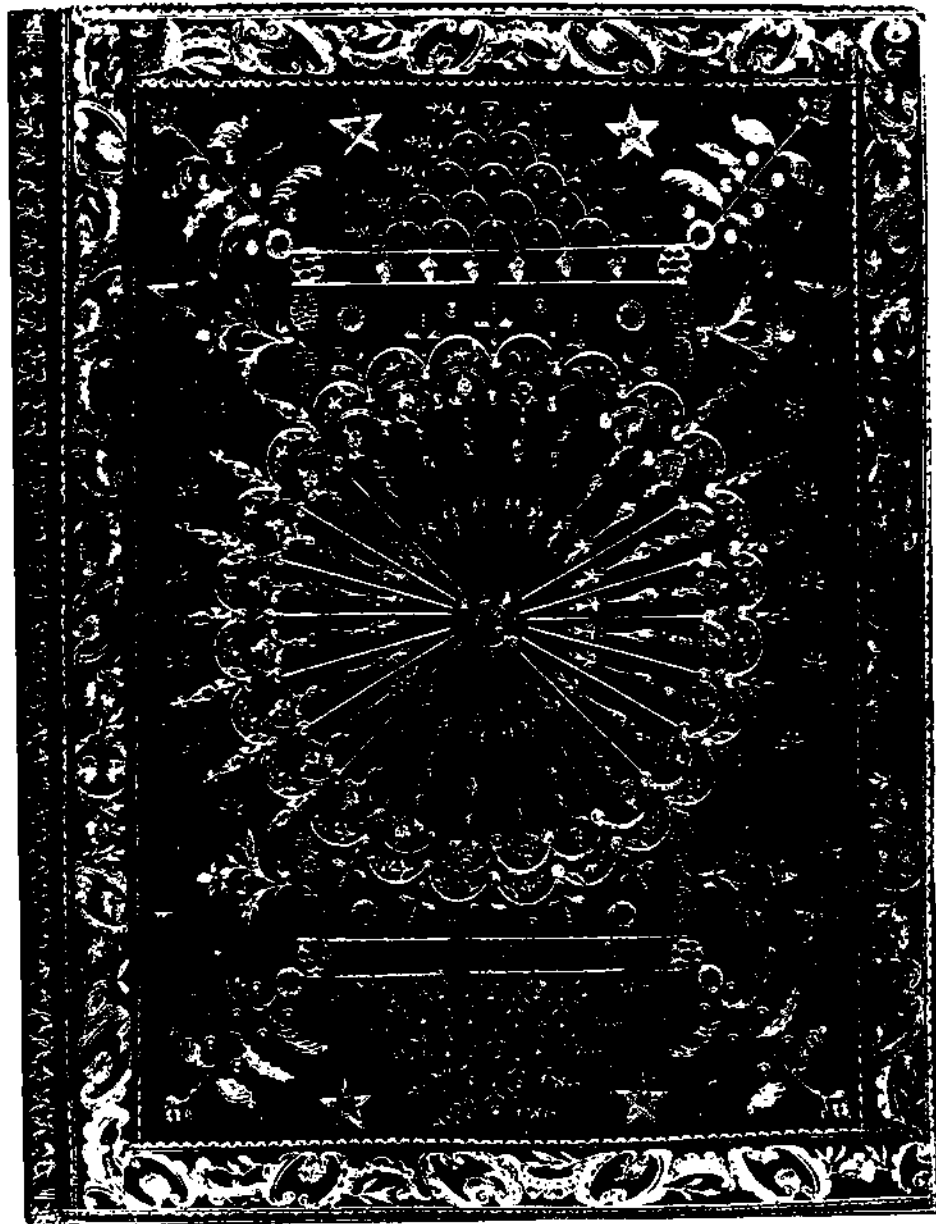


FIGURE 3. *Wheel binding, Edinburgh, about 1780.*

A third, much smaller, group of bindings in a very individual style is much less well known and has only recently been studied, particularly by J. H. Loudon of Edinburgh. These, which date from the decade 1755–1765, are of painted calf, gilt tooled in what Loudon has called “naturalistic” designs of free-flowing stems and floral and foliage designs in a simple style. The edges are often colored and gauffed, and the endpapers are of Dutch gilt paper. All seem to have been produced in one shop but the binder is unknown.

During the last 20 years of the 18th century one Edinburgh binder broke away from the prevailing styles and produced much original work. This was James Scott,

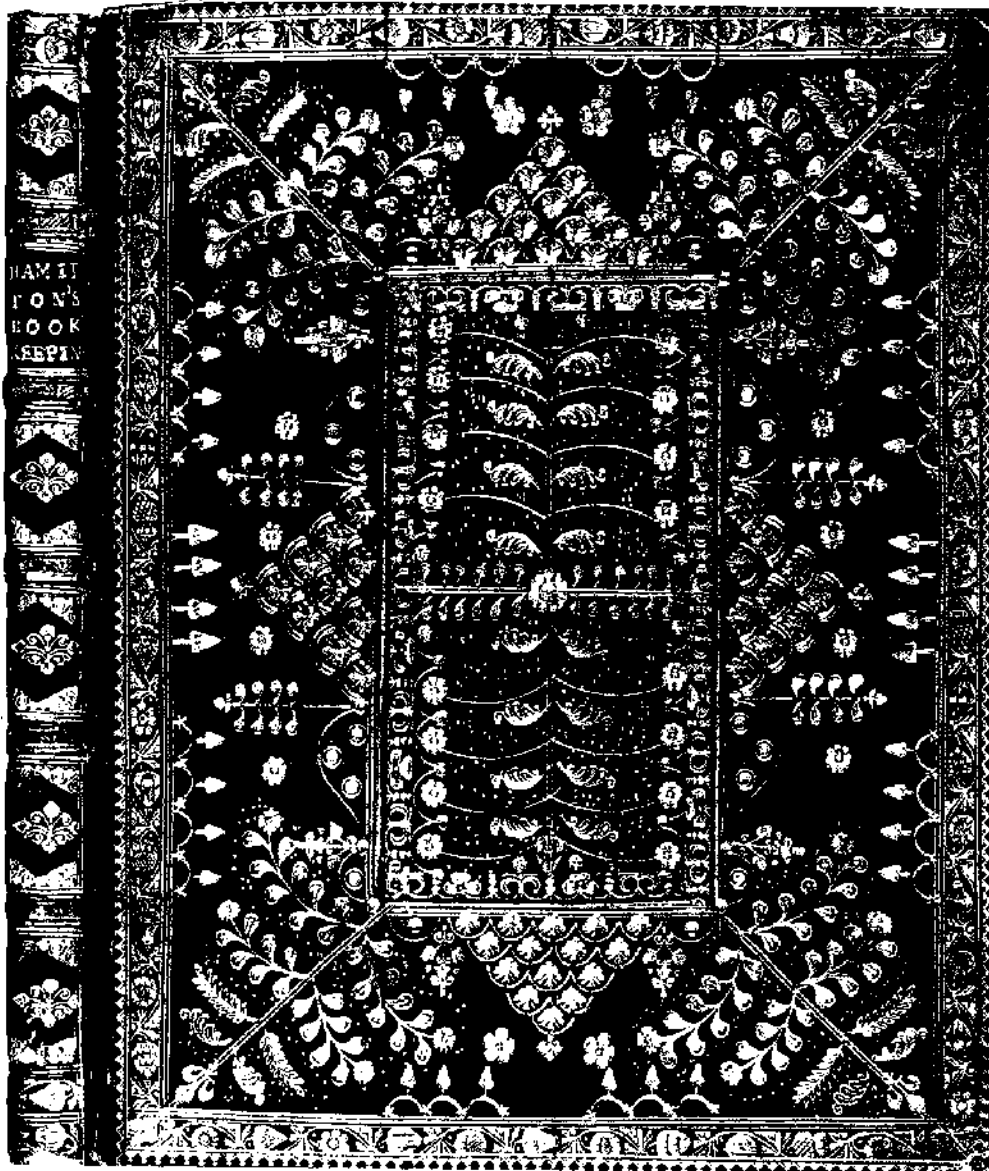


FIGURE 4. *Herringbone binding, Edinburgh, about 1735.*

whose distinctive label with white letters on a black ground—"Bound by Scott, Edinr"—was placed on the title page of each book he bound. His designs are not geometrical as in the wheel and herringbone designs. He flanked the covers with columns, straight or twisted, and his tools (among others, a panoply of musical instruments, a female figure wearing a plumed hat and holding a staff, and a thistle) are quite distinctive. He seems never to have used Dutch gilt endpapers, but only marbled paper.

The 19th century saw a general decline in the tastefulness of the decoration applied on bookbindings, but it also witnessed the emergence of the last peculiarly Scottish style of binding. This was originated by John Philip of Aberdeen, who

began business in 1807 and who died in 1847. Only about two dozen of these bindings are known (most of them in Aberdeen University Library); all are bound in calf over thick wooden boards bevelled on the three outer sides so as to throw into relief a square at each corner. Most are elaborately tooled in blind, but a few gold-tooled examples are known. The use of thick wooden boards (the average is 6 or 7 mm) gives these bindings one of their less agreeable qualities—heaviness, artistically as well as literally. An unfortunate result is that the hinges are very weak, since the cords are not laced through the boards, and the full weight of the book is on the leather.

Little remains to be said about Scottish bookbinding as such. Since the advent of cloth bindings in the 1830s and the increasing mechanization of the craft, fewer and fewer leather-tooled bindings have been produced except for special commissions. During the 19th century some reasonably good work was produced by such firms as Robert Seton and his successors, Seton and Mackenzie of Edinburgh; by John Edmond (later Edmond and Spark), the successor to John Philip (already mentioned) of Aberdeen; and by Carss of Glasgow. During the early 20th century, good “craft” bindings were produced by Henderson and Bisset and by Oliver and Boyd in Edinburgh.

More recently, Arthur W. Currie (formerly with Oliver and Boyd and now teaching in Edinburgh) has done some excellent and imaginative work to his own designs. These often have reference to the book itself, such as an all-over inlaid binding of a tiger creeping through undergrowth on a copy of Kipling's *The Jungle Book* and a seascape for *The Seven Seas*. He has also specialized in the use of colored inks as well as gold to produce his designs. One of his pupils, James Ollason, has also done some good work. Other Scottish binders worth noting are Fiona Anderson (of Glasgow University Library), the Honorable Fiona Campbell, and John Tomlinson (of the Glasgow School of Art.)

#### ACKNOWLEDGMENT

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WILLIAM S. MITCHELL



## THE SCOTTISH CENTRAL LIBRARY

In 1921 the Carnegie United Kingdom Trust established the Scottish Central Library for Students to provide in Scotland a service similar to that administered since 1915 by the Central Library for Students in England. Its primary functions were to supplement the resources of the 15 Scottish county libraries (whose collections, because of their recent foundation, were far from comprehensive) and to enable readers who lived in areas that were still without a library service to borrow directly from the central stock. Burgh and parish libraries were able to use the same service from 1923, and not until the last county library, that of Argyll, was established in 1946 was the personal service discontinued.

It was early recognized, however, that the effectiveness of the Central Libraries could be greatly enhanced if libraries could be persuaded to cooperate on a regional basis by the interlending of books and by the compilation of union catalogs for defined geographical areas. In 1929, therefore, the Carnegie United Kingdom Trust began a pilot scheme by granting to the Library of the Newcastle Literary and Philosophical Society a sum of £1,000 to enable the library to act as a regional central library for Cumberland, Durham, and Northumberland. Two conferences were held to discuss a systematic scheme, and in 1930 the trust guaranteed £3,000 annually for 3 years to establish the Northern Regional Library System, in which Westmorland was now included.

Although libraries had access to the Scottish Central Library for Students as a clearinghouse for interlibrary lending, there was no machinery for the creation of centralized records such as a union catalog of books. The Scottish Library Association had noted with interest the developments in the Northern Region and in 1932 set up a committee to investigate the feasibility of establishing a Regional Library Bureau for Scotland. Subsequently, in 1934, the Carnegie United Kingdom Trust convened a conference in Edinburgh which was attended by a large number of representatives from libraries in every part of Scotland. This conference declared itself in favor of a Scottish Regional Library Bureau and appointed a Committee of Inquiry to prepare a scheme for the bureau and to report to a future conference. A scheme was quickly prepared, only to meet objections from the Scottish Office, to which it had applied for guidance on the statutory powers of libraries to take part in the scheme. The official ruling regrettably was that, although city and county libraries possessed powers under the Education (Scotland) Act of 1918, authorities under the Public Libraries (Scotland) Acts could not competently enter into the arrangement nor make the payments contemplated under it.

The second conference, held in Edinburgh in January 1935, approved a draft constitution and resolved that the establishment of the bureau had become a matter of urgency; but over the next few years, as Parliament was preoccupied with other matters, the prospects of amending library legislation gradually diminished. This lack of progress led the Committee of Inquiry to propose in 1939 that work should begin on the Scottish Union Catalogue without further delay and without waiting for the bureau, a proposal that was approved by a third conference held in April

1939. The Scottish Union Catalogue Committee, constituted as a subcommittee of the Committee of Inquiry, appointed an editor and purchased the necessary stationery and equipment, and by September 1939 the work of compilation was begun in an editorial office in the Mitchell Library, Glasgow (provided by courtesy of the Glasgow Public Libraries). The Carnegie United Kingdom Trust provided an initial grant of £2,000 and in March 1943 made a supplementary grant of £250 a year for 2 years, on condition that the balance of the money required for cataloguing purposes during that period would be raised from other sources.

In spite of wartime difficulties, the catalog grew steadily, and by May 15, 1945, the committee could report that it contained 95,337 entries, representing in the neighborhood of 300,000 locations. The growth of the catalog, its recognized usefulness, and especially the response of libraries to appeals for financial assistance, led the Union Catalogue Committee to invite the Scottish Regional Library Committee (as the Committee of Inquiry was now called) to convene a fourth conference to decide whether the temporary basis under which the Scottish Union Catalogue was managed should be converted to the permanent status of a bureau with all its financial advantages of regular subscriptions. The idea of the bureau, that had been approved in principle in 1934, was welcomed again when the conference met in Edinburgh on September 26, 1945. Its main resolution was that the conference approved the immediate establishment of the Regional Library Bureau of Scotland in accordance with the constitution adopted by previous conferences in 1935 and 1939, and urged that the draft bill approved at previous conferences be pressed forward. At that point, therefore, the Union Catalogue Committee lost its identity and was merged with the Executive Committee of the Regional Library Bureau of Scotland, newly elected by the conference. This did not immediately resolve the legal difficulties, but the fact that burghs had been lending books and contributing to the costs of the Scottish Union Catalogue without objection from their auditors enabled interlibrary cooperation to continue. The Executive Committee, however, was well aware of the unsatisfactory position and was only too anxious to support the Scottish Library Association in its efforts to promote a new Public Libraries (Scotland) Act.

The Scottish Library Association, at its Annual Conference held in September 1946, brought forward a proposal that the Carnegie United Kingdom Trust should be asked to set up an advisory committee to consider the future of the Scottish Central Library for Students. This resulted in the appointment in 1947 of a committee representative of a wide range of library, local authority, and educational interests, under the chairmanship of Sir Alexander Gray with M. C. Pottinger as the secretary. By September of the same year, it was able to submit a unanimous report (Gray Report), which the trust in turn passed to the Advisory Council on Education in Scotland as a memorandum of evidence. Although a farsighted document, it naturally dealt only with the Scottish Central Library for Students, and it was left to a delegation from the Executive Committee of the Regional Library Bureau for Scotland to make separate representations to the Advisory Council on the future of the bureau. The report of the Advisory Council was published in 1951 and included as an appendix the full text of the Gray Report.

The combination of recommendations of both bodies therefore set in motion a number of changes that were to effectively establish the pattern for the work of the Scottish Central Library for the next 25 years. Principal among them were the recognition of the Scottish Central Library for Students as the natural headquarters of library cooperation in Scotland, the development of constitutional links with the National Central Library, the merger with the Regional Library Bureau of Scotland, the transfer of the responsibility for the service from the Carnegie United Kingdom Trust to a new body of trustees and an executive committee, and the removal of the headquarters from Dunfermline to Edinburgh. The objects of the library were clearly defined, and a change of title to Scottish Central Library was proposed. The recommendations of the Advisory Council were more specific even than those of the Gray Committee; the library, it said, should be administered by a Library Council for Scotland, and it should hold the key position for the whole lending library system. Its functions should include the completion and maintenance of the Scottish Union Catalogue, the operation and extension of the Lending Library, and the operation of an information system and a "foreign relations" department for the overseas interlibrary loans, for which the library was becoming well known. Familiarization with resources of all libraries in Scotland and exchange of information about local resources with the National Central Library and the Association of Special Libraries and Information Bureaux were to become special responsibilities. The library should collect, and keep up to date, general and special catalogs and published bibliographies in all fields, and a bibliographical advisory service should be provided to local libraries and, through them, to serious students. On finances, the council believed that the Treasury should provide whatever sums were necessary to supplement local authority contributions, determined on a population basis.

On July 1, 1952, the newly formed Executive Committee met in Edinburgh to appoint Sir Alexander Gray as its chairman for 3 years and to receive from the trustees the communication of a resolution that the principal of the University of Glasgow, Sir Hector Hetherington, had been appointed chairman of the Board of Trustees, the other members being the principals of St. Andrews, Aberdeen, and Edinburgh. As a final act of generosity, the Carnegie United Kingdom Trust financed the reconstruction of a tenement at Fisher's Close in the Lawnmarket, Edinburgh, for the new headquarters. The *feu* disposition, which was granted by Edinburgh Corporation to the Board of Trustees on May 9, 1951, is the instrument by which the library was made a legal entity; this document incorporates the objects of the library and has as its schedule the library's constitution. Arms were matriculated and the motto *Rax me that buik* was adopted. The Regional Library Bureau of Scotland petitioned the Executive Committee to accept responsibility for the Scottish Union Catalogue, and from October 1, 1953, the bureau was deemed to be dissolved. On November 5, 1953, there was a royal opening of the new building by H.R.H. the Duke of Edinburgh, and the Scottish Central Library settled down to its new role under the leadership of M. C. Pottinger. It became a notable training ground for the profession; many now in posts of responsibility began their careers there, and the library was well served also by the work of the distinguished librar-

ians and lay members who over the years formed the increasingly influential Executive Committee. Sir Alexander Gray was succeeded as chairman on July 5, 1957, by Robert Adam, formerly town clerk of Perth, who in turn resigned on March 31, 1967, to be replaced by Richard Buchanan, M.P., formerly city treasurer of Glasgow and the first lay president to be appointed by the Scottish Library Association.

The work of the library in the next 20 years included a flourishing publications program that produced such standard reference works as *Scottish Family Histories*. The systematic microfilming of Scottish newspapers was begun and a photographic unit was developed, and all the while, the routines of interlibrary lending and reporting to the Scottish Union Catalogue were gradually refined. Subcommittees investigated and produced plans for the Gaelic Union Catalogue, Scottish participation in the national Subject Specialization Scheme, the Scottish Books Exchange, a bibliography of Scottish literature, cooperative storage, a directory of nonbook materials, and the provision and interloan of choral and orchestral scores, among many other topics.

Eventually, however, the Executive Committee also had to consider the future of the library itself as an independent organization. On April 23, 1971, it nominated a deputation to meet representatives of the Scottish Office to discuss the recently published White Paper on the British Library and its possible implications for the future of the Scottish Central Library, a meeting that was held at St. Andrew's House on July 1, 1971. Arising out of that meeting, the Scottish Education Department declared its intention to convene a joint meeting of representatives of the library and of the National Library of Scotland to discuss the possibilities of a closer link between the two institutions. After various administrative matters had been investigated by the Scottish Education Department at a meeting held on February 14, 1973, a Working Party, set up to consider the detailed arrangements, was given these terms of reference:

To prepare, in the light of all relevant considerations, including statutory, constitutional, legal, financial, staffing and administrative considerations, a plan for a merger of the present functions of the Scottish Central Library with those of the National Library of Scotland, which would take effect on 1 April 1974, or on the earliest practicable date thereafter (from the unpublished minutes of the meeting).

And so, on April 19, 1974, the final meeting of the Executive Committee of the Scottish Central Library unanimously carried the following resolution:

That from and after 1 May 1974 the functions of the Library be transferred to and amalgamated with those of the National Library of Scotland and that the whole assets of the Library, both heritable and movable, be made over to the Trustees of the National Library of Scotland or their nominees and that the Trustees of the Scottish Central Library be, and are hereby, authorized to execute all conveyances, minutes or such other documents as may be required to effect such transfer or amalgamation (from the unpublished minutes).

The National Library of Scotland therefore became legally committed not only to the constitution and the objects for which the Scottish Central Library had been

founded, but also to the continuation of its tradition of service. Administratively, the new "department" seemed to fit best into the Readers' Services Division of the library, of which it was made a branch. Although the loss of the name Scottish Central Library was regretted, it became the National Library of Scotland Lending Services, balanced by the Reference Services Branch, and administered by the same Keeper. To assist them in maintaining liaison with Scottish and other libraries, the trustees of the National Library accepted a recommendation of the Working Party that the former Executive Committee of the Scottish Central Library be reconstituted, with some modification, as a subcommittee of the Board of Trustees. This new committee was also seen by the Working Party (and not least by the representatives of the Scottish Education Department) as a useful substitute for the Library Advisory Councils for England and Wales, which had been denied to Scotland despite the attempts of the Scottish Library Association to have such provision included in the legislation. The secretary of state for Scotland was willing to recognize the advisory role of the new body, but the term "advisory" in the title was unacceptable. The Working Party therefore resurrected the name of one of the Scottish Central Library's subcommittees, and it took the name Library Cooperation Committee. In its constitution it follows closely that of the Scottish Central Library, with the addition of clauses that specify the advisory function to the secretary of the state on the one hand, and to the trustees of the National Library on the other.

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W. H. BROWN

## THE SCOTTISH LIBRARY ASSOCIATION

Constitutionally, the Scottish Library Association is now—and for many years has been—a branch of the [British] Library Association, which still remains an organization for the United Kingdom as a whole although the phrase "of the United Kingdom" was officially dropped from its title in 1896. However, the Library Association (with its headquarters in London and, inevitably, a preponderance of English members) has tended to be predominantly English in outlook and influence, and the Scottish Library Association—in view of the differences that have always existed in public library legislation north and south of the Border—has a unique status as a national association quite distinct from the Library Association's regional branches in England.

It was during the fourth Library Association Conference in Scotland, in Glasgow in September 1907, that a meeting of Scottish librarians discussed the

alternatives of forming a branch of the association in Scotland or of establishing a separate association for Scotland. It was agreed that, "as Scottish libraries are administered under separate Acts of Parliament and have problems of their own, the better plan would be to have a separate Association for Scotland, but affiliated to the Library Association" (1). It is interesting to note that the phrase "in affiliation with" is still used to describe the relationship between the Library Association and this very special branch.

The association was formally constituted at a meeting held in the Board Room of the Central Library in Edinburgh on October 24, 1908. F. T. Barrett of the Mitchell Library (Glasgow) presided, and James Craigie, Sandeman Public Library (Perth), acted as secretary. A fortnight later a circular letter signed by Craigie announced the formation of the new association, "with sixty-five Librarians and Assistants—all of whom are employed in Scottish libraries . . . as Members" (2). In 4 years' time the membership doubled. Currently it stands at 1,902.

The objects of the association are to unite all persons engaged or interested in library work throughout Scotland, by holding conferences and meetings for the discussion of matters affecting the well-being of Scottish libraries; and to promote whatever may tend to the improvement of library administration and the qualifications and status of librarians in Scotland. The affairs of the association are managed by a council, which annually appoints a president, an honorary secretary, an honorary treasurer, and the other officers the council may find necessary.

Early in the association's history it was felt that one annual meeting was not sufficient, and "district" meetings were suggested and discussed. The first of these were held during the year 1912/13. After the war it was found possible to organize a branch of the association for Glasgow and the West of Scotland and another for Edinburgh and the East, and these branches have had a continuous existence from that time, providing professional talks and social meetings for their members. Branches for the rest of Scotland have been more difficult to establish. In 1933 a meeting was held in Inverness to inaugurate a branch for Dundee, Aberdeen, and the North, but a second meeting, held 6 months later, was that branch's last—not surprisingly, in view of its impossible geographical area. A branch for Dundee and Central Scotland, however, was founded in 1949 and still functions successfully, and the present North of Scotland Branch was established in 1963.

For 20 years the Scottish Library Association was quite separate from the Library Association. Although a number of Scottish librarians were members of both associations, there were those who for various reasons chose to join the Scottish association only. It was after the association's annual meeting in Aberdeen in May 1928—where the Library Association's secretary, Guy W. Keeling, had been welcomed for the first time to a meeting of librarians in Scotland—that the Scottish Library Association was invited to become a branch of the Library Association (3). That association's Jubilee Conference, held in Edinburgh in 1927, had urgently recommended the strengthening of the Library Association by the unification within its constitution of the different local and special associations of librarians throughout Britain, and with this in view it had been agreed to appoint a full-time secretary and to obtain suitable premises in London to serve as the

association's headquarters. The Carnegie United Kingdom Trust had been approached for a grant, and a generous offer was made. This was subject to certain conditions, one of which was "that the Association undertake to make an effort to induce the other library groups and associations to come within a single unit" (4). At the Scottish association's Aberdeen conference, the secretary of the Library Association underlined the importance of unity in purpose and organization, but the special committee appointed to consider the matter concluded that "the interests of Scottish libraries and librarians would be best served by the retention of its separate identity" (5).

The question was raised again the next year, and thereafter the council of the Scottish Library Association, recognizing "the obvious value of a co-ordinated body representative of the entire library service of the [United] Kingdom" and reassured that "under the proposed agreement of union the Scottish Library Association would retain its national entity," agreed that "the interests of both the Scottish library service and the Association would be best served by the closest possible affiliation with the Library Association" (6). A draft agreement between the two associations, which the council of the Scottish Library Association recommended its members to accept, was submitted after the annual meeting of 1930 to the Scottish association's 300 members in a postal ballot, for or against the union. Of the 182 voters who returned their papers, 174 were in favor and 8 were against.

Under this agreement the Scottish Library Association was to retain its constitution and whatever title its members might select, "provided always that the title chosen shall indicate the connection and/or union with the Library Association." Members of the Scottish association who were already members of the Library Association were in the future to pay only the appropriate subscription of the Library Association, and any new members enrolled "after the date of union" were to join the Library Association in accordance with its bylaws. "Members of the Scottish Library Association not being members of the Library Association" were to be recognized as Transitional Members, who were to enjoy almost all the privileges of membership of the Library Association, but the Scottish Library Association undertook to try to persuade these Transitional Members to become members of the Library Association. The Scottish Library Association was to receive toward its expenses "a rebate of not less than Three Shillings per Guinea" of the subscriptions of Library Association members who were or who elected to become members of the Scottish Library Association (7). Under later negotiations, Transitional Membership was eventually abolished (in 1951); and the rebate (which had been doubled in 1945 to 6 shillings in the guinea) was replaced, first, by a per capita grant according to the membership of the Library Association residing or working in Scotland, and later by a grant negotiated annually between the two associations on the basis of the Scottish association's estimate of its expenditure in the year ahead.

With the vote in the postal ballot in favor of union, the president and the honorary secretary of the Scottish Library Association were authorized to sign the agreement on behalf of the Scottish association. This was done at the

conference of the Library Association held in Cambridge in September 1930, and the agreement came into force at the beginning of 1931. It is worth pointing out that at the time of these negotiations the same man held office as president of the Scottish Library Association and as honorary secretary of the Library Association: the distinguished principal librarian of Edinburgh, Ernest A. Savage, whose "advocacy of the amalgamation was wholehearted, and who spared neither time nor trouble to bring about this happy result" (8).

In its 22 years as an independent association, the Scottish Library Association had given to Scottish librarians of all kinds and to local authority representatives and other library committee members the opportunity of discussing problems, resolving differences, and formulating policies that sometimes differed—in some cases significantly—from the conditions prevailing in England and Wales. Since 1931, as a branch of the Library Association, it has continued to play that special national role. Problems peculiar to Scottish library legislation were already occupying the attention of the Scottish Library Association when the affiliation agreement was signed in 1930; they continued as its main concern for 25 years, until the Public Libraries (Scotland) Act of 1955; they persisted throughout the next 20 years, until local government reorganization took effect in Scotland in 1975; and in 1978 they were under consideration by a broadly representative Working Party on Library Legislation and Policy Planning, appointed by the Scottish Library Association with a wide remit to study all aspects of library service in Scotland.

The association's continuing concern with legislation has not monopolized its energies, however. Reference has already been made to its branches throughout Scotland. These provide a focus for professional activity, each in its own area, and each is represented on the association's council and so contributes to the informed discussion from which coherent policies emerge. The council also includes in its membership representatives nominated by the Scottish groups and sections of the Library Association. There is thus in the Scottish Library Association council full and free democratic participation by all types of librarians in Scotland.

The Scottish Library Association has always taken a considerable interest in the professional education of its members, although the development of full-time library education after the Second World War had its effect on the nature and scope of the association's activities. The desirability of a library training school in Scotland was first recorded in the association's report for the years 1915–1919, and classes were in fact organized in Glasgow in the winter of 1919/20. Residential summer schools, many of them held at Newbattle Abbey College near Edinburgh, were arranged both before 1939 and after 1945, and they continued to be part of the association's program even after the opening of the Scottish School of Librarianship in Glasgow in 1946. The association's current interest in this matter is demonstrated by the recent appointment of an important committee to consider all aspects of professional development in Scotland.

The association has also achieved notable success with its publication program (9). At first its publications were mainly pamphlets and memoranda produced as ammunition in the struggle to amend and improve public library legislation in Scotland, but in 1950 two important serial publications were launched. The



*Proceedings* of the association's annual conference were first published separately in that centenary year of the first British Public Libraries Act of 1850, and have been published every year since. (Previously, some but not all of the papers read at these conferences have been printed, sometimes as summaries only, with the association's annual reports.) In the same year the association issued the first number of its *News Sheet*, which was restyled and retitled *SLA News* with Number 16 in March 1956. It now appears regularly, six times a year. Because of its consistently high standard, the journal well deserves the reputation it has won. The declared aim of one of its editors was "quite simply to make *SLA News* the best possible magazine that Scots librarians can produce, and to build it up into a library periodical of world standing" (10). When *SLA News* achieved its 100th number, with the issue for November–December 1970, another former editor could claim with justice: "Its influence on librarianship in Scotland over the last twenty years has been considerable, and if there is some satisfaction with progress in that time, 'the Official Newsheet of the Scottish Library Association can claim, without any "damned modesty," a modicum of any credit that is going' " (11).

An index to the first 82 issues of *SLA News* (1950–1967) was published in 1968. Since then—as befits a periodical of much more than passing interest—an index has been published in the last issue of every other year.

From 1966 the association has supplemented its annual report with the publication of an overall survey of the Scottish library scene in a continuing series of *Triennial Reviews*. The first covered the 3 years from 1963 to 1965. The association has also published a valuable directory, *Library Resources in Scotland*, now in its third edition, which admirably fulfills its prime function: to reveal the wealth of material to be found in Scottish libraries.

The association's most ambitious venture in publishing was to launch in 1971 a series of Scottish Library Studies, by the publication of the *History of the Public Library Movement in Scotland to 1955*. The series already includes four other volumes: *A Social History of Branch Library Development*, by J. D. Hendry; Antonia Bunch's survey, *Hospital and Medical Libraries in Scotland*; an excellent guide, *Local Collections in Scotland*, by Norma Armstrong; and a unique tribute on the 70th birthday of a distinguished Scottish librarian, *Of One Accord: Essays in Honour of W. B. Paton* (the first head of the Scottish School of Librarianship, county librarian of Lanarkshire, and at different times president of the Scottish Library Association and of the Library Association).

All in all, the Scottish Library Association has a record to be proud of in its 70-year history.

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W. R. AITKEN

## SCOTTISH PUBLIC LIBRARY LEGISLATION

The first Public Libraries Act for Scotland was passed in 1853 (3 years after the English Public Library Act of 1850). It was a permissive act, requiring adoption by the local authorities, and it was limited to burghs and parishes. The exact powers were specified, and the maximum rate which could be levied was one penny per pound of ratable value. Several amending acts were subsequently passed, leading to the consolidating act of 1887, which still remains the principal public library legislation in Scotland.

In 1918 the Education (Scotland) Act contained a clause stating: "It shall be lawful for the Education Authority of a County, as an ancillary means of promoting legislation, to make such provision of books by purchase or otherwise as they may think desirable, and to make the same available not only to the pupils attending schools, junior colleges or other educational establishments in the county, but also to the adult population resident therein." Based on this simple clause, the

County Library Service of Scotland was developed on lines similar to, and in due course equally developed as, the much older burgh library system. The County Library Service was financed through the education rate, no financial statutory limit being placed on the amount which could be levied. In contrast, under the public library acts, burgh libraries operated under a rate limit of one penny in the pound, which was increased to threepence in an amending act of 1920, and was finally abolished in the Public Library (Scotland) Act of 1955.

Drastic changes occurred in the organization of Scottish local government under the provisions of the Local Government (Scotland) Act of 1973, which abolished the former counties and burghs as units of administration and created new regional, district, and island authorities, each with its separate functions. Among other major services, education was allocated to the regions, and the clause in the 1918 Education Act quoted above was amended to exclude the adult population from the provision of book services. The public library service was made a responsibility of the district and island authorities, except in the regions of the Borders, Highlands, and Dumfries and Galloway; and a massive reorganization took place with the inauguration of the new system in 1975.

The Local Government (Scotland) Act of 1973 repealed previous library acts of 1894, 1899, and 1920, and amended the 1887 and the 1955 Libraries Acts. The amended provisions of these acts remain in force, and (together with the relevant clauses of the 1973 act), they form the current effective legislation for public libraries in the country. The main provisions of these acts are as follows:

*PUBLIC LIBRARIES CONSOLIDATION (SCOTLAND) ACT 1887*

(as amended in Schedule 21 of the Local Government (Scotland) Act 1973)

...“library authority” for the purposes of this Act means an island or district council, except that within the Highland, Borders, and Dumfries and Galloway regions it means the appropriate regional council.

The library authority may purchase, *feu* or rent any land or suitable building; and may erect any buildings suitable for public libraries, museums or art galleries, and may alter or extend any buildings for such purposes, and supply the same with all requisite furniture, fittings and conveniences.

The library authority shall manage, regulate and control all libraries or museums or art galleries established under this Act, and shall have powers to do all things necessary for such management, including the following powers:

to purchase books, newspapers, reviews, magazines and other periodicals, stationery, pictures, engravings, maps, specimens of art and science, gramophone records, tape recordings and films, and such other articles and things as may be necessary for the establishment, increase, and use of the libraries, museums or art galleries under their control, and to do all things necessary for keeping the same in a proper state of preservation and repair;

to provide from time to time the necessary fuel, lighting and other matters;

to sell or exchange any books, works of art or other property of which there may be duplicates;

to provide suitable rooms in the libraries within which the books, periodicals and newspapers may be read;

to lend out to inhabitants of the area of the authority the books of any library

under their control, and at their discretion to grant the same privilege to the inmates of institutions, to persons carrying on business or engaged in employment in the area;

to compile and print catalogues and reports of their proceedings, and to sell the same, the proceeds to be applied for the purposes of the Act.

It shall be lawful for the library authority to make byelaws for regulating all or any matters connected with the control, management, protection and use of any property, articles, or things under their control, and to impose penalties for breaches of such byelaws, not exceeding five pounds for each offence; and from time to time, as they shall think fit, to repeal, alter, vary or re-enact such byelaws, provided that approval and confirmation is given by the sheriff exercising jurisdiction in the area of the Authority.

A copy of the byelaws shall be displayed in a conspicuous place in each of the libraries, museums or art galleries of the Authority.

All penalties and forfeitures under the Act may be recovered by an ordinary small-debt action before a sheriff or justice exercising authority in the area.

All libraries, museums or art galleries established under this Act, or to which this Act applies, shall be open to the public free of charge, and no charge shall be made for the use of books or magazines issued for home reading.

#### *PUBLIC LIBRARIES (SCOTLAND) ACT 1955*

Any previous statutory limitations on the annual expenditure of a council for or in connection with public libraries shall cease to have effect.

Any limitation imposed by the principal Act on the amount of money which may be borrowed by a council for the purposes of that act shall cease to have effect.

A statutory library authority shall have power to enter into arrangements with any other library authority, whether statutory or non-statutory, with a view to the improvement of their respective library services, and any such arrangements may provide for the lending by one authority to the other any library material.

A statutory library authority may, with the consent of the Secretary of State, contribute towards the expenses of any non-statutory authority.

The power conferred by the principal act of lending out books from a library shall extend to the lending out of any other library material which the managers of the library may think proper to lend out.

#### *LOCAL GOVERNMENT (SCOTLAND) ACT 1973 (Section 163)*

The local authority for the purposes of the Public Libraries (Scotland) Acts 1887 to 1955 in their application to libraries shall be an islands or district council, except that within the Highland, Borders, and Dumfries and Galloway regions, such authority shall be the appropriate regional council.

A local authority as aforesaid shall have a duty to secure the provision of adequate library facilities for all persons resident in their area.

Other general provisions of this act which affect the public libraries service include:

*Section 56:* A local authority may arrange for the discharge of any of its functions by a committee, a sub-committee, an officer of the authority, or by any other local authority in Scotland.

*Section 64:* A local authority may appoint such officers as they think necessary for the proper discharge by the authority of their functions.

*Section 69:* A local authority shall have power to do any thing (whether or not involving the expenditure, borrowing or lending of money or the acquisition or disposal of any property or rights) which is calculated to facilitate, or is conducive or incidental to, the discharge of any of their functions.

*Section 93:* Every local authority shall have a general fund, and (a) all sums received by or on behalf of the authority shall be paid into that fund, and (b) all sums payable by the authority shall be paid out of that fund.

*Section 107:* The expenses of a local authority in discharging functions under any public general act shall be met out of rates levied under this act.

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## SCRIPTORIA

### Antiquity

The specialized business of the scribe has existed from the beginning of writing, for the art was known to few. In the ancient Near East and Egypt, the early tradition of archives required the existence of a class of professionals. We know something about their instruments and writing material and even their appearance, at work, but their business relationships (whether slave or free) are not well known. Much the same is true of the Hellenistic world, but here we have evidence about the use of scribes by librarians and masters of libraries.

A staff of copyists was available to the Museion in Alexandria, for papyri that could not be bought were copied. Under Ptolemy Evergetes (246–221 B.C.) all ships entering the harbor of Alexandria were required to deliver any manuscripts on board for expeditious copying (*I*). It was the same Ptolemy who posted a bond of 15 talents to borrow the official Athenian copy of the great tragedians and tried to pacify the owners with a copy (*I*). The Alexandrians did not hesitate to acquire duplicates, so useful for their textual studies. Aulus Gellius made specific

reference to the work of the Alexandrian scriptorium: "Ingens postea numerus librorum in Aegypto ab Ptolemaeis regibus vel conquisitus vel confectus est ad milia ferme voluminum septingenta" (2). Whether the Alexandrian scriptorium was inactive in Domitian's time we cannot know; but when Domitian restored the library (founded by Augustus in the Portico of Octavia and burned in 80 A.D.), he sent copyists to Alexandria to transcribe the best copies in the Serapeion (3).

Much the same policy of copying the best available texts must have existed in the great library of the Attalids in Pergamon. Here, however, we find a different material, parchment, used by the scribes. This was not primarily because of the monopoly of the Ptolemies on the papyrus grown in the Nile Delta but was rather due to the ubiquitous presence of sheep and goats in Asia Minor (4). When the wealthy Apellicon of Teos acquired a portion of Aristotle's library and found that many rolls were gravely damaged by damp and papyrophilic vermin, he had them restored, although his staff of copyists was said to have been careless with the texts (5). Sulla took the library as booty to Rome in 84 B.C. Two decades later the grammarian Tyrannio bribed the custodian of the collection to let him make or have made copies; and he sent one to Andronicus of Rhodes (later head of the Peripatetic School), on which the latter based a collected edition of Aristotle (6).

The correspondence of Cicero reveals much about publishing and the employment of copyists in Republican Rome (7). *Librarius* was a term applied to scribes, copyists, and secretaries as well as to booksellers, a logical association in view of the nature of the latter trade in antiquity. Most of the *librarii*, who had one main center in Caesar's Forum in the heart of the city (8), were careless scribes chiefly concerned with copying material for magistrates and pleaders. When Quintus Cicero despaired of securing good copies of Latin and Greek classics, his brother provided the services of one of his best-educated freedmen, Chrysippus, and he also promised the help of Tyrannio, one of the ablest copyists of the day (9). The situation in Rome was probably improved substantially when Atticus assembled a competent corps of slaves (*plurimi librarii*) to work with the fine collection of manuscripts he had acquired during his long residence in Athens (10). The full story of Atticus as a publisher has been admirably told by Carcopino, but the significant thing at this point is that probably for the first time a large atelier with many competent *librarii* existed in Rome. The proliferation of public and private libraries in the next two centuries suggests a continuing tradition of well-staffed scriptoria in Imperial Rome.

The rise of Christianity created new demands for book production. The flourishing Catechetical School in Alexandria, with such outstanding scholars as Clement and Origen, had a scriptorium of some size. In the middle of the fourth century Athanasius was able to accept an order from the Emperor Constans for a large number of Bibles to be delivered to Rome (11). The important library at Caesarea had a scriptorium with far-reaching influence. Septuagint texts prepared there and corrected by Pamphilus and Eusebius were considered authoritative (12), and New Testament texts from Caesarea had a similar reputation. Around the middle of the fourth century the successors of Eusebius had to replace many deteriorated



FIGURE 1. *Two Romans, one with equipment for writing, possibly a notarius competent to take dictation. In the Museo Nazionale in Naples.*

papyrus rolls with parchment codices, a chore that must have required the services of a number of copyists (13).

After Constantius II, third son of Constantine the Great, became the sole ruler in 353, he established the first major library in the new capital. Two decades later Valens gave specific attention to the development of the library. In 372 he directed the prefect of the city to secure the services of seven *antiquarii* for copying old manuscripts (four for Greek, three for Latin) and a number of *condicionales* (subordinate personnel) (14). The library, *δημοσία βιβλιοθήκη* as it was then called, had some 120,000 titles in 475–477 (by that date more codices than rolls) when it was burned (15), but we have no way of knowing which or how many were produced in the scriptorium provided by Valens. The library continued to exist for

two and a half more centuries, then it went to the same fate as the university, dissolved by Leo the Isaurian in 726 during the iconoclastic troubles.

### Early Monastic Scriptoria

We know next to nothing about the physical conditions under which the copyists of antiquity operated, although we do know something about their materials and techniques, many of which survived into the Middle Ages. Much more is known



FIGURE 2. *Ezra writing the law* (frontispiece in the *Codex Amiatinus* in the *Biblioteca Laurenziana, Florence*). Note the bookcase with open doors.



about monastic life, where copying was a major chore from the beginning. Indeed, only in Italy was there the professional *librarius* (*bibliographius*, *calligraphius*, *antiquarius*, *scriba*, *scriptor*, *notarius*) throughout the Middle Ages; and until the 13th century, monks and nuns did most of the copying in Italy and virtually all elsewhere. (The *notarius* was originally a stenographer who took dictation in shorthand.) There is no evidence for secular scriptoria in the early Middle Ages, even at the court of Charlemagne. Few books were produced outside of monastic scriptoria, although we have at least one curious exception: a *Vita patrum* copied during an expedition against the Slavs (16). The situation did not change until the 13th century, with the rise of the universities and of princely libraries and the decay of the strict monastic traditions.

The notion of scribal work as a monkish chore appears in sources as early as Jerome, who recorded various duties, among them *scribantur libri* (17). In the *Vita Martini* of Sulpicius Severus (ca. 363–ca. 420/5) there is strong evidence of the early presence of a tradition of copying manuscripts at Tours. The younger monks were specifically assigned to this task: “Ars ibi exceptis scriptoribus nulla habebatur, cui tamen operi minor aetas deputebatur, majores orationi vacabant” (18). The earliest evidence of scribal work by a secular priest (as opposed to the professional *librarius* of Roman times) appears in a half uncial manuscript of Sulpicius Severus in the cathedral of Verona dated 517: *Scr. per me Ursicinum lectorem ecclesiae Veronensis Agapito consule* (19).

To Cassiodorus we owe the firm establishment of the copying of manuscripts as a primary monastic function. He had special words of praise for copyists (*antiquarii*, *librarii*) (20), and they were expected to work from the best texts. Editors (here *notarii*) examined the texts for accuracy and provided necessary annotations and punctuation. Cassiodorus was deeply concerned with grammatical and orthographic accuracy, and he collected the old grammarians and deposited them in the library (21). In the last years of his long life, Cassiodorus wrote *De orthographia*, at the request of his monks and intended to combat careless copying. His archetypal monastery, Vivarium near Squillace, did not survive beyond the seventh century, but its influence was a permanent one. Contemporaries at Monte Cassino probably also produced many of their books, but its scriptorium did not attain distinction until the 11th century, long after the great scriptoria of the Carolingian period had flourished.

In countries newly converted to Christianity it was essential that reading and writing in Latin be firmly established in monasteries, and such was the case in the early Irish and English houses (22). The tradition was carried to the Continent and transplanted to such foundations as Luxeuil, Corbie, Bobbio, and St. Gall. Here there were scriptoria which were even more distinguished than the older ones inspired by Cassiodorus. Book production was considered so important that in the eighth century at Tours, Alcuin transferred monks from field labor to study and writing, which he considered a far nobler pursuit (23). By the 12th century, the Canon Gaufredus of Sainte-Barbe-en-Auge epitomized the rôle of the library (and the scriptorium) in the famous phrase “Clastrum sine armario, quasi castrum sin armamentario” (24).



FIGURE 3. *Saint Jerome at his writing desk. Oil painting by Benedetto Bonfigli, in the Church of Saint Peter in Perugia.*

The need for special physical provisions for copyists was obvious, and care had to be taken to protect them from noise and other distractions of daily life in a monastery. According to the plan of St. Gall from 820, the scriptorium was between the presbytery and the calefactory (the one heated room), with the library on the floor above. The noise of the kitchen must have been offset by the proximity of warmth, for there were constant complaints about numbed fingers and, indeed, even about frozen ink. At St. Gall there was a large table in the middle of the room, with seven writing desks under the six windows. The location of desks for readers and writers beside windows in corridors was quite customary, and in the Cistercian



FIGURE 4. *A copyist at his desk. From Eadwine's Psalter (ca. 1150).*

abbeys there was often an additional small corridor beside the library or the cells of the copyists (25). Individual cells or carrels for copyists were usual among the Cistercians and Carthusians, whereas other orders, especially the Benedictines, preferred a large writing room (26). The carrel system was probably for readers in the first instance, as in the account in the Durham Rites quoted by Savage (27), and from surviving monuments such as the Gloucester Cathedral, where the 20 carrels are on one side of the south cloister. However, there is no reason why they could not also have been used for writing. The recesses in the open cloister walk in the Cluniac Monastery of St. Martin at Tournay were equipped with writing tables which were regularly occupied by industrious young monks in the time of the first abbot, Odo, and there is evidence of similar arrangements elsewhere (28). And

there are also complaints about exposure to the elements in a place so remote from the calefactory.

It is likely that carrels (from *quadril*, via Norman *carole*, enclosure) were used more for reading than for copying, since, in general, a monk was not allowed to write outside of the scriptorium. The skimpy width of 2 feet 9 inches, as at Durham, would not be conducive to writing; and the presence of a low door suggests that it could be an arrangement for the *precentor* (choirmaster), also in charge of readers and copyists, to oversee either activity. Inside was a wooden, pew-like chair and a simple desk, or rather, writing surface. The value of this equipment is illustrated by a record of a grant of seven oaks to provide timber for the Grey Friars of Oxford to repair their carrels (29).

The conditions under which copyists worked were regulated, but there were variations in different periods and in different monasteries. Silence was enjoined on all Cistercians, although the Carthusians permitted copyists to speak with each other but not with outsiders (30). A 6-hour day is mentioned by a scribe of the ninth or tenth century (31). Work by natural light was the rule, probably to avoid the possibility of error in copying under artificial light and also to minimize the danger of fire and damage to manuscripts by oil or grease from lamps. But Brother Louis of Wessobrunn reported that he copied Jerome's commentary on Daniel when his fingers were numb from cold and had to finish his work at night (32), and there is other evidence of night work on some occasions. It is likely that copying was sometimes permitted on Sundays and lesser church festivals (33), although probably not on higher festivals. There is evidence that at times scribes were excused from communal services and prayers, in which case they could worship privately. They were generally excused from work in the fields and other menial duties.

The scriptorium was supervised by the *precentor*, who was also the librarian (*armarius*) in some houses, and the *precentor* was directly responsible to the abbot (34). The latter had final authority to determine texts to be copied. Once the *precentor* assigned a text or a portion of it to a scribe, it could not be exchanged with another scribe (35). A scribe who refused to accept his assigned chores might be forced to write or might be penalized in some way such as being deprived of his wine (36). In some cases, as at Tours during Alcuin's regime, texts were dictated to scribes. But greater accuracy was ensured when wax tablets (inherited from antiquity) were furnished to the copyist (37). There are also numerous instances of books produced by divers hands, and generally illumination was done by artists who were especially skilled.

The great variety of scribal error is beyond our scope and may be identified in any of the paleographical manuals. The possibility of erroneous transcription was clearly recognized, and therefore texts were examined by a corrector who compared them with the originals, and sometimes also by another who provided punctuation. This practice was particularly necessary before the Carolingian period when it first became generally customary to separate words. Although there was punctuation in ancient texts, the use of the marks that have come down to modern times developed in the Middle Ages and was firmly established in Carolingian manuscripts (38). Alcuin and his contemporaries provided specific instructions on

punctuation and the correction of texts. The scribe was supposed to copy precisely what was before him; but the more competent he was in Latin, the greater the temptation to emend the text.

In the explicit, the scribe often expressed his gratification for completing his chore, and sometimes furnished his name. Some scribes attained a certain degree of fame, for example, Reginbert of Reichenau (d. 847), Froumund of Tegernsee (d. ca. 1011), and Otloh of St. Emmeran in Regensburg (d. after 1070). The explicit is sometimes accompanied by personal comments such as one by Raoul of St. Aignan, who complained of the drudgery (and writing properly on parchment is indeed hard work), and that of an anonymous cynic who wrote at the end of a manuscript now in the Worcester Cathedral that his work was fruitless, since nobody reads books (39). Minatory inscriptions directed at thieves and mutilators also appear, particularly in the later Middle Ages (40). In the case of doctrinal works, there are often anathemas at the end against any person who alters or mutilates the text.

Books were copied from various sources, and new foundations had to depend on gifts and copies of books from the mother houses. Pilgrims might leave a book with a hospitable monastery, and novices would bring books, often copied by themselves, as initiation gifts. Borrowing books for copying was a device zealously practiced by one of the greatest medieval bibliophiles and collectors, Lupus Servatus (ca. 805–862), abbot of Ferrières after 842. Around 840 he urged Reginbert (apparently familiar with the contents of the Ferrières armarium) to bring with him his Sallust and Cicero's Verrine orations, presumably for copying. He appealed to Pope Benedict VI about 855 to send Cicero's *De oratore*, Quintilian, and Donatus on Terence. But Lupus himself was reluctant to lend books in that age of hazardous traveling conditions (41). It is likely that Lupus's effort to borrow books was not a common practice, due to the very reasons he gives on the dangers of travel, and that most copies were made from manuscripts that never left their home. Gerbert of Aurillac (ca. 940–1003, later Sylvester II) wrote to the abbot of Tours that he paid scribes in Italy, Germany, and Belgium to make needed copies (42).

To maintain a scriptorium was no less expensive, relatively, than to finance a publishing house or microfilm laboratory. The labor was available, but parchment (supplanted by paper only at a late date) was costly, and quills and ink had to be purchased, to say nothing of colors and gold for illuminated manuscripts. In the later Middle Ages, when lay scribes were employed, there was even a labor cost. There are records of differences between the *armarius* and the *camerarius* or *cellerarius* (bursar) about appropriations for the scriptorium (43). The most usual method of financing the scriptorium was to set aside a certain portion of the abbey's income, either as a current appropriation or as a sort of endowment. About 1080 a Norman official assigned certain tithes to St. Albans for book production, and the *precentor* of Abingdon secured 30 shillings in tithes for buying parchment (44). From the 12th century there are records of similar tithes for the scriptoria at Ely, Westminster, Winchester (cathedral convent of St. Swithen's), Bury St. Edmonds, and Whitby (45). But in France there was a sort of an assessment system in addition

to income from certain established sources (46). The Abbey of Saint-Père de Chartres collected a tax from priests holding its benefices, which was used to support the scriptorium and the library (47). Dependent priors at Fleury, Corbie, and St. Trinité in Vendôme had to pay taxes in cash or grain to the librarian. In 783 Charlemagne sent skins for binding manuscripts to the Abbey of St. Berbin, and in 790 he granted hunting privileges to the same house for securing skins for various purposes, including binding (48). The Grande Chartreuse, mother house of the Carthusians in the Dauphiné Alps, was given parchment and cowhide for binding by the counts of Nevers and Auxerre (49).

Monasticism as an institution went through many changes in the 13th and 14th centuries, declining in some places, taking on new rôles in others. The scriptoria were victims of the times in some places, and there was widespread illiteracy in monasteries; for example, Murbach was reported to have not one monk who could write in 1297 (50). In the middle of the 13th century Richard de Bury was moved to insert a section in the *Philobiblon*, "Querimonia librorum contra clericos iam promotos" (Chapter 4). Perhaps even more important, the need of the universities for multiple copies of standard works and the rising interest of nobility and royalty in owning deluxe manuscripts gave new dimensions to the business of copying books.

### Materials and Techniques

The most important writing device inherited from antiquity was the wax tablet, a wooden surface sunk to a certain depth with a raised frame around it and a thin coating of wax (usually black) to receive the writing. Called a *πιναξ*, *πινακίς*, *πυκτιον*, *πυξιδιον*, *δελτος*, *δελτιον*, *δελτιδιον*, *γραμματειον* or *cera*, *tabula*, *tabella*, *tabula cerata* (51), it is our most significant inheritance from the writing equipment of antiquity. This is true not only on account of its continuing use in the Middle Ages but also because the practice of lacing two or more together surely provided the original idea for the codex book. Papyrus, friable as it is, could not be easily folded to make a codex, and there is the example of an *Iliad* on single sheets of papyrus in the third century A.D. The earliest references to *pugillares membranei* are in six epigrams of Martial (52), including one to his own works. With the rise of Christianity, the parchment codex book gradually replaced the papyrus roll.

Papyrus continued to be used, mainly for official purposes (into the 11th century in the Papal Curia), but it disappeared north of the Alps in the eighth century. Thus we may assume that vellum was the primary writing material used in all but the earliest monastic scriptoria and that papyrus was the exceptional material even there, what with the Christians' preference for codex books. The early vellum preserved from the fifth and sixth centuries is firm and crisp, with a smooth and often glossy surface (always the best in works produced in Italy). Later, as the scriptoria expanded and increased production, an inferior grade appeared, indeed often with some parts of surfaces so thin that the scribes left them blank in the case of some manuscripts of the seventh and tenth centuries (53). Beginning

around the 13th century, a soft vellum was common in northern Europe, and the finest manuscripts were often on uterine vellum (from fetuses or newly born calves). Stained vellum with letters of gold or silver (for example, the Gothic Bible and the Codex Argenteus in Uppsala, silver letters on purple parchment) was used for some deluxe manuscripts at an early date.

The basic unit in most vellum manuscripts was the quaternion, four sheets folded once and thus forming eight leaves. Just as in early printed books, the signature to indicate the sequence of the quaternions was in the lower left of the last leaf. Any pagination that appears on a medieval manuscript is from the hand of a modern collator, since the practice of numbering leaves or pages did not come into vogue until the latter part of the incunabula period. Usually the signature was the letter *q* (thus, *q* i, *q* ii, *q* iii, etc.), not letters of the alphabet or catch words (*reclamantes*), which the printers began to use.

From the scribe and the collator the manuscript went to the rubricator and, when desired, to the illuminator. Their work belongs to the history of illumination, described elsewhere in this encyclopedia, but a few additional notes on monastic binding are in order here (54). Binding was a necessary final process, and it was evidently a part of bookmaking in monasteries from the beginning. Wooden boards were used throughout most of the Middle Ages, and the use of papier mâché came from the Islamic world via Spain. Clasps to hold covers firmly (and thus keep the crinkly parchment leaves flat) consisted of a couple of leather strips with metal buckles attached to other metal pieces on the front cover, but they did not become common until the Gothic period. The four corners of the cover were protected by pieces of metal, with another in the center, and often they were decorated, especially with the symbols of the evangelists. Leather covers drawn over the boards were decorated with rolls and stamps in the 15th century, an art that reached a high level of excellence at that time (55).

For writing on wax tablets, a *στῦλος*, *γραφέιον*, *γραφίς*, *γραφίδιον*, or *stilus*, *graphium* (kept in a *grapharium*; cf. German *Griffel*) was used. It was made of a metal such as iron or bronze or of bone or ivory. The butt end was a round knot which could be used for deletions by smoothing the wax, hence *vertere stilum*, "to correct" (56). For writing on papyrus, a reed—*κάλαμος*, *δόναξ*, *γραφεύς*, *σχόινος*; or *calamus*, *canna*—was used, frayed at one end for use as a brush. The reed pen continued in use through the Middle Ages, in Italy at least, into the 15th century.

The quill pen (*penna*) appeared at a fairly late date, perhaps because it is useful only when one has a very sharp knife. It is first mentioned by an anonymous historian who taught the illiterate Ostrogoth monarch Theodorich to draw a subscription, *Legi* (58). Isidore wrote: "Instrumentae scribae calamus et penna. Ex his enim verba paginis infiguntur, sed calamus arboris est, penna avis, cuius acumen dividitur in duo, in toto corpore unitate servata" (59). The tough surface of vellum could bear the pressure of a quill pen more readily than the brittle papyrus could; and since fowl were always available, and reeds were not, the *penna* was perhaps the most widely used writing instrument in the scriptoria.

Ink was called *μέλαν*, *μέλαν ὦ* *γράφομεν*, *γραφιχόν μέλαν* *μελάνιον* (dis-



FIGURE 5. *A copyist at his desk, with inkpot and pens. From Ms. Harl. 2820, f. 120.*

tinguished from *μελαντηρία*, boot black), and *atramentum (librarium*, as distinguished from *atramentum sutorium*). The *sepia* of the squid or cuttle fish was also used, as we hear from the spoiled young man in Persius who was dissatisfied with his ink (60). Pliny gives soot and gum as the basic ingredients (61), but some later authors mention gall apples. In any event the addition of gallic or tannic acid, metallic elements, and vitriol was customary from an early date. After preparation, reference was made to the substance as *ἔνχαιστον (encaustum*; whence Italian *inchiostro*, French *encre*, English *ink*). Red ink (*μελάνιον κόκκινον, minium, rubrica*) appeared in early Egyptian papyri and was used at times for sections of medieval books. One type of ink container was a horn inserted into a hole in the writing desk, and there are miniatures of scribes with two horns in



front of them, the second for red ink for captions, marginalia, underlining, chapter numbers, and paragraph signs (however, the rubricator's job was generally a separate one). In antiquity and the Middle Ages there was also the ink pot (*μελανδόχον, μελανδόχη, μελανδοχείον, atramentarium*), a cylindrical jar or metal box to admit the insertion of the reed or, later, quill pen. Double ink pots, possibly for black and red, may be seen in wall paintings at Pompeii.

### The Later Middle Ages

Scribal work as a monastic chore never died out completely, but the nature and purpose of copying books changed in the 13th century, and so did the operations of many monastic scriptoria. Some of them went into a definite decline, and it was said that in 1297 few monks at St. Gall, not even the prior, could write (62).

One can hardly speak of a European book trade before the rise of the universities. To be sure, such avid bibliophiles as Lupus and Gerbert would beg, borrow, or buy anything they could locate, but such arrangements were single transactions between abbeys or individuals, hardly part of an organized book trade. Monastic houses have never been reluctant to turn a penny for anything from chartreuse to Trappist cheese, but this generally occurred as part of the established trade in the commodity. The decay of monastic life gave rise to *scriptores conducti*, professional scribes, who were as available to monasteries as to the universities from the 13th century on.

Provost Bernhard in Vorau hired scribes in the 12th century; and Provost Konrad (d. 1300) is praised for personal copying, but *alios precio conscribi fecit* (63). Corbie bought books and hired scribes in the 13th century. The statutes of the canons of St. Victor provided that the *armarius* employ *scriptores qui pro pretio scribunt* and supervise them (64). On the other hand, preoccupation with other tasks inspired the grand master of the Teutonic Order to employ scribes at Marienburg (65).

The Brethren of the Common Life (*Fratres Communis Vitae, Fraterherren*), founded by Geert de Groote (Gerardus Magnus, 1340–1384) in Deventer, have a special rôle in the history of book production. Their emphasis on teaching for general education required large numbers of books for their schools in the Low Countries and in north and west Germany (66). Scribal work was a special duty of the brethren, and they copied books not only for their own use but also for outside sale. Every house had a supervisor of the scriptorium, the *scriptuarius*, who oversaw not only the scribes but also the rubricators and the binders, received orders and payments, and delivered the money to the procurator. The brethren in the Lüchtenhof in Hildesheim earned over 1,000 gulden in 1450, and Zwolle was paid 500 gulden for a Bible (67). The manuscripts produced by these "brethren of the pen," both those for sale and those for their own collections, were distinguished for correctness and clarity of the text. With the invention of printing they continued their work with early printing houses in Brussels, Louvain, Deventer, Mariental in Rheingau, and Rostock (68).

Libraries for those outside of the clergy were nonexistent and, indeed, unneeded,



FIGURE 6. *Saint Mark writing his Gospels. From the Horae of the Duke of Bedford.*

for few could read. Personal libraries of princes and patricians existed in antiquity, but nearly a millennium passed until the rich and the powerful began to collect books again. The Hohenstaufen emperors—especially Frederick II, founder of the University of Naples (1224)—were vigorous patrons of scholarship. Frederick II presented books to universities, was in active communication with leading scholars of his age, and encouraged translations from Arabic (69). There was most probably a library at his court in Palermo and almost surely a scriptorium for publishing the translations he promoted. His son Manfred (1232–1266), last of the Hohenstaufen kings of Naples and Sicily, and Manfred’s successor, Charles of Anjou, continued the tradition; and we know the names of scribes, proofreaders, rubricators, and

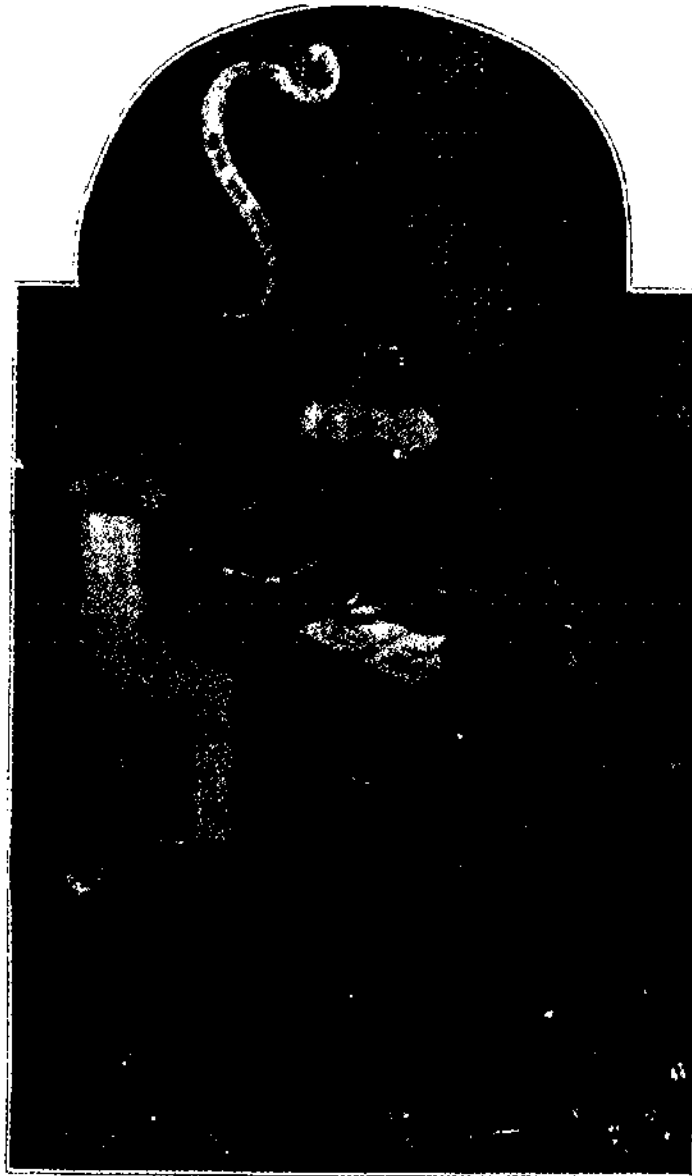


FIGURE 7. *Saint John writing his Gospel. From a book of hours in the Fitzwilliam Museum, Cambridge.*

binders from an inventory of 1282 (70). In Castile, Alfonso X el Sabio (1221–1284), perhaps the most learned and prolific of all medieval rulers, had at his disposal scribes and miniaturists who made handsome copies of his works.

Saint Louis (Louis IX, 1214–1270) not only built the Sainte-Chapelle to house the Crown of Thorns and the Holy Lance but he also placed in it copies of all scriptural texts held in the monasteries of France (71). These and many other manuscripts which were copied by royal directive were the work of a corps of calligraphers and miniaturists whose achievement inspired Dante to write “quell’arte



FIGURE 8. *A copyist at his desk. From a French translation of Valerius Maximus, written and illuminated for King Edward IV in Flanders in 1479.*

ch'alluminar chiamata è in Parisi" (72). The noble collection of at least 1,289 manuscripts assembled by Charles V (Charles the Wise, 1337–1380) for the Louvre has been decimated to barely a hundred surviving pieces, but it was a prototype of other princely libraries of the transitional period from the late Middle Ages to the Renaissance (73). Charles's translators worked closely with the scribes, and from the subscriptions we know the names of the latter as well as those of the miniaturists. In France and Italy in particular, but also in England, the Low Countries, and the Germanies, the example of Charles V was repeated by wealthy princes of church and state who not only bought manuscripts but frequently developed their own scriptoria. Their contributions in developing some of the truly great libraries of



FIGURE 9. *Saint Luke writing his Gospel (in the Dunois Horae).*

our time belong to the history of personal and institutional collecting; but without the availability of calligraphers, rubricators, and illuminators, either as domestic employees or as independent contractors, their collections would have been considerably less extensive and less significant in regard to quality.

The physical labor and specialized skill needed to transcribe a manuscript were never inexpensive, even when unpaid monastic personnel was used, for maintenance and general overhead were always at hand. Properly managed, a commercial scriptorium for popular books could make money, given the rising literacy of the late Middle Ages. Thus there was probably such a scriptorium in Strassburg

in the period 1418–1421. About 1427 Diebolt Lauber opened a similar one in nearby Hagenau (74). More than 50 manuscripts of popular books in Alsatian dialect and illustrated with line drawings have been identified. Niccolò Niccoli (1383–1437) had a substantial corps of copyists at his disposal in Florence to satisfy the enormous bibliophilic appetite of Cosimo de' Medici, and his work was of inestimable value for scholarship (75). The story of the great ateliers of Burgundy, Paris, and the Low Countries, which produced deluxe liturgical and other books in the latter 14th and the 15th centuries, belongs to the history of illumination, but they were scriptoria with skilled calligraphers as well as studios for miniaturists.

For all practical purposes, book trade was nonexistent in the early Middle Ages, and only in the 12th century, coincident with the rise of the universities, do we hear of *stationarii*, dealers in manuscripts (76). In many instances they had a formal relationship with the universities as *servientes*, along with parchment manufacturers, bookbinders, illuminators, and scribes (77). The earliest universities in each country—Bologna, Paris, Oxford, Cambridge, Prague, Vienna, and Heidelberg—all had specific provisions for the relations of the manuscript dealers with the university. Stationers not only employed scribes and illuminators and bought and sold books, but they also rented and received books in pawn. The combined functions of book production and bookselling fitted easily into the early age of printed books as scribal work and typography overlapped for a half a century (78), and many a tradition and practice of the scriptorium passed into the printing house.

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## THE SEARS LIST OF SUBJECT HEADINGS

The *Sears List of Subject Headings* is a general subject heading authority publication (1), one of two in common use in American libraries. The other is the *Library of Congress Subject Headings*, a very much more comprehensive authority (2).

The *Sears List of Subject Headings* (hereafter referred to as *Sears* or the *Sears List*) attempts to provide subject headings or patterns for subject headings across the full spectrum of a general library collection. This broad coverage necessarily involves a substantial reduction in depth of coverage. A library collecting intensively in one or more subjects must supplement or replace the *Sears List* with either a more comprehensive general authority or an authority specialized for the particular subjects in question, otherwise the library risks inadequate subject description.

*Sears's* intended audience is the large number of smaller public and school libraries in the United States and Canada. These organizations need a general authority list for several important reasons. First, they are general in their subject coverage, and they are expected to carry out the same range of tasks as their larger brethren. However, their smallness means that the tasks must be carried out on a severely lowered scale, not from desire, but because of limited resources. Their book and materials collections must cover the full spectrum of knowledge, but only in limited depth at any given point. Second, tools useful in the subject description of a very large library may be of limited usefulness, or even pernicious, if applied to the collection of a very small library. The application to the small library of tools meant for the largest libraries can result in needlessly complex subject headings and subdivisions, shelf arrangement, and descriptive cataloging. This mismatch may be compounded by the limited ability of many of the smaller library's clients to cope with complex cataloging and shelf arrangement. A third reason for the usefulness of tools that address the small library specifically is that the small library's often limited resources force it to employ cataloging personnel with little or no formal training. This problem has been alleviated greatly by the wide availability of professionally prepared catalog copy. Nevertheless, even in a library that orders its materials precataloged and prepared for shelving and filing, responsibility for the coordination of technical services and the organization of locally produced materials remains.

One result of the small library's limitations in technical services expertise, financial resources, and client proficiency—and its unlimited mission—has been the ready acceptance of the *Sears List*. The acceptance has enabled *Sears* to remain continuously in print through 50 years and 10 successive editions. It has in that time become part of the commercial cataloging system, with *Sears* subject headings offered by at least two commercial cataloging firms as a regular option (3).

Within its mission of services to the smaller library, the *Sears List* attempts whenever possible to match the vocabulary and structure used by the *Library of Congress Subject Headings*:

The successive editors of the *Sears List* have followed the policy established by Miss Sears to use the Library of Congress form of subject headings with some modifications for current terminology and spelling. These modifications to meet the needs of smaller collections have been the simplification of phrasing . . . and, in some cases, a broader level of specificity. . . (4).

This policy greatly increases the utility of the *Sears List*. First, it allows for substantial growth in a collection with minimal dislocation of the subject descriptions. Second, it allows greater depth in certain segments of a collection than would be the case in the collection generally. Finally, it allows the smaller library to use subject descriptions originated at the Library of Congress whenever necessary, with minimal consequences. The two lists are very different in size and detail, but the *Sears* policy of following Library of Congress practice as much as possible results in differences that are more predictable and of less impact than might be the case if an independent approach were taken. Subject subdivisions tend to be similar in structure to those of the Library of Congress, but simpler and less numerous. Many of the narrower headings found in the Library of Congress authority are absent from *Sears*, eliminating any possible conflict and preserving future options. Many of the broader headings are identical in both lists, because they are both widely known and less subject to evolutionary changes in the language. With all their similarities, however, the two authorities are not interchangeable, and use of the Library of Congress list as a supplement to *Sears* should be undertaken with a clear idea of the complications that might arise as a result. It is essential when using both lists to establish one as the authority, and make notations in it regarding headings established that have their origin in the other. Only in this manner can the supplementation process be monitored and kept under control.

#### **Origin of the *Sears List of Subject Headings***

The *Sears List* is now in its 10th edition. The first edition was published in 1923, over 50 years ago. It was initiated by Minnie Earl Sears in response to a need “. . . for a list of subject headings less comprehensive than the lists published by the American Library Association and the Library of Congress” (5). Sears identified two principal factors in the decision to begin a new subject authority. First, the use of the two larger lists indicated that they provided a great deal of material of little use to smaller libraries. In addition, the limited training of staff members at smaller libraries did not equip them to deal with the larger lists, which they found confusing and complex (5). The *Sears List* was an attempt to resolve these problems by matching the number and complexity of its listings to the generally simple nature of the collections for which it was designed, and by clearing out the undergrowth of inappropriately complicated subdivisions present in larger lists.

A practical approach was taken in the compilation of the initial edition. A survey was carried out of “. . . several small libraries known to be well cataloged . . .” (5),

and the subject headings they used were collected and arranged. These small libraries were:

City Free Library, Huntington, Indiana  
Steele Memorial Library, Elmira, New York  
Public Library, Jacksonville, Illinois  
Library Association, Lenox, Massachusetts  
Public Library, Middleborough, Massachusetts  
Carnegie Free Library, Ogden, Utah  
Free Public Library, Pottsville, Pennsylvania  
Osterhout Free Library, Wilkes-Barre, Pennsylvania  
Carnegie Public Library, Conneaut, Ohio (6)

If a subject heading was found to be in use in two or more of these libraries, it was established in the initial list (7). No attempt to survey all knowledge and fill in headings missed in the survey was made; it was felt that “. . . it has seemed best not to attempt to fill up possible gaps but to present a list based on actual use” (7).

The subject headings selected were not transferred without change into the new authority. Sears had already made a decision to try to conform as much as possible to Library of Congress practice, and many of the initial edition's headings were modified to accord with that policy before they were established (7). Sears stated in her introduction to the first edition that she had three possible models for subject heading form. These were the Library of Congress, the American Library Association, and the H. W. Wilson Company, at that time a principal vendor of printed cards to smaller libraries. She chose to follow the Library of Congress: “Because of the increasing use of the Library of Congress printed cards . . .” (7). In view of the gradual emergence of the Library of Congress as the preeminent authority in American cataloging and classification, this has turned out to be a fortunate choice.

The initial edition of the *Sears List* was thus conceived and executed in a practical, user-oriented fashion, based on sound judgments. That edition was a success, and it quickly led to a new edition with improvements based on a careful reading of user needs and desires (8). Successive editions followed at fairly regular intervals, leading to the present, 10th, edition. The process of improvement and reissue shows no signs of termination in the future.

### The First Edition

The first edition of the *Sears List* contained 3,203 subject headings of all types and levels of subdivision, with perhaps an equal number of listings of unused vocabulary with attached references to appropriate headings (9).

The initial edition was fairly simple in structure, containing few of the features found in later editions. It had a very short introduction, which also served as a manual of use. It provided 16 subdivisions applicable to any subject heading, and these were listed in the preliminaries (10). Topical subdivisions tended to be few

in number and quite simple in construction. Many classes of headings were omitted to save space, a common technique in subject heading authorities. Directions for formulating the headings in these classes were provided in notes beneath the subject headings that served as class labels. For example, the subject heading "Birds" had appended beneath it a note that stated: "(Names of the various birds are not included in this list but they are to be used as needed, using the plural form, e.g. Canaries, Pigeons, etc.)" (11). There were few scope notes in the first edition, possibly reflecting a close knowledge of subject coverages on the part of the nine contributing libraries. Subdivisions were indicated by indentation beneath main headings, bold-face type, and capitalization of the initial letter, as was done with main headings. The long dash customarily used to indicate subdivision in current authorities was absent. There were few subdivisions; if more were needed, the cataloger was directed to the Library of Congress authority (12).

Finally, the reference structure was in its infancy. Only vocabulary control references were provided. "See" was used as the signal for the reference, and "Refer from" as the signal for the reference tracing. Syndetic, or "See also," references were not provided:

The *See also* references have not been made in this edition partly because the answers received to the questionnaire sent out showed that the opinion as to the desirability of including them was divided, and also because the making of the *See also* references would have added greatly to the labor of the work and would have further delayed its publication (13).

The lack of a syndetic reference structure meant that most subject headings had little or no information appended beneath them. Since both the subject headings and the unused vocabulary were printed in bold-face type, the list appeared packed, and it must have been difficult to search for an individual subject heading, or to recognize one when it was located. Altogether, the initial edition was a remarkable achievement. The process of change was inevitable, however, and was soon underway, leading to the publication of the second edition within 3 years (14). Sears herself anticipated the process of change, calling the first edition ". . . more or less tentative" (15).

### Changes and Improvements in Subsequent Editions

With each subsequent edition, changes in format and features were made. In terms of absolute growth in the number of subject headings it contained, the *Sears List* did not change very greatly. The initial edition contained 3,203 subject headings. By the fourth edition, the total had grown to 3,870. There were 4,616 subject headings when the eighth edition appeared. The present edition, the 10th, provides 5,326 subject headings. The original list has enlarged by roughly 66% over 50 years, or about 50 more listings per year. This is not a spectacular growth, and it may reflect some conscious effort to hold to a certain figure. The rate of growth and the total listings in each edition are rendered somewhat less meaningful

by the impossibility of measuring the impact of the omitted classes of headings as applied to library catalogs. Growth in listings also should not be equated with either changes in subject heading composition or the introduction of new subject headings. Neither of these would produce figures equal to those cited here for raw growth. One cogent explanation for the relatively slow growth may lie in the composition and subject coverage of the vocabulary used in the *Sears List*. It is probable, though unproven, that very broad headings are less subject to linguistic evolution and resulting obsolescence than are very narrow ones. "Dogs" may serve to illustrate. In the first edition, it served as a label for all breeds of dogs, and no provision was made for adding subject headings for individual breeds of dogs (16). By the 10th edition, the reference structure under "Dogs" included a group reference to breeds of dogs, using "Collies" as an example of the type of heading to be added (17). "Dogs" itself remained unchanged, as it remains the operative label in the English language for the animal to which it refers. It may be supposed that, the more generic the label, the more permanent. Of course, *Sears* is in no way immune to change; a glance at the appendix to the 10th edition, "Black Subject Headings" (18), will demonstrate the need for constant change.

The second edition appeared within 3 years after the first, as previously mentioned. In it, a system of syndetic references appeared for the first time. The justification for this addition was as follows:

*See also* references, which were omitted in the first edition, are now given in addition to the *see* references included in the first edition. These have been added largely at the request of the teachers who use the list as a textbook in teaching subject headings. Other users of the list also suggested this addition and there seems to be a fairly general demand for these references now (19).

The new references were introduced by the signal "See also," and their tracings by the phrase "Refer from (see also ref. —)." The tracing signal phrase for vocabulary control references was changed from "Refer from" to "Refer from (see ref. —)." These somewhat clumsy signals were simplified in later editions. The syndetic references were applied complete, and they increased as new subject headings were introduced in later editions.

Other changes in the second edition included the addition of more scope notes and some changes in heading structure. Both alterations either followed Library of Congress practice or brought the *Sears List* more closely in line with that practice. Finally, "some" new subject headings were established, ". . . to take care of new needs and bring the list up to date" (19).

The third edition of the *Sears List* introduced a major improvement whose usefulness continues to this day. The new feature was a short, clear essay on the nature of subject headings, subject cataloging, and the use of standard subject authority lists in libraries. The essay was entitled "Practical Suggestions for the Beginner in Subject Heading Work" (20). No author was named, but Minnie Earl Sears was listed as the author of substantially the same essay in the fourth edition (21). A second major improvement in the third edition was a great enlarge-

ment of the number of scope notes. These notes followed Library of Congress practice as much as possible (22).

The appearance of the fourth edition in 1939 brought two important new features; one was a change in the technique of subdivision and the other involved the provision of classification numbers for most subject headings.

By the third edition, the pattern of subject subdivision had been resolved into two basic approaches. First, a subdivision that applied to only one or two subject headings was printed under them, introduced by a long dash, with the dash repeated for a sub-subdivision if one occurred. Second, a list was provided of subdivisions that could be applied to any subject heading (23). The fourth edition included a third group of subdivisions, which in terms of applicability fell between the two groups already established:

When certain subdivisions are to be used under several subjects they are *not* listed separately under each subject possible but are included in the main alphabet, distinguished from the main subject headings by being printed in italic type (24).

Thus, the fourth edition provided an intermediate group of subdivisions, creating three different places for the cataloger to look in the search for suitable subdivisions. By the fourth edition also, the practice of using certain sequences of subdivisions as models of their type had been firmly established. These model subdivision sequences could be extracted and applied virtually whole to any subject heading similar in nature to the one under which they appeared. For example, the sequence of subdivisions under "United States" could be applied to any country, and the sequence under "Chicago," to any city (24). The provision of the intermediate level of subject subdivisions lasted until the eighth edition, when the feature terminated in somewhat ambiguous circumstances. In the preface of that edition, the authors stated:

When certain subdivisions may be used under a considerable number of subjects they are not listed under each heading possible but are included in the main alphabet with a note and an example explaining how and when this subdivision is used (25).

The words "distinguished from the main subject headings by being printed in italic type" (24), found in the fourth edition, had been eliminated, but the impression was misleading. In fact, the subdivisions were no longer filed in the main sequence; they were appended to subject headings filed in the main sequence, and to certain vocabulary control references. The new scheme made them very difficult to find without consulting a unified list in the preliminaries (26).

The second major new feature introduced in the fourth edition was the formulation of Dewey Decimal Classification numbers for virtually all subject headings and subdivisions in the main alphabet. The work was carried out by the *Sears* editors, revised and edited by the editors of the Dewey Decimal Classification, then finally approved by the *Sears* staff before being printed in the fourth edition (27). In at least a few cases, the two groups could not agree, and a disclaimer was apparently

sent to purchasers of the fourth edition. In the copy the author examined, this disclaimer is printed on a slip pasted in the section of the preface that deals with the new classifications. It states:

The D.C. editors are not responsible for all numbers as they are in the List nor are all of them their first choice, though the majority of them are either in full agreement with D.C. Tables and Index, or regarded as permissible. In a few cases the numbers did not meet the approval of the D.C. editors (28).

It is not known which group of editors was responsible for the disclaimer.

The classification was worked out according to a pattern established in the *Standard Catalog for Public Libraries*, where, presumably, Dewey notation had already been applied. Following that pattern, the editors tried to assign only one classification to each subject heading, and to keep notations as short as possible (27). Some subject headings have two classifications, however, and a few have three. In the explanation of classification, the editors accounted for decisions made in the choice of numbers and for the length to which the notation was carried beyond the decimal point.

The stated purpose for adding classification was “. . . to aid the inexperienced classifier . . . and to provide a simple scheme of classification for smaller libraries” (27). This rationale supported the overall mission of the *Sears List*, which was the assistance of catalogers with limited training, working in a library with limited resources.

Classification remained a feature of the *Sears List* until the publication of the ninth edition. From the fourth through the eighth editions, the scheme of classification was identical in format and approach, though individual classifications were added, deleted, and changed through the successive editions. When the ninth edition appeared, it carried no classifications. In the preface, the editors provided an explanation for the wholesale deletion of the numbers:

The Dewey Decimal Classification numbers which appeared in the more recent editions have been omitted. Many users of Sears have called to the attention of the publisher the inconsistency of including classification numbers and at the same time telling the cataloger to consult the Dewey Decimal Classification for numbers. Moreover, it was the expressed opinion of these users that the inclusion of numbers often led to a misuse of the publication due to misunderstanding of the relationship between subject headings and classification. In view of these important professional considerations, the publisher has decided to omit the numbers from this edition (29).

The rationale for omission conflicts with the rationale for inclusion supplied in the fourth and later editions, as may be expected. It does, however, agree with later statements by the editors indicating that they regarded incorrect use of the feature as a problem. For example, this statement appeared in the eighth edition, the last to bear classification numbers, and it indicated the editors' concern clearly:

The inclusion of classification numbers in the “Sears List” is not at any time to be considered as a substitute for consulting the “Dewey Decimal Classification” it-



self. The tables are needed for interpretation of numbers and the "Relative Index" for ascertaining other aspects of the subject (30).

While it is true that the classification supplied could be incorrectly utilized, it is difficult to see that this is the responsibility of the editors of the *Sears List*. Once they have explained the use of the classification, and have provided clear warnings against its misuse, their responsibility ends. If an individual cataloger chooses to use the supplied classifications as a substitute for consulting the classification authority, the responsibility lies with that cataloger. We are not, after all, in a situation analogous to the production of an unsafe automobile or other product. No library patron was ever injured by an incorrect classification number. It might also be observed that the most difficult aspect of classification as a task is the initial summary of a book's subject and the conversion of that summary into an entry of the proper segment of the classification scheme. The numbers provided in the *Sears List* addressed that problem exactly. They must have been particularly valuable in situations where the index to the classification provided a bewildering array of suggested table locations for a single subject. It must also be said that the *Sears* editors were perfectly correct in their assertion in the eighth edition that the suggested classifications were "not at any time to be considered as a substitute for consulting the 'Dewey Decimal Classification' itself" (30). Once the cataloger learns to use the classification effectively, it is a vastly better source of numbers than any substitute could ever be.

The omission of suggested classification was not greeted with universal approval by professional librarians. Seymour Lubetsky, in a review of the ninth edition for *Library Journal*, examined the reasons given for omission of classification numbers and found them inadequate:

These reasons cannot be taken seriously. The omission will be a loss to all competent users of *Sears*, who are undoubtedly the prevailing and increasing majority, and of no help to the incompetent ones. The librarian incapable of using properly the Dewey Decimal Classification numbers will scarcely be capable of using properly any list of subject headings, with or without classification numbers (31).

The tenth edition of the *Sears List* appeared in 1972, 7 years after the ninth. The tenth edition continued to omit suggested classification numbers, reconfirming the decision made 7 years earlier. It is unlikely that the numbers will be reinstated in the future.

The fifth and sixth editions continued the pattern finally developed by the fourth. This pattern involved the provision of subject headings that followed Library of Congress practice as far as possible, supplied with Dewey Decimal Classification numbers in the great majority of cases, and with a fully developed and reciprocal network of syndetic and vocabulary control references. The main alphabetic sequence was printed on one column of a two-column format on each page, allowing space for catalogers to indicate inclusions, omissions, and alterations in the process of using *Sears* as an authority list. In both the fourth and fifth editions, the number of scope notes was increased (32). Evidently, the editors had

depended upon users of the list to indicate where confusion between subject coverages was evident and then developed new scope notes to resolve the confusion, adding them to the next edition to appear. There is no evidence that improvements were added to printings within editions.

In the sixth edition the somewhat cumbersome set of reference signals was streamlined. The earlier system used "See" to signal a vocabulary control reference, "See also" to signal a syndetic reference, "Refer from (see also ref. —)" to signal reference tracings, and "Refer from (see ref. —)" for vocabulary control reference tracings. The two reference signals were retained, but the tracing signals were changed to *x* for vocabulary control reference tracings and *xx* for syndetic reference tracings (33).

As successive editions of the *Sears List* appeared, the scope of its audience, in the view of the editors, widened steadily. In the first three editions the prefaces address the smaller library. Mention is made for the first time in the fourth edition of ". . . the increased use of the list by medium-sized as well as by small libraries and schools . . ." (34). The editors reacted to what they perceived as a wider audience by adding new features to the list, but not by the addition of large numbers of new subject headings. They explained their reaction as follows:

These changes, however, consist mainly in the addition of new features designed to aid catalogers rather than in the addition of large numbers of subjects because in purpose the List adheres to its original plan as an aid for libraries that do not need the more complete Library of Congress list (34).

The initiation of classification numbers, the elaboration of syndetic references, the scope notes, and the subdivisions—all these may be viewed as part of the editors' reaction to a wider audience. Of all the new features, only the classification numbers failed to survive into contemporary editions.

Through the initial six or seven editions, constant evolutionary change—based upon careful attention to the audience that the change attempted to serve—gradually produced the format of the *Sears List* today. The present, the 10th, edition may be traced directly back to the first edition in most of the features it contains.

### The 10th Edition

The current edition of the *Sears List* is the 10th, first published in 1972 and containing 5,326 subject headings and subdivisions (35). It differs in structure from the ninth edition in that an appendix of subject headings separate from the main listing is provided for the first time (36). Apart from this addition, the 10th edition remains typical of the structure and features gradually developed since the publication of the first edition in 1923.

The first feature of the 10th edition of interest to catalogers is the preface. In the *Sears List*, the preface is not a perfunctory exercise in salutary phrases and kind acknowledgments, but a vital part of the format, in which new features and changes in detail are carefully indicated, explained, and justified. Often these

changes are not evident at first glance, and they might be missed if the preface were not read before putting the new edition into operation. In the 10th edition's preface, four topics of interest are discussed. The first is the continued absence of classification numbers. The editors indicate that unfavorable reaction to their removal in the ninth edition was not strong enough to justify their reintroduction in the 10th (37). The second discussion of interest to catalogers is a review of the differences between *Sears* subject headings and those provided by the Library of Congress (38). This discussion is important to those libraries that apply a mixture to their catalogs. Third, the editors announce the inclusion in *Sears* of headings from the Library of Congress publication *Subject Headings for Children's Literature* (39). Not every heading was adopted, and the editors explain their selection procedure. Finally, the editors discuss their decision to provide an appendix of alternate subject headings for the first time in the history of the *Sears List*. This appendix is entitled "Black Subject Headings" (39). In the following passage, the editors explain why they provided alternate headings instead of modifying the wording of subject headings already in the *Sears List*:

In the United States youth prefers and demands to be called Black while their parents and the older generation still prefer Negro. European librarians prefer Negro. African librarians accept Negro but reject Black, and refer to themselves as Africans, or more specifically Nigerians, etc. In the newspapers and more popular publications the term Black is favored while in other materials both terms are being used. A further consideration is the fact that the word Negro is an exclusive term and so is very specific. On the other hand, the word Black is inclusive and is applied to many words having no relation to race. Because the use of *Sears* is international, because the terminology depends on the age of the speaker and the type of media, and because the preferred terminology has not stabilized, the editor decided to continue to use the Negro headings as previously established. However, an alternate list of Black subject headings has been provided in an Appendix for those libraries that wish to make the change. This compromise will perhaps satisfy both sides of the semantic question (39).

This compromise approach is probably due to the innate caution of any group of people who must provide terminology in printed form, while operating in a dynamic situation. The key phrase in the explanation quoted here is probably ". . . the preferred terminology has not stabilized." The editors must be very cautious, because they would not wish to have to remove terminology only recently established. They must try to discern the difference between evolutions in the language and temporary fashions in vocabulary. Since this cannot be done with a great deal of precision, the tendency is to wait until matters are firmly settled before establishing a new subject heading. An unfortunate byproduct of this caution is the sometimes long interval between the use of a term in society and its appearance in a subject heading authority.

The second half of the preface contains material of a more perfunctory nature, but still important to the cataloger. This section summarizes the physical characteristics of the *Sears List*, including the authority used for spelling, hyphenization, and definition; the nature of the filing of subject headings; and differences

between the *Sears* filing procedures and those directed by the *A.L.A. Rules for Filing Catalog Cards* (40). Also found in this section are discussions of subject headings used as models for subdivision and a short inventory of the types of headings included in and omitted from the listings (41).

The next main section of the *Sears List* is devoted to an essay entitled "Subject Headings: Principles and Applications of the Sears List" (42). This essay stands on its own as a fairly complete exposition of the techniques involved in assigning subject headings to books, maintaining subject access in catalogs, and maintaining a printed subject authority file. The discussion uses the *Sears List* as an exemplar throughout. It is quite clear and complete, and it is valuable reading for students as well as for users of the *Sears List* in libraries.

The essay begins with an outline of the general principles and purposes of subject cataloging and moves into a discussion of the value of a subject authority (43). Basic principles such as specific entry and the use of commonly understood terminology are explained (44). One very valuable section provides an account of the grammar used in *Sears* subject headings, and explains why each grammatical type is used. Subdivisions are covered as well, and an inventory of the various types is supplied here. The application of subject headings in biography and literature is explained, with examples (45). The essay finishes with an explanation of the various types of references used in the *Sears List* and in catalogs, along with instructions for their maintenance (46).

Several features are appended to the essay. The first of these is a short bibliography of works that may be consulted for further information about subject heading work in general. The citations range from older standard writings to more recent works, the most recent dated 1970 (47). Next, there is a section on the maintenance of the *Sears List* as a subject authority, with suggested marking techniques to be used to indicate established headings and references, additions, and changes (48). The book itself is designed for use as an authority, with each page containing only one column of listings in what would ordinarily be a two-column format. The right-hand side of each page is blank, leaving room for the suggested notations. The next appended section contains three lists of subdivisions applicable to more than one subject heading. The first list is of "key" subdivision sequences (49), of which there are eight. Each contains a subdivision pattern applicable to any other subject heading of the type of the heading under which the pattern appears. The key city, for example, is "Chicago," whose filing sequence contains 64 subdivisions. These subdivisions may be applied to any city name added to the catalog by a library (50). The keys are coordinated with omitted classes of subject headings, saving a great deal of space while sacrificing nothing in the way of coverage. The second list contains subdivisions applicable to any "general" subject heading (50). Presumably, what is meant is any subject heading to which their application seems appropriate. This list contains 29 subdivisions. Some are slightly restricted in usage; for example, "History and Criticism" is to be applied only to literature and music. Most seem applicable to virtually any subject heading, and to most topical subdivisions, though this application is not mentioned (50). The final list is of 63 subdivisions applicable to large groups of headings, but not to every heading. This list contains such sub-

divisions as "Accidents," "Fiction," and "Models." Each of these subdivisions has wide application but would produce absurd results if used without restriction. "Models," for example, could be applied to the name of virtually any object, living or inanimate, but not to a great many ideas and concepts (49). The final item appended to the essay is a list of "Headings to Be Added by the Cataloger" (51). This is a detailed list, containing 17 different omitted classes of subject headings. A breakdown of types of geographic names is provided, together with information about the establishment of references for headings added by the cataloger (51).

Following the essay, and just preceding the main sequence of headings, is a one-page guide to the use of the *Sears List*. This guide explains succinctly the various conventions and symbols used in the main listing, and it repeats the key headings (52).

The main alphabet of subject headings and unused vocabulary occupies the great bulk of the *Sears List*. Subject headings and unused vocabulary are filed in a single alphabet, one column per page, on the left-hand side of each page. The filing scheme used differs somewhat from the standard scheme embodied in the *A.L.A. Rules for Filing Catalog Cards*, the differences having to do with the preservation of sequences of subject headings and subdivisions beginning with the same word. This is achieved by regarding long dashes and commas; whereas the regular rules disregard all punctuation (53). A word followed by a long dash or a comma files before the same word followed by a space and then another word. Thus, two alphabets are created following a particular entry word, one consisting of subdivisions and inversions and one consisting of phrases. The following example illustrates the two alphabets:

Aeronautics	WORD, nothing, nothing
Aeronautics—Accidents	WORD—A
Aeronautics—Biography	WORD—B
Aeronautics, Commercial	WORD, C
Aeronautics—Flights	WORD—F
Aeronautics, Military	WORD, M
Aeronautics—Safety measures	WORD—Sa
Aeronautics—Songs and music	WORD—So
Aeronautics—Study and teaching	WORD—St
Aeronautics and civilization	WORD, nothing, An
Aeronautics as a profession	WORD, nothing, As
Aeronautics in agriculture	WORD, nothing, In A
Aeronautics in literature	WORD, nothing, In L (54)

The rationale used by the editors of the *Sears List* is that this technique is necessary because the user wants all related headings grouped together (53). What is puzzling is the inclusion of commas in the technique, along with long dashes. Commas do not create subdivisions at all; they give independent subject headings in altered grammatical form. There seems to be no substantive difference in function between them and the phrase headings placed in the second alphabet. Are they really meant as a kind of subdivision?

A great deal of unused vocabulary is filed in the same alphabet with the subject

headings. A reference to one or more subject headings is attached to each entry. These references take two forms. First, there are the true vocabulary control references. These answer the very real need to choose one term from among a group of synonymous or nearly synonymous terms, and they establish it as the one label for the concept. The alternative would be an intolerable dispersion of materials in the catalog. The second form of reference leads from one construction of the same or similar words to another construction. These references are necessary because of the rather large number of inversions of word order that have been carried out in order to assemble related subject headings. Some examples of this type of reference are:

American music. *See* Music, American  
American novelists. *See* Novelists, American  
American philosophy. *See* Philosophy, American (55)

There are a large number of these references in the sequence using the word American as the filing key, probably reflecting a decision to begin subject headings of that type with the discipline label rather than the national adjective. In addition to the references, already discussed, there are also a certain number that lead from the inverted construction of a phrase to its straightforward construction:

Attendance, School. *See* School attendance  
Boats, Submarine. *See* Submarine boats; Submarines  
Bombs, Incendiary. *See* Incendiary bombs (56)

These references may be explained by the presence of a large number of inversions in the alphabet of headings; it is possible that this rendered word order unpredictable, so that users are as liable to look for an inverted form as for a straightforward one.

The heart of the main listing consists of subject headings and the information and references associated with them. These subject headings take many grammatical forms, with a few standard forms predominating. In a study by the author of the eighth edition of the *Sears List*, these forms were explored, and counts were made of their occurrence (57). Since the *Sears List* appears not to have radically changed the grammatical structure of its headings, the relative occurrence of grammatical forms in the eighth edition may serve as a guide to occurrences in the 10th edition.

The most common form of subject heading is the single word with no subdivision. This form occurred 1,649 times in the eighth edition. The eighth edition contained 4,616 subject headings of all forms, while the 10th edition contains 5,326 headings, a 15% increase. If a 15% expansion is applied to the occurrences in the eighth edition, the result should approximate occurrences in the 10th. Thus, there should be around 1,896 single-word subject headings in the 10th edition, accounting for roughly 35% of all subject headings present. The following figures and percentages reflect this 15% escalation.

Following the single word, the simple adjectival phrase is the second most common form of subject heading in the 10th edition. It occurs about 1,214 times,

accounting for 22% of the headings. Between them, the single word and the single adjectival phrase account for 58% of all subject headings in the 10th edition. From this it may be observed that, by and large, the *Sears List* uses rather simple grammar for its subject headings. Probably a good part of the simplicity may be attributed to the relatively general nature of the *Sears List*.

The two most common types of subject headings appear more than 1,000 times each. No other type appears more than 300 times, and the actual rate of occurrence drops very steeply. Only five other grammatical types occur more than 100 times. Table 1 summarizes the occurrence of the seven most common grammatical constructions in the 10th edition of the *Sears List*.

As may be observed in the table, seven grammatical types of subject heading account for over three-fourths of all headings in the *Sears List*. Continuing this analysis, there are, based on work done with the eighth edition, over 200 other types that together make up the remaining one-fourth. None of these occurs more than 100 times. Ninety-six types occur only once, and 38 types, only twice. Projection of these occurrences onto the 10th edition would not substantially affect the results given here. A great many of the types identified in the eighth edition were originated either because of subdivision patterns or because the concept being labeled simply demanded a complex form. The nature of certain subjects dictates a degree of complexity in the labels used to describe them. This is not to say that the precise forms found in the *Sears List* are inevitable, or that no other form would produce a subject heading that made sense. In fact, this is not the case at all. Many subject headings could be restated in at least one other grammatical construction, and sometimes two or three. "Latin America—Politics" could be restated as either politics of Latin America or as Latin American politics. "Blood—Diseases" could be altered to read blood diseases or diseases of the blood. It seems probable that many of the constructions chosen were the result of a deliberate choice, possibly

TABLE 1  
Occurrence of Grammatical Constructions in the *Sears List*

Grammatical type	Example	Occurrences	
		Number	Percent*
1. Single word	Auctions	1,896	35
2. Simple adjectival phrase	Ballistic missiles	1,214	22
3. Single word with single-word subdivision	Blood—Diseases	314	6
4. Inverted simple adjectival phrase	Catalogs, card	291	5
5. Coordination of two words with a conjunction	Education and state	182	3
6. Form 1 with Form 2 subdivision	Popes—Temporal power	117	2
7. Form 2 with Form 1 subdivision	Latin America—Politics	102	2
Totals		4,116	77

\* Entries have been rounded off.

having to do with assembly of related subject headings and the use of grammar to create hierarchical sequences, particularly with subdivisions.

One feature of the grammar of the subject headings that must be counted as a structural component (but may also be viewed as an explanatory note) is the gloss attached to many headings. The glosses serve a sort of definitive purpose, in that they are attached to identical words to discriminate between their respective subject coverages. A gloss is a word or phrase enclosed in parentheses and attached at the end of a subject heading. It is in bold-face type and becomes a part of the heading, unlike a scope note, which is detached when the heading is applied to a catalog card. Glosses are usually applied to a word that carries more than one commonly understood meaning, depending upon the context in which it occurs. The gloss serves to add the context and thus delineate the subject coverage of the resulting label:

**Masks (for the face)**

**Masks (Plays)**

**Masks (Sculpture)**

Most commonly, the gloss appears on a subject heading whose wording is not repeated in another heading, but whose coverage would be confused without clarification of some kind. For example, "Conductors (Music)" is not listed in company with headings for conductors of vehicles or electricity; nevertheless, a book on copper conductors could be assigned the heading in music if no gloss were present. Less commonly, more than one subject heading is composed from the identical word, as was the case in the examples cited above, beginning with "Masks (for the face)." Sometimes a gloss is used to clarify a heading in the absence of any possible conflict. "FORTRAN (Computer program language)" probably cannot be confused with any other fortran, if indeed there is another. It is difficult to understand the purpose served by this third kind of application. The reader familiar with the acronym will know its coverage without recourse to the gloss, and the reader unfamiliar with it will not be looking for it.

Two kinds of notes are appended beneath many subject headings, between the heading and the listing of references and tracings. These are scope notes and directions for geographic subdivision.

There are two forms of geographic qualification used in the *Sears List*. The first is the addition of a place name as a subdivision, and this technique is indicated by the note "(May subdiv. geog.)" (58). The headings created using this technique include such things as "Birds—U.S." and "Cities and towns—U.S." Sometimes the type of country subdivision that may be established is somewhat restricted. For example, "Churches" carries the note "(May subdiv. geog. country or state)" (59). This restriction is necessary because the key heading "Chicago" contains the subdivision "Chicago—Churches," indicating that a city subdivision of the main heading "Churches" would create two locations for material.

The second type of geographic qualification is the creation of an inversion beginning with the main heading word and followed by the geographic qualifier, as in "Art, American." This technique is indicated by the note "(May subdiv. geog.



adjective form, e.g. . . . etc.)” (58). Often the ellipsis in this note is filled with an example of the type of construction required. “Architecture,” for example, carries the note “(May subdiv. geog. adjective form, e.g. Architecture, Greek; etc.).” “Architecture, Greek” appears as a subject heading later in the alphabet. An example is not always present in the note. The subject heading “Artificial satellites” carries a note that simply says “(May subdiv. geog. adjective form).” Interestingly enough, later in the sequence the heading “Artificial satellites, American” occurs, which is exactly the construction called for in the note. The criteria used in including or excluding examples from these notes are not clear. A fuller account of the application of the geographic qualifiers may be found in the introductory essay mentioned earlier in the article (60). Geographic qualification notes are not attached to a very substantial number of subject headings, but it is not known whether their absence must be interpreted as a prohibition against the addition of geographic qualifiers in situations where that addition seems warranted. Since there are two types of qualifier pattern in use, extreme caution should be exercised when a geographic qualifier is added in the absence of a note, lest *Sears* should use the other form in the next edition.

A second type of parenthetical direction attached to many subject headings is the scope note. Scope notes have been a continuing concern to the *Sears* editors, who appear to have increased their number in each new edition since the first. There are probably several hundred scope notes in the 10th edition. Each scope note consists of one or more sentences attached just below a subject heading, providing an explicit delineation of its subject coverage. There are usually two kinds of scope notes, based on composition. The first kind provides a definition of subject coverage without mentioning any other subject heading:

**Land tenure**

Use for general and historical works on systems of holding land

**Latin American literature**

Use for works on French, Portuguese, and/or Spanish literature of Latin American countries

The second type of scope note combines the definition with a distinction between the coverage of the heading to which it is attached and some other heading or group of headings. These others are mentioned in the note:

**Migrant labor**

Use for works dealing with casual or seasonal workers who move from place to place in search of employment. Works on the movement of population within a country for permanent settlements are entered under Migration, Internal

Definition-plus-distinction scope notes are usually applied in sets, one under each of the potentially conflicting subject headings. Sometimes one of the scope notes is replaced by a reference:

**Migration, Internal**

See note under Migrant labor

At other times there are two complete reciprocal notes, each mentioning the note under which the other appears:

Country life

Use for descriptive, popular and literary works on living in the country. Works dealing with social organization and conditions in rural communities are entered under Sociology, Rural

Sociology, Rural

Use for works which treat of social organization and conditions in rural communities. Descriptive, popular and literary works on living in the country are entered under Country life

The two types of scope notes illustrated here represent the most basic scope note composition. Other variations exist in some numbers, many involving more than two subject headings or involving groups of subdivisions. In all cases, every scope note in the group should be read before using the subject heading, so that its application can be based on a clear understanding of the subject coverages involved.

The final kind of information provided under most subject headings is a table of references and tracings of references. These fall into three categories. First, there are the syndetic references. Second, a list of tracings from vocabulary control references is provided. Third, a set of tracings from syndetic references is given. All three listings, or any combination or fraction, may appear under a particular subject heading. Some headings may have no references either to them or from them, and so may not contain any listings at all.

Syndetic references are drawn between subject headings, to call the attention of the reader to other labels under which materials will occur that are related to the materials described by the heading being examined. Most often, the references are from general headings to more specific ones or between headings at the same level of specificity. Less often, the direction of reference is from specific to general.

There are two basic syndetic reference techniques used in the *Sears List*. The first calls attention to one or more specific headings, which are named in the reference:

Camping

*See also* Backpacking; Outdoor cookery; Outdoor life; Tents; Travel trailers and campers; Wilderness areas

The second kind of reference calls attention to a defined group of other subject headings or subdivisions without naming every group member:

Cage birds

*See also* names of cage birds, e.g. Canaries; etc.

This less specific type of reference is often necessary because the objects may not be established headings, but may be members of classes to be added as appropriate. As these headings are added, the cataloger has to construct specific references to them and annotate the *Sears List* to indicate their construction. Often a syndetic reference will contain both specific and defined subject headings:

## Disasters

*See also* Accidents; Earthquakes; Fires; Floods; Railroads—Accidents; Shipwrecks; Storms; also names of particular disasters, e.g. New England—Hurricane, 1938; San Francisco—Earthquake and fire, 1906; etc.

In addition to the basic techniques illustrated here, other methods are used to efficiently refer to large numbers of headings without naming each one. For example, the phrase, “also headings beginning with” is used to free the editors from listing long and easily found sequences of filing words (61).

The final feature listed under most subject headings is a tracing of references made to the headings under which the tracings appear. The tracings are in two sections, one for vocabulary control references and one for syndetic references. The vocabulary control tracing is introduced by the symbol *x* and the syndetic reference tracing, by *xx* (62). These tracings are used just as catalog card tracings are—as a means of locating the references for modification or deletion if their object is modified or deleted. An example of these tracings is:

## Atlantic States

*x* Eastern Seaboard; Middle Atlantic States; South Atlantic States

*xx* United States

### Summary

The *Sears List of Subject Headings* has been used in American and foreign libraries for over 50 years. Since its inception, it has been valued by smaller libraries as a vital aid in the subject organization of their collections. Its policy of compatibility with the *Library of Congress Subject Headings* greatly increases its utility in those libraries with either detailed sections in a general collection or with a collection growing beyond the bounds of the *Sears List*.

In general, the *Sears List* may be said to be simple and direct in what it attempts to accomplish and in the context in which it operates. Its directions are generally clear, its explanations of practice as full as necessary, and its editors genuinely concerned about the groups they serve. It should be noted, however, that no subject authority will ever be simple in the universal sense of that word. Subject organization in even the smallest library is a complex set of interrelated tasks. A good job requires training, experience, and patience. The proper use of the *Sears List* requires the same qualities. The *Sears List*, down through its 10 editions, has attempted to achieve clarity amid complexity. In this, it has succeeded to a commendable degree.

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GEORGE M. SINKANKAS

## SECRETARIAT LIBRARIES

Secretariat(e) The office or official position of secretary; the body or department of secretaries; the place where a secretary transacts business, preserves records, etc.

—Oxford English Dictionary

The administration of the various types of dependent territories that comprised the overseas possessions of the United Kingdom throughout the centuries when what became known as the British Empire existed, was based on the secretariat. The designation of the office varied according to local preference, but the administrative structure was similar throughout. In colonies, protectorates, trust territories, and various other types of dependent lands, the governor (representing the sovereign) provided the link between the government of the day in London (via the Colonial Office) and each colony. The administration on the spot was, and still is for the few remaining colonies, centered on the chief secretary, sometimes called the colonial secretary. He is the secretary of the colony. His office, the secretariat, is the office of the colony. It is the repository of its archives and the center of its correspondence. Into this office there pours a steady stream of correspondence and reports from every department and from every district (*I*).

Because of the relationship of the secretariat to the governor, and to the conduct of the colony's legislature, the maintenance of the archives became a normal branch of its activities. For example, the close proximity of the administrative processes in a colony was likely to concentrate important archives in or near the secretariat, as in Tanzania. This country (which was formerly known as Tanganyika, Tanganyika Trust Territory, and German East Africa) came to

independence with a vital, actively consulted archive of land ownership records that had been established by the Germans during their brief period as colonial rulers, and this required the employment of suitably trained German-speaking personnel for their use.

In addition to the archival function of the secretariat library, it was generally expected of each that working collections of books would be maintained to serve the administration, and many of these libraries developed comprehensive historical and background collections which supplied reference services to the colonies' officers. Such library service was not always maintained, even in latter years when there has been increased awareness of the value of library and information services. A postwar survey of Fiji drew attention to deficiencies in this area of secretariat responsibilities (2).

Some of these collections had a history as long as the period of colonization. Few represented completeness much farther back in time than the late 19th century. The hazards that libraries and archives are prone to in harsh climates, and in territories likely to be disputed between rival powers, usually wrought havoc on their contents. The agents of war, climate, and changing administrative requirements usually led to the survival of only modest collections.

The pride taken by local inhabitants in their recorded heritage has sometimes been more directly responsible for careful preservation of their libraries than has continued use as part of the administrative service. This is illustrated by the growth of libraries connected with the legislatures in the Canadian and Australian states and provinces, many of which came to federal status from colonial origins. That of British Columbia was formally established in the Colony of Vancouver Island in 1858, and it was designated the Provincial Library and Archives 5 years later (3). In Sydney, Australia, the Parliament Library was founded in 1844, to conserve the records of the Colony of New South Wales back to its establishment in 1807, when each issue of the *Government Gazette* was franked by the governor. Forty years later the library had grown into a well-stocked reference and general collection, in addition to its special parliamentary section, and had a stock of more than 40,000 volumes (4).

Much older records survive in the lands that lay in the route of the early European explorers.

Bermuda was discovered early in the 16th century. It was administered and settled for England by the Virginia Company in 1612. In 1614 it was transferred to the Bermuda Company and remained under the company's control until the Crown assumed its charter in 1684. A General Assembly was first held on the island in 1620. When the records were surveyed at the beginning of the Second World War they were retained, bound in 406 volumes, and placed in safes in the downstairs hallway of the Public Building (5). The inventory makes it clear that there have been many losses. The normal practice of copying records for retention in London has given to posterity a better chance of tracing administrative history there than in the countries concerned. However, making allowances for the hazards to which libraries and archives were exposed (in Britain also, until the present century), there are considerable gaps on both sides for the earlier centuries.

The recurrence of physical destruction is exemplified in the story of the secretariat archives at Belize, British Honduras, where the return of disaster, in so many extreme manifestations, seems almost improbable.

The governor of the colony during the period 1925–1931 executed the last, and (barely) successful, attempt at calendaring the surviving records. Apart from the usual ravages caused by decay, damp, and insect pests in the tropics, the two invasions by the Spaniards during the 18th century, a hurricane, and a shipwreck had ensured the destruction of many older records. The 20th century had produced a fire that destroyed the contents of the colonial secretary's office, but not all of the records, which happened to have been dispersed at that time. The incoming governor initiated a comprehensive investigation and calendaring of all the colony's surviving records. This was completed on the night before a hurricane that completely destroyed the capital. While most of the documents were lost, a single copy of the manuscript version of the calendar had been locked in a metal box. During a lull in the storm the box was found in the ruins of the governor's office, but while it was being carried to safety through torrential rain, floods poured through the town. Governor and box, both floated on the waters to terra firma and thus, in unusually dramatic circumstances, the manuscript survived and was able to be sent on its way to the printers in London (6).

The first colonial secretary in Great Britain was appointed in 1768, and thus commenced the series of government departments whose operations have been concerned with the overseas territories. Much of the governance prior to this had come by a more direct grant of authority from the Crown to trading companies, such as the Hudson's Bay Company which operated in the area later known as Canada. Some of these survived well into the present century. Consequently, we have a great range of library and archive resources, which are not all held in government repositories.

The office of colonial secretary was abolished in 1782, but the need for an arm of the central government to cover these responsibilities was recognized. After several changes of jurisdiction, the Colonial Office was reestablished, and by the time of the Crimean War it had a library. By 1873 it contained 7,000 volumes, exclusive of parliamentary papers and collections of laws (7). A conscious expansion of the library was undertaken during the 1880s, and the Colonial Office Library has for long been recognized as one of the world's great collections.

The 19th century saw the development of existing colonial secretariat libraries in those colonies that were moving toward dominion status.

New Zealand's General Assembly was transferred (with its library) from Auckland to Wellington when the seat of government was moved in 1865. There were then about 4,000 volumes. Twenty years later the library had grown to 26,000 and had an annual intake estimated at 1,500 volumes. The New Zealand agent-general in England was empowered to spend occasional sums on buying acquisitions, although purchases were mostly organized by the library's committee. During this period the exchange of official publications between New Zealand and Britain (and with certain other countries) was established, to the subsequent enrichment of the national collections in each country (8).

The Australian parliamentary library has been mentioned previously. The Australian states, originally founded as separate colonies, were reported on in terms similar to New Zealand. Their libraries, when surveyed, were stated to be well supplied with publications from abroad but poorly stocked with local books—an early instance of the librarian's troubles in tracing publications of countries with less than average standards of bibliographic control (4).

Canadian secretariat libraries were, with certain exceptions, less enthusiastically supported than those in the Antipodes. Those of British Columbia, in Vancouver, and of Manitoba, in Winnipeg, received commendation in a survey of the 1930s (9). The prestige accorded to the Library of Parliament in Ottawa was contrasted unfavorably with that of the U.S. Library of Congress at that time. Canada's expenditure of merely tens of thousands of dollars was compared with that of millions in the American capital.

The end of East India Company rule in India, during the 1850s, and the extension of direct British government to most parts of the subcontinent brought about the establishment of the most highly developed branch of Britain's overseas administration. Its provincial secretariats functioned in many instances for almost a hundred years, between the end of the mutiny in the 1850s and independence and partition in 1947. Many records from the East India Company years have survived in India and have been recorded in checklists such as "The Handbook to the Records of the Government of India in the Imperial Record Department, 1748 to 1859," compiled by A. F. M. Abdul Ali and issued in typescript in Calcutta in 1925 (10).

While changes in government have occurred since independence in the countries embraced by this survey, their administrative systems have sometimes remained relatively unchanged. In Pakistan it was noted almost a decade after independence that a central secretariat library, created to meet the overall needs of the various departments of the central government, had been established in the recently designated capital, Karachi (11). While separate libraries were set up to provide information for such specialist branches as finance and scientific research, the older style of general collection, designed to provide information to the majority of the capital's civil servants, was thought to be adequate.

In the poorer (although frequently very large) colonies such as Nigeria and the former Rhodesias, the secretariat library in the capital might be the only reliable reference library for the country. This was noted at Lusaka in 1951. Its library served the administrators of the whole of Northern Rhodesia and Nyasaland (now Zambia and Malawi). It is interesting to note the recommendation of this survey that the secretariat's circulating library section should be integrated with a library service to supply nonfiction for all areas outside the urban centers, which at that time had no public library services (12).

The hazards remained when independence came to many of the countries concerned. Sometimes the libraries and archives of the former secretariats were dispersed during the rapid reorganization and expansion of administration that usually accompany transfer of power. Happily for the continuity of historical research in these localities, the new university and national library services have secured many



of the collections. The university libraries of eastern Africa were notably enriched in this way; that of Tanzania, for example, has an outstanding library of historical materials relating to the country's recorded past.

It has been noted previously that the pride of ownership that is engendered by autonomous government, following a time of colonial rule, provides a stimulus to library development. The English-speaking countries produced many examples during the 19th century, and the so-called developing countries have matched this enthusiasm during the middle decades of this century. Their often limited resources have been allocated very generously to library networks, and proliferation of government activities has been matched by library developments that have enshrined their contents in the countries' historical collections.

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M. C. G. WISE

## SEGREGATION AND THE LIBRARY

### Introduction

#### CONCEPT OF SEGREGATION

*Webster's Dictionary* defines segregation as "the separation or isolation of a race, class or ethnic group by enforced or voluntary residence in a restricted area, by barriers to social intercourse, by separate educational facilities or by other discriminatory means" (1). *The Oxford English Dictionary* defines the term as "the separatism or isolation of a portion of a community or a body of persons from the rest" (2). *Webster's Collegiate Thesaurus* gives apartheid and separatism as synonyms; discrimination, jim crowism, ghettoization, and isolation as related terms; and desegregation as the antonym (3). *Roget's* associates the term with separation, discrimination, and prejudice (4).

#### CONCEPT OF THE LIBRARY

An identification of the library community is a necessary prerequisite to the understanding of the phenomenon of segregation in the library environment. The library exists as a democratic institution devoted to intellectual freedom and service to the community. This philosophical and theoretical ideal of service to the community has not been realized in many instances, because of the effects of segregation on the concept of "community." Throughout history the library community has been narrowly defined, inclusion often being determined by circumstantial factors such as politics, economics, education, or race.

The earliest library prototypes were the collections of papyrus rolls in Nineveh

and Alexandria collected by Assurbanipal and later by the Ptolemies of ancient Egypt. An excellent system of archives and public records existed, many with libraries attached to them. Accounts by historians invariably associate these early collections with royal palaces and temples to serve members of the politically, educationally, and economically privileged classes. "No aristocratic city palace, no grand villa found it seemly to fail to have its book collection" (5). Wealthy nobles and businessmen generally constituted the library community. As the learning centers shifted from palace schools to monasteries and on to more secular environments in universities, so did libraries. Political, economic, and educational factors strongly influenced the composition of the controlling groups and the choice of people to be educated, and this, in turn, determined who library users would be.

The African slave trade, beginning in the early part of the 17th century, introduced a racial factor in defining the library community. Historians cite instances following the conquest of Greece by the Romans in which the subdued Greeks, taken as slaves, worked in libraries as copiers, clerks, and even as administrators. Because of the compatibility of the two cultures, the culture of the Roman Empire became merely a continuation and further development of Greek culture. Few parallels can be drawn between the enslavement of Africans and that of the Greeks. In fact, no previous slave system had been so totally inhumane as that imposed upon the Africans. It was brutal physically, but more so mentally and spiritually. The incompatibility of the African and European cultures, together with the monetary objectives, increased the need for complete subjugation of the conquered. The resulting cultures reflected the concept of segregation by race. The racial factor thus strongly affected the development of libraries and has been a major factor in defining the community they serve.

Groups other than the African slaves imported into America have had segregation imposed on them by law or by tradition; for example, the indigenous populations in Australia, Africa, Asia, and the United States. The Black race, however, remains the largest identifiable group, primarily because of their high visibility and the prevailing dominance of European physical and cultural characteristics as the acceptable norm.

### **Phases of Segregation and the Philosophical Ideal**

The philosophical ideal of the library as a social institution has been developing along a continuum representing four distinct phases affected by segregation. Phase one is indicative of the era of no library service to certain affected groups. In phase two there was available library service, but with strict patterns of segregation. Desegregated libraries with overtly and covertly prevailing discrimination and subterfuge represent phase three. Finally, phase four forecasts free and equal access. Not every affected group has moved along the continuum at the same rate of speed nor with the same degree of success. For many people, free and equal access to libraries remains elusive.

## PHASE ONE: NO LIBRARY SERVICE

In the progression of actions and attitudes affected by segregation, phase one predated segregation in libraries, since libraries simply did not exist for certain groups of people, such as those in the lower economic and social strata of society. Representative of this period were the early palace or imperial libraries. Though only scant information about them exists, library historians have concluded that the conditions of these libraries were closely aligned with the existing cultural patterns. During this period the increase in the number of library users paralleled the increase in the number of educated public and the corollary interest in scholarship. The public nature of the libraries that existed "for the enjoyment of all" is commendable; nevertheless, a natural excluding mechanism existed since the educated public capable of using library resources represented only a very small percentage of the total population. Association with the educated aristocracy remained the status quo throughout the ancient period of library history.

Evidence of the change from ancient to medieval libraries can be seen both in the physical characteristics of properties and in their users. Parchment was substituted for papyrus as the writing material and the codex supplanted the roll. Imperial dominance over scholarship subsided as Christianity came to the fore. This transition from imperial to church libraries also changed the emphasis of scholarship to meet the needs of the church. A learned aristocracy was also now associated with the church, but the masses of people remained uneducated and without skills for library use. Neither ecclesiastical libraries nor the later monastic libraries touched the lives of the masses.

As trade and commerce developed, so did a new middle class. Education became essential for successful business enterprises. Again the number of educated people increased and, thus, people other than nobles and clerics had need for libraries. Intellectual life shifted from the church, or cathedral schools, to new universities. Economic factors dictated, as usual, who would become a part of the new educated public. The new universities attracted primarily the well-to-do, and their libraries reflected their needs and interests. A new literature written for this new middle class was avidly collected and read. Thus, the association of modern libraries with middle-class ideals is firmly implanted in the past.

The development of new technology, particularly printing with movable type and papermaking, and the influence of Renaissance ideals broadened the base of educated people capable of being included in the library community. Alfred Hessel states that "the principle that libraries should be open to the public may well serve as one characteristic differentiating the Renaissance from the library of the Middle Ages" (6). Yet those libraries were not truly public, since users were chosen from among the educated.

Defining the public library as one with free and open access to anyone who wishes to use it, library historians establish the date of its beginning as the early 19th century, following a series of forerunners such as subscription, proprietary, parochial, and circulating libraries. These libraries served all who could afford the fees. The establishment of mechanics' institutes in England as a means of eliminat-

ing economic and social barriers to libraries was a noble idea conceptually, but it suffered from middle-class ideals. Their American counterpart, mercantile libraries, met with great success because there were no structured class systems or restrictive laws. Also, the Black element in the population was legislated into positions outside the definition of "citizen," thus making upward social and economic mobility impossible, and library use impractical.

## PHASE TWO: INSTITUTIONALIZED SEGREGATION

The establishment of free public libraries in Europe and North America during the mid-19th century gave promise to the philosophical ideal of service to all. Cultural similarities enabled the movement to spread rapidly and fairly uniformly throughout Europe and America. The European influence was evident wherever libraries were established. Institutionalized segregation was introduced to the modern world as Europeans expanded their control over territories throughout the world. Colonized peoples who were culturally dissimilar to their European colonizers were segregated, exploited, and relegated to positions outside the prevailing social order. Others were assimilated. Any library services provided for the indigenous populations were managed on a segregated basis. In the United States, both an indigenous and a Black population had to be dealt with. Only a few documented facts appear in the general histories of libraries regarding the initial establishment of separate library facilities for the various affected groups. Research in this phase of library history would be a considerable contribution to the profession.

### *Outside the United States*

The system of apartheid in South Africa remains the most rigid and fixed of the involuntary systems of separatism imposed by a European group, and it is discussed here to illustrate the extent to which a European group has gone to impose and maintain segregation in libraries for peoples who are physically and culturally dissimilar. Separate development is an integral part of the South African life-style. It is often alleged that separate development in South Africa began in 1948 with the change of government. Evidence shows, however, that prior to that time South African libraries either refused service to nonwhites or restricted their use of existing facilities. From a documented exchange of correspondence, dated April 13, 1905, between librarians in Kimberley and Johannesburg concerning the feasibility of admitting nonwhites, it may be deduced that neither city permitted nonwhites to use their libraries. In 1918 an attempt by an Asian to use the Johannesburg Public Library resulted in a refusal accompanied by a pledge on the part of the Johannesburg Public Library to support and cooperate in the establishment of a library facility exclusively for Asians. According to R. C. Kennedy, this proposal represents the first documented evidence that separate library facilities for an ethnic group was recommended (7). In 1924 the Johannesburg City Council established a firm policy that the library of that city would serve whites only.

The Bloemfontein Library Conference held in 1928 played a major role in firmly

establishing segregated library facilities for whites and nonwhites. Growing out of the conference was the recommendation that library services be provided for nonwhite school children in separate facilities from those provided for whites. Also recommended was a system of free public libraries for whites only. Acting upon these recommendations, the Carnegie Corporation of New York immediately approved an endowment to be used in carrying them out.

The first public library for the exclusive use of nonwhites was opened on January 3, 1940, in the Bantu Men's Service Center in Johannesburg (8). In 1962 the South Africa Library Association passed a resolution affirming its support of complete apartheid in the professions. Today, separate facilities exist for Coloreds (persons of mixed slave, Boer, and Hottentot ancestry), Asians, and indigenous Blacks.

The administration of, and conditions in, the segregated libraries in the Republic of South Africa vary in each of the four provinces of Natal, Cape of Good Hope, Transvaal, and the Orange Free State; nevertheless, apartheid is the law in all.

In Natal a library for Black teachers was established in a separate facility as early as 1920 (9). This Native Teachers' Library was created by the Natal Teaching Department, and it followed the pattern of segregation that had already become the life-style not only in Natal but throughout South Africa.

In Cape Province there were few libraries for nonwhites before the Carnegie Corporation pledged its support in 1928. Subscription libraries were available for those who could afford them, usually whites and a few Coloreds, but generally they served an elite group of users. Not until 1945, with the creation of the Cape Provincial Library Service, was there any question regarding separate facilities for whites and Coloreds, since Coloreds were permitted to use library facilities with whites. The question was settled in 1949 with the passing of an ordinance which required separate facilities for Europeans and non-Europeans (10). Even though the facilities are now separate, the Cape Provincial Library Service provides generously for Coloreds. The books are new, not unwanted duplicates as is the case with the other nonwhite groups. Also, Colored students are provided financial assistance to train as librarians.

In 1951 in the Transvaal Province, an ordinance was passed which required that separate facilities be provided for non-Europeans (11). Service depots have since been set up for Coloreds and Asians, but Black users, who have no depots of their own, must borrow through interlibrary loan from facilities set up for Coloreds and Asians.

Few reports have appeared in the literature about library services in the province of the Orange Free State. In 1928 Bloemfontein, the capital, was the site of an important library conference which resulted in an endowment from the Carnegie Corporation to support libraries. The nonwhite population of this province is predominantly Black, and reports of library services available to them are not widely publicized. It may be safe to assume that service, if it exists at all, is highly restricted and is no better than that in the other three provinces. In the other provinces, generally, libraries serving Black users receive considerably less financial support than that received for other libraries. The books are of inferior quality, being discards from the general library.

Librarians throughout South Africa communicate their problems through their national organizations. The South African Library Association, which was founded in 1930, had no racial restrictions on membership until 1948. For some time after 1948 nonwhites remained members but could not attend meetings. In 1962, at its 17th annual conference, the association made the following decisions: (a) the establishment of separate associations for various racial groups is accepted in principle; and (b) the South African Library Association is limited to whites effective from November 7, 1962 (12). At the same conference, the South African Library Association voted to take the lead in the establishment of separate library associations for the various racial groups. An ad hoc committee was formed to investigate the possibilities of organizing library associations for Blacks, Coloreds, and Asians. The Cape Province already had a library association whose membership was limited to Coloreds. The ad hoc committee negotiated to have the Colored Cape Library Association extended into a national organization for Coloreds. This was done in 1965. In 1972 the name was changed to Library League of South Africa.

On October 5 and 6, 1964, the association for Black librarians was formed, and it is presently known as the African Library Association of South Africa. The South African Indian Library Association was established in Durban on August 15, 1967. Because of the country's policy of apartheid, there exist four separate library associations for the four population groups.

### *In the United States*

When Christopher Columbus set foot on American soil in 1492, he found a land already inhabited by 500 tribal societies of red-skinned people, whom he called Indians. The cultural differences between the Indians and the new Americans who later came to settle in the territory were too great for the two groups to be easily assimilated. They were, therefore, segregated. Special reservations were provided under the pretense of permitting the Indians to continue to develop as a distinct cultural group. Government control over the reservations meant government interference. Basic needs went unmet and illiteracy rates were high. Library services have remained a low priority need. As late as 1963, most areas still were without library services. In 1976 some areas were just getting their first library facility. However library services were provided, usually via bookmobiles, they followed the same segregated pattern of the reservations themselves.

The government's latest policy of coercive assimilation and the resultant destruction and disorganization of Indian communities have greatly changed the character and quality of library services to them. Encouraged to leave the reservations, the Indian population has begun to shift from the reservations to urban areas, to be dissolved into the dominant society. Today the acculturation of the American Indian ranges from the native-oriented group which has had only marginal contact with whites and life outside the reservations to the assimilated elite group which has adopted the cultural patterns and values of white Americans. There are also those individuals who have moved from the reservations into the cities but have not given up their cultural values. The dominant white society is not always tolerant of their

cultural differences and information needs. Library service is thus gradually expanding, from no libraries or segregated libraries on the reservations to special services provided in urban areas. Six cities now have Indian populations of more than 10,000 each. They are Los Angeles–Long Beach, California; Tulsa, Oklahoma; Oklahoma City, Oklahoma; New York City, New York; San Francisco–Oakland, California; and Phoenix, Arizona. Ten other cities have Indian populations of more than 5,000. The challenge to librarians now is to assess the library needs of American Indians in their new environment and then allow them complete self-determination, that is, to provide them an opportunity for involvement in planning, organizing, approving, and evaluating programs to meet their own needs in a desegregated, pluralistic society.

While the American Indian represents the oldest of the affected groups in the United States, Black Americans make up the largest group, constituting some 12% of the total population. Library services to these groups have followed the traditional pattern of library development, from no service to free access. The movement along the continuum has not been uneventful nor has all progress been voluntary on the part of the dominant group. The American library system of institutionalized segregation has not been so highly structured nor so rigidly and uniformly enforced as that in South Africa. The affected groups, nevertheless, have suffered and in many cases continue to suffer from the effects of segregation.

Unlike the Indians, Black people are not indigenous to America. Instead they were brought to the country involuntarily as slaves to perform the manual labor on which the economy of the nation depended. There was no doubt as to the role they were to play in the making of the nation. The performance of this role required complete subjugation, mentally and spiritually as well as physically. Deculturation, fear, and ignorance were the means used to achieve this end. Libraries are conveyors of culture and knowledge, thus there was no desire to bring libraries and Black people together. Even after their role and status changed following the industrial revolution and the Civil War, libraries remained closed to them.

The earliest documented date for the opening of a separate library facility for Blacks is 1905, when a branch was opened in Louisville, Kentucky. Cincinnati had a branch for Blacks opened in 1912, which, supposedly, was completely administered by Black assistants. In 1916 a branch was opened in Little Rock, Arkansas, and one in Atlanta in 1921. In 1922 Hagerstown, Maryland, and Wheeling, West Virginia, were the only cities in the South providing free and unrestricted access to Blacks.

At the annual conference of the American Library Association (ALA) held in 1922 in Detroit, the question of library service to Blacks was addressed for the first time on a national scale. The report of this Work with Negroes Round Table is very revealing (13). The purpose of the meeting was to give consideration to setting up a permanent organization to exchange ideas on what was being done for Black people in the way of library services and training. It was revealed that libraries had, indeed, begun offering services to Black people, but no dates were given to indicate just when such services actually began. Louisville led all other cities in providing training for Black library assistants. The Louisville Free Public Library



offered classes to train librarians and added an adjunct class for Black students. These students came not only from Louisville but from other cities and even from other states as well. The number of applications for admission finally became so great that in time the library had to close down the program.

The New York Public Library reported the results of a survey that it had taken to ascertain the extent of library services to Black people. It was found that in areas that were sparsely populated with Blacks, primarily the Western and Eastern states, libraries provided free access to Blacks. A majority of the Southern and Middle States were heavily populated with Blacks and they either did not permit Blacks to use their facilities or they placed some type of restriction on their use. These restrictions ranged from allowing only charging privileges to the provision of separate facilities. Areas that provided separate facilities also employed Black library assistants. Thomas F. Blue, a Black librarian in Louisville, was in charge of the branch of the Louisville Free Public Library that served the Black population in the 1920s. In some areas special interest materials were provided. Some made provisions for training Black assistants to work in the libraries. In all such libraries, whites retained administrative control.

It seems from the survey that the vast majority of Black people who had access to libraries were required to use segregated facilities or were limited in their privileges. The South was open in acknowledging the restrictions placed on Black users. In the North, segregated libraries did exist but the main facilities were usually available to anyone without restrictions.

The second meeting of the Work with Negroes Round Table was held in Hot Springs, Arkansas, on April 24, 1923 (14). The discussion centered around removing the restrictions on Black users and providing free access in already existing libraries. Approval was given to segregated facilities as long as they were well organized and offered relevant services. It was agreed that each section of the country should approach problems of library service to Blacks on an individual basis.

The results of a second survey made by the New York Public Library were given, and they revealed that some barriers to Blacks had been removed. The report also indicated that, for the first time, a Black woman was attending library school in New York and another in Pittsburgh, on an equal basis with whites. It was not until 1925 that Hampton Institute opened its Library School, graduating 165 Black librarians before it closed in 1938. Atlanta University's Graduate School of Library Service (exclusively for the training of Black librarians) did not open until 1941.

A study was made at Atlanta University to ascertain what legal instrument was used to deny library service to Black people in the South (15). It was revealed that there were few laws which specifically prohibited libraries from serving Blacks. Some laws implied a separation of the races, some provided for separate bases for financial support, and yet others merely outlined how financial resources were to be distributed to whites and Blacks. Conclusions drawn as a result of the study were that custom and tradition primarily kept the races separated.

In 1930 Louis Shores did a follow-up study to the one done in 1922 by the New York Public Library (16). His study showed little improvement in the state

of library services to Blacks. He found that the vast majority of cities either provided no library services to Blacks or they provided them in segregated facilities. All of these cities were located in the South. Unrestricted and free access was provided by those cities located in the East and the West. As far as staffing was concerned, Black librarians were employed but usually in branches located in Black neighborhoods. Then, not all such libraries were administered by Black librarians. Shores also found that training facilities for Blacks were needed, especially in the South.

Segregation was a way of life in the South, as Dr. Shores's survey implied. The library was only one of many social institutions that required a separation of the races. At the 1936 annual conference of the American Library Association held in Richmond, Virginia, the laws of separation were so strict that Black librarians could not sit with friends in restaurants, meeting rooms, or any other public places. They could not attend many of the section meetings or round tables, particularly those where meals were being served. Special living accommodations had been provided for Black members on previous occasions, but their attendance at meetings had never before been restricted. Letters of protest against the Richmond situation began pouring in from the membership, which led the Council of the ALA to adopt a statement of policy as follows:

In all rooms and halls assigned to the American Library Association hereafter for use in connection with its conference or otherwise under its control, all members shall be admitted upon terms of full equality (17).

The policy became official on December 28, 1937. Now, when plans for an official ALA meeting are being made, assurance must be given that no restrictions will be placed upon any members.

Southern librarians were displeased with the action taken by the Council. The new policy prevented any annual conferences from being held in the South, since all southern cities had laws requiring segregation of the races. Southern librarians complained that an undue strain was being placed on them since they now had to travel long distances to the East, North, or West to attend professional meetings. They requested a reconsideration of the policy statement. In response the ALA Council agreed to reconsider its 1936 policy statement. A special Committee on Racial Discrimination was named to study the issue, with Mrs. Ernestine Rose, librarian of the 135th Street Branch of the New York Public Library, as chairman. The committee was asked to ascertain how other professional organizations with racially mixed membership handled similar situations and to identify cities throughout the country that would comply with ALA's policy.

In May 1940 the committee made its report at the Cincinnati conference. It contained the following recommendations:

1. That no change in the requirements adopted in December 1936 be made at this time,
2. That the American Library Association let it be known that it wishes to meet in every section of the country,

3. That in considering any city, the appropriate ALA officials are hereby specifically directed to exert every reasonable effort to secure acceptance of our present requirements; the American Library Association will withdraw and go where its conditions will be met (18).

Although the ALA Council accepted the report of the Committee on Racial Discrimination, the association as an organization exerted little leadership in any of the succeeding incidents that were to take place to break the barriers of segregation in the profession. Few leaders spoke out against segregation in libraries.

Members of the profession were kept well informed of the state of segregation through various surveys that were conducted. In 1941, Eliza Gleason's study showed only four states offering integrated services to Black and white users. Another survey was conducted by Emily Miller Danton in 1948. It revealed that segregation was the standard practice but that there was a tendency to make exceptions in special cases. Although they enforced the laws of segregation in their libraries, many librarians had doubts about the value of doing so. In 1953 Lucretia Parker made a study which revealed that conditions were improving and that 39 cities in 11 states offered integrated services. Another study was made in the same year by the Southern Regional Board. It revealed that 88 cities provided full, desegregated service to Blacks. Eli M. Obler conducted a survey of other national professional organizations to determine the extent to which they exerted leadership against segregation. He found that ALA compared favorably, but he also supported the belief that the association should not be satisfied to be merely a follower and that it should exercise leadership.

Although the South was moving forward, though not always smoothly, toward an integrated society, the pace was much too slow for the affected Black population. In 1960 they began to demand relief from local segregation laws and practices. When negotiations failed, they resorted to law suits and public demonstrations. The library was a prime target for sit-ins, read-ins, stand-ins, et cetera. Demonstrators were primarily students encouraged by the adult population. The movement spread rapidly over the South and gained national attention. Libraries responded to the demands for equal access by closing their doors and by offering "stand-up" service and other subterfuge alternatives. To prevent Blacks and whites from sitting together, all tables and chairs were removed from some reading rooms. Youth were jailed and in some instances brutally beaten. Highly publicized demonstrations occurred in Jackson and Hattiesburg, Mississippi; Danville and Petersburg, Virginia; Sumter and Greenville, South Carolina; Montgomery, Mobile, and Anniston in Alabama; and Columbus, Fitzgerald, and Albany in Georgia.

The national library organization was criticized for its lack of support and leadership in the efforts by the Black citizenry to gain free access to libraries in the South. No moral or legal support was forthcoming. There were no study committees, no persuasion on the part of the prestigious organization. Its "we must not interfere" editorials and its dependence upon its noble documents of freedom to define its position were deemed completely ineffective in this period of turmoil. The structure of the organization and the "local" nature of the issue were offered in defense of its lack of involvement.

At its 1961 midwinter meeting, the ALA Council approved an amendment to the Library Bill of Rights. Amendment Five of the Library Bill of Rights declares:

The rights of an individual to the use of a library should not be denied or abridged because of his race, religion, national origins or political views (19).

It was the responsibility of the Intellectual Freedom Committee (IFC) to safeguard the rights of users through the Library Bill of Rights. The IFC had been formed in 1940 as a result of a report of a special committee on censorship. The report recommended that the ALA adopt a Bill of Rights (which it did in 1939) and that it set up a standing committee, the IFC, to channel the influence of ALA behind certain issues, libraries, and librarians confronted with problems affecting their freedom to serve.

Amendment Five was the work of the special Committee on Civil Liberties appointed in 1960 to study the existing statements regarding civil rights, as follows:

1. Library Bill of Rights (adopted in 1939)
2. Federal Legislative Policy Statement (adopted January 2, 1959)
3. Goals for Action Statement (adopted January 2, 1959)
4. ALA Council policy statement on nondiscrimination (adopted February 2, 1949)
5. An informal statement on civil liberties prepared by the Executive Board in March 1960 (20)

Amendment Five added new responsibilities to the work of the IFC. Concerned with the conditions of continued segregation in libraries, IFC submitted three proposals to the Executive Board:

1. To study the extent of freedom of access to libraries all over the country,
2. To deny institutional membership in ALA to segregated libraries,
3. To study the membership in state associations and then deny chapter status to all segregated associations (21).

The proposals were adopted in modified form at the 1962 annual conference in Miami. As for the first proposal, financial support was pledged by the ALA Council on Library Resources. It was agreed that individual members of ALA would be urged to end segregation and discrimination in their libraries. State chapters of ALA that could not guarantee rights to all members would be asked to withdraw from affiliation within 3 years. As the result of these pressures, segregated public libraries virtually disappeared throughout the country.

### PHASE THREE: DISCRIMINATION AND SUBTERFUGE

Following the eradication of segregation in libraries in the United States, a new set of discriminatory practices became apparent that particularly affected racial minorities. The national organization has in this period exercised considerably more leadership in attempting to deal with discrimination in libraries and library organizations than was the case when segregation was the issue.

When the International Federation of Library Associations (IFLA) found itself in a peculiar position with UNESCO (its parent organization), the ALA was able to exert its influence in alleviating the situation. It had just gone through a period of turmoil itself in an effort to assure equal access to libraries, and it could now appreciate UNESCO's insistence that all its affiliates (of which IFLA was one) conform to its Declaration of Human Rights. The Declaration of Human Rights urged all affiliates to sever relations with any of its members that supported discrimination or apartheid. Having been asked to review the practices of its member associations for evidence of racial discrimination (particularly those in South Africa, Rhodesia, and African territories under Portuguese rule), IFLA felt that it could not justify interference in the internal affairs of its members and thus refused to comply with UNESCO's request. On December 31, 1971, IFLA was officially suspended from UNESCO with the provision that the suspension would be rescinded if that organization should later agree to comply. After having been suspended for 6 months, IFLA rescinded its original stand and severed relations with South Africa. It also confirmed that no Portuguese colony held membership in the organization. The United States' withdrawal of its membership from IFLA was a decisive factor in that organization's decision to rescind its stand on the issue.

The Special Libraries Association, which has a long-standing nondiscriminatory policy, withdrew from the International Federation of Documentation because the latter continued to honor South Africa as a member.

The ideal of the profession in the United States is to eradicate discrimination, just as segregation in libraries was eradicated. Of course, that task is a more difficult one—not only because of historical, psychological, and sociological factors but because of the subtleties and subterfuge involved. Alleged acts of discrimination have proved difficult to confirm except where telling patterns have emerged.

Patterns have emerged. Acts such as massive displacements, demotions, and dismissals of Black head librarians or supervisors have been widely publicized by civil rights groups. The *School Library Journal* survey of the effects of desegregation on school librarians reveals cases of blatant discrimination and subterfuge (22). Black librarians were often shifted from school to school to maintain racial quotas. Black librarians were never placed in supervisory positions that included white personnel and were prevented from having much contact with students. They were hired with short-term federal funds and dismissed when funding was depleted. They were often fired or asked to move to make room for newly graduated white librarians. Few or no Black librarians were hired at the state level. State standards were set up without consulting Black librarians. Black students were required to take the Graduate Record Examination to enter library school when the same was not required of other groups. They were discouraged from attending professional meetings and from joining local and state professional organizations. Some librarians catered to the prejudices of their community and even censored requests for Black-oriented materials.

Some public libraries have been known to be discriminatory when serving Black users. They gave aid to private schools while denying that same aid to Black communities. They sometimes refused to allow bookmobiles to serve Black com-

munities, and when they did offer this service, the stops were sure to be inconvenient or unsafe.

The Library of Congress has also had to defend itself against charges of discrimination against minorities. Without positive leadership from the leaders in the profession, those at lower levels gain confidence in continuing discriminatory practices without fear of reprisal.

#### PHASE FOUR: FREE AND EQUAL ACCESS

Outreach programs for the heretofore unserved are evidence of the belief of some librarians in free and equal access. They represent positive attempts to democratize the library and to erase its image as racist and middle class. Historically, libraries have existed to serve the privileged classes. Traditional services and methods of bringing people and resources together have proved unsatisfactory. Special interest programs, resources, and facilities have moved libraries closer to yet another phase of development: free and equal access. Not yet a reality because of the continued existence of segregation in some parts of the world and because of the damaging effects of discrimination in others, free and equal access to libraries is still an ideal that can and hopefully will become a reality to all peoples all over the world.

#### **Positive Byproducts of Segregation**

Segregation may be considered one of the negative aspects in the development of libraries, but it has produced some positive byproducts. Atlanta University School of Library Service was established in 1941 as a direct result of segregation in the profession. Also, Black collections, another byproduct, have become important features of many libraries.

A 1938 United States Supreme Court ruling resulted in Black people being able to attend state-supported graduate and professional schools in the South. To circumvent the court order, Southern states began establishing graduate and professional programs in Black institutions. The Atlanta University School of Library Service was set up with the financial aid of the Carnegie Corporation of New York to train Black librarians. Without the school, the United States would have approximately three-fourths fewer Black librarians than it now has.

Quality collections of Black resources—such as those at Howard, Fisk, and Atlanta Universities, and at Hampton and Tuskegee Institutes, not to mention the Schomburg Collection at the New York Public Library—had their beginnings in a segregated society. When they first began, many libraries either had no resources to acquire Black literature or no interest in doing so. The libraries named here, and a few others, have preserved for future generations materials about Black people—resources that otherwise might have been lost forever.

### Summary

The library exists as a democratic institution devoted to intellectual freedom and service to the community. This philosophical ideal has never been fully realized because of the negative effects of segregation on the definition of "community." Throughout history, limitations have been placed on the library community. Sometimes the basis for inclusion or exclusion has been politics, economics, education, or race.

Early libraries were for the privileged classes only, while the masses had no libraries. Segregation in libraries parallels the expansion of Europeans as colonizers in Asia, Africa, Australia, and the Americas. The affected groups have primarily been the indigenous and Black peoples.

The policy of apartheid in South Africa requires the separation of the four racial groups. As a result, there is segregation in library facilities for the different racial groups. In the United States segregated libraries have practically disappeared but discriminatory practices still exist. Discrimination is difficult to combat because of the subtleties involved. The ideal of the profession is free and equal access to libraries for all peoples. That ideal can be reached and it is hoped that it will soon become a reality.

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## SELECTION OF LIBRARY MATERIALS

There is perhaps no area of librarianship in which subjectivity is more readily apparent than in the selection of materials. In choosing materials for various types of libraries, the background, education, and professional philosophy of the librarian all come to bear on the choices he or she will make for the particular type of library in question. When using a library one can see the values held by the librarian and his or her perception of the particular library in regard to meeting the needs of its clientele or supporting the institution of which it may be an integral part. Library collections will vary in the variety and depth of subject areas depending upon type of library, budget support, and its objectives of collection development. Therefore, the task of selecting materials for specific types of libraries should be assigned only to the librarian who has a thorough understanding of the role this professional skill plays in the development of any library collection—be it school, public, academic, or special. It is difficult to specify the manner in which this skill should be developed, as this raises two basic questions: Can selection skill be developed; and furthermore, how does one teach the art of materials selection to librarians?

Selection appears at first to be an easy task; but at the same time, it can be, and generally is, a most difficult, complicated endeavor. The philosophical dilemmas of value versus demand and usage versus possession appear. Should materials in a library collection be selected to provide for a patron-centered library or a materials-centered library? Again the choice of which theory to follow depends on the librarian and the type of library for which selection is being done.

A larger problem is posed in asking: How does the librarian know the materials he chooses are the best and whether they will be used? This is an age-old problem that still plagues librarians. The library that has an automated circulation system can determine patterns of usage over a period of time, and these, in turn, aid in the future selection of materials. But, does one choose only those materials which will be used, even if better materials are available? Again the argument of value versus demand. The philosophical discussion can continue indefinitely.

Various philosophies of collection development exist, and they are found in the literature that cites the concepts and standard traditional principles of materials selection. Three notable works are: the fourth edition of *Building Library Collec-*

tions, by Carter, Bonk, and Magrill (1); *Selecting Materials for Libraries*, by Robert N. Broadus (2); and the classic *Living with Books*, by Helen Haines (3). In addition, articles on the subject have been compiled and accumulated in books of readings such as Mary Gaver's *Background Readings in Building Library Collections* (4) and *Libraries, Readers and Book Selection*, by Jean S. Kujoth (5). Several of these are used as texts in library schools and as supplementary reading for teaching prospective librarians the theory and practice of choosing library materials.

The distinction between acquisitions and selection needs to be stressed. "Acquisitions" and "selection" are not synonymous terms. Selection of library materials is only one phase of the total acquisitions process, and the selector of materials may or may not be included in all the steps involved in acquiring library materials, depending upon the size, organization, and type of library. The point is raised because, at a cursory glance, the concept of selection is often confused with the acquisitions process.

It is obvious that the professional librarian charged with selecting materials should be thoroughly familiar with the latest standards for the particular type of library in which he or she works, since all of them contain accepted and established guidelines to be used in collection development. The selector should also remember that standards set minimum levels of attainment; they are not ends in themselves but rather are to be used in the ongoing process of evaluating the selection process. Libraries should go beyond standards. In the case of academic and school libraries, this is most crucial for accreditation purposes. It is also imperative that the selector be thoroughly familiar with the basic criteria used for evaluating all types of library materials and also with the numerous available selection aids that review them.

Selection of materials is presently influenced (and will be in the future) by shrinking library budgets, inflation, changing user needs, and the formation of library networks. These factors are most significant and must be given realistic consideration along with the idealistic theories espoused in the literature and the "standard works" on selection. The "real world," so to speak, determines both the quantity and quality of library materials selection, regardless of the type of library.

The boom of federal funding for school, academic, and public libraries in the 1960s is gone, and existing programs decline due to the outcries of the taxpayer. The Elementary and Secondary Education Act of 1964 pumped large sums of money into school libraries. Academic libraries rode a crest of funds, with federal and state governments pouring money into the mushrooming growth and expansion of colleges and universities in the '60s. Library budgets soared with so much additional money that selection took a back seat to other factors in order to expend the budget each fiscal year and increase the volume count of the library's collection. A look at the statistics for libraries in the 1960s shows the astounding growth of library collections during this era. The same period also saw an increase in the number of micropublishers in the field. Colleges and universities spent millions of dollars on microform collections of retrospective bibliographies, sets of books, early periodical runs, etc. Yet, if the current usage rate of these sets is examined, the question is raised whether selection really occurred, or was it merely a matter of

acquisitions to expend the budget? Richard de Gennaro discussed this matter in "Austerity, Technology, and Resource Sharing: Research Libraries Face the Future," in the May 15, 1975, issue of *Library Journal*:

During the last two affluent decades some libraries—particularly those in the newly created or rapidly expanding universities—spent significant sums of money purchasing and processing collections of research materials in various types of microform in an effort to catch up and compete with the older and more established institutions. Experience has shown that many of these collections are seldom used, and we now see that their purchase by individual libraries was frequently unwarranted (6).

It is evident that the "possession" theory prevailed in the 1960s rather than the "user" theory.

There appears to be a strong correlation between quality of selection and the monetary amount of the library materials budget. The organization of acquisitions departments in colleges and universities and the acquisitions procedures used in public and school libraries were not, for the most part, prepared or equipped to handle the sudden influx of additional funds in the 1960s. In several cases, staff was not available for effective selection that would enable expenditure of the budget allowance. This is not an indictment of the profession, it is merely a statement of fact based on a perusal of the literature.

At the present time, libraries are faced with shrinking library budgets due to a variety of economic factors and pressures; in addition they face the yearly inflation in cost of materials, especially the escalation of journal prices. The austere budget situation definitely affects not only quantity of selection, but more important, the quality of selection. With only so much money, the librarian will choose only those materials that are vital and necessary to meet the demands placed on the library by the particular clientele or community it serves. When the austere situation exists, the critical, objective expertise of the professional comes into play, and it is imperative and essential in collection building in the era we are now entering. Critical and erudite consideration is required in order to obtain the best materials possible from the shrinking dollar. Therefore, selection must be realistic in terms of the economics involved and the resulting effects on library budgets. This is especially true when considering the purchase of a periodical title, as this is an ongoing commitment of the budget for several years to come. In the past, libraries have relied on interlibrary loan for journal articles not held by a library; however, with the implementation of the new copyright law this may be an impossible solution in the future. Rolland C. Stewart stated in his paper "The Undergraduate Library Collection" that ". . . selection proceeds in three stages: (1) the indispensable, (2) the necessary, and (3) the highly desirable" (7). This statement holds true for all types of libraries regardless of the size of their materials budget, and it should become a standard "rule of thumb."

The trend in the profession today, which will have a most significant impact on materials selection in this era of austere library budgets, is toward library networking and resource sharing. These are the vehicles which will enable libraries to meet



the needs of users where lack of funds prevents the purchase of all requested materials. This is stressed in the introduction of *Resource Sharing in Libraries*, edited by Allen Kent, by the following statements:

1. It is impossible for libraries to be self-sufficient—nor has it ever been possible in modern times.
2. Aside from library materials required in connection with specific courses, it is seldom possible to predict precisely which materials will be useful, and for how long. Despite this, some or much of the library budget, particularly in research libraries, is spent in stocking for future needs; accordingly, substantial portions of library collections are seldom used.
3. There is no reason why all library materials of potential usefulness on a campus must be physically stored on that campus—if materials can be made available at the point of need when the requirement arises.
4. The mechanisms for resource sharing are reasonably well understood.
5. There are no reasonable alternatives to effective resource sharing.
6. Based on the state of the art of resource sharing, the time for acceleration of effort is 'NOW' (8).

Only when libraries of all types join library consortia or cooperatives can they expect to meet user needs where selection has fallen short or financial limitations have prevented purchase. The time is at hand for libraries to select jointly the highly esoteric, expensive items needed only occasionally. In this regard, availability of access must take precedence over selection considerations based on the traditional possession mode.

Resource sharing fills the gap created by changing user needs, when new materials are required, and by the reexamination of selection criteria. An example in point: a sudden shift or rise in enrollment in a particular academic program in a college or university due to career-oriented students or a growing adult student population with different user needs—this can and does place severe strains on the library budget. Selection cannot possibly meet or anticipate all user needs—hence, resource sharing is more imperative than ever.

Selection of library materials for any type of library must follow a definite action plan and this is where good selection has failed at times in the past. Each library should have not only a selection policy specifying the objectives of the library and the guidelines to be followed but a “plan for action” as well. The plan should specify procedures to be used and the manner in which the policy can be implemented and then operated successfully. The plan must include checkpoints at various steps as well as evaluative feedback to ensure continuous progress toward, and fulfillment of, stated objectives. It is usually necessary to revise objectives and goals over time and thus alter or change the “action plan.”

The selection policy and action plan should state where the library is now in terms of collection strengths and weaknesses and where it plans to be in a stated time span. The selection policy and its subsequent implementation plan should take into full account the needs of the library's clientele, but it must also take a realistic view of the economics involved and the resulting effects on the library's budget. Sums are also needed in the budget for library services, not strictly for the pur-

chase of materials. More importantly, the selection process must take into consideration the networks to which the library belongs. An example in point: if a library determines that it has a weakness in a certain subject area, and it is faced with severe budgetary constraints, it must decide if it is going to follow the traditional path of expending a greater percentage of its already shrinking budget in an effort to strengthen this area, or if it will look to a neighboring library or library cooperative which already has a "strength" in this area and work out cooperative purchase agreements and, ultimately, shared utilization of these resources. The latter can be to the benefit of both libraries. This type of arrangement illustrates the area where traditional selection procedures are abandoned and more realistic, innovative approaches to selection prevail.

In conclusion, the librarian charged with selecting library materials must be thoroughly familiar with the traditional theories and concepts of materials selection, must know the "community" or clientele the library serves, must continuously evaluate the objectives of the library's selection policy taking into account the financial ability of the library to achieve them, must have a viable action plan to meet stated objectives of collection building, and most important, must be realistic in terms of that library as a part of a larger system of libraries in providing accessibility of materials to meet patron needs. As has been stated numerous times in the library literature, no library has been, is, or ever will be self-sufficient. This is an impossible dream that most librarians have been clinging to for centuries. The librarian designated to select materials for a library's collection must abandon this age-old "myth" and choose materials realistically. The user will be happy if the library has access to what is needed—patrons could not care less if the library owns it. We as librarians must adopt the same attitude!

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## SELECTIVE DISSEMINATION OF INFORMATION (SDI)

See *Mechanized Information Retrieval*

## SEMANTICS

Semantics is usually defined as the scientific or philosophical study of meaning, although the word “meaning” is the subject of intense philosophical debate, and scientists have yet to be convinced that any part of linguistics represents a science. At best, the semanticist can pursue studies guided by objectivity toward what may be useful conclusions about the nature of language. In library and information science, semantics assumes importance because indexes, as means of access to informational files, are best explained by the tools of linguistics. Semantics is allied with, and often designated as, semasiology, the study of meaning, or with semiotic, the study of signs. However, as used here, semasiology refers to the investigation of meaning, not to the ways in which meaning is conveyed, and semiotic is considered as a topic broader than semantics since it includes everything from the warning cries of birds to the hand gestures that become stylized among identifiable population groups.

General semantics, as begun by Korzybski and Hayakawa, is centered in the sociological aspects of language as very nearly a behavioral study. Semantics in the philosophical sense is concerned with an approach to the concept of truth and with the problems of language as a means of reference. All these topics are interesting in themselves, and they explain certain features of subject headings: for instance, the charge of sexism leveled at the Library of Congress (because of the wording of some of its subject headings) and the efforts of information scientists to find a means of evaluating the terms in indexes and improve them as means of access to informational files.

Language is the primary tool of communication among human beings and is as much a product of the human condition as it is an explanation. Certain elements of language (what has been called pathic communication) have no other purpose than to express feelings—but a native speaker of English will say “ouch” to let others know he has been hurt (even if he is alone), while a native speaker of Korean would say “aigu.” The process of learning a language for the first time begins with the infant trying out all the possibilities of his voice and oral cavity and finally limiting the sounds he can produce to those that gain a response from the adults attending him. What the child learns, without knowing it, is a vast range of tags that can produce a history, the boundaries of a culture and its identifiable features, and a means of exploring his own mind beyond what he has been taught. He also learns, automatically, a grammar and a phonetic structure which he can never entirely forget, even when he learns another language.

Children learning a language tend to learn the patterns they hear, so that certain mistakes can be explained in terms of the regularity of a pattern. A child who is told to “be good” will answer with the same pattern if he is told to “behave.” Since his response to the first is to say he is “being good,” it is reasonable for him to answer the second as “I’m being have.” Languages tend to change completely, so that the old forms of speech become unrecognizable after considerable time. Phonetic patterns change most slowly, grammatical patterns rather more rapidly, but the

conventions that impart meaning to words and phrases alter with amazing speed. The larger the linguistic community and the greater the opportunity to increase communication (both in variety and extent), the more rapid the changes. Purists object to this change, because there is a fluid period when meaning—that is, the conventions of meaning—have not been fixed. There are fashions in speech, to the extent that identification within a subgroup may depend upon the use of certain terms and certain patterns of speech. A child who can state his bodily needs without fear of reprisal on the part of those older people with him may find that his childhood terms are improper or simply laughable as he grows still older.

Every language has taboo words which reflect the mores and ethos of the society. The biblical commandment against the use of the name of God in vain, that is, for no serious religious reason, specifically refers to the secret name of God, which was not to be uttered aloud except in the proper ceremonial circumstances. Terms of sexual reference were about equally as taboo during the Victorian era. Words that are uniquely appropriate to the object signified tend to lose the taboo most slowly, while metaphoric words, words that in certain patterns have a taboo significance, may be acceptable at one point and unacceptable at another. The English words of sexual reference are unique in being almost completely taboo until very recently, and still taboo so far as television is concerned. However, even on television programs, innuendo and metaphor supply the lack when needed. For this reason, taboo words tend to have the greatest number of synonyms. As an innuendo, or double entendre, becomes conventionalized, it may itself become taboo.

Because of synonymy in language, words and phrases may be grouped together, a process called clustering in modern experimentation. This was the method used earlier by Peter Mark Roget in producing his *Thesaurus*, which was published in 1852. By categorizing words, they may be arranged in hierarchies, leading to the mistaken idea that words are necessarily hierarchical. This is true only of certain words in certain contexts; and in any case, the hierarchy is as arbitrary as the rest of language. A further improvement has been attempted in the effort to make the concept identified by the word fit into a hierarchical pattern. While this may be philosophically satisfying, concepts are often impossible to define in a way that will attain universal agreement. Concepts may be independent of words, especially when the word "concept" is defined in terms of cognition. There is no necessary connection between any word and any concept of what has been called the "event world." Words, though, are essential in most patterns of thinking, especially for those persons whose memory is largely based on the sounds they hear. People with visual memories may rely, to a certain extent, on pictures, but these often appear as labeled pictures in which a word or phrase is as important as the visual image. The function of words in thinking is to provide feedback, a way of evaluating the process of ratiocination. This follows the pattern of communication which is established as the child begins to learn his mother tongue. The process of sorting among available and nearly similar terms for precisely the right word to express a thought or an image leads to what has been called creative literacy.

Spoken language becomes fixed in the process of becoming a written language.

The establishment of standards of spelling (in the 17th century for French, and a century later for English) and the acceptance of a final standard in the form of an authoritative dictionary not only did much to stabilize the process of change in a given language, but this also established the difference between words in context and in isolation. Lexical meaning, that is, the definition found in a dictionary, is much less expressive than contextual meaning. Dictionaries must be continually updated as neologisms become accepted into the language and words shift meaning, sometimes as the result of pure inventiveness.

The written language always lags behind the spoken language in the establishment of new meanings for old words and in the creation of completely new words. Sometimes this process never reaches a dictionary, as when a family adopts a certain term with a certain meaning. A group of college students interested in literary criticism came upon an essay in which the French word for refined, *raffiné*, was translated as "raffinated." They adopted the word at once to mean anything that is over-refined, beyond the doubtful meaning of "precious." One of the first conclusions of the group was that Walter Pater's prose was precious and equally that the prose of anyone who studiously imitated him was raffinated. The word came to have the connotation of "following some standard to an absurd degree."

While dictionaries can establish denotation readily, only a dictionary of synonyms and antonyms can show the difference between denotation and connotation. These words are not precisely synonymous with Chomsky's identification of a surface and a deep structure in language. "Raffinated" was a useful term because of its background in a mistranslation, giving the connotation of accepting and assiduously following a false prescription for elegance. "Precious" could then be contrasted with the term to mean something achieved through inner or personalized preferences. These distinctions are often very difficult for nonnative speakers of English to understand, and they may cause confusion in any language. A German speaker of English said that his wife was going to prepare "smashed potatoes" for dinner. Although the word is roughly similar to the term "mashed" commonly used for puréed potatoes, the image is completely different. One thinks of the wife attacking the potatoes and smashing them angrily to teach them a lesson.

The more nearly a word represents precisely an object or action of the event world, the less likely it is to be ambiguous, that is, representative of two different things. Ambiguity arises from several different features of language and may be employed with considerable skill by a poet. By means of a literary trope, a word can have two meanings throughout a poem, as in a joke in which the common word is substituted for a taboo word so that whatever is said about the first reminds of the second.

Given this flexibility of meaning, words may seem to have no denotation at all, but this is manifestly false. Such word games as anagrams, crossword puzzles, acrostics, and so on are based on the recognizability of a word even when only a part of it is given. Equally, television game shows such as "Password," "The Twenty-thousand Dollar Pyramid," and the "Match Game" depend on contexts into which a word can fit. Words remind us of other words; substitutes are plentiful and sometimes more accurate than the word that first comes to mind.

This characteristic of a language underlies the degree to which verbal systems of subject analysis operate successfully, as opposed to classified systems. The problems arise from the fact that the system of "see-also" references tends to omit some terms (which could then be discovered only if the searcher knew that the term was used) and to arrange the other terms in chance patterns. No satisfactory rule can be devised that would provide for the inclusiveness of all the terms in appropriate clusters which does not employ some form of categorization or classification. A classified system has the advantages of providing context throughout the entire list and of not omitting any term, making all the terms findable if any term at all is known.

A classified system is as much subject to semantic lag as a purely verbal system. The Library of Congress list of subject headings contains many outworn terms, such as "Moving pictures" and "European War, 1914-1918," that cannot be changed because of the great numbers of titles for which the headings have been used. The prospect of recataloging so many books seems to overcome any desire for updating that may be felt. Classified systems, however, can take measures to guard against semantic lag by providing hospitality in the classification and by grouping several headings with each number in the schedule so that new headings are readily added.

Very little is known of the way users of a library become accustomed to and utilize the card catalog. Some semantic principles that perhaps can be derived from a study of television game shows and word puzzles might illuminate the subject. Users who are familiar with the subject portion of a card catalog have much greater success than those who approach it with no knowledge whatever. But catalogers know very well that no amount of study assures of absolute ability to pick the right heading every time. Everyone makes much use of "see" and "see-also" references. There is only a kind of patent trust that the network of see-also references covers the entire system.

In fact, that trust is misplaced. In a series of studies of both the Library of Congress and *Sears* lists, G. M. Sinkankas showed conclusively that the patterns of see-also references taken beyond the first step—that is, from a see-also to another see-also list, on a heading-by-heading basis—were like those of natural language. See-also references do not lead through the subject, but they lead out of it in a way that can be shown through word-association games (1). This feature of meaning has provoked several attempts at automatic classification, which have so far proved less than fruitful. Mellott, in her recently completed study of the subject heading list of the Atomic Energy Commission list used at the Oak Ridge Library, showed that the see-also references do not represent any classified structure and that they follow the patterns Sinkankas observed earlier (2).

The several philosophical studies and Fillmore's case grammar have not proved to be of more than passing interest (3). Studies of semantic features of subject-retrieval indexes must rely on self-discovered principles. A most promising avenue of approach was provided by G. S. Koh in her analysis of the Korean subject heading list, which is ostensibly an adaptation of the *Sears* list into the Korean language. Included with the Korean term is a classification number and often a Chinese

character. The English term may also be included, but in any case, a comparison with the *Sears* list in classified order provided a clue to the term being translated. Koh found that the completely unambiguous Chinese character resolved many of the problems of meaning found in the highly ambiguous Korean language, but not so many as were provided by the classification structure (4).

An axiom of linguistic research, often disregarded by information scientists working this area, is that conclusions about the nature of language cannot be reached by studying a single language. The comparative aspects of Koh's study are the most promising feature. Possible usable principles of semantics can be tested by studying a translation of a language in classified order in comparison with the original language. Translators are quite aware that there is considerable semantic mismatch between languages, to the extent that the phonetically unique structure of a language may be equated with an equally unique semantic structure. Some glimmerings of this possibility were found by Y. Courier in his study of the application of case grammar in French. Aside from the conclusion that Fillmore's proposals could not be successfully applied to French, Courier observed that French abstractions are derived from words with concrete referents (5). This is not true of English, many abstract words of which were simply quarried from Latin or Greek and then subtly changed meaning or became so vague as to defy definition. Such words were called jargon by Quiller-Couch in his essay on writing (6). A more exact description is "semantically empty words."

English, in particular, is filled with words which are so overused in differing contexts as to rub all the meaning away. "Situation" and "condition" are examples of words of this sort. This leads to the conclusion that abstraction can be defined as a function of usage and that the level of abstraction can be fairly well judged by the singularity of the referent. The most exact words are proper names identifying just one person, place, or thing. Such terms make ideal subject headings, incurring only problems of form and authority in usage. There is little or no disagreement among catalogers on this kind of heading and they are customarily omitted from the standard lists, except for a few that serve as examples. The class of words that includes all the proper names of a given category is the next level of abstraction. These classes are not fixed but may be modified in various ways to make whatever class is needed. Thus "Shirley Temple" is at once a former movie star, a child performer, and a celebrity of the Depression years in the United States. As Shirley Temple Black we would add political conservative; defeated candidate for the House of Representatives; and foreign service appointee, to the United Nations and as an ambassador.

The next level of abstraction is made up of the class of words that includes words that identify a class composed of proper names. The levels of abstraction may be worked out in a theoretical sense as far as patience will tolerate, but practically, three or four levels is about the limit. What Hayakawa called "higher order abstractions" are somewhere at the top of the list. In the cataloging of pictures, the choice of headings is governed by these considerations. Common nouns represent a class of things if they have concrete referents. The item, though, is not the word. In the explanation of the general semanticists, "A map is not a

territory" (7). The distinction between the actual thing and the word that applies to it in a given language is sometimes lost in our word-oriented thinking.

The term "semantic weight" has been used to describe this characteristic of language. That is, the closer a word is to a single reference to something in the event world, the more usable it is as an index term. The term applies to all parts of speech, although it is very easy to show that the syntactic words (what have been called function words) have almost no semantic weight. In almost all indexing systems, even in concordances, function words are omitted unless they are parts of a phrase.

Several attempts have been made to apply Chomsky's theories to indexing, most notably in the Preserved Context Indexing System (PRECIS) developed by Derek Austen. While the transformational features have proved to be quite successful, the idea that a sufficient body of data would lead, almost automatically, to a classification system has proved to be more hope than realization.

Classification systems have generally been designed a priori from a categorized list of needed terms, to which notations are added. The notation assumes a structure of its own, which, ideally, manifests the relationships needed between the terms. This seems to confirm the basic tenet of generative semantics that there are really only two divisions of language study—phonetics and semantics—and that syntax is actually a substructure of semantics and should be investigated in this context. Generative semantics has resolved, to some degree, the puzzle over interpretations of paradigms and kernel sentences. The acceptable forms are always tested semantically, leading anyone to suppose that semantics is the overarching study, of which syntax is that part capable of precise analysis.

Semantics remains a largely unexplored area of linguistic study, partly because the philosophic considerations have at times muddied the waters, or at least have served as distractions from what is a sociological investigation. That certain languages are incapable of conveying the meaning found in another language is the familiar experience of translators. Just as the phonetic structure of a language is unique and proper to that language only, the semantic structure is the result of conventions that are not duplicated in other languages; hence they are equally unique. From these conventions arise the morphological and syntactical conventions that condense messages and provide a contextual framework, in which terms can provide not only for the transference of messages but also for indications of mood and ideation as well. So long as the language provides for the accurate transfer of the message from one sender to another, it is efficient—but just what the limits of this accuracy are, or the degree attained, has not been considered in any great detail. In information retrieval systems, studies of the effectiveness of recall have often proceeded without consideration of the features of language that operate either to promote recall and relevance or to defeat one or the other. It seems very likely that languages differ in their capacity to serve as indexing systems, but so far no one has been able to design a study to show this or to assess the degree of variation.

If generative semantics at last explains the reliance of grammatical studies on semantic verification, it seems probable that further study of purely semantic



features will be seen as futile, since it is impossible to subtract the grammar of a language and still have an identifiable language. What has been advanced is the notion that morphemes may be as much minimal semantic units as they are morphological. Such syntactic considerations as the type of nexus available in a language—whether a simple “and” or possibly another term, for which in English the awkward “and/or” combination must be used—illustrate the value of comparative studies of languages for informational retrieval purposes. It may be concluded, as it has long been suspected, that classification systems are employed primarily to free an indexing system from the constrictions of a language. Certainly no other field of linguistic study is so promising as the relationship of semantics to information storage and retrieval.

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JAY E. DAILY

## SEMINARY LIBRARIES

## The Preseminary Period in Theological Education

1636 TO 1740

This section covers the period from the founding of Harvard College in 1636 to the beginning of the Great Awakening (1740).

It has been stated that “the Theological Seminary in this country may be regarded as one of the characteristic institutions of American Christianity” (1). However, George H. Williams finds that “the ‘seminary’ as a separate school for the training of ministers or priests was established in the Roman Catholic Church in Europe by a decree in April, 1564 by Pius IV. It is remarkable that the Puritans . . . should

have been willing in the Old World and the New to make use of the term for the University which so palpably had a Catholic genesis and a Counter-Reformation connotation" (2). The Puritan fathers referred to Harvard College and Yale as seminaries but the fact is that the training of clergy in the 17th century was not considered to be a "specialized and professional education." The Puritan founders "did not distinguish sharply between secular and theological learning; and they believed that the collegiate education proper for ministers should be the same as for an educated layman" (3).

This concept determined not only the curriculum of Harvard College but also the nature of its library collection. The curriculum of Harvard College was a classical one aiming "at the formation of Christian character as well as the furtherance of learning" (3). The Charter of William and Mary (1693) stated that the purposes of the institution were to furnish the Colony of Virginia "with a Seminary of Ministers of the Gospel, and that Youth may be piously educated in good Letters and Manners . . ." (4).

What was the nature of the book collection at Harvard College Library when it was founded? Henry J. Cadbury states:

The seal of Harvard so familiar today combines three open books with the motto "Christo et Ecclesiae." Though this seal is not coeval with the founding of the College, its basic elements all stem from the 17th century. The story of religious books at Harvard begins when the College begins. All records bear witness to the primacy of theological training among the purposes underlying the foundation in a wilderness of a seminary of learning. This purpose is reflected in both curriculum and books and the interest of the alumni (5).

In 1638, 2 years after the founding of Harvard College, John Harvard's private library of 400 volumes was bequeathed to the College Library; a little over 60% of the collection consisted of theological books. The growth of the library was very slow since its main source of acquisitions was gifts by clergymen and some laymen. In all instances the books given were theological or pertaining to the classics. In 1655 the library contained 800 volumes. In 1723 there were 3,500 books, and in 1764, the year the library burned, there were over 5,000 volumes.

What was the quality of the collection? Once more we quote Cadbury: "More objective appraisal of the Library could be made only by comparing it with some selected list. Against such a standard any library dependent upon miscellaneous giving, no matter how large and interesting, is likely to seem deficient" (6). The select list against which the Harvard Library collection was checked was Richard Baxter's "poorest or smallest library that is tolerable." According to Cadbury, ". . . of this minimum 'poor students' library, with about six score authors or specific titles, barely half are recorded as in the College Library in 1723" (6). Besides gifts from colonial ministers and laymen, the library had received a token amount from the state toward the purchase of books.

The training of ministers in the colonial period was basically through college education. "English experience together with the continuing influence of handbooks like Bernard's *Faithful Shepherd* (copies of which circulated in the Colonies)

dictated that New World ministers receive rigorous training in logic and rhetoric, divinity and the ancient languages" (7). There were three possible courses for further "continuing" education: (a) 3 more years of reading at the college toward the M.A. degree, as "resident bachelors" in theology; or (b) retiring to the family residence and reading there; or (c) being tutored by prominent clergymen. Eventually this latter form of "theological" education served as a primary means for training ministers, independent of Harvard College instruction.

Reference has been made to Richard Baxter's *Christian Directory*. This was one of the earliest of the bibliographies serving as a guide to ministers in their study. The three lists of books provided were compiled in response to the question, "what books especially of theology should one choose, who for want of money or time can read but few?" (8). Samuel Willard during his vice-presidency at Harvard (1701–1707) prepared a guide for postcollegiate study of theology entitled *Brief Directions to a Young Scholar Designing the Ministry, for the Study of Divinity*. This was so popular that it appeared in print in 1735 for wider distribution. Willard was an orthodox Christian and his purpose in the *Directions* was to safeguard orthodoxy. In 1726 Cotton Mather published a guide entitled *Manductio ad Ministerium, Directions for a Candidate of the Ministry . . .*, which was intended to serve both the years at college and beyond. Finally, one should mention John Edwards's *The Preacher, A Discourse . . . to which is added A Catalogue of Some Authors who may be beneficial to Young Preachers and Students in Divinity* (1705). According to Mary Latimer Gambrell, copies of this work were in both the Yale and Harvard Libraries in the 18th century (9).

Bibliographies and guides to reading presuppose the existence of private libraries in the homes of colonial ministers. Development in theological education in the 18th century found these private collections to be real assets.

#### 1740 TO THE 1790s

The second stage of development of theological education extends from the Great Awakening (1740) to the founding of the first seminaries in 1785, 1791, and 1794.

The 17th century in New England was a period during which Harvard College was founded, "wherein a succession of a learned and able *ministry* might be educated" (10). It was also a time when some Puritan colonists began a counter-ministry movement that played down the educated ministry and emphasized lay, nonordained preaching. Furthermore, postcollegiate training of candidates for the ministry, as mentioned above, became a tutorial process provided by outstanding clergymen.

Theological ferment—with the rise of antinomianism, arminianism, and the Anabaptist movement—in 17th-century New England paved the way for a diversity of theological viewpoints on theological education. Learned ministry was still the rule and not the exception. Harvard regarded theological education as consisting of rigorous training in academic subjects.

Harvard founders knew there was more to the making of a faithful shepherd than instruction in Hebrew and divinity. They shared with William Perkins and Bernard the assumption that "true Prophets of the Lord" must have their hearts made new by grace (11).

Harvard-trained ministers found a response in early 17th-century New England society, where wealth and social rank were respected. Harvard education was expensive and therefore attracted men who could afford the expense. Furthermore, Harvard presupposed that students would come from grammar schools, and as grammar schools were mostly found in wealthy New England towns, the students represented the wealthy and educated class of society.

The second generation New Englanders could not afford the high cost of education. This was one of the reasons for the rise of the counter-ministry movement in the middle of the 17th century, which in turn was encouraged by the fact that learned ministry was no longer affordable or even desirable. Hence, the atmosphere became ripe for "revival," which found in Jonathan Edwards an inspiring leader who prepared the way for the preaching of George Whitefield of England. This revival is known as the Great Awakening. George Whitefield and the Harvard faculty engaged in a series of charges and counter-charges on theological questions. The piety of the Harvard-trained ministers was questioned. It was also believed that many communities had lost their enthusiasm for matters of the spirit.

Another factor in the change of attitude toward learned ministry was the practice of halfway covenant. In early 17th-century New England, membership in the church meant membership in the covenant of grace which one entered by conversion. Halfway covenant meant that children and adults were admitted to church on a much wider baptismal basis, that is, with no requirement for an experience of conversion. This resulted in the fast growth of the congregations, but the quality of the membership declined.

The form and content of theological education had to change. What had already begun earlier—namely, the training under the tutelage of ministers—became an established practice and was known as "the Schools of the Prophets." As the number of these "schools" increased, "colleges were already beginning to pass over from theological to secular interests" (12). Harvard and Yale were not able to respond to the revivalists, and young men who came from the churches affected by the revival preferred to be tutored by the great preachers. Two of the outstanding clergymen who were trained by tutors were Joseph Bellamy and Samuel Hopkins.

Bellamy later established his own theological school. His private collection consisted of some 100 titles and 350 pamphlets. His qualifications as a teacher may be described by the words found in the *Memoir*: "with the exception of two or three divines that might be mentioned it is doubtful if any contemporary in America was more thoroughly read in the various departments of theology than the pastor of a small church in Bethlehem . . . (13). A detailed account of Bellamy's library is found in Mary Latimer Gambrell's *Ministerial Training in Eighteenth-Century New England* (pp. 108–111). Some of the students of Joseph Bellamy

became, in their own right, instructors in theology. Among them was John Smalley, who taught Ebenezer Porter, the first president of Andover Theological Seminary. Bellamy's collection is said to have lacked works in the classics and the writings of the Fathers, to have contained none of the contemporary secular literature, and to have been very limited in church history and science. In both Bellamy's and Smalley's library collections, books essential for the study of the Bible were limited in number (as in Bellamy's) or lacking (as in Smalley's). Smalley, however, had a wider interest, so his collection included books in the classics and contemporary literature. Pliny, Shakespeare, Bunyan, Locke, and many other authors were present on his shelves. Curriculum determined the nature of the collection in a library. Theological education was never understood as studies in theology exclusively. William Ames's *Medulla Theologica* (Amsterdam, 1652) remained the basic reading in theological discourse. Even the study of the Bible was secondary to the study of theology.

Since theological education during the 18th century took place in parsonages, it is important to mention other prominent clergymen who were engaged in instructing ministers. Nathanael Emmons was one who believed "that proper understanding of natural and revealed religion was contingent upon knowledge of such secular subjects as history, ethics, metaphysics and civil polity . . ." (14). To this end, he developed his library collection. Nathanael Emmons lived in Franklin, Massachusetts, a town named after Benjamin Franklin. Three separate libraries were kept in his house: the Franklin town library (a gift of Benjamin Franklin), the parish library, and his own private collection. It is worth noting that the Benjamin Franklin collection consisted mainly of the works of English theologians.

It is not an exaggeration to say with Gambrell that "Joseph Bellamy, John Smalley and Nathanael Emmons were typical of the heads of the private theological schools" (15). The Great Awakening gave incentive to the development of parsonage education and placed greater emphasis on the personal piety of the minister. Another aspect was the fact that "the sympathizers of the Great Awakening were by no means indifferent to the need for education; the religious movement led to the foundation of a series of institutions of which the first was Princeton, chartered in 1746" (16).

Developments in 18th-century America, with the Great Awakening and its concomitant movement of parsonage education, prepared the way for independent schools for theological education.

The first of these is considered to be the Seminary of the Reformed Church in America, established in 1784 in New Brunswick, New Jersey. We read that: "The core of the library was a private collection of Domine Von Bunshooten. This was very modest and very Latin . . . small, textual, didactic and consistently polemic" (17). The development of this collection was due to gifts of books from individual donors and the collections of deceased domines, as the teachers and scholars in that community were called. An outstanding private library of the Reverend Dr. George W. Bethune was given to the seminary in 1870. Being a bibliophile, his collection contained rare imprints representing the well-known

presses of Aldus, Baskerville, Elzevir, Froden, Koperger, and Stevens. The library presently has 128,210 volumes (1974/75); and it contains many treasures such as Melancthon's own copy of *Catullus, Tibullus, Propertius* (Aldus, Venice, 1515).

All the works of the writers of the Reformation period, Luther, Calvin, Chemnitz, Hunnius, Hutter, Gerhardt, Quenstedt, Calov, Zwingli, Bullinger, Musculus may be found in fine copies, as well as the works of the later writers, Keckerman, Alsted, Alting, Burmann, Heidanus, Heidegger, Buddeus, Carpzov, Rambach, Michaelis, Döderlein, Morus and, in opposition, the Roman Catholic writers, Bellarmin, Canisius, Maldonat, Becan (18).

In 1796 the Associate Reformed Theological Seminary was proposed at the General Meeting of the Synod in New York City, but due to lack of funds the project was suspended until 1801 when a "committee recommended the appointment of a minister to visit Great Britain as an agent of the Synod, to secure ministerial help for the wide field calling for supply, and to seek all possible assistance in the work of erecting a theological seminary and furnishing it with a suitable library" (19).

John M. Mason was elected for this project. He raised \$5,000, "the principal of which was expended in the purchase of books for the intended seminary library . . ." (19). In 1805 the seminary was established in New York City; its collection of 3,000 volumes was the first major theological collection bought at one time for one library in America. The books were moved to Newburgh, New York, to the new site of the seminary, and the collection became known as the Newburgh Collection. Dr. Mason classified the books under these headings:

1. The Scriptures in various languages
2. Expositors
3. Biblical literature
4. Christian ministry
5. Systematic theology
6. Polemical theology, comprising the Deistical, the Arminian, the Popish, the Episcopal, and the Baptist
7. Miscellaneous theology, sermons, etc.
8. Moral and political science
9. Metaphysics
10. Belles lettres
11. History, sacred and civil
12. Natural philosophy
13. Grammars and dictionaries in various languages

Reference is made to the Newburgh Collection because of its history. The second oldest Protestant seminary—established in Service, Pennsylvania, in 1794 by the Associate Presbyterian Church—it was the earliest predecessor of the Pittsburgh Theological Seminary, and it is in the latter's Clifford E. Barbour Library that the Newburgh Collection is housed. Service Seminary came into existence with the appointment of the Reverend John Anderson as "professor of theology and kindred studies" and it had a library of 800 volumes—the first seminary established in the

Western Continent.\* A succession of seminaries came into existence and eventually merged to form the Pittsburgh Theological Seminary. Service Seminary moved to Canonsburg, Pennsylvania, in 1821, then to Xenia, Ohio, in 1855, then to Saint Louis, Missouri, in 1920. Another branch came from the Associate Reformed Presbyterian Church, which established a seminary in Pittsburgh in 1825, known as the Allegheny Seminary and later as the Pittsburgh Seminary. In 1930 Pittsburgh and Xenia merged to form Pittsburgh–Xenia Seminary. The Presbyterian Church (U.S.A.) founded classical academies in Washington, Pennsylvania, in the years 1785 and 1787. The Western Seminary developed out of these two academies and came into existence in 1825 “to furnish a ministry for the rapidly opening western territory along the Ohio River.” In 1958 the merger of the United Presbyterian Church of North America and the Presbyterian Church (U.S.A.) resulted in the formation of the United Presbyterian Church in the U.S.A. Pittsburgh Theological Seminary and its Clifford E. Barbour Library then came into being. Besides having the Newburgh Collection, the Barbour Library inherited from Western Seminary the second James Warrington Collection of Hymnology (the first went to Hartford for a time and is now in Atlanta, Georgia, at Candler Theological Seminary).

The 18th century came to a close with the establishment of two Protestant seminaries, the New Brunswick Theological Seminary and Service Seminary, and one Roman Catholic, St. Mary’s Seminary in Baltimore (1791). All three are still in existence, but unfortunately records have not been kept as to the founding and development of the St. Mary’s library collection.

#### **The 19th Century and the Establishment of the Major Seminaries That Are Still in Existence**

The 18th century saw an increase in the American population and hence in the number of churches established, not only in New England but also in New York, New Jersey, and Pennsylvania. The Great Awakening brought into existence many new churches. The need for ministerial training became more urgent. Parsonage-trained ministers did not fill the need. J. M. Mason, writing in November 1801 to the chairman of the Committee of the Associate Synod, said: “Many of the congregations which are now waiting for pastors and a greater number of vacancies not yet matured are in those parts of the United States which have been recently settled” (20).

The 19th century was a period of burgeoning growth of theological seminaries. This survey is limited to the seminaries where library collections of special value and interest were developed or have survived, sometimes by merging with other libraries.

#### **THEOLOGICAL SEMINARY, ANDOVER**

The first of the 19th-century seminaries was the Theological Seminary at Andover, Massachusetts, which opened its door in 1808. It is considered to be “the first Protestant school of theology at the graduate level in the United States” (21).

\* That is, in the territory west of New York.

Its founding was the result of two theological viewpoints developed in the Congregational Church. Harvard represented the liberal wing of Puritan theology, whereas Andover took a more conservative stance. The library at Andover had a humble and slow start, but by 1838 there were some 1,200 volumes on the shelves. The emphasis at Andover was on the role of the professor in theological education, and therefore it is not surprising to know that the seminary opened its door without a library! However, several important purchases and gifts resulted in the rapid growth of the library. Dr. Edward Robinson, who served as librarian, and who later became a well-known archaeologist, made purchases in Germany during the years 1826–1830; Reverend W. B. Sprague of Albany presented to Andover some 8,000 pamphlets; the private library of the German church historian C. W. Niedner was purchased in 1866; and many other collections were added in due time. By the time Andover Library merged with Harvard, its collection had risen to 62,000 volumes. “The merging of these two fine libraries—each of them rich in research materials and in rare and unusual old volumes, as well as in current religious literature—backed by all the resources of the Harvard College Library made this one of the greatest theological libraries in the world” (22). Thus the Andover–Harvard Library came into existence, and it remains with that name as the library of the Harvard Divinity School. It will be of interest to know what some of the rules were for the use of the library at Andover as early as 1811:

- X. The stated time for loaning books to students shall be from 2 to 4 o'clock of every Saturday afternoon in term time.
- XI. No student may have on loan at one time more than three books. . . .
- XV. When there shall be more than one copy of the same book the least elegant one shall be lent first. . . .
- XVII. The library shall be aired *one* day a week, if weather permits, and swept and dusted once a month (23).

In 1931 Andover Seminary became affiliated with Newton Theological Institute (which was founded in 1825 by the Baptists), but the Andover Library collection remained at Harvard. Today the total number of the collection at Andover–Harvard Library is 335,000 books. Its greatest emphasis has been on Biblical studies, with impressive collections in historic and theological studies. Besides the Niedner Collection in Continental church history, it also has the J. P. de Bie library in Dutch theology and the library of the Universalist Historical Society.

#### HARTFORD THEOLOGICAL SEMINARY

The founding of the Hartford Theological Seminary in 1834 was due to a theological disagreement known as the Taylor–Tyler Controversy. Dr. Taylor represented the Arminian viewpoint and Dr. Tyler was the Calvinist. What made Hartford Theological Seminary outstanding was the development of one of the best theological collections in the United States. Once more, the beginnings of the library were modest. In 1855 the library contained 5,500 books; in 1860 the



library numbered about 7,000 volumes. The real growth in numbers and quality began in 1878 with the coming of Chester D. Hartranft, who was librarian and later president of the institution. His activities and those of Ernest C. Richardson, who succeeded Hartranft as librarian, brought about significant growth of the library. (Both were charter members of the American Library Association.) Among the special collections acquired by the library under the direction of Hartranft and Richardson were the Beck Collection of Lutherana, which consisted of 800 volumes of very rare first editions of Luther's works; the Mueller Semitic library; and the Paine Hymnological Collection (later the Warrington Hymnological Collection was added to this). The library became known as Case Memorial Library, in honor of its great supporter, Mr. Newton Case, a successful businessman of Hartford. When this valuable collection was sold to the Candler School of Theology (of Emory University in Atlanta, Georgia) in 1975 it totaled 259,000 books.

### YALE COLLEGE

A divinity professorship was established at Yale College in the year 1746, but it was not until 1822 that a separate charter brought about the Yale Divinity School. "The Divinity Library was established in 1932 through the consolidation of the Day Historical Library of Foreign Missions, the Trowbridge Reference Library and the Richard Shelton Sneath Memorial Library of Religious Education" (24). At the time of its establishment as a separate library, it contained about 35,000 volumes. After World War II the John R. Mott Library was added to its collection. The Day Missions Library—a collection representing documentations relating to East Asia, South Asia, Oceania, and Africa—is considered to be "one of the two major collections of its kind to be found anywhere" (24). Today the Divinity Library is said to have over 300,000 volumes, which is an indication of its vitality.

Seminary or divinity libraries which are university related have the advantage of being a part of a much larger library system, and Yale Divinity and Yale University Libraries together could boast in 1968 of having over 600,000 volumes bearing upon religion.

### AUBURN SEMINARY AND UNION THEOLOGICAL SEMINARY

Auburn Seminary was established in 1818 in Auburn, New York, by a group of Congregational and Presbyterian ministers. The growth of its library was extremely slow. When Auburn joined Union Theological Seminary, of New York City, in 1939, the library contained 12,000 volumes. Union Theological Seminary was founded in 1836 in the midst of a "theological atmosphere . . . charged with suspicion and bitterness" (25). The seminary was designed to express the view of the moderates.

Not very often are the directors or trustees of an institution willing to mortgage the institution's property in order to raise money to purchase a library collection, especially when faculty salaries need improvement. Union Theological Seminary directors are on record for doing this very thing in order to purchase the Leander

van Ess Collection of 13,000 volumes comprising 600 works. Among them were found some 430 incunabula. Brother van Ess was a former Benedictine monk of the monastery of St. Mary at Paderborn. He was in charge of this collection, known as *Libri Prohibiti*. A good part of the collection consisted of the controversial literature of the Reformation period, plus Bibles, polyglots, lexicons, concordances, commentaries, and Greek and Latin Church Fathers. The nature of the initial collection of a library may determine the eventual character of its holdings, and the Union Library had an unusual beginning. The second factor in the development of a library collection is its leadership. As in Andover and at Hartford, Union benefited greatly by having scholar-librarians who were instrumental in acquiring unusual private collections and in attracting donors with special gifts of money or books. Edward Robinson, Henry B. Smith, Charles A. Briggs, and Charles R. Gillette were among the outstanding scholars who as librarians brought valuable collections to Union. Edward Robinson was responsible for the van Ess Collection. Dr. Briggs, with the help of Dr. Ezra Gillette and his son Charles R. Gillette, made it possible for the McAlpin Collection of British History and Theology to be part of the Union Library. "It contains some 17,000 books and tracts printed before 1701 relating to the religious movements of the stormy 17th century; and the collection of the books and pamphlets on the Deistic and Trinitarian controversies of the 18th century is a worthy sequel" (26).

#### MISSIONARY RESEARCH LIBRARY

The Missionary Research Library began as the result of the World Missionary Conference at Edinburgh in 1910. The initial attempt to bring together books and pamphlets related to missions was under the leadership of Dr. John R. Mott. In 1929 this library occupied the Brown Memorial Tower of Union Theological Seminary of New York, and in the year 1967 the Missionary Research Library and the Union Theological Seminary came under the same administrative supervision. The combined collection now numbers 555,000 volumes (1976), making it the largest theological library in North America.

#### COLGATE-ROCHESTER DIVINITY SCHOOL/BEXLEY HALL/ CROZER THEOLOGICAL SEMINARY

The name of the Colgate-Rochester Divinity School/Bexley Hall/Crozer Theological Seminary, as it is known today, reveals the history of mergers which started with the founding of Colgate Theological Seminary in 1917. The legend that still lingers on is that the 13 men who founded the seminary at Hamilton, New York, also started its library, with each person contributing a book!

Rochester Theological Seminary was established in 1850. During the librarianship of Professor Velona R. Hotchkiss (1854-1865), who was also elected professor of church history, the entire library was purchased for \$2,300. It consisted of 4,600 volumes that had belonged to Dr. Johannes August Wilhelm Neander, professor of church history and New Testament exegesis at the University of

Berlin. This collection is still considered a treasure. Among other important private library collections, the Ambrose Swasey Library (named after the donor of a sum of \$50,000 for the library endowment fund) contains a good portion of the library of Walter Rauschenbusch. A collection of tracts and books published during the German Reformation period was also added to the library.

Bexley Hall, the Divinity School of Kenyon College (the third oldest Episcopal School in America), was founded in 1824 at Gambier, Ohio. Bishops Chase and McIlvaine made direct appeals to England for financial assistance and for books. The results were very encouraging. The core of the library was the private collections of the two bishops and the books received from England, which are considered now to be the old and rare book collection of Bexley Hall, known as the Colburn Library. One striking category of books is polyglot Bibles:

Of the nine Polyglot Bibles listed in Rumball–Petre's reference work on editions of the Bible, Colburn Library has five. Of the four great Polyglots, Colburn Library has two: The Royal Antwerp Polyglot of Plantin (1568–1572) and Walton's London Polyglot (1655–1657). Of the five minor Polyglots, Colburn has three: Tremelius' Polyglot New Testament (1569); the Hamburg Polyglot (1596) and Bagster's London Polyglot (1831) (27).

When Bexley Hall merged with Colgate–Rochester Divinity School in 1968, a collection of 30,000 volumes came with it.

Crozer Theological Seminary was established in 1868. By 1871 Crozer had a new, separate library building. William Bucknell, a layman, was not only fully responsible for this structure but he also gave the sum of \$25,000 so that a collection could be acquired. From the printed reports on the library by Professors C. P. Krauth and Ezra Abbott, assistant librarian of Harvard, one gathers that what was acquired in a short time was a library of lasting value. Ezra Abbott's words do justice to the quality of the books Bucknell Library purchased in the initial years of its founding: "the principle [controlling] the selection throughout, of making it primarily a library for scholarly research rather than a repository of popular books" (28). The year Crozer Theological Seminary merged with Colgate–Rochester Divinity School, Bucknell Library claimed to have 86,000 volumes, and only 30,000 of this number were added to the Swasey Library of Colgate–Rochester. The mergers, therefore, have made the Swasey Library a collection of 180,000 volumes.

## GENERAL THEOLOGICAL SEMINARY

The General Convention of the Episcopal Church established the General Theological Seminary in 1817 on the family estate of Clement Clark Moore, known as "Chelsea." This was the first seminary of the Anglican Communion in America. The library was founded in 1820 by John Pintard, "a leader in the civic life of early New York." Through his efforts, a set of the Fathers was bought and the library was begun. It was during the deanship of the Reverend Eugene Augustus Hoffmann, whose term began in 1879, that the library and the seminary made great

strides. In 1898 Reverend E. A. Hoffmann presented a complete and an excellent copy of the Gutenberg Bible to the library. It is part of a collection of over 20,000 volumes in the field of Biblical studies, which include early editions of the texts of the Bible in Hebrew, Greek, and Latin. Among early manuscripts are found a Hebrew Bible from 1264, three 10th-century Gospels, and a complete Latin Bible from about 1250. The Greek text of the New Testament is represented by the editions of Erasmus (1516), the first *printed* Testament (Ximenes, 1514), the first edition of the standard (received) text of Stephanus (1550), the first Greek Testament with modern verse divisions (Stephanus, 1551), and many others. The English Bible and its various editions are also owned by the library. There are three early Tyndale volumes, a complete English Bible of Coverdale (1535), several Great Bibles, a first edition of the Geneva Bible, and the first edition of the Authorized Version of 1611.

The liturgical collection of 7,000 titles covers adequately the origins and development of the Book of Common Prayer. Works related to the history of the Church of England constitute a good portion of the general church history section of the library. "From the Reformation on, the major crises and controversies of English church life may be followed in a wide range of contemporary tracts, sermons and pamphlets, many of great rarity" (29). The life and work of the Episcopal Church is a responsibility which the seminary, through its library, has tried to fulfill. The Archives and Manuscripts Division is especially strong in maintaining the papers of American bishops, starting with the first bishop, Samuel Seabury. Two librarians, Professor Burton Scott Easton (1904-1916, 1920-1948) and Dr. Niels H. Sonne (1948-1975), made considerable contributions to the growth of the collections, which now number over 185,000 volumes.

### DREW THEOLOGICAL SEMINARY

The Methodist Episcopal Church founded Drew Theological Seminary in 1866. It is stated that "Drew had a library before it had a faculty" (30). This collection was the result of a book-purchasing trip by a scholarly agent sent to Europe by the first president of Drew, Dr. John McClintock, with a list of books and \$2,500 in cash. Drew Library is basically a theological library with special collections. Among them are the slavery collection of Bishop Joseph Crane Hartzell; the David Creamer hymnology library; and many other collections of manuscripts, letters, and diaries related to the Methodist Church. In 1950 the personal library of Walter Koehler, a church historian of Heidelberg, Germany, was purchased and added to the Drew collection. The institution and its library have now developed into a university, and the library contains 350,000 volumes.

### PRINCETON THEOLOGICAL SEMINARY

Princeton Theological Seminary was established in 1812. The following describes the library at the time the first professor, Archibald Alexander, was appointed in the Theological Seminary:

At first, the few cartloads of old second-hand, often odd volumes, raked together from studies and garrets, scarcely deserved the name of the library . . . the whole collection was contained in the professor's study. The gift of Walton's Polyglott . . . was the first token of any thing like a literary apparatus (31).

The first year's monetary appropriation for the library was \$100, and the amount was spent on two copies of Parkhurst's work on the Hebrew language, six copies of Wilson's *Introduction to the Hebrew Language*, and two Hebrew Bibles.

The generosity of the members of the seminary community, including the graduates serving overseas in the mission of the church, made the development of the library collection enter a period of rapid growth. The religious Americana of the Speer Library (named after Robert E. Speer, an eminent layman and missionary statesman of the 20th century, who was at the time of his death in 1947 the president of the Seminary Board of Trustees) is the result of a collection begun through the efforts of the Reverend William B. Sprague. He was the author of the nine-volume set of *Annals of the American Pulpit*, and he presented the original gift of more than 700 volumes to the library and continued to add to it until 1872. One is able to find a copy of every known first edition of the Massachusetts election sermons issued between 1721 and 1829. Mention should be made of the A. B. Grosart collection of books acquired in 1885, illustrating the Puritan and Nonconformist literature of England from 1550 to 1700. The Speer Library also holds the Louis S. Benson Library of Hymnology, comprising nearly 10,000 volumes with an impressive collection of early American hymnody. In 1975 the Speer Library collection stood at 325,000 volumes.

#### PHILADELPHIA SEMINARY

The oldest Lutheran Synod of America, the Ministerium of Pennsylvania, established the Philadelphia Seminary in the year 1864. The library holds the archives of the Ministerium of Pennsylvania from the year of its founding in 1748. The liturgical collection of about 1,000 volumes is where "the development of the American Lutheran service is traceable . . ." (32). The library holds many first editions of Luther's sermons. In 1975 the library contained 116,000 volumes.

#### GETTYSBURG SEMINARY

The predecessor of the Lutheran seminary in Gettysburg was the Hartwick Seminary, founded in Oswego County, New York, in the year 1797 with a library of 420 volumes. However, the building erected on the estate of John C. Hartwick was completed in 1815, thus making the New Brunswick Seminary still the oldest theological seminary in this country.

The General Synod of the Evangelical Lutheran Church in the United States acted in 1825 to establish a theological seminary and a year later the Gettysburg Seminary was founded. Dr. S. S. Schmucker was its one and only "professor of Christian theology." Dr. Benjamin Kurtz of Hagerstown, Maryland, was commis-

sioned to go to Europe to raise money and to acquire books for the seminary. His trip took him to London, to the cities of northern Germany, to Copenhagen, to Sweden, to Riga and St. Petersburg, and to Berlin and central Germany. He returned to Gettysburg with 5,000 volumes, to which were added the books that Dr. Schmucker had collected in the United States.

Gettysburg Seminary was one of the seminaries which suffered as a result of the Civil War. The seminary was in the hands of the Confederate Army, and Dr. Schmucker's library was plundered.

Once or twice the room containing the library was used for short intervals as the office of the surgeons. Dr. Schmucker records: "the library of the seminary has not been occupied by the soldiers, although a disposition to do so was manifested on several occasions, which was prevented only by affixing stronger locks to the doors and by suitable protestations to the superior officer in command." None of the seminary books were disturbed (33).

The library collection that Dr. Kurtz had provided in 1826 was considered to be practically worthless 40 years later. An effort was made in 1869/70 to build up the collection. The most valuable addition to the library was acquired beginning in 1919. Known as the Zimmerman collection and containing 11,000 volumes, it is described by A. R. Wentz as follows:

It was a grand storehouse of general and theological literature, history, biography and travel, but especially valuable for its works from the fine arts. These volumes are supplemented with splendid folios of art and architecture, a large number of rare coins and valuable medals and about 13,000 mounted postcards or photographs collected during many years of travel. There is a rare copy of the famous Gothic "Codex Argentinus" with facsimile pages and a leaf from the Gutenberg Bible, the first book ever printed from movable type. There are a number of very rare old books, including the richly illuminated manuscript Bible of the 13th century, quarto Bible of 1479 and a folio copy of the New Testament of 1488 and several other incunabula. Other treasures are two large volumes of St. Jerome's letters printed in 1468, the first edition of Luther's small catechism and prayer book, first edition of the Augsburg Confession in German of 1530 and the first edition of the Greek Bible of 1518 with marginal annotations by some contemporary (33).

The library in 1975 was reported to have about 110,000 volumes.

#### LANCASTER THEOLOGICAL SEMINARY

The German Reformed Church in America established a seminary (later known as the Lancaster Theological Seminary) in Carlisle, Pennsylvania, in 1825. It moved to York, Pennsylvania, in 1829, then to Mercersburg in 1837, and in 1871 to Lancaster, Pennsylvania. In the development of its library, the name of Dr. Philip Schaff should be mentioned. A Swiss-born Lutheran church historian, he joined the faculty of Lancaster in 1844 and during his 21 years there he "became the main channel through which the riches of German Protestant Theology flowed to the New World" (34). The library was named the Philip Schaff Library when

the new building was dedicated in 1967. The Central Archives and Library of the Evangelical and Reformed Historical Society and the Archives of the United Church of Christ are housed in the Schaff Library, which holds 112,000 volumes.

#### ST. CHARLES BORROMEIO SEMINARY

St. Charles Borromeo Seminary was founded in 1832, and its charter was granted by the Commonwealth of Pennsylvania in 1838. It is owned and operated by the Roman Catholic Archdiocese of Philadelphia and is situated in the Overbrook section of Philadelphia. The main library, the Ryan Memorial Library, is named for Archbishop Patrick J. Ryan, second archbishop of Philadelphia. The American Catholic Historical Society of Philadelphia Library and Archives are found on the same campus. Two special collections make the Ryan Library unique among seminary libraries. The first is the Graphic Art and Original Prints Collection and the second is the Afro-American Collection. The library held 166,000 volumes in 1975.

#### ST. VINCENT'S SEMINARY

Boniface Wimmer established St. Vincent's Seminary in 1846 in Latrobe, Pennsylvania. He came from St. Michael's Abbey in Metten, Bavaria, and brought with him the initial collection of the library. To this collection were later added books donated by King Ludwig I of Bavaria and by the Ludwig Missionsverein through Court Chaplain Joseph F. Mueller. The library collection is rich with 16th-, 17th-, and 18th-century European imprints and there are more than 18 incunabula. In 1975 the theological section of the library contained 77,000 volumes.

#### LIBRARIES OF REFORMED JUDAISM

The first rabbinic school in America (later known as Hebrew Union College—Jewish Institute of Religion) was founded in 1875 by Rabbi Isaac Mayer Wise in Cincinnati, Ohio, to serve American Reformed Judaism. Subsequently, several other schools were established under the same administration. The Jewish Institute of Religion in New York was established in 1922 by Rabbi Stephen S. Wise. The California School of Hebrew Union College—Institute of Los Angeles was chartered in 1954, and the Jerusalem School of Hebrew Union College—Jewish Institute of Religion was founded in 1963.

The Klau Library of the Hebrew Union College—Jewish Institute of Religion in Cincinnati was dedicated on June 3, 1961. A small building which houses the Dalsheimer Rare Book collection is connected to the main Klau Library. It is not very often that one finds in one locality such a rich concentration of exceptional collections of books as here. The Rare Book Room has manuscripts of the Bible, a large collection of Samaritan manuscripts, and manuscripts of the old Chinese—Jewish community. The Eduard Birnbaum Music Collection consists of 6,000 manuscripts and printed volumes of Jewish music collected by Cantor Birnbaum.

The Klau Library has one of the finest Spinoza collections of early editions of his works, in many languages. Another area of specialization is the Jewish Americana, where one finds the first Hebrew Bible printed in the United States (Philadelphia, 1814). "No short summary of the holdings can do justice to the scope of the rare book collection, to the quality and rarity of these treasures, or to their scholarly importance" (35). Finally, attention should be drawn to the collection of the 16th-century Hebrew books, where there are "over 1,300 volumes, perhaps three-quarters of the known Hebrew books of the century are gathered here" (36). The main library, named in memory of David W. Klau of New York, is considered to be one of the largest depositories of Judaica-Hebraica in the world. In 1975 the library had 269,000 volumes, 116 incunabula, and 6,000 manuscripts.

The Emil Hirsch-Gerson Levi Library of the New York campus was established in 1922. The library started with the private collection of Dr. Stephen S. Wise, president of the Jewish Institute of Religion from 1922 to 1948. The growth of this library was due to a succession of private collections given to the library: Rabbi Samuel Mendelsohn of Wilmington, North Carolina, donated his collection of biblical, talmudic, and halachic literature; and Dr. Gerson B. Levi of Chicago was responsible for the presentation of a partial collection of Dr. Emil G. Hirsch's library. The outstanding contribution to this collection was the complete bibliographical and scholarly writings of the father of Jewish bibliography, Professor Moritz Steinschneider.

Dr. George Alexander Kohut was instrumental in arranging for the addition of part of the private collection of his father, Reverend Dr. Alexander Kohut, to the Emil Hirsch-Gerson Levi Library. He was also responsible for the transfer of many duplicates from the Yale University Library. This included a sizable collection of the works of Josephus in various translations and rare editions. Dr. Kohut's own collection of Hebrew manuscripts ranging from the 16th to the 19th centuries was also given to the library.

#### LIBRARIES OF CONSERVATIVE JUDAISM

Conservative Judaism opened its rabbinic seminary in New York City in the year 1886 under the auspices of the Jewish Theological Seminary Associates. Dr. Sabato Morais of Philadelphia was the prime mover and the first president, an office he held until his death. Rabbi Morais "sought to establish a school to train rabbis and teachers who would preserve traditional Jewish values and practice against the onslaught of 'radical reformers such as the Reformed promulgators of the Pittsburgh Platform'" (37).

In 1902, having gone through a precarious financial situation, the institution was reorganized under the present name of the Jewish Theological Seminary of America. Solomon Schechter was its first president. On its faculty were scholars such as the talmudist Louis Ginzberg, the Semitist and biblical scholar Israel Friedman, and Mordecai Kaplan as principal and dean of the Teachers' Institute which Solomon Schechter founded. The library was greatly expanded during his term of office, when Alexander Marx, historian, served as librarian. Solomon Schechter was



succeeded by Cyrus Adler, whose term of office lasted from 1915 until his death in 1940.

It was . . . during this period that the library acquired its status as the largest Jewish library in the world. It was chartered as a separate corporation (1924). Notwithstanding the disastrous fire of 1966 which resulted in the loss of 70,000 books, the seminary library ranks as the greatest collection of Jewish books ever brought together in one place (37).

Once more we see the sphere of influence of an institution expanding beyond New York City, during Louis Finkelstein's administration. The first branch was opened in California in 1946 and was called the University of Judaism. In Jerusalem, the Israel Schocken Institute for Jewish Research and the American Student Center were established.

#### ST. MARY OF THE LAKE SEMINARY

Bishop Quarter, the first bishop of Chicago, founded St. Mary of the Lake Seminary in 1844, and its library was established in 1846 as the library of the University of St. Mary of the Lake. In 1921 the university was established as a seminary and was relocated to Mundelein, Illinois. Its collection of 125,000 volumes (1975) is augmented by special collections of manuscripts, incunabula, and rare books.

#### PACIFIC SCHOOL OF RELIGION

The Pacific Theological Seminary (now known as the Pacific School of Religion) was founded in 1866. It was the first theological school west of the Mississippi and began with eleven men, six of them Congregational ministers and five Congregational laymen. Instruction began on August 19, 1869, with no faculty and a "small group of books." "When the time came for the School to move from San Francisco to Oakland in 1871 there was little else to bring but the 150 volumes in the library" (38). In 1882 the library of Enoch Pond, president emeritus of Bangor Seminary in Maine, was acquired, thus doubling the number of volumes in the library. The collection grew primarily by gifts—this meant haphazardly and slowly. By 1941 the collection included over 25,000 volumes. The first full-time librarian of Charles Holbrook Library (named after a benefactor, Charles Holbrook, a Sacramento businessman) was J. Stillson Judah. During his administration some notable collections were added to the library. The Howell Bible Collection was acquired in 1956. Among the rare Bibles were found a 13th-century manuscript Bible; a Zwingli Bible of 1531 (often called the second "Protestant Bible"); the Tyndale New Testament (1536); a copy of the first Great Bible (1568); the first and second editions of the King James Bible (known as "He" and "She" Bibles because of the verse in Ruth where in the first edition the latter is referred to as "He," which in the second edition was corrected to "She"); and finally, the Wycliff New Testament of 1731. Another notable addition was the Woodrow Wilson Col-

lection—books by and about Wilson given to the school by Mr. Ford Samuel, postmaster of Alameda, California. In 1963 the Evans American Library (microcard copies of American books printed from 1639 through 1800) was presented to the library by Mr. Milo Rowell, a trustee. Holbook Library specializes in Western American church history. In 1975 the collection had 102,000 volumes.

### **Seminary Libraries in the 20th Century and the Founding of the American Theological Library Association**

#### **AMERICAN ORTHODOXY: ST. VLADIMIR SEMINARY**

American Orthodoxy was first served by eight Russian monks who arrived in Alaska in the year 1794. It was in 1905 that Archbishop Tikhon (who later became patriarch of Moscow) opened a seminary in Minneapolis, Minnesota, which was transferred to Tenafly, New Jersey, in 1913. Due to the Russian Revolution of 1917, support to the seminary was cut off and it was closed in 1923. Fifteen years later (1938) the seminary was reopened under the name of St. Vladimir. The ensuing years, until 1948, were difficult years financially. The post-World War II years brought to America outstanding Orthodox theologians: George P. Fedotov of Paris, Nicholas Arseniev of Warsaw, and others. With the arrival of the Right Reverend Dr. Georges Florovsky from Paris, who was appointed dean (1949–1955), the seminary entered a new era. The seminary is fully accredited by the American Theological Society. Its library, though not very large in numbers (35,000 volumes), has brought together a strong collection in the areas of Orthodox history, theology, and culture. With the purchase of two private libraries—that of Archimandrite Anthony Repella in 1956 and that of Metropolitan Makary in 1957—Russian theological literature is uniquely represented in this library, and hence in America.

#### **DROPSIE UNIVERSITY**

One of the products of the 20th century which has indirectly supported Hebrew, biblical, and Middle Eastern studies, without being sectarian and theological, is the institution known as Dropsie University, a graduate institution which was formerly known as Dropsie College for Hebrew and Cognate Learning. The institution was granted a charter on June 6, 1907, by the Commonwealth of Pennsylvania, which stipulated that its location was to be Philadelphia. The status change from college to university occurred on September 1, 1969.

The Dropsie University Library contains over 100,000 volumes of books and periodicals. It includes special collections bequeathed to the university or permanently deposited by scholars and friends; for example: Dr. Eduard Glaser, the well-known Arabic traveler; Judge Mayer Sulzberger; Professor Max L. Margolis; and Professor Solomon J. Koss.

The library houses 450 fragments from the Cairo Genizah, 32 incunabula, ori-

ental manuscripts, and 16th-century imprints. The Abraham I. Katsh microfilm collection of rare Hebraica manuscripts and documents from the U.S.S.R., Poland, and Hungary makes this material available to scholars in the West for the first time.

#### PERKINS SCHOOL OF THEOLOGY

“With the opening of the [Southern Methodist] University in 1915, the School of Theology began its work as an integral part of the institution and was designated by the Methodist Episcopal Church, South, as its official seminary in the jurisdiction” (39). A large gift from Mr. and Mrs. J. J. Perkins of Wichita Falls, Texas, led the trustees to name the school as the Perkins School of Theology. Mr. J. S. Bridwell and his daughter Margaret, of Wichita Falls, Texas, made it possible for Perkins to erect the Bridwell Library, which opened its doors on December 18, 1950. After a decade of purchases in current theological and philosophical publications, in 1962 Bridwell Library received the Bridwell-DeBellis Collection of Fifteenth Century Printing, consisting of 206 incunabula. With the support of the Bridwell Foundation and Mrs. Margaret Bridwell Bowdle, this collection has grown to 600 titles. The Bible, the works of St. Augustine, and the sermons of Savonarola account for a major portion of Bridwell Library's early printed collection. Another area of emphasis in Bridwell Library is the collection of modern printing (Kelmescott Press and after), namely, 20th-century printings. Finally, due to its Methodist heritage, the polygraphic interest in John Wesley is kept alive. The Short Title Catalogue (1475-1640) and Wing (1641-1700) Collections represent about 3,000 volumes. Under its present librarian, Decherd H. Turner, Jr., the library has developed a rare book collection unique among seminary libraries.

#### THE AMERICAN THEOLOGICAL LIBRARY ASSOCIATION

The second half of the 20th century brought two developments: the founding of the American Theological Library Association (ATLA) and the establishment of consortia of theological seminaries.

The convening committee for ATLA had the following members: Dean E. B. Hawk, Perkins School of Theology; A. F. Kuhlman, director, Joint University Libraries, Nashville, Tennessee; and L. R. Elliott, librarian, Southwestern Baptist Theological Seminary.

The following joined at the request of the convening committee: Robert S. Beach, librarian, Garrett Biblical Institute; Sanford Fleming, president, Berkeley Baptist Divinity School; K. S. Gapp, librarian, Princeton Theological Seminary; and Lucy W. Markley, librarian, Union Theological Seminary, New York. The American Association of Theological Schools on June 12, 1946, voted a resolution in these words:

Whereas, there is a growing recognition among colleges and universities of the value of a closer integration of the library and the educational program of the institution, and

Whereas, some of the presidents, deans, and librarians of the schools of this Association believe this library development has equal significance for theological education, and

Whereas, the Association has voted to study library work during the biennium, 1948-50 and

Whereas, a conference on theological library work seems to be desirable,

Therefore Be It Resolved that the Executive Committee be requested to consider the matter of calling a conference of theological librarians and others interested, and to arrange for such a conference, if in their judgment this seems wise (40).

The first conference met at Louisville Presbyterian Seminary in Louisville, Kentucky, on June 23 and 24, 1947. What led to this first conference? The first factor is believed to have been the Religious Books Round Table (RBRT) of the American Library Association, as stated by Dr. L. R. Elliott:

At the ALA . . . 1916 there was established a Round Table of Theological Librarians. This name was enlarged the next year to read "Round Table of Libraries of Religion and Theology." By 1920 public libraries were included. . . . In the years following, the emphasis of the RBRT shifted to the needs of the religious sections of public libraries, with major attention to seminary libraries diminishing. However, some of the seminary librarians remembered the earlier character of the RBRT and hoped for something that would better serve their particular needs (41).

Another influence, again stated in the words of Dr. Elliott and quoted by Robert F. Beach, was that:

under the impetus of this literature (e.g. Branscomb. *Teaching with Books*) a southern seminary librarian (i.e. L. R. Elliott) discussed [the matter] with two southern seminary deans, who were members of the Executive Committee. From these conversations which occurred during the latter part of 1945 and the early part of 1946, came the resolution voted by AATS at McCormick Presbyterian Seminary in June, 1946, encouraging the Executive Committee to authorize the first national conference of theological librarians (41).

It is obvious that the role played by Dr. L. R. Elliott "in getting things under way" was considerable, thus making him the logical choice as the first president of ATLA.

ATLA has a close association with the American Association of Theological Schools (AATS), now known as the Association of Theological Schools (ATS). ATS has been very supportive of ATLA. Active affiliations are maintained with the American Library Association, the International Association of Theological Libraries, and the National Book Exchange. A representative of the Library of Congress has always been present at the annual conferences.

ATLA has served ATS by advising on standards for libraries in its accreditation policies. Publication of *Aids to a Theological School Library* has served this purpose. Several projects undertaken by ATLA since its founding have already made the association very effective in improving and strengthening library services in theological seminaries. *The Index to Religious Periodical Literature* first appeared in 1953; it covered the years 1949-1952 and was prepared under the editorship

of J. S. Judah. Thirty-one journals were indexed by 20 volunteer librarians! (It must be noted that in 1907, under the editorship of Ernest Cushing Richardson, a massive work had appeared: *Periodical Articles on Religion, 1890-1899*, in two volumes.) Volume 11 (1973/74) of the *Index* covers 198 journals.

The association has a duplication service:

The ATLA Board of Microtext operates as a non-profit education program to produce microfilm and Xerox copy for the benefit of the Association and others. Its efforts are directed to the filming of materials required by the Association and for research in theology, especially that material which is not commercially feasible to film, or otherwise would not be filmed (42).

The ATLA Board of Microtext project started in 1957 under the leadership and chairmanship of Dr. Raymond P. Morris of the Yale University Divinity School Library. The Sealantic Foundation grant of \$80,000 made it possible for this project to be established.

One of the significant projects of ATLA has been the Library Development Program, under the chairmanship of Dr. Raymond P. Morris. With two separate grants from the Sealantic Fund, \$875,000 in 1961 and \$436,750 in 1964, two purposes were achieved:

First, through team visitation and counsel, to lift the standards of library performance; and second, through the principle of "matching funds" to stimulate individual seminaries to increase the level of their book and periodical acquisitions by a substantial margin (43).

The ongoing committees of ATLA in the year 1975 were those on Cataloging and Classification, Membership, Nominating, Periodical Exchange, Personnel Exchange, Publication, Reader Services, and Standards on Accreditation.

Representatives of ATLA are appointed to the AACR Revision Committee, to the Council on National Library Association, to the Council on the Study of Religion, and to the Universal Serials and Book Exchange.

The association prints and distributes the *Proceedings* of the annual conferences and the *Newsletter*, which is produced under the editorship of Donn Michael Ferris of Duke University Divinity School Library.

## CONSORTIA OF THEOLOGICAL SEMINARIES

The second development in the second half of the 20th century occurred in the 1950s and the 1960s, when clusters or consortia of theological seminaries mushroomed throughout the country and when the accent was on area theological library cooperation. The following are some of the major clusters:

### *Interdenominational Theological Center*

The Interdenominational Theological Center (ITC) in Atlanta, Georgia, was chartered in 1958 and began operation in 1959. Seven schools are joined in the

center: Gammon Theological Seminary (Methodist Episcopal Church), Morehouse School of Religion (American Baptist Home Mission Society), Phillips School of Theology (Christian Methodist Episcopal Church), Turner Theological Seminary (African Methodist Episcopal Church), Johnson C. Smith Theological Seminary (United Presbyterian Church), the Charles H. Mason Theological Seminary (Church of God in Christ), and Absolom Jones Theological Institute (Episcopal).

Ownership and management of the libraries rested in ITC. Library services are centralized, and are accountable to all the students of the six denominations. Constituent seminaries contribute their holdings to this library. The library is a participating member in the Atlanta University Center Library and in the Union Library Catalog which includes 28 institutions. A library exchange is carried on with Candler School of Theology at Emory University and Columbia Theological Seminary (44).

The ITC Library concentrates on acquiring material on the Black Church.

#### *Boston Theological Institute*

The Boston Theological Institute (BTI) was incorporated in 1969 with the following schools participating: Andover Newton School of Theology (Hills Library), Boston College (Bapst Library), Boston University School of Theology (Library), Episcopal Theological School (Library), Harvard Divinity School (Andover-Harvard Theological Library), St. John's Seminary (Library), Weston College (Library), the Gordon-Conwell Theological Seminary (Burton L. Goddard Library), and Holy Cross School of Theology (Library). The cooperation is evidenced in three areas: cooperative processing, collection-building policies, and readers' services.

#### *Chicago Area Theological Library Association*

The Chicago Area Theological Library Association (CATLA) includes 24 libraries of theological seminaries, universities, and colleges. CATLA is a voluntary association.

#### *Chicago Cluster of Theological Schools*

The Chicago Cluster of Theological Schools (CCTS) is formed by eight theological seminaries: Bellarmine School of Theology (Catholic, S.J.), Bethany Theological Seminary (Church of the Brethren), Chicago Theological Seminary (United Church of Christ), Catholic Theological Union (Franciscans, Passionists, Servites, and Society of Divine Word), De Andreis Seminary (Vincentians), the Lutheran School of Theology in Chicago, Meadville Theological School (Unitarian), and Northern Baptist Theological Seminary. The libraries are linked by teletype, and an on-line communication system has been established for interlibrary loans.

*Graduate Theological Union*

The Graduate Theological Union (GTU) was incorporated in 1962 by four Protestant seminaries: American Baptist Seminary of the West, Church Divinity School of the Pacific (Protestant Episcopal), Pacific Lutheran Theological Seminary, and San Francisco Theological Seminary (Presbyterian). It was formed to serve "as the common instrument for their doctoral programs. They were joined 2 years later as participating institutions by the interdenominational Pacific School of Religion and subsequently by Dominican (1964), Unitarian (1964), Jesuit (1966) and Franciscan (1968) faculties" (45). A common library serves students of GTU and all member schools. The collection numbers over 400,000 volumes. Through its microfilm program, several thousand reels have been acquired that provide the resources of European libraries. Cooperation among institutions has meant a considerable rise in the budget for books and periodicals by decreasing unnecessary duplication of books and serials. Furthermore, GTU is involved in a cooperative acquisitions program in relation to the University of California and Stanford University.

*Consortium of Minnesota Theological Faculties*

Luther Theological Seminary, Northwestern Lutheran Theological Seminary, Bethel Theological Seminary, St. John's University School of Divinity, the St. Paul Seminary, and the United Theological Seminary of the Twin Cities constitute the Consortium of Minnesota Theological Faculties. "Coordination and cooperation in book and periodical accessions as well as in book loaning privileges and Union Listing procedures are far advanced in the libraries of the Consortium" (46).

*Toronto School of Theology*

The Toronto School of Theology is the result of the pooling of resources on the part of several Canadian theological colleges and faculties. The following are the member institutions: Emmanuel College of Victoria University; the University of St. Michael's College; Knox College; St. Augustine's Seminary of Scarborough, Ontario; Trinity College; McMaster Divinity College at Hamilton, Ontario; Regis College; and Wycliffe College. Each institution has its own library. A library coordinator, who is also the librarian of Emmanuel College, is in charge of the cooperative system of acquisitions.

*Schools of Theology in Dubuque*

The Schools of Theology in Dubuque include three institutions and their libraries: the Wartburg Theological Seminary, Aquinas Institute of Theology, and the University of Dubuque Theological Seminary. The combined total of 193,000 volumes and cooperation in the areas of reference, circulation, and technical services have enabled the merged libraries to better serve the institutions represented. The

School of Religion of the University of Iowa joined this cluster to form the Association of Theological Faculties in Iowa.

*Rochester Center for Theological Studies*

Mention has been made of the Colgate–Rochester/Bexley Hall/Crozer merger. These are now part of the Rochester Center for Theological Studies, which also incorporates St. Bernard Seminary and the University of Rochester. The academic programs and the libraries of all the institutions are available to the students of the center.

*Other Cooperative Organizations*

To this list of clusters and consortia, one should add the following:

The Consortium for Higher Education Religion Studies, Inc. This has as its members the following institutions: Ashland Theological Seminary, Earlham School of Religion, Hamma School of Theology, Pontifical College Josephinum, Lutheran Theological Seminary, Methodist Theological Seminary, Mount St. Mary's Seminary, Wilmington College, Winebrenner Theological Seminary, United Theological Seminary, and University of Dayton—Department of Religion.

The Council of Southwest Theological Schools. The council represents the following institutions: Austin Presbyterian Theological Seminary, Baptist Missionary Association Theological Seminary, Brite Divinity School, Episcopal Theological Seminary of the Southwest, Institute of Religion of Oblate College of the Southwest, Perkins School of Theology, Phillips University Graduate Seminary, St. Thomas Seminary, Southwestern Baptist Theological Seminary, and University of Dallas.

Richmond Theological Center. This is formed by the following institutions: Presbyterian School of Christian Education, Virginia Union University School of Theology, and Union Theological Seminary Virginia.

Saint Louis Theological Consortium. This is constituted by the following institutions as members: Eden Theological Seminary, Saint Louis University School of Divinity, Concordia Seminary, Kenrick Seminary, and Covenant Theological Seminary.

The Theological Education Association of Mid-America. The association coordinates the programs of the following institutions: Asbury Theological Seminary, Lexington Theological Seminary, Louisville Presbyterian Theological Seminary, Southern Baptist Theological Seminary, and St. Meinrad School of Theology.

The Washington Theological Consortium. This organization has a wider base, which incorporates other clusters and independent institutions. They are as follows: the School of Religious Studies, the Catholic University of America; the Cluster of Independent Theological Schools (DeSales Hall School of Theology, Dominican House of Studies, and Oblate College); Howard University School of Religion; Lutheran Theological Seminary at Gettysburg; Episcopal Theological



Seminary in Virginia; Washington Theological Coalition; and Wesley Theological Seminary. St. Paul's College holds associate membership.

### Concluding Remarks

The U.S. Commissioner of Education's *Annual Report* for 1876 states that there were then 124 schools of theology and that the library collections totaled 644,176 volumes. Among special libraries, seminary libraries took first place, followed by libraries on the subject of agriculture. According to Haynes McMullen, the religious libraries comprised ". . . 6% of all the non-school libraries." His report continues:

The dominance of collections under the subject of religion continued until the beginning of the twentieth century; in 1900 they made up 5% . . . still leading all other special subject libraries in number. However, in 1923 and again in 1951, they comprised only 2% of the total. . . . In a ten state sample for 1974, religious libraries have risen from 2 to 5% since 1951; scientific and medical libraries are the only subject-specialized libraries which are more numerous in the 1974 directory (47).

Seminary libraries in 1975, according to the *ATLA Statistical Record*, had an aggregate collection of 15,600,000 volumes, representing 135 libraries. A century of growth has resulted in an increase of 15,000,000 volumes. The quality of the collections, the availability of library materials in microform, the bibliographic control and high standard of cataloging, and classification with the use of the OCLC's on-line union catalog have all contributed toward making seminary libraries academically sound and technically efficient. Theological research is no longer a "European adventure." American seminary libraries have succeeded in providing not only supportive assistance to theological education but also in offering researchers all the tools necessary for in-depth and in-breadth study (48).

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## SENIOR CITIZENS

### Introduction

Although the title of this article is "Senior Citizens," the term itself is not clear, and it is not always appreciated by the people to whom it refers. Such figures of speech as "senior citizen," "golden agers," and "elderly" are perceived by some older adults in a negative connotation. The indexes used in social research provide us with other terms. *ERIC* uses the term "older adults" as a synonym for senior citizens, the *Social Sciences Citation Index* uses "aging" and "aged" for descriptor terms, and the *Library of Congress Subject Headings* has chosen "aged" and "libraries and the aged" as their subject headings.

What is a "senior citizen"? A senior citizen, an older adult, is a social creation. In our American society a person over 60 years of age is considered to be an older adult. At the same time, many of the retirement associations have chosen the age of 55 as the age of earliest admission to membership. Therefore, it is difficult to answer the question What is an older adult?—because the terminus a quo is socially as well as legislatively determined. For example, one may retire and receive Social Security benefits at ages 62 or 65, or age 60 if a widow, but one may begin receiving dividends from a tax-sheltered annuity plan (for example, a Keogh pension plan for self-employed individuals, created by the federal government) at age 59½. The definition of old age is becoming increasingly variable as business and industry encourage early retirement through pension plans based on years of service, and as federal legislation has prohibited mandatory retirement before age 70 for most workers.

### Older Adults and the Population

In 1970 Americans over 65 comprised one-tenth of the population, or 20.1 million; in 1975 the total was 22.3 million, or 1 in 9. Demographic studies indicate that by 2000 the population over 65 will be 30.6 million, or 1 in 8. Of the total population, 1 of every 8 females is 65 or older, compared with 1 of every 11 males. At present there are 13.2 million women and 9.1 million men over age 65. By the end of the century there are expected to be 18.6 million older women, but only 12 million men. At present the average life expectancy of a white American female is 76.6 years, compared to 69.6 years for a white American male. For Black males and Black females the life expectancies are 64.6 and 71.6 years, respectively. Almost two-thirds of the older adults live in urban and suburban areas, the remainder live in small towns or rural areas. Geographically, the largest numbers of older adults live in the South, followed by the Midwest, Northeast, and West.

One of every six older adults is classified as poor. Almost 70% of the older poor people are women. Thirty-six per cent of old Black people are classified as poor, compared with 14% of older white people. It was Michael Harrington who first brought to national attention the plight of older adults in this nation, through the discussion on case and insular poverty in America in his book *The Other America*.

### Older Adults and Human Need

The present problems faced by older adults have come about for a number of reasons. In a traditional society the family cared for both its younger and older members; however, as traditions give way and the family becomes more mobile, the family is not able (nor is it required, or even willing) to meet the needs of its older family members. In her book *The Coming of Age*, Simone de Beauvoir points out that throughout history, societies that were nomadic or mobile perceived older adults as a burden and that in certain cultures euthanasia was practiced. When people were no longer of utilitarian value to that society they were either abandoned or put to death. In contrast, nonnomadic or agrarian societies have been more protective of older adult family members, partly because the older members have value in agrarian economies.

The sense of uselessness is just one of the feelings that many older adults share in a highly mobile society. To people brought up on a work ethic, retirement can be a period of great frustration. This sense of frustration is coupled with poverty, isolation, loneliness, separation from families, declining physical and mental health, and the general impression of not being wanted by the society-at-large; and these factors combine to create a social problem that studies show will not dissipate in time, but will continue. One symptom of the situation is the number of older adults now living in nursing homes or boarding homes, estimated at 5% of those over 65. The waiting lists for admission to these homes are long, the cost for many is prohibitive (unless the home is run by a governmental agency), the care provided is not always up to standard, and the older adults who are there have nothing

to look forward to as they contemplate the last years of their lives. Attempts are being made to upgrade the care of older adults in nursing homes. This involves a number of improvements: the development and use of standards for professional care in nursing homes and boarding homes, the physical safety of the homes themselves, regulation of prescription drugs administered, and the licensing and inspection of the homes on a periodic basis.

### **The White House Conferences on Aging and Federal Programs for Older Adults**

The first national conference dealing with older adults dates back to the Truman administration. A second conference, of more significance, was held during the Kennedy administration. In 1965 an Older Americans Act was passed by Congress and provisions were made for each state to develop a statewide plan for older adults. The Retired Senior Volunteer Program (RSVP) owes its existence to the 1965 act, and it has provided older adults with a structure and an opportunity to use their time and talents in community activities.

During the course of the 1971 White House Conference on Aging, important needs were recognized that directly concern older adults: income, medical care, housing, and transportation. Through a revised Older Americans Act passed in 1973 and with the creation of Supplementary Social Security Income (SSI), steps have been taken to meet these needs. SSI is handled through the Social Security Administration (which makes income determination), but caseworkers in county offices of public assistance also monitor the funds. The intent here is not to suggest that SSI is "welfare" but that it is a "supplement to Social Security"; and therefore the older adult's pride is not to be affected. Also, some states, such as Pennsylvania, provide free local public transportation and rebates for property taxes from funds collected in state lotteries.

The 1973 revised Older Americans Act carries a revised Title VII program which provides funds for nutrition, whether through congregate feeding programs or by meals-on-wheels, a program that supplies hot meals to older adults who are confined to their homes. At the same time, the submission of a state master plan on aging is required to receive federal funds. This goes beyond the scope of previous legislation because it requires territories or regions within the state to have individual plans. At present the Federal Administration on Aging is part of the Department of Health, Education, and Welfare. Funds come through the Older Americans Act itself and also through Title XX of the Social Security Act, with funds matched and/or supplemented by state, county, and municipal governments. Where communities decide they would like to plan and construct housing for older adults, funds are made available through the Department of Housing and Urban Development (HUD).

In 1973 Congress also passed the Comprehensive Labor and Training Act (CETA), known previously as the Manpower Programs of the Office of Economic Opportunity (OEO). This legislation provided for public employment but placed

its administration outside of OEO. Many older adults are given part-time employment under this legislation. In addition, the Small Business Administration has hired retired business people to assist and advise people engaged in small enterprises. This group is known as SCORE, the Service Corps of Retired Executives. Older adults are also eligible to participate in the Peace Corps for volunteer overseas service and in VISTA (Volunteers in Service to America) for volunteer service in community activities in the United States. RSVP, SCORE, VISTA, and the Peace Corps are all handled through ACTION, a coordinating agency of the federal government (806 Connecticut Avenue, N.W., Washington, D.C. 20525). Other government-sponsored work programs for older adults include Foster Grandparents, which involves older adults in the care of children, and the Green Thumb Program, which involves older male adults in outdoor projects in rural areas.

Medical care for adults is administered through the Social Security Administration. The program, known as Medicare, is financed in part through monthly payments deducted from the individual's Social Security payment, while the remainder is supplied through provisions of the Social Security Act. If an older adult needs hospitalization, he must pay an initial amount of money which is then added to the amount paid by the Medicare program for the person's hospital care. The amount of a person's individual monthly payment and payments for hospitalization are determined through local Social Security Administration offices.

#### **State and Regional Services to Older Adults**

Direct contact with older adults is maintained through the operation of the regional or area agencies on aging, which attempt to fulfill the goals of each state master plan on aging. This responsibility may be carried out directly by each area agency on aging or the area agency may "contract" part of its responsibility to another agency within that region, one that is more adequately equipped to perform that social service. These activities include: planning and coordination of activities; information and referral; transportation; employment and volunteer programs such as RSVP; nutrition programs; advocacy and community organization; and protective services, which include casework counseling, home health care or "chore" services, nursing consultation, placement in a variety of foster or institutional settings, continued education, and legal and fiduciary control care.

#### **Research and Education in Gerontology**

Significant research in gerontology has markedly increased since the 1971 White House Conference on Aging. However, this research has not been free of inherent bias, the reason being that original research in gerontology has tended to deny positive value to aging itself. For example, one important study on aging was entitled "Growing Old, the Process of Disengagement." Disengagement implies not growth but withdrawal. Robert Kastenbaum, writing in 1965, has explained the inherent problem in any study on the process of aging:

On what basis can one advance a notion of aging as a normal and valuable process within the psychosocial realm when the biological view is so prevailingly negative?  
(from "Theories of Human Aging," *J. Social Issues*, Vol. 21, October 1965)

The level of mental health care of the older adult illustrates the bind just noted. Mental health care for the older adult has been slow to develop, for two reasons: either the etiology is considered more organic than functional, or the patients are not considered prime candidates for cure because of their age. However, the American Psychiatric Association has published its own study of aging and mental health and has come to more positive conclusions about mental health care for older adults. At the same time, many universities across the nation have special departments or centers engaged in research in gerontology and geriatric medicine. Their effect on social policy concerning older adults is in an evolutionary stage.

### **Continuing Education for Older Adults**

Accompanying the growth in the study of gerontology have come trends in education more favorable to participation by older adults. For many years the Institute of Lifetime Learning, an agency of the American Association of Retired Persons and the National Retired Teachers Association, has stressed the value of continuing education for older adults. Now many colleges and universities offer courses which older adults may take free or for a reduced tuition fee.

At the same time the early educational research of Thorndike has been criticized and discredited insofar as that theory applies to older adults. Thorndike concluded in his *Adult Learning* (1928) that beyond a certain age there was no value for further education and that the ability to learn and retain knowledge was hampered after a certain age. Many area agencies on aging have now set up "Late Start" programs in their county community colleges. These programs seek to involve older adults in various types of continuing education.

Preretirement education workshops and seminars are being held by businesses, institutions, libraries, and insurance companies, to prepare people in their middle 50s for the emotional, financial, and intellectual challenges of retirement. One such preretirement seminar is called SMART, which is conducted by the Aid Association for Lutherans, a fraternal life insurance company in Appleton, Wisconsin.

### **Associations for Older Adults**

Space does not permit a listing of the many associations involved with older adults. Three recent publications attempt to provide information on numerous national and local organizations that are active in the area of older adults. The National Council on the Aging (1828 L Street, N.W., Suite 504, Washington, D.C. 20036) publishes its own directory of national organizations with major respon-

sibility for older adults. The *Encyclopedia of Associations* also lists associations involved directly and indirectly with older adults. Finally, Robert Butler's study *Why Survive? Being Old in America*, a Pulitzer Prize-winning survey of older adults in America, contains two listings of associations for older adults as well as a critique of the major associations.

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## SERIAL SET

At over 14,000 volumes, and growing, the *U.S. Serial Set* contains a vast body of information emanating from both houses of Congress, the executive agencies, the president, and a variety of nongovernmental organizations. Through its history (which in effect dates back to 1789) it has been variously referred to as the *Congressional Series*, *Congressional Set*, *Serial Number Set*, *Sheep Set*, and *Sheep Bound Reserve*, the latter two designations derived from the material used in binding the early volumes.

In the early days of congressional history, there was little consistency in the printing and distribution of documents issued by the legislative bodies. In the absence of a government printing office, private printers were engaged on contract,

and there were no specifications regarding the size or appearance of volumes. In a resolution passed in December 1813, the House of Representatives sought to bring order out of chaos by authorizing the uniform printing of "all messages and communications of the President of the United States, all letters from the several departments of the government, all motions and resolutions offered for the consideration of the House, and all other papers which are produced in the usual course of proceeding or by special order of the House." Congress having provided for a more orderly issuance of information, it remained for John G. Ames, head of the Document Division of the Department of the Interior and later superintendent of documents, to encompass the entire body of material in a single sequential numbering system. That system is still in use today and it is the basis of the common designation for the massive collection of volumes, the *Serial Set*. The scheme devised by Dr. Ames numbered the volumes beginning with the volume of the *Senate Journal* of the 15th Congress, 1st Session (1817) and proceeded through the entire set without further reference to individual document or volume numbers, congress or session designations, or dates. These serial numbers appeared for the first time in the second edition of his *Checklist of Public Documents Containing Debates and Proceedings of the 1st to the 53rd Congress Together with Miscellaneous Lists of Documents and Historical and Bibliographical Notes*. (Although the documents from the first 14 Congresses were not originally issued in any uniform manner or collected into volumes, the publications issued over this period [1789–1816] were gathered together by Gales and Seton, reprinted as the *American State Papers*, and arbitrarily assigned numbers 01–038 to be placed at the head of the set numbered by Ames.)

*Reports* and *Documents* issued by both houses of Congress comprise the backbone of the *Serial Set*. *Reports* are accounts by congressional committees of their actions on public and private bills and indicate their interpretation of the legislative measures under consideration. Also included as *Reports* are those committee investigations of particular subjects or situations of public concern. These are commonly referred to as special reports and are not necessarily linked to any particular piece of legislation. *Documents* include a far greater variety of materials. Included here are presidential messages; administrative reports of the executive agencies; special congressional publications such as directories, manuals, and rules of procedure; and reports of nongovernmental organizations required by law to report to the Congress, such as the Boy Scouts of America and the Daughters of the American Revolution.

Current definitions of House and Senate *Reports* and *Documents* cannot be applied when viewing the *Serial Set* historically. From 1817 to 1819 all publications were given the designation *Documents*. The House separated its *Reports* and *Documents* series in 1819, but the Senate continued with the single designation for a number of years. As a result of a joint resolution of August 3, 1846, both houses of Congress agreed to define their publications in a uniform manner. From the 30th to the 53rd Congress those definitions prevailed, and the user of the *Serial Set* can, for that period, expect to find reports of committees on public and private bills cited as *Reports*; reports to Congress by the executive agencies, as *Executive Docu-*

ments; and all other publications, as *Miscellaneous Documents*. From the 54th Congress to the present, as a result of legislation passed in January 1895, the current definitions have prevailed. The elimination of the descriptors "miscellaneous" and "executive" has simplified matters considerably and has eliminated confusion between the reports of executive agencies and materials issued from secret sessions of the Senate (also traditionally referred to as Executive Reports and Executive Documents).

As the content of the *Serial Set* has varied over the years at the direction of the Congress, materials other than *Reports* and *Documents* are found there. The *Journals* of both the House and Senate were regularly included from the 15th to the 83rd Congress (1817–1952). Although hearings and committee prints have not been issued regularly with *Serial Set* numbering, some hearings of particular note have been included as part of a report or by special order. Likewise, the executive publications issued from secret sessions of the Senate have been included only by special direction. The *Congressional Record* and its predecessors and the actual texts of bills and resolutions have never been issued as part of the *Serial Set*.

Guides for the user of the materials in the *Serial Set* range from Benjamin Perley Poore's *Descriptive Catalogue of the Government Publications of the United States, September 5, 1774–March 4, 1881*, to the recently conceived *CIS U.S. Serial Set Index* being issued in segments by the Congressional Information Service in Washington, D.C. Researchers will become familiar with the whole range of guides including John Ames's *Checklist*; his *Comprehensive Index to the Publications of the United States Government 1881–1893* and its successor, the biennial *Document Catalog*; the *Document Index*; and the *Numerical Lists and Schedule of Volumes*. Schmeckebier and Eastin, in their comprehensive work on government publications, provide detailed analyses of the guides to congressional materials and give the researcher guidelines on the appropriate uses and usefulness of each. The *CIS Index* is not covered by Schmeckebier and Eastin since its first volumes appeared in 1975, but it is projected to be a comprehensive index by subject, key word, and names, accompanied by numerical lists of reports and documents and a schedule of serial volumes. Projected to be published in 12 parts, it will cover the period 1789–1969.

In spite of liberal distribution policies on the part of the Congress, the complete *Serial Set* is not widely available as an entity. Because the serial numbering system was devised by Ames long after the binding of the set itself had become a reality, the early volumes do not bear serial numbers, and they have been added to collections in individual libraries at their own discretion. Depository libraries have always received volumes of the *Serial Set*, but many on a selective basis only. In addition, the policy of issuing the reports of executive agencies in departmental editions as well as congressional editions (as *Documents* in the *Serial Set*) has provided many libraries with only the separate departmental editions, which they may or may not have numbered themselves and shelved with their *Serial Set* collections. As a result, the only truly complete sets are now held by the Library of Congress, the libraries of the House and Senate, the Public Documents Library (formerly of the Office of the Superintendent of Documents and now housed in the National

Archives), and the National Archives Library. As an adjunct to its *Index*, the Congressional Information Service is compiling a complete *Serial Set* on microfiche, which may change the state of availability of the collection.

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## SERIES

### Characteristics of Series

The word “series” is given three definitions in the glossary of the *Anglo-American Cataloging Rules*:

1. A number of separate works issued in succession and related to one another by the fact that each bears a collective title generally appearing at the head of the title page, on the half title, or on the cover; normally issued by the same publisher

in a uniform style, frequently in a numerical sequence. Often termed "monographic series," "monograph series." 2. Each of two or more volumes of essays, lectures, articles, or other writings, similar in character and issued in sequence, e.g., Lowell's *Among my books*, second series. 3. A separately numbered sequence of volumes within a series or serial, e.g., *Notes and queries*, 1st series, 2d series, etc. (1).

Series as commonly understood by librarians are described by the first definition, and in that sense they are the subject of this article.

The first task in discussing any concept with which one may be less than familiar is to define it. The definition quoted here represents a single view, though an authoritative one. In the course of research, 10 sources were checked for definitions of series (2). Two of the sources, the British and North American editions of the *Anglo-American Cataloging Rules*, presented identical definitions. The remaining eight presented definitions that varied to a greater or lesser degree. There was, however, an identifiable core of agreement about the characteristics of a typical series. There are seven common points:

1. Typically, a collective title is present on all or most series members.
2. Members of the series are usually issued separately.
3. Members of the series are usually issued successively.
4. Generally, members of the series conform to a uniform physical style.
5. Often, the members of a series bear a more or less close relationship in terms of the subjects they explore.
6. Usually the members of a series are published or issued by the same company or corporate body.
7. Many series have an assigned order, usually indicated by numbering individual members.

Additionally, most of the glossaries consulted expanded on point one, indicating the title page, the half-title page, and the cover as the three most likely locations for the collective title.

None of the definitions discussed series in relation to other than printed materials. An examination of the seven points listed here indicates that they are as applicable to nonprint materials as they are to printed ones. The only point needing modification would be the locations of the series title; such candidates as instructor's manuals and title frames would need to be added to the list. In fact, series do occur in a wide variety of nonprint materials; based on past history, this incidence is bound to increase. Nevertheless, since series of printed materials tend to engage the attention of libraries to a much greater extent than series in other media, this article is confined to printed series.

What sets a series member apart from an ordinary book? First, it must be noted that no one of the seven characteristics listed here sets the series member apart from the nonseries member. Usually it takes a combination of characteristics to accomplish that. Conversely, no single characteristic is essential; any member of any given series may lack one or more of the seven, even the collective title. This seems to make series recognition a chancy business; in at least some cases it is just that. Most of the time, however, ample evidence is at hand. Nevertheless, many librar-

ians have encountered that cryptic phrase, "one of a series"—testimony to the fact that there are no smooth roads to bibliographic control.

The hallmark of a series is the collective title found on each member that is issued. The amount of information presented with the title varies from series to series. Often a full statement is provided, making quite plain the fact of the series: "Being Number 4 of the Model Maker Series of Practical Handbooks Covering Every Phase of Model Work" (3). Equally satisfactory, though not so explicit, is this statement: "Books in Library and Information Science—A Series of Monographs and Textbooks" (4). Most commonly, the series title is given separately, sometimes accompanied by the names of series editors or by lists of other works in the series. Usually the typography and arrangement used is enough to enable a trained cataloger to recognize a series when the title alone is supplied. Below this level of information, recognition becomes difficult. For example, the title page of one book states, "Mayflower—Classic Ships No. 2—Their History and How to Model Them" (5). On the verso of the title page there is this: "Also in the same series—No. 1: HMS Victory—by Noel C. L. Hackney" (6). The inference of a series remains clear, but the details are becoming mixed. The series title is located as if it were a subtitle, and a layman might well mistake it for one. On the cover of another work, only the phrase "Library of the 20th Century" appears (7). The cataloger must infer from the wording and location that the phrase is a series title. In another case, on the inside of the paper cover of a book, the phrase "Dover Books on Folk Art and Crafts" is followed by a list of titles and particulars (8). It is difficult to decide whether this is a series title or the heading for an advertisement section describing other books for sale by the same publisher. Finally, one may encounter very general characterizations to which it is difficult to assign any particular significance. For example, at the bottom of the title page of *The Studio Handbook of Minerals* is the phrase "A Studio Book" (9). This phrase may or may not be part of the imprint; the publisher's name and location are supplied on the next line. Probably the phrase identifies a "publisher's series," but one cannot be sure.

In all the cases described here, some more or less specifically worded collective title appears in one of the locations indicated by the glossaries as being common for series titles. The only exception is possibly due to paperback binding. There are probably a certain number of publications in series that lack series titles. Most likely these represent design errors on the part of their publishers or result from some sort of ex post facto decision based on an assessment of the market possibilities for a series that has emerged from some more modest venture. The identification of earlier, unlabeled members of such a series would be impossible without evidence from the publisher, perhaps the inclusion of early series members in a list published in a later work. That untitled series members can occur is indicated by the existence of Rule 142.A.1 of the *Anglo-American Cataloging Rules*, which provides a technique for inserting a series title in the description of a work when that title comes from a source other than the work itself (10). Thus, even when absent the series title can serve as the chief indicator for a series.

Points two and three of the definition characteristics presented earlier state that, in general, series members are issued separately and successively. These are important characteristics, because they help to differentiate between series and sets. A

set, such as an encyclopedia, is usually issued together and simultaneously, even though it may contain many individually titled volumes and may have an overall title that resembles a series title. In spite of outward appearances, the encyclopedia would not normally be offered for sale as single volumes, to be sold on demand. Also, in most cases, an edition of an encyclopedia would appear complete at a particular point in time, rather than volume by volume over a period of years. Most series are sold member by member, free of any obligation to purchase the entire series. Of course, the publisher is delighted to sell the whole series on a standing order basis; that is the object of the exercise. Generally though, one may purchase hundreds of books and other materials, only to discover when cataloging them that many are members of unsuspected series. Series are usually contracted, written, and marketed member by member, rather than as sets. An exception to this characteristic may be the reprint publishing industry, where series may be published and marketed in groups designed for acquisition in a single purchase (11). This exception aside, separate and successive publication, in combination with other characteristics, serves quite well to delineate series from series-like publications.

Another important characteristic of the series is a uniform style applied to its members as physical objects. Many series have a common style of binding, cover design and color, page layout, and text format. Some series formats permit variation from member to member within a larger design framework. An example of this flexibility is the Marcel Dekker series, Books in Library and Information Science. The style of page design and typography varies to a small degree, and the covers appear in several different colors, with some variation in cover/title style (12). In other series, design control is much tighter. Books from the John Wiley and Sons Information Sciences Series are quite uniform in page layout and typography, and they are bound in a distinctive blue cloth that makes groups of them highly visible on the shelf. The imposition of a uniform style clearly sets the series book apart from the individual monograph. The individual monograph's design is unrestricted by membership in any sort of marketing package and thus may be altered as appropriate, subject to the demands of economy and the "house rules" (13).

A fifth important characteristic of most series is their relatively unified subject coverage. Most members of a given series tend to be about the same subject, or at least closely related subjects. Narrowness of subject matter covered probably varies on a range from popular nonfiction series through scholarly series in the humanities to the narrowly conceived series in the physical and life sciences. The perception of breadth will vary according to the training of the perceiver. To a layman, a series may seem quite narrow in subject coverage. To a research-trained expert the same series may be hopelessly general. Subject coverage, wide or narrow, is not the only unifying factor that may be present. Other factors—such as style or quality of presentation, care in editing, or degree of illustration—may be the central unifying themes of a series. Subject may not be involved at all. A series wholly without a unifying factor is difficult to imagine.

Most series tend to be published by the same firm throughout their lives. Proprietary rights and the dictates of good business virtually guarantee this characteristic. Nevertheless, the nature of the publishing industry means that there are

probably a few exceptions. The mergers and absorptions so characteristic of the publishing industry must have had their effect on series, such that ones of long duration may well have begun with one firm and ended with another.

The last common characteristic of series given by the glossaries is the use of assigned numbers to place members in order. Numbered series are far from universal, however. They loom larger than they really are because of the tendency to make added entries in library catalogs for the numbered series, while in many cases ignoring the unnumbered ones. Many series are not ordered in any way, while other, comparable series might bear very careful numbering. Thus, the absence of numbering should not be viewed as ruling out a useful series. Nevertheless, the use of a numbering scheme is an indicator of serious intent on the part of a publisher, and it should be taken into account when the library's reaction to the series is decided upon.

This section has attempted to outline some differences between series and non-series books. In terms of the actual content of books, there are, of course, no differences at all. Why the series device, then? Where did it come from, and why has it lasted so long? The next section attempts to get at the origin and continued survival of the series, and to find out why series have been such a successful marketing device.

### Historical Origins

Series appear to have their origin in a technique of play publication in late 17th-century England. Booksellers issued individual plays by particular playwrights in numbered pamphlets, priced to sell. These pamphlets were intended to be bought and saved for binding in a single volume, with a title page supplied by the bookseller (14). This mode of publishing became very popular in English cities and towns during the first three or four decades of the 18th century. Finally the inevitable happened; plays became a drug on the market and booksellers were saddled with bales of unsold stock (15). Nevertheless, the series concept—the sale of a progression of serially numbered, separately published pamphlets—was by 1750 firmly established in English bookselling circles as a profitable marketing method (16). During the same period, subjects other than plays became freight for the series vehicle. Chief among these appear to have been the lurid accounts of the crimes and executions of criminals, often compiled by prison chaplains who visited the condemned in their cells (17). This sort of popular writing went a long way toward making reading a general pastime, rather than one reserved for the rich. The ability to issue cheap reading matter was very significant in a period of generally high prices. An indication of the high costs of reading occurs in James M. Keech's article about Victorian "three-decker" novels. The cost of one of these three-volume novels was equivalent to about \$35 in present-day currency. The result of these prices was that many readers obtained the "three-deckers" through commercial lending libraries, rather than through outright purchase (18). The ability to issue series books at affordable prices kept the practice alive. It survived as a marketing device because it worked.



The trends in series publication established during the late 17th and early 18th centuries continued into the 19th century. The series book at that time was usually a reprint of a work whose copyright had expired (19). This condition did not last; beginning in the 1820s, societies and publishers began to issue series of original works priced cheaply enough to enable wide popular sale (20). By the middle of the 19th century, series were available in great profusion at very moderate prices:

By 1850 the new railway bookstalls were covered with the shilling volumes of the Railway Library, the Parlour Library, the Popular Library and the Shilling Series. At that time, indeed, the only chance of making cheap books pay was said to be to issue them in series form: to some extent they advertised one another, and the publisher profited from the purchaser's dislike of having an incomplete set of books (21).

Parallel trends were at work in the United States, where much the same restriction on sales of expensive books existed. Series grew in importance in the United States in parallel with the rise of learned societies and universities modeled on the German prototypes. By the early decades of the 20th century, William Warner Bishop, a leader of the library profession and an employee of the Library of Congress, wrote:

This is a day of publishers' series and sets. Moreover, books that of themselves would never find a publisher are brought out by various forms of cooperation. Institutions of all sorts, and innumerable societies issue series of monographs. Frequently the name of the collected group is better known than that of any of its members. Still more frequently books are cited by the number (or year), in the collected title, or even by some such loose description as "Renan's Hibbert Lectures" (22).

The situation lamented by Bishop in 1914 continued without pause. Today there are thousands of series being published, a very large percentage of which are of interest to libraries. The second edition of Eleanora A. Baer's *Titles in Series: A Handbook for Librarians and Students* lists "approximately 40,000 book titles published in America and foreign countries prior to January 1963" (23). This datum can give only the barest indication of the significance of series in present-day libraries. Even if series were perfectly executed, with none of the complications and errors that dog them in real life, the sheer volume and variety of their publication would nearly overwhelm most libraries. The contemporary series takes many forms, and it represents a significant fraction of the total output of the publishing industry. In the following section these forms are reviewed.

### Types of Series

An examination of individual works, publishers' catalogs, and catalogs of series—particularly those compiled by Eleanora A. Baer (23) and the Library of Congress (24)—indicates that there are eight more or less distinct kinds of series being pub-

lished today. These eight are distinguished largely by their content, publisher, origin, and intended audience. The eight types are:

1. Juvenile potboiler fiction series
2. Juvenile quality fiction series
3. Juvenile nonfiction series
4. Adult potboiler fiction series
5. Publisher's series, broad scope
6. Publisher's series, narrow scope
7. Scholarly or professional series
8. Scholarly/scholarship support reprint series

To these categories might be added a ninth, the government publication series. Government publication series seem to represent a complex numerical control system used by various bureaus and departments, rather than a marketing technique. As such, they are beyond the scope of this article, and they are best left to an examination of the bibliographic control of government documents in general. Several excellent reviews of government documents have discussed government publications series. Of these, perhaps one of the clearest discussions may be found in *Government Publications and Their Use*, by Laurence F. Schmeckebier and Roy B. Eastin (25).

The categories listed here are narrower than those usually encountered in the literature. It was felt that the usual categories were not sufficiently clear, or accurately drawn. An example would be the use of the term "scholarly reprint series." A cursory examination of the products of the publishers that serve academic and research libraries by reprinting unobtainable materials will quickly confirm that much output is not scholarly in any sense of the word; it consists rather of primary and secondary sources needed by libraries to support the research of their patrons. The words "scholarship support" may be a more accurate characterization of this type of series.

#### JUVENILE POTBOILER FICTION

The first type of series listed is the juvenile potboiler. "Juvenile" is meant to include children from reading age through young adulthood. Series in this category are intended for the mass market. They are sold either directly to their readers, or indirectly, through parents and relatives (26). The literature marketed through these series has several characteristics. First, all works in each series are represented as being written by the same author, whether or not this is true (27). Second, the chief characters in the series appear in every individual book, are roughly the same age as the reader, and do not grow older or develop (28). Finally, the overall quality—in terms of writing, illustration, and physical components—is low (28). In fairness, it should be said that the cost to the buyer is also low; two leading series sell for \$2.50 per volume in hard covers. These two series are archetypes of the contemporary juvenile potboiler. They are the Hardy Boys Series and the Nancy Drew Mystery Stories. A trip to the local bookstore disclosed that the latest Hardy Boys

stocked was *The Mysterious Caravan*, number 54 in the series (29), and the latest Nancy Drew was *The Sky Phantom*, number 53 in that series (30). Both books were written by authors who are credited with writing every book in their respective series. Both series have been represented on television, and this must have an effect on book sales. Both series are made up of books identical in binding and style, and very nearly the same in thickness. The physical quality of both series is low, with poor illustrations and printing, and a cheap hardcover binding. Both series were accompanied on the shelves by other publications and merchandise featuring the Hardy Boys and Nancy Drew, obviously intended for "tie-in" sales, in much the same manner as selling shirts with movie characters printed on them. The impression received from the visit was a very commercial one, with potentially great profits to be gleaned from each reader who gets caught up in the stories and acquires book after book in order to experience with the leading characters adventures never to be experienced in real life. The juvenile potboiler seems to be a kind of nonpictorial comic book—a step beyond the comic book in that literacy is required to make sense of the story, but not a very long step in terms of the themes dealt with or the depth of treatment.

School and public libraries have generally reacted to these series by not purchasing them:

It was generally agreed that the *Nancy Drew* books, the *Hardy Boys*, and the *Bobbsey Twins* do not belong in the library, even though children like and want to read these. Certain standards of quality should be maintained. No educational institution should provide the mediocre; no public funds should be spent for such material. These series are poorly written and have no literary standards. The characters are not memorable. The format is poor. The books are not well bound, and therefore do not last. Children may read the books anyway, but it is the job of the librarian and teacher to guide pupils in wise reading choices. For these reasons, the above series should also not be included in book fairs (31).

The view quoted here is typical of library opinion concerning juvenile potboilers in general as well as those it mentions by name. No contrary opinion has been discovered in the literature to date. The closest approach to a contrary view is the opinion that books should not be rejected simply because they belong to a series; they should be selected or rejected based on an individual evaluation:

So the word *series* tells very little about the nature of a group of books. About all it says is, "These books have uniform page size and price, are for a similar age span, and come from the same publisher."

We still have to evaluate each book, title by title, on its own merits. There are some poor books in series, but there are some poor books published separately, too. I am not sure that anyone has statistics to prove whether the proportion of poor books is higher in series or in singles (32).

This section has discussed series that contain largely bad material; that is why the category is separated from the next one, juvenile quality fiction series. Probably the remarks just quoted would apply to a situation in which the books in

quality series were generally selected by a library and those in potboiler series were largely rejected, after an individual evaluation. The press of work in school and public libraries probably militates against the potboiler series because it can be rejected as a series, with no attempt to assess individual titles. Justifications based on literary quality and the ideals of the library are easily at hand to support categorical rejection. Whether outright rejection of the juvenile potboiler series is appropriate in all cases is arguable. Literacy is such in some areas that getting children to read at all must be counted a triumph of sorts, and never mind what is read.

### JUVENILE QUALITY FICTION

The second category of series is the juvenile quality fiction series. This category is set off from the first because librarians have traditionally made the distinction between series of real literary quality and the juvenile potboilers. Obviously, the distinction is based on subjective judgments; what fall into the category are series whose members have been found by librarians to be of good quality, in their opinions.

One of the first characteristics that distinguishes the quality series from the potboiler is the number of series members. The potboiler series tends to be endless, written hastily, and in many cases written by more than one person, but represented on the members' title pages as the work of one writer (33). In contrast, the quality juvenile fiction series usually contains far fewer works, perhaps only two or three (34). The contrast in quantity is not surprising, given the difficulty of writing a really good book. A number of works have mentioned specific series that are considered to be of high quality. One work from 1966 cites the following series:

Examples of useful series cited include those by Laura Ingalls Wilder, Beverly Cleary, Eleanor Estes, Carolyn Haywood, Hugh Lofting, and Ludwig Bemelmans' picture books about Madeline. These series are not in the same class with the *Bobbsey Twins* and *Nancy Drew*; in fact, the Wilder series is particularly noteworthy (35).

Another work, from 1962, presents a list of high quality series, compiled in terms of the main characters involved in each. There is some overlapping between the two lists:

A few of the outstanding characters in good series books for young readers are Jo of *Little Women* and other books by Louisa May Alcott; Madeline in picture books by Ludwig Bemelmans; Henry Huggins in books by Beverly Cleary; Betsy, Eddie, and Penny in three series by Carolyn Haywood; Dr. Dolittle, created by Hugh Lofting; Mary Poppins, the English nurse, in books by Pamela Travers. Sometimes the main character is an animal, such as Freddy, the pig who is a detective in books by Walter Rollin Brooks; Angus, the lovable Scottie dog in Marjorie Flack's picture books; Curious George, the monkey created in words and pictures by Hans Augusto Rey; and Big Red, a dog in several books by James Arthur Kjelgaard. A few other writers of appealing books in series for the elementary grades are Elizabeth Enright, Eleanor Estes, Maud Hart Lovelace, Arthur

Ransome, Noel Streatfield . . . and Laura Ingalls Wilder, whose *Little House in the Big Woods* (Harper, 1953) and other books are a continuing delight (36).

It is impossible to provide a comprehensive and current list of high quality series for children and young adults. Any such lists, including the one quoted, will rapidly go out of date, at least as regards new additions. Many of the books on the lists given here have endured. The list of characters compiled by Azile Wofford is now more than 16 years old (36), yet the author's 5-year-old son was delighted with Curious George books, and insisted on having them read to him whenever possible.

Selection can be guided by the literature to a certain extent, but the literature cannot do the selecting. That must be done by librarians on a personal and continuing basis, and particularly with an eye to emerging classics as well as to established ones. Series of high quality are often rather short, the demands of quality being severe. As Wofford notes, the length of a list of titles in the same series can become a cause for suspicion: "When an author writes three books in a series, school librarians should become watchful lest he also run into the snares common in series writing" (36).

#### JUVENILE NONFICTION

The third type of series involves juvenile nonfiction. The literature displays comparatively little disquiet over the quality of works in this category. The main problem with juvenile nonfiction in series seems to be the very large number of series to choose from; they serve many different grade levels, often in competition, and they fairly invite wasteful duplication in the library's subject coverage (37). The juvenile nonfiction series maze can only be penetrated through constant study and experience; there is no ready-made guide available in the literature (38). The difficulty of mastering the maze is indicated in an editorial by C. B. Grannis in *Publishers Weekly*, in which he identified 153 juvenile nonfiction series for sale in the 1968 children's book number of that journal (39). His remarks on the potential of a successful juvenile nonfiction series explain why they have proliferated:

If a series is of consistently good quality—and, of course, for the publishers, that's the hard part—it is a staple that the children's, school and classroom libraries want and that some children will be eager to collect, and bookstores should therefore represent. The standard formats and basic sales expectations can contribute to attractive pricing. For the editor, the series provides a focus for developing an idea and for enlisting, in many cases, top-grade authors and illustrators, or specialists (39).

Obviously, the publisher who establishes a series that seems to promise consistently high quality has a potential gold mine on his hands.

The proliferation of the series format for juvenile nonfiction has continued unabated since 1968. An example may serve to illustrate this trend and the effect it has on the product of one large publisher. An examination of the relevant section of the current *Publishers' Trade List Annual* reveals that Franklin Watts, Incor-

porated, is a large and prolific publisher of books for children and young adults (40). In addition to books offered as single items, a total of 880 juvenile nonfiction titles are marketed through 50 series and 6 subseries. The range of subjects and points of view is immense. There are series for beginning readers; series for minority children; series about sports, careers, personal conduct, and grooming; and series on dozens of other subjects. The titles of these series are listed here, with the estimated number of books in each series, and they give a fair indication of the topics covered.

Series Title	Number of <b>Books</b>
American Government	3
Ant and Bee Books	10
Associated Press Books	3
Big Books	1
Franklin Watts Biographies	46
Blacks in America	6
Choosing Careers and Life-Styles	4
A Closer Look at ——	24
Colonial Americans	18
Color Craft Books	7
Concise Guides	42
Career Concise Guides	29
Cooking Plus	2
Easy-Read-Books	
Easy-Read Awareness Books	4
Easy-Read Fact Books	16
Easy-Read Wildlife Books	6
First Books	266
First Steps to Math	7
Focus Books	45
World Focus Books	27
Holiday Cookbooks	2
How Animals Survive in Their Environment	2
How to Draw	1
The Human Body	10
Ideas About/Learning About ——	5
Impact Books	6
Indians of North America	3
Industry at Work	2
Instant Reference Library	11
International Library	17
Issues	1
Keynote Books	4
Let's Find Out Books	43
Let's Find Out Books (revised, full-color editions)	12
Mainstreams of Music	4
The Military History of World War I	12
The Military History of World War II	19
Military Lives	11
Minorities in American History	6
Panda Paperbacks	8

Series Title	Number of Books
Picture Albums	17
Picture Life Books	10
Read About Books	3
Schools for Action	5
Science at Work	5
Science Experiences	11
Sports Action Books	12
Studies in Contemporary Politics	6
Target Books	8
Terrific Triple Titles	14
They Lived Like This Books	9
Things to Make and Do Books	4
Visual Biographies	11
Warwick Press Books	
First Look at Nature Books	4
Modern Knowledge Library	12
Visual World Books	4

The series listed range in size from 1 to 266 titles. The largest series is First Books, with a quite untypically large number of titles. Counting First Books, the average number of books per series is 16; omitting First Books lowers the average to 11 books per series. Many series contain only a single title, and many small series contain a number of announced titles as well as titles in print. From this, one may deduce a very rapid recent expansion in the number of series offered by Watts.

All Watts series for children and young adults have grade-range indicators appended to catalog listings for individual titles. These were collected from the series listed and were collated. There are 31 different grade-level indicators currently in use in Watts's juvenile nonfiction series. The seemingly large number arises from the possible combinations of ranges, low grades, and high grades. These grade-range indicators are listed below. Numbers equal grades from first to twelfth, and K stands for kindergarten:

All	3-5	5-7	7-9
	3-6	5-8	7 up
K-2	3-7	5-9	
K-3	3 up	5-10	8 up
K-6		5 up	
	4-6		9-12
1-3	4-7	6-8	9 up
	4-8	6-9	
2-4	4-10	6 up	10 up
2-6	4 up		
2 up			

Most Watts juvenile nonfiction series bear a single grade-range indicator. Five series have two grade-range levels among their members, six series have three, and two have four. The Concise Guides and First Books series are atypical in that the

former has eight different grade-range indicators and the latter has a total of nineteen among its 266 titles.

Reasoning from Watts as a typical large publisher, the picture of the juvenile nonfiction series that emerges is one of extreme complexity. There are numerous subjects covered, compounded by different approaches to the same subject. Materials are produced for a multiplicity of grade-ranges, both between and within series. Since juvenile nonfiction is an area of vital interest to public and school libraries, this complexity presents a serious challenge to those libraries, particularly in the areas of bibliographic control, selection, and technical processing.

#### ADULT POTBOILER FICTION

The fourth type of series is the adult potboiler. Adult potboiler series consist of books to be read for pure pleasure. They require only a relatively low level of education for appreciation of their contents. Series of adult potboilers usually involve a succession of titles that feature the same protagonists or the same themes. The individual titles in a series are very similar in style, approach, format, and plot. Most of the characteristics that apply to the juvenile potboiler series apply equally well to adult potboiler series.

Generally, adult potboiler series fall into several well-defined genre of fiction. In each genre may be found prominent current examples of the potboiler series. In science fiction, there are two competing series of books that present stories based on the television series "Star Trek." Alan Dean Foster "creates" the series published by Ballentine (41). Bantam Books publishes the second series, written by James Blish (42). In western novels, two currently popular series are the Vengeance Seeker, by Will C. Knott (43), and an informal series by Louis L'Amour built on the history of the fictional Sackett family (44). There are a number of well-established adventure series. One of the oldest is Tarzan, by Edgar Rice Burroughs. Number 24, *Tarzan and the Castaways*, is now available in paperback (45). The Doc Savage Series, by Kenneth Robeson, is into its 83rd title, *The Red Terrors* (46). The Executioner, by Don Pendleton, is a very successful adventure series launched a few years ago. It is into its 30th title, *Cleveland Pipeline* (47). In romance, a specialized genre where a kiss can be the high point of the plot, the champion series may be the Barbara Cartland Library. This series is up to Number 73, *The Naked Battle* (48). In addition to the genre listed here, series may be found in mystery and detective stories, gothic novels, fantasy fiction, and, of course, erotica—Maurice Girodias was able to publish such authors as Henry Miller and Jean Genet in his Traveller's Companion series (49).

Altogether, the series device pervades popular fiction, where its continuous delivery of similar plots or characters in a uniform format has proven most successful. The mass paperback format has reinforced this success by lowering prices and multiplying outlets. The modern paperback adult fiction series thus may represent the zenith of the series proposition: that the masses would purchase books if they were issued in series and at an attractive price.



## PUBLISHER'S SERIES AND SCHOLARLY AND PROFESSIONAL SERIES

The next three types of series to be examined are the publisher's broad-scope series, the publisher's narrow-scope series, and the scholarly or professional series. These three types should not be viewed as distinct but as three ranges on a scale of variation in breadth and depth of subject coverage. This scale would run from very wide and shallow at one end to very narrow and deep at the other. The shallow end terminates in series whose members have no subject affinity at all. The deep end terminates in series with such strong subject affinity that all members may fall into a single classification on the shelves of a research library.

The scale also arranges adult nonfiction series in the order of the interest libraries have in their series membership. Series information for works near the wide end of the scale is often ignored entirely. Series in the middle ranges have some impact on cataloging. As series approach the narrow end of the range, their impact on the library increases, until the fact of a series becomes the governing characteristic in treatment of series members.

Publisher's broad-scope series fall into the first third of the scale and range from no subject affinity at all to broad subject affinity. At the wide end of this third of the range, series exist that are unified only by the presence of a series statement or something like it. Many of these statements may be ". . . simply a publisher's characterization of some or all of his books (e.g. *A Borzoi Book*)" (50). Harper Colophon Books is an example of a series with almost no subject affinity. The Library of Congress subject headings assigned to 21 members of this series are the following:

1. Tramps—United States—Personal narratives; *Box-car Bertha*; Female offenders—United States.
2. Land subdivision—United States; Land tenure—United States; Farm corporations—United States.
3. Power resources; Power (Mechanics).
4. [Fiction; no subject headings assigned.]
5. [Fiction; no subject headings assigned.]
6. United States. Marine Corps Recruit Depot. Parris Island, S.C.—Pictorial works.
7. Automobiles—Maintenance and repair.
8. Ethics.
9. [Fiction; no subject headings assigned.]
10. Man—Addresses, essays, lectures; Reiff, Philip, 1922—; —Fellow teachers: Psychoanalysis—Addresses, essays, lectures; Civilization—Philosophy—Addresses, essays, lectures.
11. Dakota Indians; Crow Indians.
12. Psychotherapy; Consciousness; East and West; Schizophrenia.
13. Psychiatric social work—United States; Social work with youth—United States; Crisis intervention (Psychiatry).
14. Youth; Conflict of generations; Authority.
15. Gambling—Addresses, essays, lectures.
16. Pennsylvania—Description and travel—1951—; —Guide-books.
17. Gilman, Charlotte Perkins Stetson, 1860–1935—Biography.

18. Ethnology—Philippine Islands; Ethnopsychology; Negritos; Luzon—Social life and customs.
19. United States—Civilization—1970—; —Addresses, essays, lectures.
20. Myth; Rites and ceremonies; Symbolism.
21. Sex (51).

Assuming accurate subject analysis by the Library of Congress, the most that may be said about Harper Colophon Books is that a fair percentage of them seem to address questions of psychology and related subjects. Any attempt to label Harper Colophon Books as a series in psychology, however, is negated by the presence of books on power generation, automobiles, and even on travel in Pennsylvania during the bicentennial year. Calling Harper Colophon Books a broad-scope series nearly understates the case.

At the narrow end of the first third of the scale described here are those non-fiction series whose subject coverage, though quite broad, is nevertheless recognizable. Icon Editions, published by Harper and Row, is an example of such a broad subject series. Nine titles from this series are:

1. *Age of the Masters: A Personal View of Modern Architecture*
2. *The Bolshoi Ballet*
3. *Giotto and Florentine Painting, 1280–1375*
4. *The Invisible Present: African Art and Literature*
5. *Dictionary of Subjects and Symbols in Art*
6. *Modern Painting and the Northern Romantic Tradition: Friedrich to Rothko*
7. *Caravaggio and His Followers*
8. *Vermeer*
9. *Florentine Painting and Its Social Background: The Bourgeois Republic Before Cosimo de' Medici's Advent to Power, XIV and Early XV Centuries (52)*

These titles indicate clearly the general orientation of Icon Editions to works in the visual arts. Coverage of the subject is very broad, ranging from the early Renaissance to modern times and taking in visual experiences from architecture to the Bolshoi Ballet. With its clear though broad subject, Icon Editions makes a useful limiting marker for the publisher's broad-scope series.

The publisher's narrow-scope series occurs in the middle third of the range of subject width and depth discussed earlier. Narrow-scope series all cover distinct subjects, falling more and more toward the narrow end of the range as the subjects covered grow more specialized and the coverage more detailed. The two limits of the narrow third of the range occupied by publisher's narrow-scope series can be illustrated with two series, Holiday Magazine Travel Guides and History of the American Colonies. Holiday Magazine Travel Guides, published by Random House, represents the wide end of the third, while History of the American Colonies, published by Scribner, represents the narrow end. A listing of 13 titles in the Holiday Magazine Travel Guides indicates subject coverage clearly:

1. *The Holiday Guide to Britain: England, Scotland and Wales*
2. *The Holiday Guide to London*

3. *The Holiday Guide to France*
4. *The Holiday Guide to Italy*
5. *The Holiday Guide to Spain*
6. *The Holiday Guide to Scandinavia: Denmark, Sweden, Norway*
7. *The Holiday Guide to West Germany*
8. *The Holiday Guide to Greece and the Aegean Islands*
9. *The Holiday Guide to Mexico*
10. *The Holiday Guide to the Caribbean and the Bahamas*
11. *The Holiday Guide to Israel*
12. *The Holiday Guide to Hawaii*
13. *The Holiday Guide to Ireland (53)*

The titles listed here indicate that Holiday Magazine Travel Guides has a clearly delineated and rather narrow subject, specific touring areas of the world. The individual members seem to be carefully balanced in terms of where people go when they travel for pleasure, and this balance lends further definition to the series. Nevertheless, the Holiday Magazine Travel Guide series falls toward the shallow end of the middle third of the spectrum, because it treats each touring area in a fairly general way. The average series member is 135 pages long, and has no bibliography (53).

Scribner's History of the American Colonies series represents the other end of the middle third of the range of subject breadth and depth. The titles of four members are listed here, together with the extent of their texts and bibliographies, in pages:

- Colonial Georgia: A History*; text: 307 pp., bibliography: 10 pp.  
*Colonial Pennsylvania: A History*; text: 321 pp., bibliography: 16 pp.  
*Colonial Rhode Island: A History*; text: 384 pp., bibliography: 27 pp.  
*Colonial New York: A History*; text: 375 pp., bibliography: 34 pp: (54)

The subject area of this series is at least as clearly defined as that of the travel guide series already discussed. In addition, the members have lengthy texts and bibliographies; both are earmarks of the kind of book more suited to the scholar than to the general public, though one can still imagine any given member to be of interest to many well-educated laymen. Probably, however, the bulk will be sold to college, research, and very large public libraries.

If the breadth of subject were narrowed and the level of treatment deepened much beyond that demonstrated by these examples, the resulting series would be of interest almost solely to scholars and researchers, rather than to laymen, however well educated. The last third of the range of subject width and depth is reserved for this type of series, the scholarly or professional series.

Scholarly or professional series are published to support particular academic and professional disciplines by providing them with high quality original contributions to their literatures, state-of-the-art reports, and similar material. Very little of the material published in scholarly and professional series is of any interest to laymen. A great deal of it is so narrowly conceived that it interests only particular sub-specialties within academic disciplines and learned professions.

Scholarly and professional series may be published by several types of organizations, including commercial publishers, scholarly and professional associations, and government organizations. Universities are a significant source of scholarly and professional series. To illustrate the nature and extent of publication of scholarly and professional series, some typical issuing bodies and the series they produce are examined, beginning with commercial firms.

Academic Press, a subsidiary of Harcourt Brace Jovanovich, is heavily involved in the publication of monograph series, symposia, and annual reviews in a large variety of scientific disciplines and professions. An examination of these publications reveals an extremely complex picture. Academic Press appears to publish 98 different series. In these series, a total of 1,148 different titles are offered. The number of individual bibliographic and physical volumes is much larger, as many titles are offered in various formats: for example, in cloth and paper binding, and in library editions with and without microfiche. There is an average of just under 12 different titles per series. This average occurs within a wide range: the smallest series have but one title, while the largest has 131 (55).

The number of disciplines and professions served by Academic Press monograph series is immense. All the familiar disciplines are represented, and a very large number of subdisciplines as well. Many series are published in cooperation with learned and professional associations in particular disciplines. Some examples are the ACM Monograph Series, published in cooperation with the Association for Computing Machinery (56); the Institute for Research on Poverty Monograph Series and the Institute for Research on Poverty Policy Analysis Series, published in cooperation with that institute (57); the London Mathematical Society Monographs, published in cooperation with the society (58); and Synopses of the British Fauna, published in cooperation with the Linnean Society of London (59).

In addition to covering a wide range of subjects in numerous disciplines and professions, Academic Press series are internally complex. Some series have numbered members and some do not. Some numbered series use "volume" as the number designator, while others use "number." Some use both, though this appears to indicate a change in policy rather than carelessness. Some series use "volume," then "number," then no numbering at all (60). For example, *Experimental Botany: An International Series of Monographs* contains members designated Volume 1 through Volume 6, no Volume 7 at all, then Number 8, and finally four more members that bear no numbering (61).

Scholarly and professional series are also published by learned associations. One such is the American Chemical Society, which offers most of its monographic publications through series. The largest series offered is the ACS Monograph Series. This series was up to its 173rd monograph as of 1976 (62). Only a part of the series is offered through the American Chemical Society; monographs out of print with the society are available from University Microfilms International in Ann Arbor, Michigan. While the monographs in print are available in hard cover only, those offered by University Microfilms are available in hard cover, soft cover, and microfilm. Two other monograph series are devoted to the publication of symposia papers. One, the *Advances in Chemistry Series*, among other functions,

“provides a medium for symposia that would otherwise be fragmented, their papers distributed among several journals or not published at all” (63). The other, the ACS Symposium Series, is intended as a means of rapid publication of symposia whose currency could suffer if the normal delays of full-dress publication were undergone. Instead, “. . . the papers are not typeset but are reproduced as they are submitted by the authors in camera-ready form. As a further means of saving time, the papers are not edited or reviewed except by the symposium chairman, who becomes editor of the book” (63). In addition to these series, the American Chemical Society publishes six others, each serving a defined purpose.

Universities and other educational institutions are the third major publisher of scholarly and professional series. Harvard University is an example of this type of publisher. Harvard publishes a number of series itself, publishes others that are distributed by Harvard University Press, and sponsors still others that are published outside the university. Many individual members of series originally published by or for Harvard have been reprinted by publishers entirely outside the cooperative arrangements mentioned here. The result is that Harvard University series present a complex bibliographic organization, difficult to decipher and arrange in coherent fashion. Some examples should indicate the variety of publication in series centered on Harvard University. The Widener Library Shelflists are published by that library, a unit of Harvard University, but distributed by Harvard University Press (64). Another series, the *Bulletin of the Museum of Comparative Zoology*, is published directly by the university (65). Harvard East Asian Monographs are published by the university's East Asian Research Center but distributed by Harvard University Press. The Harvard East Asian Series, on the other hand, is published by Harvard University Press (66). Other series, issued earlier by Harvard University or Harvard University Press, are reprinted by independent companies, such as Kraus Reprint Company, Folcroft Library Editions, Dover Publications, and Arno Press (65). Between Harvard University and Harvard University Press, at least 30 series are published (67). This number might be substantially larger if reprint publishing of Harvard University materials were taken into account.

Altogether, the scholarly and professional series present a picture of great quantity, variety, and complexity. Along with reprints issued in series, the scholarly and professional series are among the most difficult bibliographic challenges faced by larger libraries. At the same time, the titles in these series are among the most vital to the larger library collections, particularly those that support university-level teaching and research.

## REPRINT SERIES

Series composed of reprinted works are very much a logical extension of series composed of originally published works. Both types of publication serve the same audience, the college and university community. While new series enable the large library to easily acquire scholarly works on a given subject, reprinted works in series enable the same easy acquisition of works perhaps long out of print and unobtainable by any other method.

Reprints in series are not reprinted series. Usually the reprinting of a work involves breaking it out of its original series (if any) and placing it in a series established strictly for the reprinting project in hand. The result is a new series filled with old books. An example of this process is the volume on Napoleonic times by Harold C. Deutsch. This work was originally published as Volume 41 of the Harvard Historical Series in 1938, then reprinted in 1975 as Number 4 of the Porcupine Press series *Perspectives in European History* (68). This sort of complexity demands more than routine cataloging. If the alternative to the reprint is a lack of needed resources, the extra effort is probably worthwhile.

Reprints in series seem to be of two types, scholarly reprints and what might be called scholarship support reprints. Scholarly reprints are simply the reissue, in series, of scholarly works no longer obtainable on the regular market. Scholarship support reprints are created when material of utility to the scholar (otherwise unobtainable) is reprinted. These works may not be scholarly in and of themselves, but they are essential for the production of scholarly work in a given field. The large research library must stock both kinds of material, the first to provide a record of the research previously carried out and the second to supply the raw materials upon which new conclusions will be constructed. Reprinting in series provides the research library with a convenient and attractive combination of collection development and ready availability, at a more or less reasonable price.

Both types of series are published by specialized firms or divisions, the scholarly reprint publishers. Carol A. Nemeyer, in her book *Scholarly Reprint Publishing in the United States*, provides a good definition of this type of firm:

A scholarly reprint publisher is one who assumes the responsibility for the selection, production and sale of new copies of scholarly works that were available at some earlier date from another publisher or institution. The reprints are generally (but not exclusively) produced by a photographic process, and are intended to satisfy a relatively small, specialized market (69).

Scholarly reprint series are issued in a variety of disciplines, and collectively they may account for the great majority of the output of a reprint publisher. For example, the catalog of the Da Capo Press reveals that most of that firm's offerings are organized into broad subject series, some numbered and some not. Most series either contain numbered and unnumbered members or contain only titles that bear a number (70).

Da Capo's series are scholarly, scholarship-support, or a combination of both. The Music Series, for example, contains Sir Thomas Beecham's *A Mingled Chime: An Autobiography*, along with Maurice J. E. Brown's *Chopin: An Index of His Works in Chronological Order* (71). Other titles in the Music Series make clear that it is very much a mixture of scholarly and scholarship-support materials. Another series, *China in the 20th Century*, seems to be composed of first-hand accounts of events and problems in China from the mid-1930s through the rise of Communist China in the middle '50s. None of the works could be considered scholarly, but all would be essential to a collection designed to support the study of modern Chinese history (72).

In addition to these series, Da Capo publishes several others. The Da Capo series are listed here to give some idea of the range of offerings from a reprint publisher:

Series Title	Number of Volumes (estimate)
Music Series	379
Earlier American Music	20
The Roots of Jazz	43
The Da Capo Series in Dance	10
Architectural and Decorative Art	48
Graphic Art	55
Photography	22
Library of American Art	33
China in the 20th Century	27
Latin America in the 20th Century	4
The Middle East in the Twentieth Century	7
Prelude to Depression: The Social and Intellectual History of the American 1920's	3
The Politics and Strategy of World War II	9
The American Scene: Comments and Commentators	126
Civil Liberties in American History	126
Franklin D. Roosevelt and the Era of the New Deal	161
Law, Politics and History	61
Europe, 1815-1945	12
Russia Through European Eyes	10 (70)

These series titles, abstracted from the Da Capo catalog, were chosen because the description that accompanied the title explicitly named the group of works as a series. Groupings not so named were left out. Thus, a very conservative estimate is that Da Capo offers a total of 1,156 separate volumes through 19 different series. All such volumes are available individually, even if they are of a multi-volume set offered as one title in the series. Individual titles in the series range over a tremendous chronological span, sometimes several hundred years. Works in a given series might range from the 18th century to the mid-20th, from the extremely scarce to the merely out of print. For example, the series *Civil Liberties in American History* offers the purchaser Alan Barth's *The Price of Liberty* and William Bollan's *The Freedom of Speech and Writing upon Public Affairs Considered*, among other titles. The Bollan work was originally published in 1766 and may represent a very useful purchase. The Barth work may be just as useful; however, it was first published in 1961 and might well already be in many good-sized collections (73).

From this example, it can be concluded that the reprint series presents the library with a few difficult problems. Duplication is probably chief among them, and there is the danger of at least four kinds. First, one work may be reprinted by several publishers, introducing the danger of purchasing the same title from different sources. Second, a single title might be placed in more than one series, making standing orders from that publisher a risky business. Third, a work pur-

chased singly from a publisher may also arrive as part of a series standing order. Finally, reprints in series, particularly recent works, may already be owned by the purchasing agency. All these pitfalls may be avoided, but only at the cost of careful study of individual reprinters and their series and by equally careful maintenance of ordering and processing records. Quality in the composition of a reprint series is another problem area. The quality of a series depends upon the choice of members, the delineation of the area to be covered, the editorial effort expended on each member, and the quality of reproduction of the original. All of these factors may vary from series to series, and within each series; consequently, standing orders cannot be the final step in obtaining a group of related works, but they must be the prelude to careful monitoring and feedback involving both the library and the reprint publisher. In spite of problems of duplication and quality—and, of course, cost—the reprint in series allows individual libraries to fill out both the picture of scholarship and the raw materials of scholarship in a chosen collecting area without the very costly bibliographic work necessary to develop such a collection title by title. This economy of scale makes reprints in series an attractive proposition for the growing research library.

### **The Impact of Series**

The preceding section has attempted to delineate the types of series that occur at present and to provide enough instances to enable the reader to grasp the main characteristics of each. This final section attempts to sum up the impact of series. Any discussion on the impact of series quickly moves out of the scope of this article, because virtually every library operation is involved with series to one extent or another. Series obviously affect acquisitions work. Series are primary vehicles for marketing literary property to libraries. Their attraction is the continuing supply of desired material without the cost of individual buying decisions. Just as an individual will buy more of a potboiler series to enjoy further adventures of a favorite detective, so will the research library be tempted to place a standing order for a series that promises to supply a steady flow of high quality, virtually unobtainable materials. Series also affect cataloging. The fact of their existence must be acknowledged, described, and made accessible. To the degree that the series is vague, muddled, or botched, so will the cataloging be correspondingly difficult. The reprint series superimposes a new set of cataloging problems onto those already posed by the originals from which the reprints are made. Series affect many other areas of library operation. Budgeting, recordkeeping, management—all are affected by the need to acquire, organize, and exploit series. In school libraries, these problems are compounded by the need to thread a path through a maze of competing series, ever watchful to ensure that what began well continues to be worth the expense.

Will series last? The evidence seems to indicate that they will. First, there is longevity; the series as a device for marketing has survived for over 150 years with no evidence to show that its utility is fading. Second, major reference works



are devoted to the bibliographic control of series, whereas many other features of books are left entirely uncontrolled. No great effort, for example, is expended to create catalogs of editors or of places of publication. Third, publishers seem to be increasingly about the business of gathering their individual titles into series, particularly publishers catering to school libraries. Fourth, the popular series, juvenile and adult, seems to be enjoying a renaissance, if not in the library, then very much in the mass market bookstores that have sprung up in every shopping mall across the country. Finally, series are enjoying the media tie-ins increasingly enjoyed by nonseries books. Nancy Drew and the Hardy Boys may be seen on television, as well as read, and the small screen is now commonly used to advertise romantic novels and other works in paperback format.

These trends seem to indicate that the series as a device useful to publishers will be around for at least the foreseeable future, and probably for as long as print remains the major medium of information transfer.

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## SET THEORY

### Introduction

Set theory, which is that branch of mathematics concerned with the properties of sets, was developed during the 19th century. Since then the subject has undergone extensive development and refinement, and by now notions of "sets" or "collections" have permeated virtually all of mathematics. Set theory has also been widely used in logic and has implications for library and information science.

This discussion of set theory is divided into two parts. The first part gives some historical development of the theory of sets, examines the basic ideas of set operations, and describes their applications to information science and logic. It also

includes a brief discussion of fuzzy sets. No special mathematical background is necessary for understanding this section.

The second part, dealing with related set-theoretic topics, is more technical in nature. Cartesian products, equivalence relations, partial orders, lattices, Boolean algebras, and Brouwer algebras are included because of the current research interest in these topics, as evidenced in the literature of information science.

### Historical Development

#### LEIBNIZ TO CANTOR

The familiar notion of a “set” or “class” is used intuitively to refer to a collection of entities of any sort, such as the set of all the integers between 1 and 1,000, the set of all cards in a given library catalog, or the set of all information scientists. Set theory—or more accurately, the theory of infinite sets—was invented in the latter part of the 19th century by the German mathematician Georg Cantor (1845–1918). The creation and development of Cantor’s set theory was preceded by work with sets and classes (referred to variously as algebra of classes, algebra of sets, logic of classes, or calculus of classes) that can be traced back to the 17th-century mathematician and logician Gottfried Wilhelm Leibniz (1646–1716).

The algebra of classes is closely related to the elementary logical properties of statements. In traditional logic, ordinary declaratory statements (also called assertions or propositions) may be combined by logical connectives—“or,” “and,” “not”—to give new statements and to show relationships (1). Leibniz was the first to attempt to make logic algebraic; that is, he extended traditional logic by the use of symbols for the logical relations, in addition to the symbols for the logical statements. Leibniz conceived of logic as a science containing the ideas and principles underlying all other sciences, and he proposed a scheme for the reform of all science by the use of two instruments: the “characteristica universalis,” a universal scientific language, and the “calculus ratiocinator,” a calculus of reasoning for the manipulation of the language. Although his utopian scheme was never realized, his ideas stimulated others to attempt a calculus of logic and paved the way for symbolic (i.e., mathematical) logic (2–4).

Among the many creative followers of Leibniz was the French astronomer and mathematician J. D. Gergonne (1771–1859). Gergonne considered five basic relations between the classes  $A$  and  $B$ :

1. Complete coincidence (equivalence)
2. Left-sided inclusion ( $A$  is contained in  $B$ )
3. Partial intersection
4. Right-handed inclusion ( $B$  is contained in  $A$ )
5. Nonintersection ( $A$  and  $B$  are disjoint) (5)

The Czech theologian and mathematician Bernard Bolzano (1781–1848) laid the foundations for set theory in his fundamental work *Paradoxes of the Infinite*

(published posthumously in 1851). In *Paradoxes*, Bolzano became the first to note that an infinite set could be considered equivalent to certain of its subsets. For example, the set of positive whole numbers can be put in one-to-one correspondence with the set of positive even numbers, although the set of even numbers is clearly only a subset of the set of whole numbers (6).

Moritz Wilhelm Drobisch (1802–1896) presented a mathematical reworking of classical logic in *Neue Darstellung der Logik nach ihren einfachen Verhältnissen nebst einem logisch-mathematischen Anhang* (1872) by considering the algebraic construction of simple forms of statements. He used the symbol  $<$  to denote the relation of inclusion and the symbol  $=$  as the symbol for identity, and he introduced an “undefined infinite concept,” the analog of the present-day universal set. He also employed circle diagrams to represent various combinations of sets, a method used later by John Venn (7).

The basis for all subsequent development of the algebra of relations (or symbolic logic, as some writers prefer) was laid in England in the first half of the 19th century by Augustus De Morgan (1806–1871) and by George Boole (1815–1864). De Morgan first suggested the concept of the universal set. He considered both a given set and its complement (i.e., the set of objects not contained in the given set) to lie within the limits of a certain universal set (8). De Morgan’s name is also associated with the well-known theorems in set theory relating complements, union, and intersection of sets. Boole was the first to achieve a calculus of logic, specifically a calculus of sets, complete with rules of operation (9). It is properly called an algebra, although not quite the form of “Boolean algebra” that is known today. Boole used an algebra of the numbers 0 and 1 only, where 1 is the Universe (everything) and 0 is Nothing (empty set or null class).

Boole’s algebra was refined by his pupil William Stanley Jevons (1835–1882), by the German mathematician Ernst Schröder (1841–1902), by the American mathematician Charles Sanders Peirce (1839–1914), and by the English logician John Venn (1834–1923). Some examples of their contributions include extending the logical operation of “union” to mean “and/or” (Boole restricted its use to “disjoint” sets), Ref. 10; distinguishing between “proposition” and “propositional function” (a distinction that is still often misunderstood), Ref. 11; and the method for illustrating various combinations of sets known as “Venn diagrams,” Ref. 12. These points are discussed in greater detail later in this article.

The ideas of mathematical logic that had developed up to this point were based in large part on a desire to make logic mathematical. The development of mathematics itself (e.g., non-Euclidean geometries, axiomatic treatment of the foundations of mathematics) caused mathematical logic in the last quarter of the 19th century to develop independently of the direction taken by Boole and his followers.

Unlike Boole and others who considered logic to be a branch of mathematics, the German Gottlob Frege (1848–1925) thought that the entire content of mathematics could be derived from formal logic. This concept, which came to be known as “logicism,” represents an attempt which is, in essence, very close to Leibniz’s “universal characteristic” (13).

The Italian Giuseppe Peano (1858–1932) is credited with the first attempt to

develop mathematics in true logistic form. Rather than basing mathematics on logic, he analyzed the *methods* of mathematics and tried to express them in a form similar to that of the logical calculi (14). Peano introduced the logical symbols that are still used today:

- $\in$  Read "is included in"; used to express the relation of membership of an element in a set.
- $\supset$  Used to express inclusion of one set in another.
- $\cup$  Used to symbolize union of sets.
- $\cap$  Used to denote the operation of set intersection.

The concept of a set is basic to both mathematics and logic. Ideas about membership, relations, symbolism, etc., have concerned both mathematicians and logicians. The modern theory of sets, however, did not grow out of investigations into problems of mathematical logic, but rather developed from Georg Cantor's work in the theory of infinite series and related topics of analysis. Cantor wrote:

By a "set," we shall understand any collection into a whole,  $M$ , of definite, distinguishable objects  $m$  (which will be called "elements" of  $M$ ) of our intuition or thought (15).

This imprecise definition of the word "set" soon led to difficulties in the development of set theory, as we shall see in the following section.

### ANTINOMIES ARISING FROM NAIVE SET THEORY

Cantor's discoveries in the 1870s at first met with distrust and even antagonism from most mathematicians and with indifference from most philosophers. The problem was due to his revolutionary treatment of infinite sets (i.e., sets containing an infinity of elements conceived as existing simultaneously, at least in thought). The concept of infinity had previously been handled cautiously in mathematical research, due to the suspicion that it encroached on the domain of philosophers and violated the principles of religion (16).

When set theory became accepted in the 1890s and began to be applied in analysis and geometry, paradoxes, or antinomies, were discovered that cast doubt on the validity of the theory. A theory is said to contain an antinomy when each of two contradictory statements can be proved within the theory, even though the axioms of the theory appear to be true and the rules of inference valid. The assumptions on which Cantor based his general set theory—or "naïve" set theory, as it has come to be called—seemed self-evident, and yet when expanding them mathematicians encountered contradictions whose source they were at first unable to find. For example, the "set of all sets" seems to be a legitimate set according to Cantor's definition of set, although it is a paradoxical notion. This point is discussed in more detail later in this article.

Cantor himself discovered the first antinomy in 1895, which was rediscovered 2 years later by Cesare Burali-Forti (1861–1931). The matter was not considered to

be very serious, however, as it emerged in a rather technical region of the theory. Both men apparently believed that a slight revision in the proofs of the theorems would remedy the situation (17).

This optimism was shattered in 1902 when Bertrand Russell (1872–1970) presented an antinomy that lay at the basis of set theory and endangered its very foundations. Russell's antinomy deals with the set of all sets that are not members of themselves. It states that if the collection of *all* sets that are not elements of themselves is a set, then this set has the property that it is an element of itself if and only if it is not an element of itself (18). A well-known popularization of this paradox (Russell; 1919) concerns the barber in a certain village who shaves all and only those persons in the village who do not shave themselves. Who shaves the barber? A variation of this antinomy is the "Library Paradox" of Ferdinand Gonseth (1933). Suppose that the Library of Congress compiles, for inclusion in the Library of Congress, a bibliography of all those bibliographies in the Library of Congress which do not list themselves. Is this bibliography listed in itself? (19).

#### DEVELOPMENT OF AXIOMATIC SET THEORY

The discoveries of the antinomies caused various reactions among mathematicians, prompting the famous statement by the leading mathematician of the day, Jules Henri Poincaré (1854–1912), that the theory of sets was "a disease from which mathematics will some day recover" (20). Some people continued to work in "safe" areas that were not affected by the antinomies; some rejected set theory altogether; still others sought to reexamine the contents and methodology of naïve set theory and construct a theory free of contradiction. Most of the various systems resulting from this reexamination can be classified into three main groups: the logicistic, the intuitionistic, and the axiomatic (or formalistic) approaches (21).

The logicistic thesis is that mathematics is a branch of logic, that mathematical notions can be defined in terms of logical notions, and that the theorems of mathematics can be proved as theorems of logic. Logicism perceives the antinomies in set theory as a sign that something in the mathematical methods in general is out of order. It attributes the defect to logic and its use in mathematics rather than to mathematics itself, and it proposes a reform of logic.

The intuitionistic school maintains that traditional mathematics has misinterpreted and mismanaged the concept of infinity. According to this view the antinomies are caused by defects in the foundation of mathematics itself, rather than just logic or set theory. Therefore, intuitionism proposes a reform of mathematics as a whole (22).

The axiomatic attitude toward set theory differs from the logicistic and intuitionistic attitudes in that it believes in the soundness of logic as used in traditional mathematics. It does not propose reform of the foundations of logic or the foundations of mathematics, but rather calls for the formulation of new basic assumptions, or new axioms, concerning sets. The axiomatic attitude views the antinomies only as a failure of Cantor's basic assumption about sets as expressed in his definition of set, rather than as a failure of logic (23).

The first axiomatization of set theory was given in 1908 by Ernst Zermelo (1871–1953) and it was later refined by Abraham A. Fraenkel (1891–1966). Known as the Zermelo–Fraenkel (ZF) set theory, it avoids the antinomies by limiting the size of sets. A second axiomatization of set theory originated with John von Neumann (1903–1957) in the 1920s. Modification of the theory by Paul Bernays (1888–), David Hilbert (1862–1943), and Kurt Gödel (1906–1978) brought it closer to the ZF theory. No attempt is made here to identify the specific contributions of each man. The interested reader is referred to Refs. 16–18 for treatments of axiomatic set theory.

### Set Theoretic Concepts

#### BASIC DEFINITIONS

In an axiomatic treatment of set theory, the terms “set” and “membership” are undefined terms, much as “point” and “line” are in an axiomatic treatment of geometry. Informally, the term set is used in the connotation of a collection or class of objects, the objects themselves having membership in the sets in question. For expository purposes, an informal approach is taken here.

If  $A$  is a set and if the object  $x$  is a member of  $A$ , then one writes  $x \in A$  and says that  $x$  *belongs* to the set  $A$  or that  $x$  is an *element* of the set  $A$ . If an object  $y$  is not a member of a set  $B$ , then the notation  $y \notin B$  is used.

Sets can sometimes be described by explicitly displaying their elements. For example, the set  $A$  consisting of the first five letters of the Roman alphabet can be represented as  $A = \{ a, b, c, d, e \}$ . Clearly,  $b \in A$ , while  $w \notin A$  in this case.

Sets are also specified by means of a distinguishing property of their elements. If  $P(x)$  is a property of objects  $x$ , then the notation  $\{ x \mid P(x) \}$ , or  $\{ x : P(x) \}$ , stands for the set consisting of all such objects  $x$  under consideration having property  $P(x)$ . For instance, if the objects in question are whole numbers, and if  $P(x)$  is the property “ $x$  is even,” then  $\{ x \mid P(x) \}$  is the set of numbers  $\{ 2, 4, 6, 8, \dots \}$ . More concisely,  $\{ x \mid x \text{ is even} \}$  denotes this set of even whole numbers.

Two sets  $A$  and  $B$  are said to be equal,  $A = B$ , when they have the same elements. Thus, the set of whole numbers given by  $\{ x \mid x \text{ is the sum of two odd numbers} \}$  is equal to  $\{ x \mid x \text{ is even} \}$ .

Given two sets  $A$  and  $B$ , it may happen that every element of  $A$  is also an element of  $B$ . In such case,  $A$  is said to be a *subset* of  $B$  (or  $A$  is *contained* in  $B$ ), and one writes  $A \subset B$ . Note that according to this definition, any set is a subset of itself. When  $A \subset B$  and  $A \neq B$ , the set  $A$  is said to be a *proper subset* of  $B$ . It is often useful to observe that the assertion that  $A = B$  is equivalent to the assertion that both  $A \subset B$  and  $B \subset A$ .

The *empty set*, or *null set*, denoted by  $\emptyset$ , is the set which has no elements. If  $A$  is any set, then  $\emptyset \subset A$  (for otherwise there would have to be an element in  $\emptyset$  which is not an element of  $A$ ).



## SET OPERATIONS

Given several sets, additional sets can be constructed by combining some of the defining properties of these sets by means of the logical connectives “and,” “or,” or “not.”

The *union* of the sets  $A$  and  $B$ , written  $A \cup B$ , is the set consisting of all elements which belong to either  $A$  or  $B$  or both. In symbols,  $A \cup B = \{ x \mid x \in A \text{ or } x \in B \}$ .

The *intersection* of  $A$  and  $B$  is the set consisting of all elements common to both  $A$  and  $B$ . Hence,  $A \cap B = \{ x \mid x \in A \text{ and } x \in B \}$ .

For example, if  $A = \{ a, b, c, d \}$  and  $B = \{ b, d, g \}$ , then  $A \cup B = \{ a, b, c, d, g \}$ , while  $A \cap B = \{ b, d \}$ .

It may be the case that two sets have no elements in common. Then, of course, their intersection will be the empty set. In this situation, the sets are said to be *disjoint*.

The union or intersection of any finite number of sets,  $A_1, A_2, \dots, A_n$ , can equally well be considered. Their union,  $A_1 \cup A_2 \cup \dots \cup A_n$ , consists of all elements which are members of at least one of the sets, while their intersection,  $A_1 \cap A_2 \cap \dots \cap A_n$ , is the set of all elements common to all of the sets. In fact, the notions of union and intersection extend quite easily to an infinite number of sets.

In applications of set theory, one considers sets which are themselves subsets of some fixed set, the so-called *universal set*, or *universe of discourse*. This is a relative term, in that the universal set depends upon the discussion at hand. In one context, the universal set might consist of the set of all documents in a given collection. In another context it may be convenient to consider the universal set to be the set of all Boolean expressions made up from the indexing terms of a system. Many of the early antinomies in set theory arose from overlooking the necessity of specifying the universal set in a given discussion.

The *relative complement* of a set  $B$  with respect to a set  $A$ , denoted by  $A - B$ , is the set of all elements of  $A$  which are not elements of the set  $B$ . When the relative complement of a set  $A$  is taken with respect to a universal set  $U$ , the resulting set,  $U - A$ , is usually denoted by  $A'$  and is called the *complement* of the set  $A$ . Note that the complement of a set is a relative term, depending upon the universal set as well as upon the set itself.

Another set which can be obtained from two sets  $A$  and  $B$  is their *symmetric difference*, denoted by  $A \triangle B$ . This is the set consisting of all elements which belong to exactly one of the sets  $A$  and  $B$ , but not to both. According to this definition,  $A \triangle B = (A - B) \cup (B - A)$ .

In the older literature, at least since the time of Boole, one finds the notation  $A + B$  denoting the “sum” of the two sets and meaning the set of elements which are either in  $A$  or in  $B$ . Since the common usage of the word “or” is somewhat ambiguous—possibly meaning “and/or” on the one hand, and meaning “one or the other, but not both” on the other—some care should be exercised when consider-

ing this notation. When and/or is intended, then  $A + B = A \cup B$ ; but when one or the other, but not both is intended, then  $A + B = A \Delta B$ . Of course, if  $A \cap B = \emptyset$ , then  $A \cup B = A \Delta B$ , and no confusion arises. See Ref. 24, page 7, for a discussion of this point relative to the Universal Decimal Classification.

VENN DIAGRAMS

Set operations can be visualized by means of so-called Venn diagrams, in which the universal set  $U$  is denoted by a rectangle, and subsets of the universal set are represented by circles inside of the rectangle. Figures 1–5 illustrate the set operations given here.

SET IDENTITIES

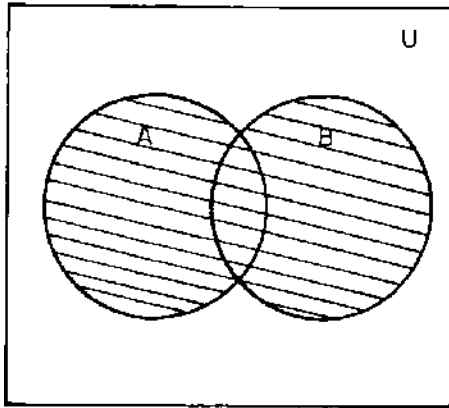
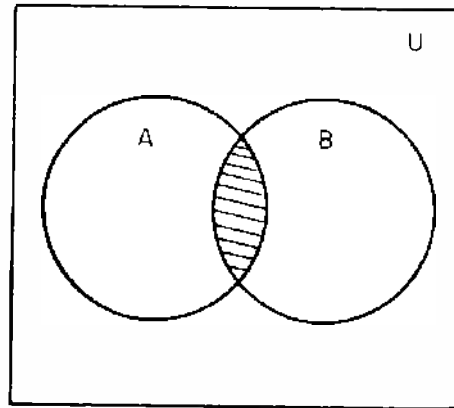
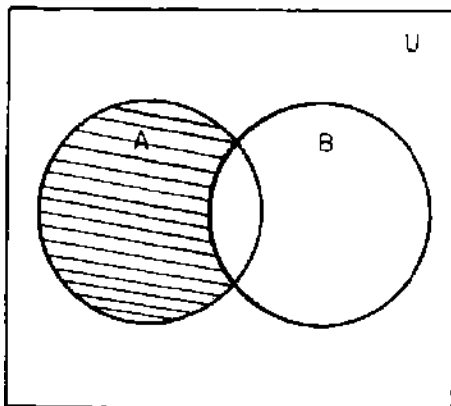
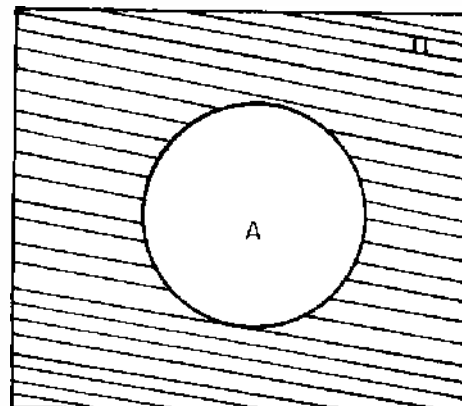
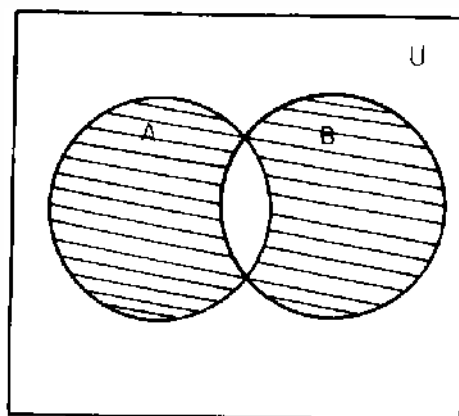
Expressions involving various set operations can often be modified or simplified by making use of so-called set identities. Some useful relations among the common set operations are listed in Table 1. They can be verified by referring to the definitions of the expressions, or by comparing the Venn diagrams of each part of the

TABLE 1  
Set Identities

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$A \cup B = B \cup A$	}	Commutativity
$A \cap B = B \cap A$		
$(A \cup B) \cup C = A \cup (B \cup C)$	}	Associativity
$(A \cap B) \cap C = A \cap (B \cap C)$		
$A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$	}	Distributivity
$A \cup (B \cap C) = (A \cup B) \cap (A \cup C)$		
$A \cup \emptyset = A,$	$A \cap \emptyset = \emptyset$	
$A \cup U = U,$	$A \cap U = A$	
$A \subset B$ if and only if $A \cup B = B$		
$A \subset B$ if and only if $A \cap B = A$		
$A \subset B$ if and only if $B' \subset A'$		
$(A')' = A,$		
$A \cup A' = U,$		
$A \cap A' = \emptyset$		
$\emptyset' = U,$		
$U' = \emptyset$		
$(A \cup B)' = A' \cap B'$	}	De Morgan's Rules
$(A \cap B)' = A' \cup B'$		
$A - B = A \cap B'$		
$A \Delta B = (A \cup B) - (A \cap B)$		

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FIGURE 1.  $A \cup B$  shaded.FIGURE 2.  $A \cap B$  shaded.FIGURE 3.  $A - B$  shaded.FIGURE 4.  $A'$  shaded.FIGURE 5.  $A \Delta B$  shaded.

asserted statement. All sets in Table 1 are to be considered as subsets of the same universal set  $U$ .

### THE POWER SET

The set consisting of all subsets of a set  $A$  is called the power set of  $A$ , and it is frequently denoted by  $2^A$ .

For example, if  $A = \{ a, b, c \}$ , then  $A$  has as subsets  $\emptyset$ ,  $\{ a \}$ ,  $\{ b \}$ ,  $\{ c \}$ ,  $\{ a, b \}$ ,  $\{ a, c \}$ , and  $\{ b, c \}$ ; and  $\{ a, b, c \} = A$  itself, so the power set of this set is given by a set of eight elements:

$$2^A = (\emptyset, \{a\}, \{b\}, \{c\}, \{a, b\}, \{a, c\}, \{b, c\}, \{a, b, c\})$$

If the elements of this set  $A$  are displayed in the order  $a, b, c$ , then a string of words *Yes*, *No*, *Yes* can be thought of corresponding to the subset  $\{ a, c \}$  of  $A$ . *Yes* in the first and third positions denotes the membership of  $a$  and  $c$  in the subset, and *No* in the second position indicates that  $b$  is not in the subset. A string of all *Noes* defines the empty subset of  $A$ , while the string of all *Yeses* corresponds to the subset  $A$  itself. Clearly, there are exactly eight different ways of making this kind of correspondence between the elements  $a, b, c$  and all possible strings of three words using *Yes* and *No*.

More generally, if a set  $A$  has a finite number  $n$  of elements, its power set contains  $2^n$  elements. This is because there are  $2^n$  ways of associating strings of  $n$  words using *Yeses* and *Noes* with the elements  $a_1, a_2, \dots, a_n$  of  $A$ .

The power set of a finite set contains many more elements than the set itself. This can be expressed by saying that while there is a one-to-one correspondence between such a set and a subset of its power set, the reverse situation is not true. For the above example, the set  $A = \{ a, b, c \}$  can be put into one-to-one correspondence with the subset  $( \{ a \}, \{ b \}, \{ c \} )$  of its power set in an obvious way, while it is clear that the eight-element set  $2^A$  cannot be put into one-to-one correspondence with any subset of  $A$ . It can be shown that such a statement is true for any set, finite or infinite. That is, there is a one-to-one correspondence between a set  $A$  and a subset of  $2^A$ , but there cannot be a one-to-one correspondence between  $2^A$  and a subset of  $A$ . In some sense, the power set of any set is "larger" than the set itself.

This notion can be used to explain why there is no "set of all sets." If there were such a set, then it would have to contain its own power set. But then, there would be a one-to-one correspondence between its power set and a subset of itself. (Merely map each element of the power set onto itself.) Since this cannot happen for sets, there cannot be a "set of all sets."

### FUZZY SETS

The set theory described here is based on classical two-valued logic, in which a statement is always "true" or always "false" (see under the heading "Relation

to Logic" in this article). In set theory, an element  $x$  in a universal set  $U$  either belongs to a given subset of  $U$  or does not. Attempts to work with somewhat vague entities such as the "class" of all beautiful women, or the "class" of all numbers much greater than 2 in the context of pattern classification led to the development of "fuzzy sets" by Zadeh (25), in which some uncertainty with regard to membership is allowed. The notion of fuzzy sets is felt to be a useful tool in these investigations because there is "the natural feeling that probability theory is not appropriate for treating the kind of uncertainty that appears . . . this uncertainty seems to be more of an ambiguity than a statistical variation" (26, p. 145). In information science, fuzzy sets have been used to develop consistency measures in indexing (27), and to formulate the problem of associative retrieval (28).

Perhaps fuzzy sets and their algebra can be more easily understood by first considering the notion of the "characteristic function" of a set in ordinary set theory. If  $A$  is a subset of a universal set  $U$ , a function  $f_A$  can be defined on all of  $U$  by means of the scheme:

$$f_A(x) = \begin{cases} 0 & \text{if } x \notin A \\ 1 & \text{if } x \in A \end{cases}$$

Such a function  $f_A$  is the *characteristic function* of the set  $A$ . Observe that the set  $A$  consists exactly of all those elements  $x$  in  $U$  for which  $f_A(x) = 1$ . In this way, each subset of  $U$  is associated with its characteristic function. Note that  $f_\emptyset(x) = 0$  for all  $x \in U$ , and  $f_U(x) = 1$  for all  $x \in U$ . There is a useful correspondence between set operations and combinations of characteristic functions. For example, if  $A$  and  $B$  are two nonempty subsets of  $U$ , then  $x \in (A \cup B)$  if neither  $f_A(x) = 1$  or  $f_B(x) = 1$ , or both; while  $x \in (A \cap B)$  if both  $f_A(x) = 0$  and  $f_B(x) = 0$ . Hence, for all  $x \in U$ ,  $f_{A \cup B}(x)$  is the maximum of the two numbers  $f_A(x)$  and  $f_B(x)$ . This is often written as  $f_{A \cup B} = f_A \vee f_B$ , where the symbol  $\vee$  denotes taking the maximum of the functional values of  $f_A$  and  $f_B$  for each  $x \in U$ . (Similarly,  $\wedge$  is used to denote the minimum.) The other entries given below can be verified in the same way.

$$f_{A'} = 1 - f_A$$

$$f_{A \cup B} = f_A \vee f_B$$

$$f_{A \cap B} = f_A \wedge f_B$$

$$f_{A \Delta B} = |f_A - f_B|$$

where  $| \dots |$  denotes the absolute value

$$f_A(x) \leq f_B(x)$$

for all  $x \in U$  if and only if  $A \subset B$

A fuzzy set  $A$  in a universal set  $U$  is represented by a function  $f_A$  defined on  $U$  in such a way that for all  $x \in U$ ,  $0 \leq f_A(x) \leq 1$ . The number  $f_A(x)$  represents

the "grade of membership" of  $x$  in  $A$  (29). When  $A$  is a fuzzy set, the nearer  $f_A(x)$  is to zero, the more tenuous the membership of  $x$  in  $A$ . When the function  $f_A$  takes on *only* the two values 0 and 1, then the fuzzy set  $A$  is a set in the usual sense, and  $f_A$  is its characteristic function. Zadeh's original idea of fuzzy sets has been extended by Goguen (26) to the case that the function  $f_A$  on  $U$  takes its values in a partially ordered set  $L$  (see under the heading "Partial Orders" in this article), rather than merely numerical values between 0 and 1 inclusive. Such entities are then known as L-fuzzy sets.

An algebra of fuzzy sets analogous to the algebra of sets can be developed by imitating properties of characteristic functions. These operations on fuzzy sets are described as follows:

The complement,  $A'$ , of the fuzzy set  $A$  corresponds to the function  $1 - f_A$ .

The union,  $A \cup B$ , of two fuzzy sets  $A$  and  $B$  corresponds to the function  $f_A \vee f_B$ .

The intersection,  $A \cap B$ , of two fuzzy sets  $A$  and  $B$  corresponds to the function  $f_A \wedge f_B$ .

The fuzzy set  $A$  is contained in the fuzzy set  $B$  when and only when  $f_A(x) \leq f_B(x)$  for all  $x \in U$ .

It can be shown that the usual properties for these fuzzy set operations are true, as in the case for ordinary sets (25).

In some applications of fuzzy sets (29), two "levels" are selected, say the numbers  $a_1$  and  $a_2$ , where  $0 \leq a_1 < a_2 \leq 1$ . One says that  $x \in A$  if  $f_A(x) \geq a_2$ , that  $x \notin A$  if  $f_A(x) \leq a_1$ , and that  $x$  is indeterminant relative to  $A$  if  $a_1 < f_A(x) < a_2$ . When a function  $g_A$  on  $U$ , a three-valued characteristic function, is defined by

$$g_A(x) = 1 \text{ if } x \in A$$

$$g_A(x) = 1/2 \text{ if } x \text{ is indeterminant relative to } A$$

$$g_A(x) = 0 \text{ if } x \notin A$$

then the algebra of fuzzy sets given here leads to a kind of three-valued logic (30).

### Applications to Library and Information Science

Cantor's general definition of a set as "any collection into a whole of definite, distinguishable objects, called elements," while it is intuitively appealing, leads to antinomies in set theory mentioned earlier, since it permits the existence of sets which are too large. The *Aussonderungssaxiom* (axiom of separation) of Zermelo overcomes this problem by permitting one to delineate the elements of a given set which satisfy some property and form the set consisting of just those. Specifically this axiom says: "If  $M$  is a set and  $P$  a property having significance for the elements of  $M$ , then there exists a subset  $M(P)$  of  $M$  whose elements are all those elements

of  $M$  that have property  $P$ , and only these." (This is one of the axioms of the Zermelo–Fraenkel system.) For example, considering the set of documents in a given library as the given set, Zermelo's axiom can be used to separate the set of all documents dealing with a specific subject (31).

In applying set-theoretic ideas and operations to retrieval systems, the problems that confronted mathematicians when they first used these tools in other branches of mathematics do not arise. The antinomies encountered in naïve set theory were the result of Cantor's concept of infinite sets. In retrieval systems, which deal with finite sets of documents, index terms, etc., such a concept is obviously irrelevant. When one talks about a universal set, this may refer to the documents in a specific collection, or to all the documents ever written, but nonetheless, the number of elements (documents) in the set is finite.

As was shown earlier, there are two essentially different ways of specifying a set: by listing all of the elements of the set or by specifying some property that all elements of the set have in common. In document retrieval (which is perhaps a more accurate term than information retrieval), it is customary to use the second approach. Sets of documents are specified, or defined, by the properties that are applied to the documents in a particular retrieval system. A property may be the subject content of the document, the author(s) of the document, the language of the document, or some other characteristic. An individual document can, of course, belong to several different sets.

Document sets are defined at the time they are entered into a retrieval system and at the time of searching the system. In principle, this is true in the case of traditional library systems as well as nontraditional systems. In practice, however, methods of storage and retrieval vary widely. In any case, the goal in searching is to select the particular set of documents that satisfy the query from the universal set (i.e., the set of all the documents in the system). In precoordinate systems the formulation of the search query is limited to the sets that were defined at the time of entry. In postcoordinate systems the search query may be formulated by defining new sets that are logical combinations of those defined at the time of entry (32). (A discussion on defining new sets in searching is given in the next section of this article.)

The number of combinations of sets possible is limited in practice by the contents of the document collection and by the operational limitations imposed by the system design. Manual or optical coincidence systems are largely restricted to the set operation of intersection (analogous to the Boolean connective "and"), primarily because of limitations inherent in the methods of implementation. Computer systems, however, allow the use of the set operations of intersection, union, and complement ("and," "or," and "not," respectively) in formulating search queries. These logical operations form the basic search mode of existing large-scale document retrieval systems such as MEDLARS, ERIC, NASA, and others.

Although numerous modifications and alternative search strategies have been proposed in recent years, all are presently in the theoretical or experimental stage. A good source of information on developments in this area are the review articles

dealing with document retrieval systems that appear in the *Annual Review of Information Science and Technology* (33).

### Relation to Logic

As has already been noted, there is a close relationship between symbolic logic and set theory. However, it has been graphically demonstrated—by Taube (34) and Hillman (35), for example—that the mere replacement of logical symbols by set theoretic ones in logical expressions can lead to misleading or erroneous results about sets. In this section, a relation between logic and sets is sketched. (See also under the headings “Boolean Algebras” and “Brouwer Algebras” in this article.)

Symbolic logic deals with, among other things, so-called *propositions*, statements which are always true or always false, but not both. The statements “ $2 + 2 = 5$ ” and “George Washington was the first president of the United States” are propositions, while “ $x$  was a man” and “Tomorrow is Tuesday” are not propositions. Customarily lower-case letters,  $p, q, r, \dots$ , are used to denote propositions. New propositions may be constructed from given ones by means of certain operations. If  $p$  and  $q$  are propositions, then  $p \wedge q$ , their *conjunction*, is a proposition which is true if both  $p$  and  $q$  are true, and is false otherwise. The conjunction of  $p$  and  $q$  is usually rendered into English by saying “ $p$  and  $q$ .” The *disjunction* of two propositions  $p$  and  $q$ , written  $p \vee q$ , is the proposition which is true in all cases except when both  $p$  and  $q$  are false, and it is read “ $p$  or  $q$ .” The *negation* of  $p$ ,  $\sim p$ , is the logical opposite of  $p$ , being true if  $p$  is false and false when  $p$  is true. The *conditional*,  $p \rightarrow q$ , read as “if  $p$ , then  $q$ ,” is the proposition which is false if  $p$  is true and  $q$  is false, and is true in all other cases. Finally, the *biconditional*,  $p \equiv q$ , read “ $p$  if and only if  $q$ ,” is true exactly when both  $p$  and  $q$  are true or when both  $p$  and  $q$  are false. Often these definitions are expressed in truth-table form. See Ref. 12, pp. 49–51, for example. A proposition which is always true, such as  $p \vee (\sim p)$ , is called a *tautology*.

The statement “ $x$  was a man” is not a proposition, but it becomes one if  $x$  is replaced by “Charles Babbage” or “Lady Lovelace.” Such expressions are called *propositional functions* of one variable and are denoted by  $p(x), q(x), r(x), \dots$ , where  $x$  ranges over some universal set. Thus, a propositional function of one variable becomes a proposition when the variable  $x$  is replaced by an appropriate value. In similar fashion, “ $x$  eats  $y$ ” is an example of a propositional function of two variables. In general, propositional functions of any finite number of variables can be dealt with. By convention, propositions are considered to be propositional functions of zero variables. Propositional functions can be combined using conjunction, disjunction, negation, and the conditional and the biconditional to obtain new propositional functions. To any of these, one can preface *quantifiers*:  $\forall$  (for all) and  $\exists$  (there exist). A *predicate* is any of these expressions, with or without quantifiers. A predicate of the form  $\forall x p(x)$  is an assertion that *for all* permissible substitutions of the variable  $x$ , the resulting proposition  $p(x)$  is true.



(This assertion itself is a proposition and therefore is either true or false.) The symbol  $\forall$  is called the *universal quantifier*. Similarly, a predicate of the form  $\exists x p(x)$  asserts that *for some*  $x$  (at least one) among all permissible ones, the proposition  $p(x)$  is true. The symbol  $\exists$  is called the *existential quantifier*. See, for example, Ref. 12.

If the universe of discourse is the set  $U$ , and if  $p(x)$  is any propositional function with  $x$  ranging over the set  $U$ , then it is possible to associate with  $p(x)$  the (possibly empty) subset  $P$  of  $U$  which contains all elements  $x$  in  $U$  which when substituted into  $p(x)$  yield a true proposition. That is,  $P = \{ x \mid p(x) \text{ is true} \}$ . Sometimes such a set  $P$  is called the *truth set* of  $p(x)$ . When  $p(x)$  is a proposition (free of  $x$ ) which is true, then the truth set of  $p(x)$  is the universal set. The truth set of a false proposition is the empty set.

Clearly, if  $p(x)$  has truth set  $P$ , then  $\sim p(x)$  has truth set  $P'$ , the complement of the set  $P$ . Also, it is easy to convince oneself that the truth set of  $p(x) \wedge q(x)$  is  $P \cap Q$ , and that the truth set of  $p(x) \vee q(x)$  is  $P \cup Q$ ,  $Q$  being the truth set of  $q(x)$ .

These ideas can be related to the process of searching a system for all documents indexed by one term, say  $i$ , in the following way. If  $i(x)$  is the propositional function "x is indexed by  $i$ ," and if the universal set  $U$  is the collection of all documents being searched, then the object of such a search is to find the truth set  $I$  of the propositional function  $i(x)$ , the subset of all documents in  $U$  indexed by the term  $i$ .

Because of the natural correspondence between the negation, disjunction, and conjunction of propositional functions and the complementation, union, and intersection of sets, rather more complicated document searches can be broken down by means of set algebra.

For example, if  $i_1$  and  $i_2$  are the indexing terms "automation" and "libraries," respectively, then  $I_1 \cap I_2$ , the intersection of their truth sets, would contain those documents that have both indexing terms, automation and libraries, assigned to them. This set would contain documents about automation in libraries—a subject that is more specific than either of the two original index terms. Further specificity can be obtained by combining additional sets. If  $i_3$  is the index term "published in 1977," then  $I_1 \cap I_2 \cap I_3$  is a new set consisting of documents about automation in libraries published in 1977. Similarly,  $I_1 \cup I_2$  consists of those documents dealing with automation or libraries or both. In this case, a new set arises that represents a subject that has the same specificity or is less specific than the subjects represented by either of the sets alone. Again, more than two sets may be combined if desired. To continue with this example, the set  $I_2'$  (the complement of  $I_2$ ) would be the set of documents in the system that does not deal with libraries. In an actual search, one would be deluged with unwanted documents if one searched for the complement alone. Therefore, it is the practice to combine this with another set and to form the relative complement of one set with respect to another to get a set that is more specific than each of the sets alone. Thus,  $I_1 \cap I_2'$ , or  $I_1 - I_2$ , represents those documents dealing with automation except for automation in libraries, which is a subject more specific than either automation or libraries alone.

Unfortunately, the situation is somewhat more complicated for truth sets when

the conditional and biconditional connectives are used. Since  $p(x) \rightarrow q(x)$  is true for all  $x$ 's except those for which  $p(x)$  is true and  $q(x)$  is false, its truth set must be  $(P \cap Q)'$ , or  $P' \cup Q$  (using De Morgan's Rule), with  $P$  and  $Q$  being the truth sets of  $p(x)$  and  $q(x)$ , respectively. Also,  $p(x) \equiv q(x)$  is true in two cases, when both  $p(x)$  and  $q(x)$  are true, and when both are false, so its truth set is  $(P \cap Q) \cup (P' \cap Q')$ , which after some manipulations becomes  $(P \Delta Q)'$ , the complement of the symmetric difference of the truth sets  $P$  and  $Q$  of  $p(x)$  and  $q(x)$ .

If a propositional function  $p(x)$  has the property that its truth set equals the universal set, then the predicate  $\forall x p(x)$  is true, and conversely. For example, if  $p(x)$  and  $q(x)$  are propositional functions, then the predicate  $\forall x [p(x) \vee q(x)]$  is true when and only when  $P \cup Q = U$ , where  $P$  and  $Q$  are their respective truth sets and  $U$  is the universal set. Similarly,  $\forall x [p(x) \wedge q(x)]$  is true when and only when  $P \cap Q = U$ , which really amounts to saying that  $P = Q = U$ , since both  $P$  and  $Q$  must be subsets of  $U$ . The predicate  $\forall x [p(x) \rightarrow q(x)]$  is true if and only if  $P' \cup Q = U$ , and this latter condition is equivalent to  $P \subset Q$ . In like manner,  $\forall x [p(x) \equiv q(x)]$  is true whenever  $(P \Delta Q)' = U$ , or  $P \Delta Q = \emptyset$ , and this is equivalent to saying that  $P = Q$ . Expressions involving the existential quantifier are true exactly when the respective truth sets are nonempty. For instance, to say that  $\exists x [p(x) \rightarrow q(x)]$  is true amounts to asserting that  $P' \cup Q \neq \emptyset$ .

It is possible to begin with a tautology (a proposition which is true regardless of the truth-values of its component parts) and deduce a corresponding theorem about sets by means of the considerations outlined here (cf. Ref. 35).

For example, regardless of the truth or falsity of a proposition  $p$ , the proposition  $p \vee (\sim p)$  is always true, and hence it is a tautology. Now let  $P$  be any subset of a universal set  $U$ , and let  $p(x)$  be the propositional function  $x \in P$ , where  $x$  ranges over  $U$ . Then, of course,  $P$  is the truth set of  $p(x)$ . Since  $\{p(x) \vee [\sim p(x)]\}$  is true for all  $x \in U$ , the predicate  $\forall x \{p(x) \vee [\sim p(x)]\}$  is true, so one deduces the obvious theorem about sets that  $P \cup P' = U$ .

The reader can check that  $p \rightarrow (p \vee q)$  is also a tautology, so if  $p(x)$  and  $q(x)$  are any propositional functions, then  $\forall x \{p(x) \rightarrow [p(x) \vee q(x)]\}$  is true. If  $P$  and  $Q$  are any subsets of  $U$ , and if  $p(x)$  is  $x \in P$  and  $q(x)$  is  $x \in Q$ , then the above considerations show that either  $P' \cup (P \cup Q) = U$ , or that  $P \subset P \cup Q$ .

In Ref. 35 (page 161) is found the tautology

$$(\sim[p \equiv q]) \equiv (p \equiv \sim q)$$

For any propositional functions  $p(x)$  and  $q(x)$ , this tautology permits the assertion

$$\forall x \{ (\sim [p(x) \equiv q(x)]) \equiv [p(x) \equiv \sim q(x)] \}$$

Again, letting  $P$  and  $Q$  be arbitrary subsets of  $U$  with  $p(x)$  being  $x \in P$  and  $q(x)$  being  $x \in Q$ , one can conclude the set-theoretic result that  $P \Delta Q = (P \Delta Q)'$ . This is essentially Formula B' on page 162 of Ref. 35. Also, since the truth set of  $\{. . .\}$  is  $[(P \Delta Q) \Delta (P \Delta Q)']'$ , the set identity  $[(P \Delta Q) \Delta (P \Delta Q)']' = U$  follows. After some manipulations (which by now the reader is equipped to carry

out) replacing  $P \Delta Q$  by its equivalent form  $(P \cap Q') \cup (Q \cap P')$ , this expression reduces to Formula B'' on page 162 of Ref. 35.

### Cartesian Products, Relations

The familiar process of "plotting points" to draw a graph involves locating a point by means of its  $x$  coordinate and its  $y$  coordinate, the point itself being designated by a so-called ordered pair  $(x,y)$  of numbers. Ordered pairs can be defined in a more general context in the following way.

If  $A$  and  $B$  are sets, and if  $a \in A$  and  $b \in B$ , one can form the set  $[\{a\}, \{a,b\}]$ . Such set is called the *ordered pair*  $(a,b)$ . The term  $a$  of this ordered pair is called its first coordinate, and the term  $b$ , its second coordinate. Thus, if  $A$  and  $B$  are the sets of all integers, the ordered pair  $(2,3)$  is the set  $[\{2\}, \{2,3\}]$ , while  $(3,2)$  is the set  $[\{3\}, \{2,3\}]$ . According to this definition, two ordered pairs are equal exactly when they have the same first coordinates and the same second coordinates.

The *cartesian product* of two sets  $A$  and  $B$  is the set consisting of all ordered pairs  $(a,b)$ , where  $a \in A$  and  $b \in B$ . The notation  $A \times B$  is used to denote such a cartesian product. For example, if  $A = \{a, b, c\}$  and  $B = \{4, 5\}$ , then the cartesian product  $A \times B$  is the set  $[(a,4), (a,5), (b,4), (b,5), (c,4), (c,5)]$ .

If  $A$  and  $B$  are sets, any subset of  $A \times B$  is called a *relation* from  $A$  to  $B$ . A subset of  $A \times A$  is a (binary) relation on  $A$ . Relations are often designated by letters:  $R, S, T, \dots$ . If  $R$  is a relation from  $A$  to  $B$ , it is sometimes convenient to write  $x R y$  instead of  $(x,y) \in R$ , and  $x \not R y$  in place of  $(x,y) \notin R$ .

For example, let  $N$  be the set of all whole numbers. If  $S$  is the subset of  $N \times N$  defined by  $(x,y) \in S$  if and only if  $x$  is less than  $y$ , then one could write  $4 S 5$ , since  $(4,5) \in S$ ; but  $6 \not S 4$ , since  $(6,4) \notin S$ . Of course, since the defining property of  $S$  is a well-known concept with its own notation, normally this relation is described by  $x < y$  instead of  $x S y$ .

It has been found that, among all possible relations on a set, those having some of the following properties are of special interest. A relation  $R$  on a set  $X$  is said to be

Reflexive exactly when for all  $x \in X$ ,  $x R x$

Symmetric if for all  $x$  and  $y$  in  $X$ ,  $x R y$  implies that  $y R x$

Transitive if for all  $x, y, z$  in  $X$ , if  $x R y$  and  $y R z$ , then  $x R z$

Antisymmetric when for all  $x$  and  $y$  in  $X$ , if both  $x R y$  and  $y R x$ , then  $x$  and  $y$  are equal

The relation  $S$  given above, the less-than relation, has only one of these properties: transitivity. Ordinary equality possesses all four properties, while the relation of set inclusion on the power set of any set has the reflexive, transitive, and antisymmetric properties.

Of the various kinds of relation that can be considered using these properties, equivalence relations and order relations are discussed in the following sections.

### Equivalence Relations and Partitions

There are many relationships between objects which, when viewed in a certain way, resemble ordinary equality of numbers. Notions such as books belonging to the same class in the Library of Congress (LC) classification scheme, human beings having the same mother, and plane triangles being similar—all these share common properties which can be subsumed under the abstract concept of “equivalence relation.”

An *equivalence relation* on a set  $X$  is any relation on  $X$  which is reflexive, symmetric, and transitive.

A moment's reflection will show that the relation of ordinary equality is an equivalence relation on any set. The three examples mentioned here also define equivalence relations on appropriate sets. For example, if  $X$  is the set of all books in the Library of Congress, define the relation  $C$  on  $X$  by saying that  $x C y$  if and only if  $y$  belongs to the same LC class as  $x$ . It is easy to see that the relation  $C$  is reflexive, symmetric, and transitive. Likewise, if  $H$  is the set of all living human beings, one can consider a relation  $M$  on  $H$  defined by  $x M y$  if and only if  $y$  has the same mother as  $x$ . Clearly  $M$  possesses all three of the requisite properties of an equivalence relation. Similar remarks hold for the relation of similarity when applied to the set of all plane triangles.

Let  $R$  be an equivalence relation on a set  $X$ . To each element  $x \in X$ , associate a subset  $[x]$  of  $X$  consisting of all elements of  $X$  which are in relation  $R$  to  $x$ . The set  $[x]$  is called the *equivalence class* of  $x$ . Thus,  $[x] = \{ y \mid y \in X \text{ and } x R y \}$ . Any element of an equivalence class is called a *representative* of the equivalence class. For example, if  $x$  is the book *A Survey of Modern Algebra*, in the Library of Congress, then relative to the equivalence relation  $C$  above, the equivalence class of  $x$  would be the set of all books in the QA class (Mathematics). The set of all equivalence classes arising from an equivalence relation  $R$  on a set  $X$  is called the *quotient set* of  $X$  by  $R$ , and it is denoted by  $X/R$  (sometimes read “ $X$  modulo  $R$ ”). The quotient set of  $X$  by  $R$  is a subset of the power set of  $X$ . Such a quotient set has three basic properties: (1) each equivalence class is nonempty, (2) two equivalence classes are either identical or disjoint, and (3) the set  $X$  is the union of all equivalence classes. To illustrate these properties, consider again the relation  $C$  on the set of all books in the Library of Congress. There are no empty classes in LC, so property (1) holds. The classes do not overlap, so property (2) is true. The set of all books in the Library of Congress consists of the union of all sets of books in each of the LC classes, so property (3) follows also.

Interestingly enough, the above process can be reversed by beginning with a certain kind of collection of subsets of any nonempty set and arriving at an equivalence relation on that set. A collection of subsets of a nonempty set  $X$  is called a *partition* of the set  $X$  if three properties hold: each subset in the collection is nonempty; given any two subsets in the collection, they are either identical or disjoint; and the set  $X$  is equal to the union of all sets in this collection.

For example, if  $X = \{ a, b, c, d, e \}$ , and if  $A_1 = \{ a, c \}$ ,  $A_2 = \{ b \}$ , and  $A_3 =$

$\{d, e\}$ , then the collection  $\{A_1, A_2, A_3\}$  is a partition of the set  $X$ , as can easily be checked. Now define a relation  $R$  on this set  $X$  by saying that  $x R y$  if and only if  $y$  belongs to the same subset  $A_1, A_2$ , or  $A_3$  of  $X$  that  $x$  does. For instance,  $a R c$ , while  $b \not R e$ . By checking all possible cases, one can see that the relation  $R$  has the three properties required of an equivalence relation. Furthermore, relative to this equivalence relation, the equivalence classes are given by  $[a] = [c] = A_1$ ,  $[b] = A_2$ , and  $[d] = [e] = A_3$ .

More generally, it can be shown that given any partition of a nonempty set  $X$ , if a relation  $R$  on  $X$  is defined by  $x R y$  when and only when  $y$  belongs to the same subset in the partition of  $X$  that  $x$  does, then  $R$  is an equivalence relation on  $X$ , and the equivalence classes defined by  $R$  are exactly those subsets of  $X$  which are given by the original partition.

### Partial Orders

When a set of numerical data is arranged according to size, the set can be considered to have imposed upon it an "ordering" of some kind. If a collection of subsets of any set is arranged according to set inclusion, the result is again an ordering of this collection. (Of course, there may be pairs of subsets in the collection which cannot be compared to each other under this ordering.) Hierarchical classification schemes exhibit an ordering of their terms. Although these "ordered sets" differ in many aspects, their common structure can be subsumed under the notion of another kind of relation on a set, a "partial order." It turns out that partial ordering of a set is a generalization of the relation "less-than or equal" for numbers, so relations which are partial orders are often designated by some notation suggestive of this fact, instead of by capital letters as in the previous two sections. In the following discussion, the symbol  $\leq^*$  is used for an order relation on a set.

### POSETS

A *partial order* on a set  $X$  is a relation  $\leq^*$  on  $X$  which is reflexive, transitive, and antisymmetric. Thus, for all  $x \in X$ ,  $x \leq^* x$ ; for all  $x, y, z \in X$ , if  $x \leq^* y$  and  $y \leq^* z$ , then  $x \leq^* z$ ; and for all  $x, y \in X$ , if  $x \leq^* y$  and  $y \leq^* x$ , then  $x = y$ . A set  $X$  together with a partial order  $\leq^*$  is usually called a *partially ordered set*, or *poset*. Notice that in the definition of a poset  $X$  it is not required that every pair of elements  $x$  and  $y$  in  $X$  be related to each other. Posets in which it is the case that for every pair  $x$  and  $y$  either  $x \leq^* y$  or  $y \leq^* x$  are called *linear orders*, or *simple orders*, or *chains*. While the usual ordering of numbers by the relation  $\leq$  is an important example of a chain, there are many useful instances in which a poset is not a chain. For example, in an information retrieval system, to relate terms by saying that one includes another imposes a partial order on the set of all terms, yet there clearly are unrelated terms in such a system.

If  $X$  and  $Y$  are posets partially ordered by  $\leq_X$  and  $\leq_Y$ , respectively, their car-

tesian product  $X \times Y$  becomes a poset if a relation  $\leq^*$  is defined on it by agreeing that  $(x_1, y_1) \leq^* (x_2, y_2)$  if and only if  $x_1 \leq_x x_2$  and  $y_1 \leq_y y_2$ . The resulting partially ordered set is called the *cardinal product* of the posets  $X$  and  $Y$ . This can be extended to any finite number of posets.

Finite posets can be displayed by means of their "Hasse diagrams," which indicate a finite sequence of upwardly directed arrows from each element to those to which it is related. Figures 6–11 illustrate some of the possibilities.

Figure 6 displays a partial ordering of the power set of  $X = \{a, b, c\}$ , partially ordered by set inclusion. Subsets of  $X$  which are related this way are joined by a finite sequence of upwardly directed arrows. Observe that the subsets  $\{a, b\}$  and  $\{b, c\}$ , for example, are not related in this partial ordering of  $2^X$ .

Figure 7 represents the ordering of the set  $\{2, 3, 4, 6, 8, 12\}$  by the relation of divisibility. That is,  $x \leq^* y$  if and only if  $x$  is a divisor of  $y$ . The reader can check that this is indeed a partial order on this set.

Figures 8, 9, and 10 represent other types of partial order on the sets indicated. They are referred to below.

Figure 11 displays the factors of 18 ordered by divisibility, as in Figure 7.

In a poset  $X$  with partial order  $\leq^*$ , if  $S$  is any subset of  $X$ , an element  $b$  of  $X$  is an *upper bound* of  $S$  if  $x \leq^* b$  for all elements  $x$  in  $S$ . In Figure 7, if  $S = \{2, 3\}$ , then both 6 and 12 are upper bounds of  $S$ . On the other hand, for the same example, the subset  $\{8, 12\}$  has no upper bounds. Among the possible upper bounds of a subset  $S$ , if any exist, there may be one such that, relative to the partial order, it is "least." An element  $c$  in a poset  $X$  is the *least upper bound* of a subset  $S$  of  $X$  if  $c$  is an upper bound of  $S$  and if  $b$  is any upper bound of  $S$ , and then  $c \leq^* b$ . Similar considerations give the notions of the *lower bound* of a subset of a poset and the *greatest lower bound* of a subset of a poset. It is a consequence of the anti-symmetric property that greatest lower bounds and least upper bounds of subsets are unique, whenever they exist.

## LATTICES

A *lattice* is a poset  $X$  having the additional property that for every pair  $x, y$  (of elements of  $X$ ) the set  $\{x, y\}$  has a least upper bound and a greatest lower bound in  $X$ . One commonly writes  $x \vee y$  for the element which is the least upper bound of  $\{x, y\}$ , and  $x \wedge y$  for the element which is the greatest lower bound of this set. Figures 6, 8, 9, 10, and 11 are lattices.

It can be shown that the cardinal product of two lattices is itself a lattice (36), or more generally, that the cardinal product of any finite number of lattices is a lattice. This notion has been used by Mooers to produce a mathematical model of language symbols (37).

Figure 6 is a special case of the more general result that the power set of any set is a lattice when the power set is ordered by set inclusion. When ordered this way, it turns out that for the elements  $A$  and  $B$  of the power set (subsets of the given set),  $A \vee B$  is  $A \cup B$ , and  $A \wedge B$  is  $A \cap B$ .

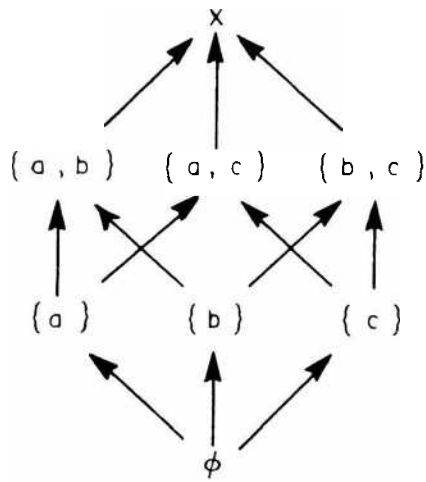


FIGURE 6.

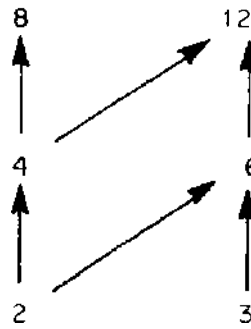


FIGURE 7.

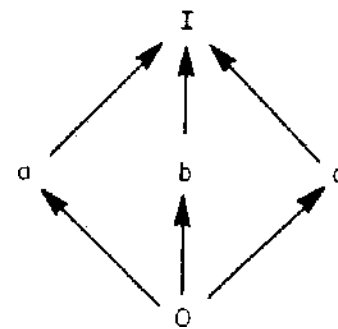


FIGURE 8.

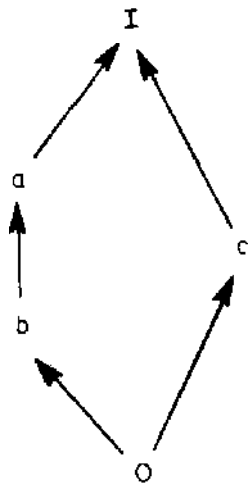


FIGURE 9.

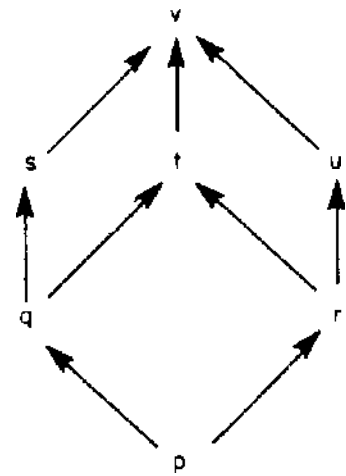


FIGURE 10.

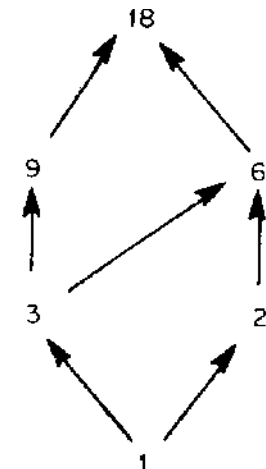


FIGURE 11.

Since the collection of all subsets of a given set is a lattice, it seems natural to investigate which assertions about the algebra of sets are also true in lattices.

A lattice is said to be *distributive* if for all elements  $x, y,$  and  $z$  in it,  $x \wedge (y \vee z) = (x \wedge y) \vee (x \wedge z)$ . It turns out that this property is equivalent to the “dual” property that  $x \vee (y \wedge z) = (x \vee y) \wedge (x \vee z)$ . While the lattice of subsets of a set is a distributive lattice, according to the identities of Table 1, neither Figure 8 nor Figure 9 is a distributive lattice. For Figure 8, observe that  $a \wedge (b \vee c) = a \wedge I = a$ , while  $(a \wedge b) \vee (a \wedge c) = 0 \vee 0 = 0$ . In 1934 G. Birkhoff showed that a lattice which is not distributive contains at least one configuration like Figure 8 or Figure 9 as a “sublattice” (a subset of its Hasse diagram, ordered in the original fashion) (38).

The first distributive law for sets listed in Table 1 shows that if  $C \subset A$ , then  $A \cap (B \cup C) = (A \cap B) \cup C$ . A useful generalization of this in the context of lattice theory is given by the following concept. A lattice is said to be *modular* when for all elements,  $x$ ,  $y$ , and  $z$ , if  $z \leq^* x$ , then  $x \wedge (y \vee z) = (x \wedge y) \vee z$ . Every distributive lattice is a modular lattice, but there are modular lattices which are not distributive. For example, the poset given by Figure 8 is a modular lattice, as can be checked. However, Figure 9 gives a poset which is not modular, since  $b \leq^* a$ , while  $a \wedge (c \vee b) = a \wedge I = a$ , and  $(a \wedge c) \vee b = 0 \vee b = b$ . It can be shown that a lattice is nonmodular if and only if it contains a sublattice like that of Figure 9 (39).

The notion of a *semimodular lattice* is somewhat more complicated. A lattice is semimodular if for every triple of distinct elements  $a$ ,  $b$ ,  $c$  such that  $a$  and  $c$  are not comparable,  $b \neq a \wedge c$  and  $a \wedge c \leq^* b \leq^* a$ , there exists an element  $d \neq a \wedge c$  satisfying both conditions  $a \wedge c \leq^* d \leq^* c$  and  $a \wedge (b \vee d) = b$  (40). Figure 10 is a semimodular lattice. It can be shown that every modular lattice is semimodular (41). However, by considering the sublattice of Figure 10 consisting of  $p$ ,  $q$ ,  $s$ ,  $u$ ,  $v$ , ordered as indicated, one sees that this example contains a sublattice like that of Figure 9, so it is not modular. Thus, there are semimodular lattices which are not modular.

The importance of nonmodular lattices in information retrieval was noted some years ago by Fairthorne (42). It may also be of interest to observe that the collection of all equivalence relations on a finite set  $X$  of  $n$  elements (or, equivalently, the collection of all partitions of  $X$ ) can be partially ordered by saying that for equivalence relations  $R$  and  $S$  on  $X$ ,  $R \leq^* S$  if and only if for all  $x, y$  in  $X$ , the assertion  $x R y$  implies that  $x S y$ . The resulting poset of equivalence relations is a modular lattice if  $n = 1, 2$ , or  $3$ ; but for  $n$  greater than  $3$ , it is a semimodular lattice which is not modular (43). This result suggests that the lattice structure of the set of all possible classification schemes which are partitions (nonempty, non-overlapping classes whose union is the whole set of documents) of a finite set of documents is semimodular but not modular if there are more than three documents in the collection.

When the collection of all subsets of any set  $X$  is considered as a lattice partially ordered by set inclusion, the subsets  $X$  and  $\emptyset$  play a distinguished role. In this lattice, the set  $X$  itself is the *greatest element* and the empty set is the *least element*. In general, a poset  $P$  has a greatest element  $I$  if for all  $x \in P$ , one has  $x \leq^* I$ . Similarly, a least element  $O$  of a poset  $P$  has the property, that  $O \leq^* x$  for all  $x \in P$ . Figures 6, 8, 9, 10, and 11 are posets which have both least and greatest elements. Because of the antisymmetric property, if a poset has a least element, it is necessarily unique. The greatest element, if it exists, is unique also.

In the algebra of sets, each subset of a universal set has a complement. This notion carries over to lattices in the following way. For a lattice with both  $O$  and  $I$  elements, a *complement* of an element  $x$  is an element  $y$  such that both  $x \vee y = I$  and  $x \wedge y = O$ . A *complemented* lattice is one in which every element has a complement (at least one). For example, the lattice given in Figure 8 is a complemented lattice. Note that in this example, the element  $a$  has two complements,



$b$  and  $c$ . It can be shown that in a distributive lattice with  $O$  and  $I$  elements, complements of elements are unique whenever they exist (44). (Of course, the lattice shown in Figure 8 is not a distributive lattice.)

## BOOLEAN ALGEBRAS

A complemented distributive lattice is called a Boolean algebra (or Boolean lattice). Boolean algebras developed from the study of formal logic begun by Boole in the 1840s (45). The collection of all subsets of any set, when considered as a lattice ordered by set inclusion, is a Boolean algebra. Every finite Boolean algebra can be represented in an equivalent form as the power set of some finite set. (Technically speaking, it is "isomorphic" to the Boolean algebra of all subsets of a certain finite set, Ref. 46. In fact, M. H. Stone, Ref. 47, has shown that any Boolean algebra is isomorphic to a "ring of sets.") Thus, the number of elements in a finite Boolean algebra must be a power of 2.

Elements of a Boolean algebra satisfy identities like those indicated in Table 1 for sets. By formally replacing  $\cup$  by  $\vee$ ,  $\cap$  by  $\wedge$ ,  $\emptyset$  by  $O$ ,  $U$  by  $I$ , and  $\subset$  by  $\leq^*$ , and by denoting the complement of an element  $x$  by  $x'$ , one obtains true statements for any Boolean algebra from these identities. Often, Boolean algebras are defined in terms of a collection of axioms based on these identities, instead of by explicitly mentioning their lattice structure. For instance, a set  $X$  with two distinguished elements  $O$  and  $I$  and two binary operations,  $\vee$  and  $\wedge$ , is a Boolean algebra if all of the following properties hold: both operations are commutative, associative, and idempotent ( $x \vee x = x$  and  $x \wedge x = x$  for all  $x$ );  $x = x \vee (x \wedge y)$ ,  $x = x \wedge (x \vee y)$ ; the operation  $\wedge$  distributes over the operation  $\vee$ ; and for each  $x \in X$  there is an element  $x' \in X$  so that  $x \vee x' = I$  and  $x \wedge x' = O$  (48). See Refs. 35 and 38 for other algebraic characterizations of Boolean algebras.

The algebra of propositions—with the connectives "and," "or," and "not"—is also a Boolean algebra (49). This connection with logic provides an application of the identities of Boolean algebra to switching circuits (50), when, for instance, two switches in parallel represent the statement  $p$  or  $q$ , while two switches in series stand for  $p$  and  $q$  (51). The identities of Boolean algebra can be used in switching problems to design circuits with prescribed functions or to simplify such circuits without altering their functions.

Another kind of Boolean algebra arises by considering the set of all possible "Boolean functions" of  $n$  variables,  $x_1, x_2, \dots, x_n$ , which can be built up by using the three operations  $\vee$ ,  $\wedge$ , and  $'$ , where the elements  $x_1, x_2, \dots, x_n$  satisfy no additional identities except those implied by the axioms of a Boolean algebra (e.g.,  $x_1 \vee x_1' = I$ ,  $x_3'' = x_3$ ,  $x_7 \wedge x_7' = O$ , etc.). The resulting collection of expressions, the "free Boolean algebra" generated by  $n$  symbols, consists of  $2^{(2^n)}$  elements which form a Boolean algebra (52,53). Canonical forms for such Boolean functions can be developed and used to investigate relationships between functions. This is the basis of the analysis of document retrieval given by Mott, Artandi, and Struminger in Ref. 32, Chap. 10.

BROUWER ALGEBRAS

It has been suggested by Fairthorne that Boolean algebras might not provide the best models for information systems (54). As mentioned earlier, they are related to classical two-valued logic with its law of the excluded middle (the proposition  $p \vee \sim p$  is a tautology) and the perplexing conditional. (In classical logic, given any two propositions  $p$  and  $q$ , either  $p \rightarrow q$  is true or  $q \rightarrow p$  is true, so  $(p \rightarrow q) \vee (q \rightarrow p)$  is a tautology.) See Ref. 38, pages 189–195, and Ref. 2, Chap. 3, for further critical remarks. Fairthorne advocates consideration of the intuitionistic logic of Brouwer as possibly a more appropriate model (55). In 1952 the logician Lukasiewicz proposed an axiomatization of intuitionistic logic which has as a model what is now called a Brouwer algebra, or Skolem algebra, or implicative lattice (56).

For any two elements  $a$  and  $b$  in an arbitrary lattice  $L$ , let  $X = \{ x \mid a \wedge x \leq^* b \}$ . Then  $X \neq \emptyset$ , since  $b \in X$ . It may be that  $X$  has a greatest element  $c$ . If so, the element  $c$  has two properties:  $a \wedge c \leq^* b$ ; and for any  $x \in L$ , if  $a \wedge x \leq^* b$ , then  $x \leq^* c$ . A Brouwer algebra is a lattice having the property that for every pair of elements  $a, b$ , there exists such an element  $c$ , denoted by  $(a \rightarrow b)$ . (This should not be confused with the notation for the conditional connective for propositions.) It can be shown that in a Brouwer algebra, the element  $(a \rightarrow b)$  corresponding to each pair  $a, b$  is unique. Furthermore,  $x \leq^* (a \rightarrow b)$  exactly when  $a \wedge x \leq^* b$ . Every Brouwer algebra has an  $I$  element and is distributive. Brouwer algebras are generalizations of Boolean algebras in the sense that every Boolean algebra is a Brouwer algebra with the element  $(a' \vee b)$  playing the role of  $(a \rightarrow b)$ .

A simple example of a Brouwer algebra which is not a Boolean algebra is given by the lattice shown in Figure 11, the lattice of all factors of 18 ordered by divisibility. This lattice has 18 as its  $I$  element, and it also has 1 as its  $O$  element. To find  $(6 \rightarrow 3)$ , for example, let  $X = \{ x \mid 6 \wedge x \leq^* 3 \}$ . Then  $X = \{ 1, 3, 9 \}$ , so  $(6 \rightarrow 3)$  is 9.

One can show that any finite distributive lattice is a Brouwer algebra with a  $O$  element (57). In any Brouwer algebra with a  $O$  element, the *pseudocomplement* of an element  $x$ , denoted here by  $x^*$ , is the element  $(x \rightarrow O)$ . The pseudocomplement  $x^*$  is the greatest element of the set  $\{ y \mid x \wedge y = O \}$ . In a Boolean algebra, the notions of complement and pseudocomplement coincide, and  $x' = x^*$  for each element.

Pseudocomplementation resembles complementation in some ways. For example, it can be demonstrated that  $O^* = I, I^* = O, x \wedge x^* = O$ , and  $x \vee x^* \leq^* I$  for every element in a Brouwer algebra with  $O$  (58). On the other hand, it can be shown that in such Brouwer algebras, the condition  $x \vee x^* = I$  is equivalent to the lattice's being a Boolean algebra. Other properties of the pseudocomplement are:  $x \leq^* x^{**}$ ;  $x^* = x^{***}$ ; if  $x \leq^* y$  then  $y^* \leq^* x^*$ ;  $(x \vee y)^* = x^* \wedge y^*$  (a De Morgan-like rule); but  $x^* \vee y^* \leq^* (x \wedge y)^*$ .

The reader can verify that in the lattice shown in Figure 11,  $1^* = 18, 2^* = 9, 3^* = 2, 6^* = 1, 9^* = 2$ , and  $18^* = 1$ . Note that  $3 \leq^* 3^{**}$ , since  $3^{**} = 2^* = 9$ , for example, and  $3 \vee 3^* = 6 \leq^* 18$ .

For the reader with more mathematical background, another example of a

Brouwer algebra is given by the collection of all open sets in a topological space, ordered by set inclusion. Here,  $(x \rightarrow y)$  is the interior of the set  $x' \cup y$ , where  $x'$  is the set-theoretic complement of  $x$ . The pseudocomplement of an open set  $x$  is the set of interior points of the set-theoretic complement of  $x$ .

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## SHARED CATALOGING

See also: *Bibliographic Classification; Descriptive Cataloging; Format, Catalog; International Cataloging and International Standard Bibliographical Description; Library of Congress; Library Cooperation in the United States; National Library of Medicine*

For the last 100 years or so one of the preoccupations of the library profession has been to improve the cost efficiency and cost effectiveness of the cataloging process by making the results of the cataloging of an item in one library available to others. The reader is referred to the article by Hanson and Daily for a historical review (1). The major efforts—Library of Congress (LC) Catalog Cards, National Union Catalog, etc.—are well known and they are well described in that article. These systems were products of their time, using currently available and well-understood technology. They were, and are, successful.

It was only in the mid-1970s that it began to be appreciated that the LC Catalog Card system would break down under current conditions. This is, however, a good record for a system that has not changed fundamentally since its introduction in 1901, although its processing techniques were improved as technology changed (2). Even after the Library of Congress closes its own card catalog in 1980 it will continue to offer the service, although clearly the demand is diminishing.

The problem is that despite all the hard work, and even success, the technique necessary to effectively share cataloging was not available until the introduction of on-line computer services in the mid-1960s. Verner Clapp wrote in 1966:

For the day of centralized/cooperative processing seems to be here at last, and there is no stopping it.

Yet its time might have come so often before! Most of these efforts proved resounding failures; a few, great successes; but never before now (if even now) have all the needed elements been assembled for success. Indeed, what most impresses the observer as he looks back over the long history of centralized/cooperative processing is not the emergence of the idea—this has inflamed many imaginations over nearly two centuries—but the slow and arduous process by which the enabling conditions have been gradually recognized and gradually achieved. One is led to wonder whether even now we are capable of recognizing the important elements for the future development of these services . . . (3).

When this was written, the first work on on-line catalogs was being contemplated, work which later gave birth to shared cataloging. It is also interesting to note that for this achievement, it was necessary to perform some technical innovation.

### Definitions

There are two definitions of shared cataloging. The first is straightforward but the second requires some explication. The term “on-line shared cataloging” is used

to describe the condition in which two or more institutions combine their efforts to build a common catalog data base. This is a different process from: (a) "copy cataloging" (or "cataloging from copy"), in which one library uses catalog copy derived from another for its own *internal* purposes without reporting use of the data, or the holdings so described, to a "union list" or remote source; (b) "centralized cataloging," in which one central unit undertakes to catalog (and perhaps physically process) items on behalf of another, possibly satellite, library, and to supply the results to that library and maintain a union catalog (although it should be noted that such a centralized catalog may well use an on-line shared cataloging system); and (c) "cooperative cataloging," in which cataloging done independently is submitted to a central source for coordination and compilation into a combined catalog, for example, the National Union Catalog (NUC).

The resulting definitions are different from some earlier uses of the term "shared cataloging," but they do reflect current usage.

1. Shared cataloging: A component of the Library of Congress National Program for Acquisitions and Cataloging (NPAC) in which national and other local bibliographic entries for foreign (i.e., non-U.S.) publications are the basis for descriptive cataloging distributed by LC to research libraries participating in the program. In some cases, bibliographical descriptions are obtained in advance of publication.
2. On-line shared cataloging: A procedure in which two or more libraries or information centers cooperate in the joint, simultaneous creation of a common data base, by using cataloging data submitted by others, either in whole or in part, or by contributing original cataloging data for unique items not previously contained in the data base. The result of on-line shared cataloging is usually an on-line data base containing bibliographic descriptions and location holding data for participating libraries. It also provides a variety of off-line, batch-produced products, for example, machine-readable data tapes, catalog cards, and statistical reports.

### Description of LC NPAC Shared Cataloging

The NPAC shared cataloging program began in 1966, following the passage of Public Law 89-329, the Higher Education Act of 1965, Title IIc. Under that act, the librarian of Congress was charged with:

1. Acquiring, so far as possible, all library materials currently published throughout the world which are of value to scholarship; and
2. Providing catalog information for these materials promptly after receipt, and distributing bibliographic information by printing catalog cards and by other means. . . .

One stimulus for the passage of the law and the creation of the NPAC program was the mass of foreign material coming into research libraries under the P.L. 480 program. In the first years, funds were transferred from the Department of

Health, Education, and Welfare to support the program, but since 1972 the program has been supported by direct appropriations.

By 1975 the Library of Congress had established the following programs and centers:

1. Specialized NPAC Shared Cataloging Programs with 24 countries:
 

Australia	Italy
Austria	Japan
Belgium	Netherlands
Bulgaria	New Zealand
Canada	Norway
Czechoslovakia	Romania
Denmark	South Africa
Finland	Spain
France	Sweden
German Democratic Republic	Switzerland
German Federal Republic	U.S.S.R.
Great Britain	Yugoslavia
2. Nine shared cataloging centers outside the United States, in:
 

Barcelona	Paris
Florence	Tokyo
The Hague	Vienna
London	Wiesbaden
Oslo	
3. Three regional acquisition centers which publish accession lists for East Africa, Southeast Asia, and Brazil

The LC works closely with the book trade, compilers of national bibliographies, and book exporters and uses their local descriptive cataloging data; to these are added LC main entries and other necessary elements to complete the cataloging, and the format is made to conform to LC practice. The cards are marked with a symbol if the data source is a national bibliography. Cards are printed and distributed to participating libraries, which maintain depository files and report to LC on items ordered and received that are not found in the depository cards. In addition, cooperating libraries report on titles which appear in 14 countries not covered by NPAC (4-6).

The NPAC Shared Cataloging Program ran into some criticism from the House Appropriations Committee following a staff investigation report that claimed that the program had "not saved either time or money." But some of the criticism was apparently based on misunderstanding and perhaps unfamiliarity with the program (7), and certainly the program continued to grow.

Some change in cataloging practice was caused by the introduction of the International Standard Bibliographic Description (ISBD) and its adoption by some, but not all, of the contributing national bibliographies. As more bibliographies adopt ISBD, there will be less need for change, another step in the direction of Universal Bibliographic Control (UBC) (8). Another interesting example of the

international influence of aspects of shared cataloging was the Meeting of Experts on Shared Cataloging in Research Libraries, held in Strasbourg in 1972 and organized by the League of European Research Libraries (LIBER). The objects of the meeting were to define the relationships between the libraries and national bibliographies, to seek harmonization of West-European national programs, and to cooperate in order to create a European Library "in a position to have a set of documents from the Third World" (9). The United States and the LC were not represented at the meeting.

In 1973 Ishimoto reported on the impact of NPAC on university libraries and concluded that "there is no doubt this program has contributed a great deal towards reducing cataloging costs and increasing bibliographic compatibility with the Library of Congress" (10).

The program celebrated its tenth birthday on July 1, 1977, and it continues to change and expand. New agreements with Hungary and Ireland were announced in 1977 (11). In the year ended September 30, 1977, a record 116,000 NPAC titles were cataloged (12).

### Description of On-line Shared Cataloging

An on-line shared cataloging system is one which maintains a common data base for all its participants. They can draw cataloging data from the base for their own purposes, they can modify it or add purely local data if necessary, and they can contribute original data to the base for the common good.

The first on-line shared cataloging system to become operational was the Ohio College Library Center (OCLC). It commenced on-line operation in August 1971 (13), although it produced batch products earlier, in 1969.

There were some essential preconditions which had to be met before this achievement was possible. First, it had to be possible to communicate with a computer, on-line, from remote points—preferably with high speed lines and visual display CRT terminals rather than character by character using TWX-type techniques. Second, it was necessary for the computer to have large, high speed, random-access files, achieved by the development of disk storage. Sequential tape processing would be intolerable in an on-line situation. Third, it was necessary to develop an efficient index system and storage space allocation procedures to permit rapid access and efficient file utilization—not a trivial task. A component of this problem was the study of word compression techniques to produce efficient search keys for file access. Fourth, it was essential that there be a standard format and character set for the transmission of bibliographic data in machine-readable form, one that could be used by the system and understood by participants. Fifth, it was necessary to have efficient peripheral devices which would allow the production of acceptable output products.

By the latter 1960s these conditions prevailed. The "third generation" computer was available from a number of manufacturers. Random access on-line techniques were attainable, and experience was being gained with such nonlibrary



tasks as airline reservation systems and military applications. The Library of Congress had concluded its MARC (Machine Readable Cataloging) experiments and in 1968 commenced weekly distribution of MARC tapes containing current LC cataloging data in the MARC II format (14).

Upper and lower case print trains were available, and later the print train sponsored by ALA was introduced. It also became possible to process output tapes through computer-output microfilm devices, or through computer typesetting systems, to produce acceptable book-form catalogs. Indexing systems were available from computer manufacturers as part of their software support (for example, the index-sequential system); but in use they proved to be barely adequate for handling large bibliographic files. One of the achievements of OCLC was its work on this problem.

Thus the conditions were set, but they did need to be sparked by the operational factors. These were found in the remarkable individuals at OCLC and the goals they established. In looking at the success of OCLC, it is important to remember the earlier work of Kilgour, its executive director, in the Columbia/Harvard/Yale Medical Libraries Computerization Project in the early 1960s (15,16). This project eventually foundered but the experiences gained were invaluable.

OCLC is perhaps the phenomenon of librarianship of the 1970s. As of August 1978 it had 4.2 million bibliographic records on-line, with an average response time of 8 seconds, and it served over 1,600 libraries through 2,189 terminals. It is perhaps fair to say that its success and that of other networks has given added impetus and credibility to the drive toward a national library network, and that it has changed the dynamics of that process.

OCLC is, of course, not the only on-line shared cataloging system (17). Other agencies in other parts of the country and in Canada also took, and are taking, advantage of the computer and telecommunications technology and have done fine inventive work. BALLOTS, at Stanford University, California (18,19); the Washington (State) Library Network (20); and the Ontario University Library Cooperative System (OULCS) Unicat System (21) are all operational. Each system is different, with facilities on one not available on the others, but fundamentally they fulfill the same operational goals.

One of the factors which led to the rapid growth and acceptance of OCLC was the fact that a number of regional consortia and networks turned to it for service—and, very important, the OCLC Board of Trustees decided to expand and provide these services. The first networks to sign contracts with OCLC were PRLC (Pittsburgh); the Cooperative College Library Center (Atlanta); NELINET (New England); Five Associated University Libraries (FAUL) (New York); the Union Library Catalog of Pennsylvania (Philadelphia), which later became PALINET; and the State University of New York (SUNY). In January 1978, 22 regional networks had contracts with OCLC. Hewitt describes the rationale behind the decision of Colorado Academic Libraries Book Processing Center to join OCLC (22). This description is typical of the thoughtful deliberations made by regional institutions before approaching OCLC.

The driving force behind all of the systems and their affiliates is primarily, al-

most purely, economic. It has been well demonstrated that massive improvements in cost efficiency and cost effectiveness of the cataloging operation can be obtained through participation in on-line shared cataloging networks.

Further, access to massive bibliographic on-line files improves acquisitions processing and searching, interlibrary loan, serials control, and subject access since the file is central to all these processes. The on-line systems have some of these added facilities or are designing and implementing them. Another vitally important byproduct of the system is the ability to generate management information about library collection development by discipline, form, imprint date, language, etc., through analysis of the tapes containing machine-readable input cataloging for libraries in the system. This is a very necessary function in days of straitened acquisition budgets, and when the total efficiency of the acquisition/selection process is being questioned (23).

The systems may also be used for deliberate attempts to create data bases dealing with specific disciplines, collections, or types of material which are dispersed through many libraries. The outstanding example of this process is the CONSER (Conversion of Serials) project. In this project, some 13 libraries and organizations—including the Library of Congress, the National Library of Medicine, the National Library of Canada, Cornell University, the New York State Library, SUNY, and the Minnesota Union List of Serials—are cooperating in a retrospective conversion of all serials with the deliberate intent of creating a National Serials Data Base (24,25).

Another interesting project which uses, in part, shared cataloging procedures is the COMARC (Cooperative MARC) project, which is testing the feasibility of sharing the labor of creating machine-readable bibliographic records. Seven institutions—Boston Theological Institute (BTI), the University of Chicago, Cornell University, Northwestern University, the 3M Company Library Systems, Washington State Library, and Yale University—are participating in the initial phase; others may join later. The OCLC output tapes are the source of COMARC records for three of the above participants (BTI, Cornell, and Yale), and some projected participants are expected to be OCLC users. The Library of Congress in turn is processing, validating, and updating the records submitted, and is distributing them as COMARC tapes through the MARC distribution services (26,27).

### **Problems of On-line Shared Cataloging**

Despite the success of on-line shared cataloging, there are problems which must be addressed. Some are perennial; some are new; others are fundamental but have lain dormant only to be awakened by the shared cataloging process.

As the process becomes more widespread and as communications technology allows librarians to think internationally, the question of technical and format standards becomes an imperative that demands early solution, as Avram has pointed out (28).

The whole question of quality control of the data base needs to be addressed. Aspects of this problem are:

1. What are the differences in efficiency and procedures between inspection control and quality control?
2. How can we solve the problem of acquiring definitions of authority standards in a timely, acceptable manner?
3. What are acceptable "performance" standards for cataloging data by record and by field within a record; and what are the acceptable costs associated with meeting these standards?
4. What is the appropriate sanction/reward procedure to attain quality data; and what are the appropriate network practices in administering such procedures?
5. What are the National Library and Information Service Network implications of quality control of bibliographic data? For example:
  - a. Cost of poor quality data
  - b. Loci of responsibility (and their relationship to industrial "lot inspection" procedures)
  - c. Communication among levels
6. What is the role of authority files, both name and subject, in the quality control of bibliographic data; and what procedures should implement the role?
7. What are the implications of quality control for individual library personnel policies and practices?
8. What are the appropriate error correction procedures in on-line quality control; and who has authority to change the file?
9. What are the future roles of the LC and other national libraries, and of the international bibliographic network, in the maintenance of quality control of bibliographic data?
10. What are the future roles of other producers of bibliographic data (e.g., A&I Services, the publishing industry) in the maintenance of quality control of bibliographic data?
11. What is the appropriate investment pattern to ensure the generation and maintenance of quality control procedures and high quality data for the national library system?

A further complication in the problem of maintaining quality control and lowering network costs is the forthcoming revision of the *Anglo-American Catalog Rules. AACR2*, due to be published in the fall of 1978, is to be adopted officially on January 1, 1981. Yet, at the time of this writing, the revision had not been seen by any save the few who have worked on it. There is a strict constraint on copying and revealing the content of the rules, and as of August 1978 it looked as if libraries and networks would have only 2 years to adopt policies and to change procedures and computer programs in accord with the new rules. No one knows what the impact of *AACR2* will be on on-line shared cataloging procedures, network costs, and, most important, the massive files which have been built under *AACR1*.

A question which lies at the center of cataloging is catalog format, and there has been much speculation on the impact of computers on format. Given multiple access points, particularly the ability to perform Boolean and character-string

searches of the text of the catalog record, how necessary is the "main entry/unit card" concept? Further, to what extent should the record be augmented with additional analytic and descriptive data to assist in retrieval? Many libraries are turning to COM catalogs (in both microfiche and microfilm), believing that their catalog maintenance problems will be solved by these processes, but little thought has been given to the format to be used. This writer suspects that after a few years, a massive, growing, COM catalog will be as unwieldy and costly a tool as librarians have devised, unless very careful consideration is given to format and maintenance problems.

One of the major undertakings of on-line shared cataloging networks is the training and retraining of library staff—professional and nonprofessional—in network procedures, including MARC tagging and terminal use. This effort has been largely unrecognized yet it is essential. The SUNY network, for example, estimates that over 70% of its total effort is spent in training. Networks have found that, by and large, librarians were quite unprepared for on-line shared cataloging. Few catalogers, for example, had probed the MARC format before having to use it, and few administrators had sought out the potential of new technology to solve library problems. Formal library education has also been slow to appreciate the importance of on-line shared cataloging in library education. Few library schools have terminals or offer appropriate training, even in 1978—7 years after the first demonstration of on-line shared cataloging and a decade after the commencement of the MARC tape distribution service. Yet the MARC format and the International Standard Bibliographic Description have had a fundamental impact on cataloging theory and practice. It is only fair to say, however, that the basics are being taught at an increasing number of schools.

Another interesting byproduct of on-line shared cataloging is the need it has created for a specialist network staff, with unique skills, largely self-taught or learned on the job. For this, librarians draw upon cataloging theory and practice; telecommunication, computing, training, and communication skills; and on administration practice, systems design and analysis, etc.

#### **Future of On-line Shared Cataloging**

On-line shared cataloging is an established process which has touched the operation of many libraries. In doing so, it has challenged many hallowed assumptions and raised many new problems. It is interesting to see the way it is affecting different library activities, and how it has broken some of the arbitrary divisions within libraries.

Although on-line shared cataloging is established, it is still a very new baby and will continue to grow and change quite rapidly for the next decade, particularly as the problems noted in this discussion are addressed. It is probably reasonable to expect that with the implementation of on-line subject access, the true on-line catalog, replacing the card catalog, will be attained within the next decade.

It certainly seems that computer technology will continue to be adequate for the

massive files and traffic expected, even though some components are close to "state of the art" already. The economics of on-line shared cataloging, with one central source (of both equipment and expertise) serving many users, is well established and probably cannot be challenged. It does seem, however, that some functions—for example, circulation or maintenance of regional serials union lists—may well devolve into a subsidiary network surrounding major bibliographic centers.

By far the most absorbing question is the way in which the present and developing systems can combine into a national network of on-line shared cataloging or a national on-line catalog. There seem to be few technical barriers to realizing this possibility, and the problems are being addressed, through the leadership of the Library of Congress, NCLIS, the Council on Computerized Library Networks, individual networks and institutions, and the information industry. Precedents for this type of system exist; for example, in the Advanced Research Projects Agency network. This leaves the final question, which is one of finance and politics: Can the components and strengths which are available at different sites be harnessed together for the common economic good? On the basis of the dramatic rise of shared cataloging, the momentum of its development, and the sheer economic necessity of changing procedures and techniques, one must expect that they will be, and that these developments will place the on-line shared catalog at the center of library activity.

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## SHAW, RALPH ROBERT

Ralph Robert Shaw (1907–1972) was born in Detroit on May 18, 1907, son of Max and Pauline Sandburg Shaw. In 1928 he received an A.B. from Adelbert College of Western Reserve University; in 1929, a B.S. and in 1931 an M.S. in Library Science from Columbia University; and in 1950, a Ph.D. from the University of Chicago with a dissertation on *Literary Property in the United States*. In 1929 he married Viola Susan Leff (d. 1968), and in 1969 he married Mary McChesney Andrews. Both marriages were without issue.

While an undergraduate at Western Reserve, Shaw worked in the Science and Technology Division of the Cleveland Public Library, an initial paraprofessional experience which was, in his own opinion, heavily determinative for his subsequent career. While working on his B.S. at Columbia, he was an assistant in the Reference Department of the New York Public Library. Once qualified with a library science degree, he was employed in the Engineering Societies Library in New York as assistant and then chief bibliographer under the late Harrison W. Craver. During this period Shaw prepared his first book, a translation of Georg Schneider's *Theory and History of Bibliography* (Columbia University Press, New York, 1934), a work characterized by Shaw's genius for grasping and interpreting essential ideas but with less than meticulous attention to detail.

His record at the Engineering Societies Library as a scholarly and practical bibliographer, with a keen sense of service to specific interests of patrons, won him the appointment as director of the Gary, Indiana, Public Library. Here he developed services which were effectively adapted to the needs of that steel-mill community in the latter 1930s.

To the surprise—indeed, to the dismay of some old-line librarians, Shaw won the appointment as U.S. Department of Agriculture (USDA) librarian in 1940 on the basis of a strictly objective review of his qualifications by an examining board. He had already established a solid reputation as an unswatatable gadfly in the American Library Association; he was a perceptive and informed critic of the professional library establishment and many of its shibboleths. In Washington, Shaw began to apply the principles of industrial management which had been obvious throughout the first decade of his professional experience. Characteristic was his assembly-line organization of the *Bibliography of Agriculture*, the monumental and abiding point of departure for all agricultural research for the past three decades. During his tenure at the USDA Library (1940–1954), he developed and put into practice his seminal notions about library technology (and what it can learn from other areas of organized human productivity), professional organization (with special reference to the ALA), scholarly publication, and library education.

In 1954 Shaw left the USDA to serve as professor in the new Graduate School of Library Service at Rutgers University, where he remained for the next decade. (He was named dean for the years 1959–1961, to satisfy administrative necessity rather than any long-since unnecessary need for recognition.) His long-term interest in library education had started in the summers of 1936 and 1937 when he was an instructor at Columbia; he continued there in 1951, and at Western Reserve

in 1953. Despite his reputation as a technocrat, Shaw was a firm believer in the humane tradition of librarianship. He interpreted it for many a student who was to pass into the "establishment" of the '60s and '70s—with the message that machines are useful only to free humans for creative rather than routine work.

By 1964 Rutgers was firmly established as a major library school, and Shaw was a millionaire from his Scarecrow Press (*infra*). He accepted a call from the University of Hawaii to serve as dean of library activities, and in the next 4 years he established a solid basis for library service in the university of a burgeoning new state. He became professor emeritus at Hawaii in 1969. His Nokaoi Press in Honolulu was a typical venture conceived by an always active intellect. It permitted him to indulge his genius in an aspect of printing and publishing on a totally different scale from that of Scarecrow, by then a major scholarly publisher. After a long illness, a period when Shavian wit and wisdom was patiently and tolerantly passed on to those who were fortunate enough to have been his intimates, he died on October 19, 1972.

Shaw's advice and participation was solicited by nearly all who came into contact with him and recognized his consummate skill in handling organizational and technical problems. Honors, advisory positions, board memberships, national and international consultantships, and many other services are recorded in *Who Was Who in America*. Shaw's stubborn dedication to his notions about the rational solution of the problems of bibliography and dissemination of information made him less than beloved to many library traditionalists. His success at Gary, the USDA, Rutgers, and Hawaii convinced even those annoyed by an often abrasive presentation of new ideas that his theories were sound, and that his practical execution of them was thorough and successful.

Shaw's contributions to information science were built around the notion that man's potentials can be developed most effectively by eliminating those chores that are unworthy of the dignity of human effort. Thus in 1950 his Rapid Selector was revealed, a device for codification and retrieval of subjects in a given field by the use of roll film. It was a primitive machine in many respects, but one that is likely to be considered as seminal by future students in the field. Demands on his time by those who recognized his competence, and his own thinly spread interests, prevented him from developing many other promising ideas for the mechanization of information science. A single example of Shaw's enormous store of ideas is a camera with infinitely variable advance and automatic developing (patented February 21, 1956). Other notions about facsimile transmission, extreme reduction in microforms, multinational union catalogs, and much else—all based on the solid experiences of modern industrial rationalization and a practical sense of their application to information science—were constantly fermenting in Shaw's busy mind.

Shaw could have been but was not a superior and meticulous research man. *Literary Property in the United States*, an early Scarecrow Press imprint, pulled together a miscellaneous selection of source materials that define literary property and illustrate its protection; yet they were selected with a sure instinct for the essential. Virtually a fiasco was the project for a manual to describe comprehensively "The State of the Library Art," which was handsomely financed by the Council on Library Resources and planned as an updating and improvement on the *Handbuch der*



*Bibliothekswissenschaft*. It is a pathetic torso, uneven and poorly edited (even with one author's name incorrectly spelled on the title page).

The early history of the Scarecrow Press (so-called because it was first operated out of Shaw's home and had no overhead) was based on a fundamentally sound idea that scholarly works could be published in small editions with less expense than that incurred by heavily subsidized university presses. The first imprint, Reuben Peiss's translation of Alfred Hessel's *A History of Libraries* (1950) was a poor selection from the standpoint of the quality of both the original and the translation, but it proved the point. Shaw was his own reader and editor and had too many irons in too many fires to give full attention to detail. Yet the press was successful and published many important works both under Shaw's active direction and later on. After a quarter of a century, Scarecrow has become one of the major publishers in the fields of bibliography and librarianship, and it still reflects Shaw's fundamental ideas about the services of a publisher to a profession. Also significant is the bibliographical publishing explosion in the wake of Scarecrow—with such firms as Shoe String, Whitston, and Libraries Unlimited, which surely have their ultimate inspiration in the Scarecrow Press.

Shaw served as ALA president in 1956/57. He was always dedicated to a strong professional organization; he operated within it when possible, outside it when advisable, and was insurgent when necessary. He never lacked respect for the genuinely creative members of the establishment, never failed to attack those who, in his opinion, were unproductive or self-seeking. In his role as chairman of the ALA Fourth Activities Committee, Shaw brought into full public view many of the weaknesses of the association. There were no answers to his solidly documented report. As ALA president he inspired full confidence in his own professional competence and dedication, above all in his ability to guide the association's administration in the policies that had been successful in Gary and at the USDA.

Shaw was a renaissance man in the best sense of the word, perhaps with some of the failings of a Cesare Borgia or a Cellini, but with much of the genius of an Aldus or a Leonardo. It is difficult to write about him with total objectivity, for his personality had many facets and was very complex in its expression. It is doubtful that any biography could reveal the whole man; yet, with the possible exception of the life of Melvil Dewey (one of Shaw's own two or three ideals in the library business), no biography could be more instructive for the library history of the United States, nay, of the world. But it must be handled with the perception for the essential that distinguished Shaw's own thinking, and with vastly more attention to detail than he himself ever gave.

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## THE SHEAF CATALOG

### Introduction

The late 19th century, for libraries as for so much else, was an age of invention. Libraries had begun to move away from their concern for pure custodianship, which was characterized at least in part by monolithic inventory-catalogs printed infrequently and with little bibliographic detail. The onset of general literacy and the rising tide of publication demanded greater uniformity and speed in the making of catalogs, and librarians' thoughts turned increasingly to consistent cataloging practice guided by codes of rules and to more flexible forms of the physical catalog itself, based on files of single entries. Such an attitude befitted an age that had given birth to the industrial philosophy of the production line.

The concern for technology of library innovation is reflected in a comment of Melvil Dewey's in *Library Notes* calling for:

... experiment, looking for something combining the obvious advantages of the cards in drawers, which are now the best plan, with the chart-like advantages of the large page, and with the economy of space which would allow more catalogs on a given floor space. *There is probably no more practical question under discussion* [emphasis added by the present author] (1).

Librarians had long maintained for themselves catalogs that were unit-entry files of paper slips, though only occasionally did they offer them for public use. Harvard tried a short-lived experiment in 1823, whose end seems to have been hastened by the same doubt that almost aborted it: the fear that readers might remove or disturb the slips. The keys to understanding the development of the physical forms of the catalog up to at least 1920 are the two factors just mentioned: the urgent need for an economically maintained catalog based on unit entries, and the fear that readers would remove the entries if they were not glued down or locked up. Hence the British Museum's "guard book" catalog of slips pasted into loose-leaf ledgers of daunting size; hence Charles Jewett's clay forerunner of the lino-type slug, from which he hoped to print continually revised universal bibliographies (2); hence that echo of the boardwalk, A. J. Rudolph's Elastic Indexing Machine (3); hence the card catalog, where the slips are made durable and can be locked in with a steel rod; hence also the sheaf catalog, in which the slips are regular paper and are locked into a small loose-leaf binder. With the production of card stock and catalog cards by the Library Bureau and the Library of Congress, the future of the card catalog was assured, though not without considerable and well-justified competition from the sheaf catalog, as the literature of the period attests.

If we consider the development of the card catalog as the success story, like the internal combustion engine for automobiles, then the sheaf catalog was the Stanley Steamer of catalog invention. It is tempting to continue the analogy, with the old printed catalog as the horse and carriage, and the guard book catalog as the electric brougham—especially since computer-produced catalogs, combining the guard

book objectives of movable unit entry and page-sized layout, reflect the revival of the ecologically preferable electric runabout. Even more tempting is to see Melvil Dewey as the Henry Ford of the card catalog—confirming its acceptability by the sheer weight of the American Library Association (ALA; of whose committee on catalogs Dewey was secretary) and the Library Bureau, and through the standardization of the  $7.5 \times 12.5$  cm card stock and then the production of catalog entries, first by the Library Bureau and later by the ALA. In 1901 the Library of Congress could hardly have produced catalog entries in any other form, and the sheaf catalog went the way of the Rudolph Indexer.

### The Early Sheaf Binder

The sheaf catalog first emerged in Leyden University, developed in 1871 by its librarian, Dr. W. N. Du Rieu (4). It was not described formally at the time in the professional literature, although the idea was used almost immediately in the French Bibliothèque National (5) and in the city library in Cassel, Germany (6). Later it was adopted by the Imperial Library in Vienna for a periodicals index (7). Justin Winsor visited Leyden in about 1871 and brought back the idea of the sheaf catalog to Harvard (8), as described by Lane at the White Mountain Conference (9). Also, in the early days of the Boston Public Library, Professor Jillson visited and reported on developments in several European libraries, including Leyden (8). But it was not until 1884 that Dr. Du Rieu wrote to the *Library Journal*, after “a brief and not very distinct description” by C. Ledyard Norton (10). The letter was read to the Lake George Conference and contained a characteristic description of the catalog:

. . . (a bookbinder) pushes 150 or 200 cards ordered as it must be justly together on the upper side and the left side; he folds round the right edge of the cards the parcel of parchment, which becomes the back of the volume; he puts them between the two pasteboards ready for this purpose; he puts all between two wooden boards of the same size, and places this in a small bookbinder's press, such a one as the binders use when they are gilding a book; he makes, with a nice saw that cannot cut deeper than one centimetre, a slice on the just spot determined by two slices in the wooden boards at both sides of the right end of the cards; he passes a little cord twice by these slices and knots twice the cord. On the back of the volume his number is fastened, and his content written, as you see (4).

The catalog was updated by cutting the cord, inserting new slips in the appropriate places, notching them in line with the existing slit, and tying on a new cord. Du Rieu mentioned that a previous experiment had used perforated entries, but it had proved difficult to punch the new entries (presumably he was referring to alignment with the earlier entries). It was precisely the punched paper slip, however, that became standard in sheaf catalogs, once the potential of prepared stationery was realized.

Few librarians relished the thought of the public handling bundles or books of

paper slips simply held together by string, though as late as 1894 a similar system was being proposed for a guard book catalog (apparently a priori) by H. W. B. MacKay of Cambridge, Massachusetts (11). The developments of the 1880s all favored a stout binding in which the slips were held by rods or screws. Torboss continued Du Rieu's idea of notched slips (12), but he held them in place by a telescopic screw clamp. D'Altemps of Turin bored a hole through the inner edge (i.e., toward one end) of a volume of slips, and held them together by a hollow cylinder in which a screw could be turned to hold the volume tightly (7). A more solid version of the D'Altemps method was proposed for the Victor Emmanuel Library in Rome by the bookbinder Aristide Staderini (13). Staderini's method used a stout binder of cloth boards with leather backs, held together with strong screws.

The methods described so far were so much based on the concern to lock or bolt the slips in binders for fear of accident or depredation that the binders could not be consulted easily by the reader, not even as readily as bound books. The Leyden and Torboss catalog volumes were difficult to open, as were the others when full and screwed together tightly; and even when half empty, the fixed binders handled sloppily and tended to close up by themselves. The first binder to allow easy consultation was developed by Giulia Sacconi-Ricci of the Marucellian Library in Florence (14), as an improvement of the sheaf binder invented by her father at the National Library in Florence (7). Her binder had the now customary metal cylinder and screws, but they were fastened to metal plates independent of the binder, so that the binding could be opened easily, as a book, and the slips could be clamped in place within the binder, no matter how few or how many there were, as in modern file binders. Although there continued to be new developments in sheaf binders, Sacconi-Ricci's overriding concern for ease of consultation was almost unique.

#### Later Sheaf Binder Development

A few further innovations occurred in sheaf binder design—mostly in England. James Duff Brown of Clerkenwell in London was as innovative, wide-ranging, and energetic in England as Melvil Dewey was in the United States. Brown proposed the "Adjustable Sheaf Catalog Holder" in 1892 (15,16). In this, the slips had L-shaped slots instead of holes, so that they might be hooked onto the binder rods without having to take the binder apart, and thus it returned to the tightly clamped form of the Leyden catalog. The Brown catalog binder appeared on the commercial market almost immediately, produced by Henry Evans of London (17). Arthur Lambert invented a very solid binder whose cover at the spine was of wood, with ordinary cloth-covered boards hinged on the wood about 1½ inches from the spine (18,19). The binder was so stout that a single brass pillar was sufficient to hold the slips in place. This pattern is still sold in England. Moore's Modern Methods, an office supply firm, developed a binder that attempted to allow ease of updating, like the Brown binder, but it also sought to avoid having to clamp the entries in place (20). It used four prongs, two entering from the front of the volume and two

from the back, so that an entry could be inserted easily at any place without taking any of the existing entries off the retaining prongs.

Librarians were concerned not only with the design of the individual binder but also with its placement and display in the library. Professor Otis Robinson of the University of Rochester devised a special display case with angled troughs, in which laced sheaf binders (rather like the punched and tied volumes abandoned in Leyden) were laid out open in rows, ready for consultation (21). H. C. Badger, curator of maps in Harvard College Library, had invented (like MacKay, apparently *a priori*) a "tube-nut" [*sic*] system of sheaf binders which he went on to place lengthwise in drawers in such a way that they could be swung up and around, to open like the telephone directories in some public booths (22).

Badger also asked why the sections of the catalog should not be placed in appropriate areas of the collection. This latter idea was taken up in detail by Mizpah Gilbert of the North Branch Library in Fulham, London (23), who also suggested using the whole of the binder spine (an area about  $4 \times 3$  inches) for a prominent display label. This suggestion was echoed 3 years later, in the same journal and without acknowledgment, by another London library (24). The idea was also used extensively in the Liverpool City Reference Library.

#### Inside the Sheaf Binder

Although in the early days some librarians agonized about the waste of space on sheaf catalog slips and advocated the inclusion of several titles under one author entry or several citations under the same subject heading on one slip (25), most librarians treated the sheaf catalog as containing single unit entries. All remarks here are based on the latter approach.

In fact, the available space on most kinds of sheaf catalog slips is roughly the same as on a standard catalog card. The average sheaf catalog binder was and is about 7 inches wide and 4 inches high. Allowing for the rigid end of the binder that clamps the slips, and for the smaller dimensions of the slips inside the binder, the available space is not much more than  $3 \times 5$  inches. Each binder holds about 500 slips, made of stout paper; card stock would be too stiff and intractable. It may thus be scanned much as a book catalog is scanned, and this is one of the advantages claimed for it. Further, since it locks up only 500 entries in one binder, its use may be spread among more users than the card catalog, which has perhaps 1,500 entries in a single drawer.

Another advantage claimed for the sheaf catalog is that its paper slips may be prepared on a typewriter with carbon copies, thus obviating expensive duplicating or printing techniques. But carbon copies smudge easily, and such a catalog is not viable outside a small and careful clientele.

The sheaf catalog emerged as a way of utilizing existing paper-slip catalogs, and for constructing manuscript catalogs in the period immediately before the introduction of printed catalog entries. The early manuals were concerned with the layout

of the entry itself, which logically must put the heading at the *right-hand* side of the slip if the sheaf binder is arranged normally from front to back. The entry may be laid out with the heading on the left-hand side, but then for visibility and easy handling, the slips should be filed in the binders the other way round: bound by the right-hand edge and filed from what was originally the back of the binder to the front. The left hand can then run them under the thumb for easy scanning. This was the practice in the Library of the University of Durham in England. The other concern of the early manuals was for an acceptable style of handwriting!

### Evaluations of the Sheaf Catalog

Between 1890 and 1915 many serious papers were written in support of the sheaf catalog, and they compared it favorably with the card catalog. For example, an article by Miss H. E. Green of the Boston Athenaeum provoked much interest and response (26), as did a similar article in England by the influential L. Stanley Jast (27).

A contemporary standard work on cataloging by Henry Quinn referred to the sheaf catalog as "preferable for public use" (28); although by 1930 Margaret Mann could say that "it will not find much favor in America as long as printed cards are used" (29). The advantages and disadvantages of the sheaf catalog as discussed in these papers, and as observed in the present writer's own experience, are as follows:

#### *Advantages*

1. Its single unit entry approach offers complete flexibility.
2. The book/loose-leaf binder form offers easy handling.
3. Its 500 entry limit on entries per binder means that one reader can monopolize only a small part of the catalog.
4. Its self-contained binder means that a reader need not physically block access to other parts of the catalog.

#### *Disadvantages*

1. Paper slips are more difficult to file into a sheaf catalog than cards in a card catalog.
2. Paper slips wear out more quickly than cards.
3. Carbon copies of paper slips have very short lives in even medium use.
4. Because the slips lie sideways, and are handled from the fore-edge end, it is difficult to include guide slips as general headings.

### The Use and Future of the Sheaf Catalog

As might be expected, the sheaf catalog became popular primarily in small and medium-sized public libraries, although Lake Forest and Harvard had been two of the earliest enthusiasts. In Great Britain there was early acceptance—perhaps because of the advocacy of J. D. Brown, and perhaps because of an awareness of the

need for economy in space and cost and because it was more customary for large English libraries to use the sheaf catalog. The Brotherton Library of the University of Leeds, the library of the University of Durham, and the Liverpool Public Library were all major users; some still use sheaf catalogs.

The Brotherton Library union catalog of the main and departmental university libraries contains approximately 1¼ million entries and grows at the rate of about 70,000–80,000 a year (30)—a telling demonstration that the sheaf catalog need not be limited to small collections. It is interesting to note that complementing the Brotherton's sheaf catalog is the Undergraduate Library's COM (computer-output-on-microform) catalog. The city of Liverpool has one of the largest public libraries in the United Kingdom, and its reference library has used a sheaf catalog since 1891. In 1954 the library reorganized to combine the lending and reference collections, and the sheaf catalog has included entries for both kinds of material (31).

The catalogs of some of the Regional Library Bureaux, clearinghouses for the British interlibrary loan system, were in sheaf form. They profited from the slightly larger area on a sheaf catalog slip by having a printed grid to indicate the location of items in the region. The British National Bibliography printed sheaf catalog slips, as it did standard cards, but the service was discontinued in 1970.

Despite the sheaf catalog's early popularity, long history, and continued use by some large and scholarly libraries, its future is limited. With the advent of computer-produced catalogs—whether printed, microform, or on-line—the sheaf catalog (as eventually may happen with the card catalog) will be confined to small operations with small collections, coupled with a need for economy and casual use.

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DAVID BATTY

## SHEFFIELD. UNIVERSITY OF SHEFFIELD LIBRARY

### Early History

The University of Sheffield was created by Royal Charter in 1905. Like other universities of its kind it was formed by the amalgamation of earlier institutions: the Medical School (1828); Firth College, founded by Sir Mark Firth as a college for

both arts and sciences and opened in 1879; and the Sheffield Technical School, opened in 1886 under the aegis of Sir Frederick Mappin, as an institution which would reflect the local importance of the applied sciences, especially in the steel industry. In 1887 the three departments were united as the University College of Sheffield, and since the new institution closely resembled the constituent colleges of the Victoria University (Manchester, Leeds, and Liverpool), it applied for membership in that body. The application was refused, however; and it was in any case not long before all the members achieved an independent existence with full university status.

The library, of course, existed from the earliest days, though in no very exalted form. The Medical School had a library, belonging to the Medical Society, as early as 1833. The library at Firth College was housed in the Hall of the College, and it was available only when the hall was not otherwise in use, for lectures, meetings, examinations, and social occasions. The cases were kept locked, and the books were obtainable only by application to the assistant librarian, who was employed full time by the university, although not exclusively in this role. The inadequacy of the library service, as early as 1903, can be judged from the following resolution of the University Senate in December 1903:

The Senate desires to draw the attention of the Council to the serious injury done to the work of the College by the diminution in the grants to the Library during the past few years. The grant last year was £40, or £35 below the usual amount. The annual cost of journals etc is about £35 a year, leaving a very small balance for new books and for binding, with the consequence that a number of books greatly wanted last year were deferred, whilst no binding was done. The accumulated deficiencies of former years are now pressing heavily on this year's resources. Towards some relief of this the Senate asks for an additional grant this year to the Library of £15. (quoted in A. W. Chapman. *The Story of a Modern University*, p. 164)

During the University College period the library's stock was built up chiefly by the devoted and skilled acquisition work (through begging and persuasion) of G. C. Moore Smith, professor of English language and literature from 1896 to 1924; but by 1905 the total stock approached only 10,000 volumes, compared with 60,000 at Liverpool. Moore Smith was powerfully aided in his campaign for better financial provision and larger accommodation by Sir Charles Firth, much of whose own library (almost 10,000 volumes, chiefly of historical works) eventually came to the University Library. In 1905/06 the university's income was some £30,000, and a special grant of £850 was made toward the stocking of the library.

As a base for the new university, new buildings were inaugurated on the Western Bank site in 1905. It had been intended that a new library should be a part of the initial building project, but, money having run out, the library was first housed in the General Lecture Room. However, on the day the new buildings opened, a gift of £10,000 for the new library was announced by Edgar Allen, a local businessman. A joint committee of Senate and Council was set up forthwith "to consider questions in connection with the new library," and the architect of the new site, E. M. Gibbs, was commissioned to design the building.

Drawing on his knowledge of current American libraries (seen during a visit

to the United States some years earlier) and on ideas gained from a tour of British libraries with Moore Smith, Gibbs devised an octagonal building. This was constructed southwest of the main building, to which it was connected by an open-sided corridor, to minimize the risk of fire. The consultant to whom the plans were submitted at the university's request suggested a rectangular plan, but the architect demolished the idea with a masterly analysis of library planning needs. The octagonal design allowed for quiet alcoves and central supervision and service; and the library could accommodate 100 readers and 20,000 volumes. The first design had to be modified because of expense, and the stack area beneath the reading room was left without shelves. It was expected that this stack space would ultimately provide for a further 80,000 volumes, but when installed in 1925 the shelving proved to hold only 60,000 volumes, with extreme inconvenience in access and use. A spiral staircase was the chief means of access, from the center of the octagonal floor above.

In 1907 the first full-time librarian was appointed, to permit Moore Smith to give all his time to his professional duties. In fact, the new librarian, Thomas Loveday, was also an academic. He had held a Chair of Philosophy in Cape Town, and eventually, after a succession of high academic posts, became vice-chancellor of Bristol University (1922–1944). He was succeeded as librarian in 1911 by A. P. Hunt, who previously served on the staffs of the Bodleian and Balliol College Libraries, and had been librarian of the Manchester Literary and Philosophical Society. Hunt remained as librarian until 1941.

During the 1920s severe economy measures had to be adopted by the university, primarily because of the failure of the public appeal, in 1920, for funds to develop the university. This was due chiefly to the general state of the country's economy, the "slump," and the coal strike of 1921. As a result, the library's recurrent funds were greatly reduced; and similar economies caused the problems with the two-tier stack mentioned above.

Toward the end of the 1920s Sir Charles Firth confirmed the gift of a large part of his own library, and storage immediately became once more a cause for concern. A special grant was made by the Town Trustees, and this was used to remodel the General Lecture Room, which in 1931 once more became a library, with a capacity for a further 20,000 volumes. The loss of this lecture room was keenly felt for years, but as the new History Library it made a particularly attractive and pleasant reading room. (It is now the Tapestry Room, used for all Senate and Council meetings.)

For the whole of the 1930s, pressure was being built up for extensions to the library's space. Since Firth Hall, the university's main meeting hall, was by that time too small for its purpose, the university's thinking throughout the decade focused on the possibility of converting it into a university library, and building a new, large hall elsewhere.

However, money was still extremely short, and a further appeal in 1936 failed to reach half the target figure. But by that time the library was already virtually full, and with an acquisition rate of some 5,000 volumes a year there was room for only a single year's purchases. A low-cost scheme, proposed by H. B. Leighton to pro-

vide a basement stack for 40,000 volumes beneath the History Library, was adopted and completed before the end of 1936.

In 1941 A. P. Hunt was succeeded by S. A. Peyton, then librarian of the University of Reading. Though it was wartime, planning was going on for postwar development. In 1944 and 1946 reports were made to the University Grants Committee, based on an increasing estimate of student numbers (from about 800 before the war to possibly 3,000 by 1956), and these included plans for a completely new library building. In the interim, widespread temporary and ad hoc changes in accommodation in the university included a two-tier stack in a large room belonging to the library.

In 1937/38 the Liverpool University Library had already been moved from Tate Hall to a new purpose-built library, the Harold Cohen Library. A decision to use the converted Firth Hall in Sheffield at this stage of library growth might have lost a generation of development; but fortunately the plan was never implemented.

### The New Library Building

It was not until 1953 that the architectural firm of Gollins, Melvin, Ward and Partners was awarded first prize in a competition for the layout and design of a large new area at Western Bank. The first installment of the prize-winning scheme to be built was the new library; and this was in fact the first important modern building to be completed by any English university since the war. In 1959, the year it opened, it was one of the biggest university library buildings in the country, after Oxford and Cambridge. By the middle of this construction period, in 1956, Dr. Peyton was succeeded as librarian by J. E. Tolson, who had been sublibrarian of the university since 1947.

The competition brief for the library design asked for a building life of 100 years, given an existing stock of 200,000 volumes and an annual intake of 8,000 volumes; that is to say, a total capacity of a million volumes. Seating capacity was to be 20% of the students based at the Western Bank area, or a total of 360 seats, excluding the periodicals reading area. However, before the building was completed, massive increases in student intake were agreed upon (4,500 by 1966, from 2,000 in 1956) which could not be accommodated within the existing plan, though 80 extra seats were incorporated on the stack floors. The library was therefore already short of seating space when it opened.

As a building the library is extremely attractive, with a strikingly pleasant view of a park from the Reading Room. It is of simple, rectilinear design, square in plan, with strongly emphasized horizontals in Portland stone dividing the low, glass-paneled elevations. The internal finishes and details are notably fine, blending marble, wood, stainless steel, and glass in a durable and distinguished whole.

As a working library, however, the new building suffers from a backward-looking philosophy of library provision, when judged beside subsequent university libraries such as those at Hull, Edinburgh, and Nottingham and the "new university" libraries. This is reflected in a rigidity of planning that defeats any attempts to

modify it. The Reading Room is lofty and contains only large, open tables, rather than a variety of seating. There are no carrels for research students and staff. The stacks are low ceilinged (7 ft., 3½ in.; 2,222 mm.); and they cannot be converted to other uses, though they were not fully shelved in 1959 and remained some 20,000 shelves below capacity in 1977. Library staff accommodation was inadequate in 1959, and almost immediately the Periodicals Reading Room had to be taken over for acquisitions and other administrative use.

The planned open-access shelving (130,000 volumes, 13% of the capacity) is entirely in the Reading Room, though the topmost stack floor, which houses periodicals, has been opened to readers. All other volumes are held in closed-access stacks (with limited access by special permission for research purposes). There is no possibility of developing subject areas with specialized staff, and pressure on all kinds of space except stack storage is high.

### **The System in 1978**

As a result of the way in which the university and its campus have grown, the University Library, though based in the 1959 Main Library building, extends over 13 branch libraries. The major branch library, the Applied Science Library, has been, for historical reasons, almost autonomous, although it was incorporated into the University Library system at an early stage. Other libraries, including the Institute of Education Library, became branches in the early 1970s after a recommendation by the Working Party on Library Development, chaired by Professor W. L. Saunders. Now all libraries of any size are a part of the system; they are: Chemistry, Music, Architecture, Town and Country Planning, Glass Technology, Japanese, Geography, Law, Physics, and the branch at Hallamshire Hospital, added in 1978. In addition, a Short-Loan Collection of 10,000 volumes has been housed in the Arts Tower adjacent to the Main Library.

In 1976 a Library Seminar Room was built in a part of the exhibition area, the remainder of which was at the same time considerably upgraded for exhibition purposes. The new Seminar Room has enabled the library to develop its already well-established program of instruction in library use (at all levels from first year to postgraduate), and programs for self-teaching (video and tape/slide) are also being produced. Audiocassette programs for language instruction have been introduced in collaboration with the Language Centre; and both audiovisual and microform techniques are being closely studied.

A computer-based issue system (Plessey light-pen) was introduced in the Main Library and the Short-Loan Collection in 1974, and it has been extended to two branch libraries (where Checkpoint security equipment has also been installed). A pilot project in MARC-based cataloging was begun in 1976, with the Short-Loan Collection; and a machine-readable list of periodicals is now in existence.

Information services are provided both manually and via a terminal in the Main Library, which provides access to MEDLINE, Lockheed, and other data bases. It is expected that this area of library service will develop rapidly in the late 1970s.

The library staff in 1978 included the librarian, the deputy librarian, 4 sub-librarians, 26 assistant librarians, 24 senior library assistants, 34 library assistants, 22 clerical staff, and 7 technical, ancillary, and other staff—a total of 119 (compared with a total of 17 in 1956).

Following is a list of university librarians, with their dates of service:

Professor A. Denny, F.L.S. (honorary)	1893–1897
Professor G. C. Moore Smith, Litt.D., Ph.D. (honorary)	1897–1907
T. Loveday, M.A., LL.D.	1907–1911
A. P. Hunt, B.A.	1911–1940
S. A. Peyton, Ph.D., Litt.D.	1941–1956
J. E. Tolson, M.A.	1956–1974
C. K. Balmforth, M.A., F.L.A.	1974–

### The Future

Plans were accepted by the university in 1974 for a new Science Library, to be built near the present Applied Science Library. This would bring the Applied Science Library together with the Chemistry and Physics Libraries and other smaller collections. The reorganization might even be extended to include the central administration of the library in the new building, leaving the present Main Library as an Arts and Social Studies Library, with central stack storage. With the publication of the University Grants Committee Report on Capital Provision for University Libraries in 1976, the new Science Library became less certain, and in Sheffield as in all other British universities the implications of the report are still being closely considered.

It seems probable that the Sheffield University Library system will develop in the 1980s on four major sites: a library for the sciences based on the present Applied Science Library, the medical library in the Hallamshire Hospital, the Crookesmoor Library for Law and Economic Studies (opened in 1977), and the Main Library at Western Bank. The Main Library would then offer subject coverage in arts, humanities, sociology, and life sciences, and also act as a central store for relegation of less-used material from these major branches and from the smaller specialized branches such as Music and Japanese, which will remain in operation.

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COLIN K. BALMFORTH

## SHEFFIELD. UNIVERSITY OF SHEFFIELD POSTGRADUATE SCHOOL OF LIBRARIANSHIP AND INFORMATION SCIENCE

### Origins and Programs

The University of Sheffield Postgraduate School of Librarianship admitted its first students in 1964, but its origins go back at least to 1960. In that year, the Library Association (LA), through its president, B. S. Page, made an informal approach to Sheffield University's librarian, Mr. J. E. Tolson, seeking the university's reaction to the proposition that it should set up the second university school of librarianship in Great Britain (the only such school at that time being University College London School of Librarianship and Archives, founded in 1919). The LA's proposal came to Sheffield at a time when British universities were beginning to prepare themselves for the expansion which characterized the 1960s, and the idea of a new postgraduate school for carefully selected graduates of high caliber proved very attractive to the university authorities. The Library Association's proposal was accepted with enthusiasm: resources were made available for staff, a handsome and conveniently situated house was bought for the school, the University Grants Committee showed its favor by making a substantial grant for improving the uni-

versity's holdings in the relevant subject areas, and the Town Trustees (a local charity) demonstrated the city's support for the new venture by offering an annual grant of £2,000 for the first 5 years of the school's existence.

Though there was only one other university school of librarianship, there were at that time several schools in colleges of further education (most of which later became polytechnics), and an important and entirely reasonable question to ask was, Why another school—and a university school at that? This, indeed, was one of the first questions which exercised the present writer when he took up the post of director in 1963; and during the months which followed, as staff were appointed and arrangements for teaching got under way, ideas about the role of the school began to crystallize in two important respects (1). First of all, the implication of the new school being created within a university came to be seen in terms of the level of work to which it aspired. Two distinctive characteristics of a British university are the highly selective character of their admissions policies and their commitment to research. It seemed appropriate, therefore, to think of the school as a means of attracting into the library and information professions appropriately motivated students of very high academic caliber; and having recruited such students, to provide them with a professional education in an environment of advanced study and research. Almost by definition this meant a relatively small school, a school with a very favorable staff/student ratio, and one in which the emphasis would be on seminars and small-group work, on a good deal of informal contact between staff and students, and on an "open-door" rather than an "office hours" approach to teaching. This indeed has turned out to be the case, and though student numbers now stand at around 60 (all full time) rather than the 23 of the first session of 1964/65, the school is still small enough to remain a close and intimate academic community.

This line of thinking, then, gave a firm sense of direction to the school's general educational policy and objectives. But a second important policy decision was also taken in those early days before the school opened: it was that very special efforts would be made to recruit science and technology graduates into the school's programs. Such people were rare indeed in library and information work, but it was already becoming clear that professional developments of the 1960s and after would call increasingly for their specialist skills and knowledge. To attract such graduates was no easy matter. The library profession's image and its normal course of professional training were, to say the least, not such as to make an immediate appeal to scientists and technologists. It was decided, therefore, to create courses in scientific and industrial information work, specially tailored for science and technology graduates and taught by staff who were themselves science graduates (2).

It was felt that Sheffield—situated as it is, in the industrial north, in close proximity to a wide range of scientific and industrial libraries and information units—was particularly well placed to be the base for such a program. A further asset, of course, was the nearby National Lending Library for Science and Technology, the director and staff of which had from the very early stages shown a keen interest in the new school and a strong desire to assist and cooperate. It was planned that some 40% of the annual intake should be scientists, who would follow the special sci-



entific and industrial information work program, and that the balance would be arts and social science graduates following a program in librarianship. There was, however, a good deal of common ground. Both groups took as their starting point the study of the library and information needs of different types of community; both studied library and information resources across all disciplines, though with differences of emphasis; both shared a common concern with that group of subjects which can conveniently be labeled information retrieval; and both had to study the computer and its library and information applications. This latter was by no means usual in 1964, and it may well be that the Sheffield School was the first to require all its students to follow a course in computer applications.

It is not without interest to record that the Library Association accepted both programs as giving exemption from the examinations leading to its Associateship and that scientists who complete the school's requirements are recognized by the Institute of Information Scientists for exemption from certain of the institute's requirements. These facts might perhaps be taken as exemplifying the conviction deeply held within the Sheffield School, that there is a fundamental unity between library and information studies.

Both the Librarianship and the Scientific and Industrial Information Work Programs occupied an academic year of postgraduate study and led to a Diploma in Librarianship. Entrance requirements were very rigorous—a good honors degree, a year of practical experience prior to joining the school (modified in the case of some of the scientists), and a reading knowledge of two languages—and it was quickly recognized within the university that students of very high caliber were being attracted. During the 1967/68 session the school was invited by the university to put forward proposals for upgrading the diploma programs to a master's degree, and a complete restructuring of the courses took place. The Diploma in Librarianship disappeared and was replaced by two master's degrees, an M.A. in Librarianship and an M.Sc. in Information Studies. The duration of the programs was extended to a full calendar year and the extra 3 months thus made available could be devoted to the Special Study—a small-scale research exercise leading to a dissertation. (Up to that time, the Special Study had had to be compressed within the duration of the Christmas vacation.) These changes took place with effect from the 1968/69 session, and as a consequence the school became the only institution in the country to offer a basic qualification in librarianship at the master's level and one of only two (the other being City University) which offer a master's program in information science. It is worth mentioning, as another sign of changing times, that in 1967 the name of the school itself had been changed to the Postgraduate School of Librarianship and Information Science.

Five years later a third master's program was created as an outcome of a 1971 Nuffield Foundation meeting of experts, called together to consider the shortage of high quality social science and law graduates in the library and information professions. This meeting concluded that in some respects the situation was similar to that in science at the time when the Sheffield School had started up in 1964, and that just as the specially tailored program for scientists had made a significant contribution to remedying that particular shortage, so might a comparable pro-

gram oriented toward social sciences and law prove similarly attractive for graduates from those disciplines (indeed, the future need for such a specialization had been foreseen in the early, 1963, planning for the school) (1). The Nuffield Foundation made a substantial grant to enable the Sheffield School to create such a program, and in 1973 the M.A. in Information Studies (Social Sciences) was offered for the first time. Like the other two master's programs it had to face the challenge of satisfying the objective of providing a general professional education for the wide range of posts in which its graduates might find themselves, but it had also to provide the maximum possible social science and law orientation. In fact, it has a great deal in common with the other two programs; but it is perhaps distinctive in the attention which it gives to information and communications problems outside the traditional system of library and information units, and this has been reflected in the range of posts taken up by its graduates (3).

With the three programs already described, together with facilities for master's and doctorate degrees earned by research, it could be felt that the school was able to offer a reasonably comprehensive choice for potential postgraduate students. There was still, however, one important gap, and that was a program for professionally qualified and experienced practitioners who wished to enhance their existing qualifications but did not wish to do so by means of a research degree. To meet this need, a master's degree program has been created in which the emphasis is on advanced study and course work, with a research element being provided by a dissertation which occupies the last 3 months of a full-time, calendar-year course. The first students were admitted in October 1977, and it was already clear that the program would prove particularly attractive to senior librarians and information workers from overseas.

By the end of the 1975/76 session, 495 students had successfully passed through the school, of whom 169 (or 34%) were science graduates and 34 were social science or law graduates (mostly the former). It seems likely that for some time to come student numbers will remain at approximately 60 following the taught master's degree programs, with perhaps up to 10 to 12 further students working full time for doctoral or master's degrees by research. The posts into which the 495 students have been appointed on completing their courses within the school cover the whole spectrum of library and information work (4,5). However, by far the highest proportion (47%) have gone into academic libraries, followed by 20% who went into special library and information units and 13% who joined public libraries. It is interesting to note that 4% went straight into research and development posts—an indication, perhaps, of the school's strong research orientation.

### Research Projects

The priority which the school planned to accord to research was made clear even before the first students were admitted:

. . . we shall become actively involved in research in the fields of librarianship and information work; . . . we shall be able to offer facilities for research students, with

possibilities of working for higher degrees; . . . senior workers in our field [will] come to us, perhaps on research fellowships. . . . (6)

All of these intentions have in fact been realized; indeed they began to be realized before the end of the school's opening academic year, when the first research grant was received from OSTI (the Office for Scientific and Technical Information). In the years which have elapsed since that time, the school has received research grants and contracts to a value approaching £¾ million. At any given time, three or four funded projects are likely to be in process, each normally extending over a period of 2 or 3 years and employing 12–15 full-time research staff. From the beginning, the research effort has been particularly strong in the information science area, with teams under the direction of Professor M. F. Lynch carrying out work on the identification and elucidation of fundamental structural patterns in the information and data which are typically handled in computer-based bibliographic information systems. This work, in addition to many direct and practical applications, has led to a reinterpretation of Shannon's mathematical theory of communication which has significant and very far-reaching implications for information science (7). In parallel with, and in a sense balancing, this research in the field of information science, there has always been a substantial research program in what might be thought of as the more traditional areas of librarianship. Examples are: a study of the language barrier in an academic community (8), a 2-year study of local library cooperation (9), a very large-scale research on library and information unit staffing (10,11), an investigation into education and training for scientific and industrial information work (12), and research into information needs and information services in local authority social service departments (13).

From the beginning, an important aim has been to engage in the sort of multidisciplinary work for which a university environment is particularly suitable. In a joint project with the Department of Physiology, the school created an experimental information service which gradually broadened its scope and has now become the self-supporting Biomedical Information Service and a part of the University Library. Another example of the multidisciplinary approach was the joint award to the present writer and Dr. P. H. Mann, Reader in Sociology, of a grant of approximately £¼ million to establish a Centre for Research in User Studies. This unit, which began operation in January 1976, has a research, advisory, and educational role, and it is intended to become the national center of expertise in the whole area of user studies.

A particularly valuable benefit from the school's heavy involvement in research has been the opportunity which it has afforded for students to be associated via their special studies and dissertations with real-life, ongoing research. Many of these dissertations have in fact resulted in publication in a whole range of professional journals or, in some instances, in the school's *Occasional Papers* series. It is true to say, then, that the master's programs have all been enhanced by the funded research programs which have been a feature of the school from its earliest days. It should also be added, of course, that research students and postdoctoral Research Fellows have likewise derived considerable benefit and inspiration from this

source—as, indeed, have the academic staff, whose teaching undoubtedly acquires an extra “edge” from their involvement in the funded research programs.

Before leaving the subject of research, reference should be made to a rare and very special honor which was accorded in 1975 to a member of the school's staff. In recognition of his distinguished research in information science, Dr. M. F. Lynch was awarded a personal chair. This was the first chair in information science in Great Britain and it made the school the only institution of its kind in the country whose staff included two professors.

### **Continuing Education**

As the school's normal programs occupy 11 months of the year, it has been less easy than in some institutions to carry out continuing education activities on any substantial scale. The school's record of short courses and summer schools has nevertheless been quite significant and has reflected, in most cases, those areas in which the school has specialized by research and advanced study.

Thus, in 1966 a course on computer applications in university libraries provided British university librarians with their first introduction to the power and potential of the computer, and this was repeated in 1967 to ensure that every university library which wished to benefit from the course had the opportunity to do so. Workshops on the matching of chemical structures by computer and a course on on-line retrieval provide similar examples of efforts to disseminate information on specialist topics in which the school has had a strong research interest. At a different level, a series of introductory courses on medical librarianship reflected the specialization of a member of staff (now no longer with the school) who was one of the country's leading medical librarians. But perhaps most significant of all has been the series of international courses—two under British Council and two under UNISIST auspices. All of these courses have been for senior professionals from overseas; the first, in 1966, covered Librarianship in Britain; the second, in 1972, was on the Role of the Library in Development, and Its Implementation; the third, in 1975, concerned Advanced Information Work; and the fourth, in 1978, covered the same topic.

### **International Activity**

A special feature of the school, from its earliest days, has been its involvement in international professional activity. Advisory and consultancy work for governments and international and other organizations has been carried out in most parts of the developed and developing world, and school staff members serve on committees of the International Federation of Library Associations, the Federation for International Documentation, and the Committee for Information and Documentation on Science and Technology.

For many years a special relationship was maintained between the Sheffield School and the East African School of Librarianship; and an academic link has recently been established with the University of Isfahan (Iran), by which the Sheffield School will provide Ph.D. training for faculty members of Isfahan's planned School of Librarianship.

Many leading professionals from overseas have had research attachments to the school. The first was Leonard Jolley, librarian of the University of Western Australia, and he was followed by Dr. Donald Davidson, librarian of the Santa Barbara campus of the University of California, who was a Senior Fulbright Research Fellow in 1966/67. Since that time there have been few years in which there has not been a senior overseas librarian or information worker attached to the school, the most recent being Dr. G. E. Vleduts, the distinguished information scientist, formerly of VINITI (U.S.S.R.).

### The Future

The school is well established within the university as a department which attracts highly qualified applicants, students who have been well received by the profession and who are in many cases already occupying positions of seniority and influence in the library and information world. Moreover, the school's success in attracting research funds has placed it very high within the university, in terms of research activity. The original objective of providing a high quality professional education for high caliber graduates, in an environment of advanced study and research, has seemed to point the right direction for the school up to the present. It is hoped and believed that development in the future will be in accordance with this same policy. However, the present educational and economic climate counsels caution in prediction, and the most valuable asset for this or any other educational institution in the years which lie ahead is undoubtedly responsiveness, the ability to adjust to new circumstances while retaining a firm hold on the academic and professional standards established during the years since 1964.

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W. L. SAUNDERS

## SHELFIST

A shelflist is an essential tool in nearly every library. It is a file consisting of one entry for each bibliographic item (print or nonprint) cataloged for a particular collection. This file is usually maintained in the order in which the materials are found on the shelves. Ordinarily this is according to call number within a classification scheme; however, it could also be arranged in some other sequence such as accession number order or alphabetical order, particularly in a very small library. One exception to shelf-order sequence is the library in which different sizes or types of material are shelved separately but the shelflist is still maintained in a single sequence by classification (1). A second example is found in large library systems where there are many branch or departmental libraries. In these instances the central library's shelflist also serves as a union list (2).

The majority of shelflists in the 1970s are in card format. However, as technological advances pervade libraries, the shelflist record is frequently being converted to machine-readable form. An early example of this is the conversion of the Widener Library shelflist at Harvard University (3).

Shelflists serve many purposes. The most common use is as the control record of those items officially added to the collection. As such, it is essential when the collection it represents is being inventoried (4). It can serve as the basis for damage

claims and/or rebuilding the collection in the event that there has been a disaster. A shelflist also provides a basis for the establishment of a collection's value. In some cases the shelflist itself may be insured.

Because the shelflist ordinarily groups material by classification number, it facilitates accurate classification and can serve as a substitute for a classified catalog. Many other uses of the shelflist result from its classed arrangement. One is its service as a guide to materials selection, because it facilitates the determination of the extent of the collection in any specified subject area. Measurement of shelflists can be a method of comparative evaluation of the collections of similar libraries, particularly research libraries. Frequently, a portion of a shelflist is reproduced for use by a librarian, faculty member, or patron away from the file. This subject access can be made available by photocopying or typing from a card file, or by printing subject catalogs or lists in call number sequence from a machine-readable file.

There is no fixed set of data in a shelflist record. The information included varies from library to library and by time period. In earlier eras it was thought to be a time-saver to limit a shelflist record to very brief cataloging information (5). Recently, use of all the data found on a complete catalog card has been favored. This full information is a great help in cataloging and classifying and can save additional checking.

Any shelflist card should include a notation of all copies of all volumes or pieces of a title. Sometimes this will be on the face of the card and sometimes on the back. When necessary, additional cards are prepared and attached to the first. The price is often included because it is useful information if an item must be reordered or if a borrower must be charged for lost or damaged material. Price records can also be an aid in getting estimates of the value of a collection. The source of the acquisition is usually not included, but either the date or an accession number incorporating a date is normally present.

Shelflist records for serials may or may not include a statement of holdings. This will ordinarily depend on the completeness of check-in records or special-holdings lists. When these records are extensive, a shelflist record for serials often refers a user to the more detailed holdings information.

There may not be shelflist records for serials, particularly periodicals and newspapers, if they are shelved in alphabetical sequence or are treated by methods other than classification (6). Ordinarily, the statement of holdings on the shelflist record for a serial is made in terms of physical units. Sometimes each volume is listed separately. Acquisition dates may be included but more often they are not. The same holds true for the method of acquisition because this can be quite variable. Libraries having a shelflist record for serials often find that this is the most practical source for determining the number of serial volumes that were either added to or withdrawn from the collection each year (7).

Regardless of the type of material covered in a particular shelflist record, the data pertaining to each particular piece should be recorded as concisely as possible. Thus, *v.* is normally used for volume and *cop.* or *c.* for copy. Abbreviations such as *g* for gift commonly are employed to indicate the method of acquisition. This brevi-

ty will apply whether the shelflist record is in card or machine-readable form. Various codes are used to represent particular pieces of information.

One extremely important use of a shelflist record is in the completion of a call number by the assignment of a book number. In fact, this is an essential task in preparing a shelflist record for a particular collection. Most commonly, book or author numbers (used in all types of library materials) are taken from the Cutter-Sanborn or Cutter author tables (8), or from the simplified book number scheme of the Library of Congress.

These tables provide for assigning a book number based on the author's name (or in some cases, on a title main entry). Because no two items should have an identical call number, it is necessary to consult the shelflist before final call number assignment can be made. For example, if two items have the exact same classification number (whether LC, Dewey, or other) they must be given different book numbers. If the author of one is Adams, B., and the author of the second is Adamson, D., it is necessary to differentiate. Using the LC book number scheme these could be .A3 and .A32. If a work by Adams, R. were added later, it would have to be inserted in between, perhaps as .A315.

In many cases, shelflisting is done by the classifier at the time of classification. However, some libraries utilize a separate clerical shelflisting staff. Almost every library will place a temporary card in the shelflist to prevent the number being reassigned before the permanent shelflist card is ready (9). Temporary cards are also used if a shelflist card is removed to note the addition or withdrawal of copies or volumes.

The shelflist is an important library tool—a dynamic and evolving one. It has varied in scope and purpose over the years. In the earliest days of museums and libraries a catalog was developed which served as an inventory of an institution's treasures. These first catalogs were in essence shelflists because there were no alternative access points. Somewhat later, location symbols were added. This was especially true in monastic libraries because they often had some books or manuscripts stored in cloisters and others in chapels. Eventually, a separate shelflist record evolved for inventory purposes. This enabled a library's catalog to expand in other directions and offer alternative access points to the resources of the library's collection (10). Indeed, catalogs were often initially thought of as indexes to the shelflist.\*

After its development in manuscript or book catalog form, the shelflist in card format became widespread during the 19th century. It has proved to be a flexible tool and one that is relatively easy to store and maintain. However, despite its essential simplicity and utility, it has obvious limitations. Presently it is undergoing major changes in format with the conversion to, or development of shelflist records in machine-readable form.

Machine-readable shelflist records provide possibilities for a variety of products and services not available from a shelflist in card format. Various projects which take advantage of machine-readable shelflists include: new acquisitions lists issued

\* For more information on the development of catalogs see the article by Eugene R. Hanson and Jay E. Daily, "Catalogs and Cataloging," this Encyclopedia. Vol. 4, pp. 242-305.



at regular frequencies in call number sequence; lists of the collection as an aid to bibliographers in weeding or selection; statistics on the growth of the collection; duplication of the shelflist (perhaps in microform or as a book catalog) for use at other locations; lists in sequence other than classification number; and serials holdings lists (11). An automated shelflist also makes it possible to rapidly provide faculty members or other patrons with lists of portions of the collection of interest or concern to them (12). This ability to reproduce the shelflist record and have it available at dispersed locations also facilitates cooperative purchasing among libraries and leads to better utilization of resources.

If a shelflist record is automated in its full form, including all available cataloging information, it forms a data base that can be used for many purposes. First, this one record per title provides (in considerably less space) the information ordinarily repeated in both the shelflist and the catalog in manually maintained files. Second, indexes can be built for searches on author, title, and subject, among other data elements. Third, the basic file is provided for automated circulation systems and for all forms of management statistics covering the growth and utilization of the collection.

Off-line automated shelflists and printed shelflists in book catalog form have the disadvantage of not being current at all times. In this regard, a card file utilizing temporary slips may be more complete. However, on-line data bases offer the opportunity for shelflist information that is not only current but available in multiple locations. Call number assignment may then be made on a decentralized basis without fear of duplication. These multiple locations may be within one institution or may be part of multi-institutional efforts, whether on a regional, national, or international scale. The development of networks offers the potential for unique assignment of call numbers for all libraries following any single classification scheme. Despite separate cataloging and classification operations, this can be a reality when it is possible to access and search on-line data bases by classification number.

The shelflist concept will remain an important part of library records in the foreseeable future. It will doubtless be modified by and take advantage of new machine-based technologies. In any case, it is and will remain a necessary tool for inventory, evaluation, call number assignment, and dissemination of subject-grouped holdings information about any collection. This is true whether a collection consists of print or nonprint materials or a mixture of both.

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## SIERRA LEONE, LIBRARIES IN

See also *Africa, Libraries in*

### General Background

Sierra Leone was first visited by Portuguese traders in the mid-15th century, and it later became a British colony where freed slaves were settled during the late 18th and early 19th centuries. British influence on Sierra Leone lasted for more than a century, after which independence was gained, in 1961. It became a republic in the Commonwealth in 1971. Under British rule and as an independent nation, in spite of Sierra Leone's high potential in natural resources, it has never quite prospered economically. Twice did the British try to abandon it as an unprofitable possession which had little prospect of gaining self-sufficiency. As an independent nation, it has often been classified as a poor country, even though it is ostensibly rich in mineral resources: diamonds, which represent 16% of the Gross Domestic Product (GDP) and are also its principal export; iron ore (mining ceased in October 1975); and latterly, rutile and bauxite. Agriculture directly employs 75% of its population of 3,002,426 (1974 census) and contributes 30% of the GDP, but only 15% of export earnings. Rice is the main staple food and occupies 60% of the total land under cultivation. Export-earning crops are palm products, piassava, coffee, and cocoa.

However, owing to inflation and limited foreign exchange, Sierra Leone's Development Plan for 1974-1979, which envisaged investment of just over 620 million leones (Le) to rationalize and give greater depth to the economic structure, had to be substantially revised. The World Bank and the International Monetary Fund have, however, contributed to the economic development of Sierra Leone through aid programs such as the IDA (International Development Agency), which has contributed primarily to the development of educational facilities in Sierra Leone. Some school and college libraries have benefited from these programs.

Against this background—and as in most developing countries—the development of libraries is not really a priority in Sierra Leone, although education expenditures constitute about 23% of the national budget (data for 1976).

Literacy in Sierra Leone is rated as 15% of the total population, and efforts are being made to develop literacy programs, especially in support of rural development projects. The main thrust seems to be the development of literacy in the local vernacular languages in order to promote various educational and social programs.

### EARLY LIBRARY DEVELOPMENT

Historically, there does not seem to have been a public library development movement in Sierra Leone during early times. Libraries have had either personal or institutional origins. The former could be categorized as private libraries and the latter as special libraries.

#### *Arabic Libraries*

Though the Arabic script was introduced into Sierra Leone at a much earlier date (circa 1750) than the Roman alphabet, there is a tendency to minimize its historical educational influence—partly because of religious considerations and partly because of its limitations in international usage and applications. German missionaries in the mid-19th century had declared that the Muslims knew no more Arabic than Roman Catholics did Latin. Even at that time such a declaration was not viewed with much seriousness by the Church Missionary Society (CMS), which sent Edward Blyden, an Arabist, to conduct a fact-finding survey on the Muslims in Sierra Leone. Blyden was deeply impressed with Islamic literature and wanted to preach to the Muslims not in order to destroy Islam, but to purify it as a foundation for Christianity. His motivations in 1866 were based on his analysis: “It strikes me that Roman letters will never prevail or be read in Mohammedan Africa. A strange alphabet is always repulsive” (1). This conviction was further reinforced by his visit to Fulah Town, one of the Muslim settlements in Freetown, where he found Muslims with whom he could speak Arabic. Here he also visited the Arabic library of Alpha Mohamed Sanusi, Arabic letterwriter, with its newspaper subscriptions from Constantinople. Blyden therefore—in CMS tradition—started translating the Bible into Fulah using Arabic script.

Arabic script was introduced into Sierra Leone and its hinterland through an interaction of traders, migrants, travelers, clerics, military leaders (warriors), diplomats on peace missions, teachers, and marriage alliances. But the strongest elements among these were religion and education.

Well before the middle of the 18th century, the coast and rivers of Sierra Leone had become areas of trade and migration. Muslim migrants established centers in Kisi-Kisi, along the Mellicouri and Kolente Rivers, and at other points on the overland caravan trade routes. Dominated by religious motivations, small Islamic states had developed which were meshed into a widespread system known as “the Guinea/Sierra Leone System,” founded on mutual trading interests and kin rela-

tionships. Some of these states—such as Sumbuya, Kisi-Kisi (or Moriah), Benna, Musaia, and Port Loko—vied with each other for control of trade and territory, and in servicing the activities of European slavers and merchants, particularly the French, before the arrival of British interests in the colony in 1787.

The British later maintained economic, and generally also political, relationships with African Muslim leaders. Through them the colonial government received intelligence reports on the trade routes and on the political activities of the Guinea/Sierra Leone System. These accounts can be found in several volumes of Arabic and government interpreters' "Letter Books," and in minute papers and letters of the Aborigines Department, located in the Sierra Leone Public Archives. Thus, by the 1870s the British colonial government had adopted Arabic as an official language of correspondence with indigenous rulers and had employed several scribes, interpreters, and messengers on the local colonial staff in Freetown, as agents of communication in the Arabic language.

The use of Arabic was also valued for both religious and political purposes among the participants of the Guinea/Sierra Leone System. Written Arabic was used for communication and recordkeeping, while religious charms written in Arabic were believed to provide the possessor with protection from injury, disease, and death, and to assure victory in wars and success in economic pursuits. Islam and its religious agents, partly because of its mystical and magical powers, had more to offer to the indigenous local peoples of Sierra Leone than had the Christian faith. Thus, as the Muslim migrants gained influence as intellectual and political elites in the community, their proselytizing influence was widely accepted. A more subtle pattern of behavior was successfully adopted: one of trade and alliance which led to acquisition of land, intermarriage, and conferring of titles. Individual Muslims—because of their political, social, and economic positions—sought the integration of the Islamic communities' philosophy and ideas into the local system of the indigenous peoples, and by 1890 a Muslim educational system had been established. There were 20 schools with 500 pupils within the colony area.

In the northern and in some parts of the southern interior, there were Koranic schools and colleges at a time when the Roman alphabet was still unknown.

There were primary schools (known as *karanthes*) directed by a *karamoko* (learned man) or *alfa* (scholar), where pupils learned the Arabic alphabet, recognition of Arabic words, how to recite the Quran (Koran), and the fundamental concepts and rituals of Islam. There were also places of worship, such as mosques and prayer fields (*sallekene*) where continuing education for young and adult Muslims was imparted by means of sermons and rituals. And there were specialized religious schools where scholars were trained in law, theology, and Arabic literature, though most of the institutions of higher education were located in other West African territories—Guinea, Mali, and Senegal, for example. A few centers had been founded in the Sierra Leone hinterland by the early 19th century, after several decades of Muslim education in Sierra Leone.

In the late 18th century Captain John Mathews commented on the existence and educational activities of a "Madingo Kingdom" on the Kolente River, where

Muslim teachers were actively proselytizing among the Susus and Baggas, and who had established "several small 'burees'" which served as public schools, "where their youths were taught to read and write Arabic" (2).

Blyden confirmed the existence of this educational system when he visited Gbile in 1872 and was able to describe a Muslim university under the direction of Foday Tarawali and his sons. This educational institution, he said, had about 500 students who were studying Islamic sciences and receiving training in Islamic law, theology, and Arabic literature. During its years of existence it had produced many religious and political leaders. But in about 1875 its extensive library and the university were destroyed, and Tarawali was forced to leave Gbile. Such was the importance of education to these people that in 1830, or earlier, land had been given by the Sankoh Alimami of Taweah to the Fofanah in return for having Foday Tarawali come to this chiefdom and teach about Islam. Foday Tarawali was a devout man whom the colonial government described in 1878 as the "High Priest of Moriah." In the traditional Muslim fashion, archival and oral tradition sources confirm that he also served as a highly respected mediator for peace in the Susu country for more than 50 years. It was during one of these missions that he was killed in 1880, leaving a bequest of land, 86 domestic servants, £60 cash (sterling), 6 valuable gowns, 6 large brass kettles, 40 Arabic books, 24 cows, and 8 sheep (3).

Books were valuable tools to these teachers and religious leaders, and they took their libraries with them as they moved about. Books were usually in manuscript form, and owner/librarians searched for new acquisitions to improve their stock. Books were also therefore considered to be a most valuable property, more so than money, to be bequeathed to the most promising and favorite sons.

Muslim education in Sierra Leone today is both traditional and innovative, in that the use of the *karamokos* and mosques has continued, while new organizations have been adopted to enhance its expansion. Two main groups are responsible for this: the Ahmadiyya Missionary, which was founded in India, and the Muslim Brotherhood, an indigenous missionary movement. Both operate school systems. The Muslim Brotherhood has been receiving educational assistance from Arab nations for several years. Arabic and Islamic studies are also taught in many of the government schools, particularly in the north of Sierra Leone.

However, in spite of this long history of Muslim education and influence in Sierra Leone, Islamic studies are not featured in the curriculum of the University of Sierra Leone. Arabic was taught at Fourah Bay College for a brief period during the 19th century, soon after the college was founded; but it was discontinued and never revived, though there have been several requests for the establishment of an institute of Islamic studies at the university. As a result, the university libraries do not collect Arabic materials. Scholars wishing to use Arabic sources on the history of Sierra Leone would therefore need to consult the private libraries of *alfas* in Freetown and in the interior, and the public archives. Many of these libraries contain rich collections of books on Islamic sciences and family histories which are in bound manuscript form and are regarded as family heirlooms which cannot be parted with. Arabic scholars wishing to consult them are often requested to obtain

copies of them rather than using them on loan. The scholar might provide the owner/librarian with an unused manuscript book, with Indian ink and pens, or he might copy the collection of family history and other materials for a small fee.

Though 85% of Sierra Leone's population is estimated to be illiterate, very little, if any, cognizance is taken of the existence of that sector of the population which is literate in Arabic. There are many people who can read and write in their own vernacular language in Arabic, but who must use their thumb prints as representing their signature, instead of signing their names in Arabic on official documents.

Arabic libraries still extant in the Freetown area are those of Mr. Mohamed Mahdi, of Savage Street; Mr. Hashim Habib, Argyle Street; and Alhaji Fata Rahman, to name only a few. In the provinces, Arabic libraries are to be found in the houses of Muslim priests and scholars in Muslim settlements like Damawulo in the Kenema District and similar towns in the Northern Province. In these libraries books are kept in baskets made of rope, hung suspended from the ceiling of thatched huts or more modern homes. With this type of storage, books are preserved from infestation by tropical insects and the effects of dampness.

#### *Libraries in General*

The earliest record of a library in Sierra Leone in the British colonial period dates from 1794. Nova Scotian settlers, Europeans, and Sierra Leone Company employees, who had settled in Freetown in 1792, were attacked by a French squadron led by an American slave-trader who had some grievance against the colony. As the settlers fled their homes, the crew plundered, and they deliberately destroyed everything of value they found, including furniture, books and papers, the printing press, the library, and telescopes and barometers. The chaplain of the colony had been allowed £50 a year and books in 1786, but all was destroyed in the raid (4).

In the Crown Colony, the working-class settlers (who formed a rather large proportion of the population) were assigned to learn trades like carpentry, masonry, shoemaking, etc., and to develop vegetable gardens and produce adequate food for self-sufficiency; while the Church Missionary Society endeavored to educate and develop a middle class which "will not be below their European contemporaries" (5). British influence on education in Sierra Leone was quite dominant during the colonial era and until recent times. Thus in 1815 the Church Missionary Society established the Christian Institution for the purpose of educating children who had been rescued from slavery. The method of training then adopted was similar to that of British schools, with the exception that part of the day was devoted to useful manual labor. Children were maintained at a cost of £5 a year, and this expense was in many cases borne by kind supporters of the society, with each child thus educated being named according to the direction of his or her benefactor. Mention is made of this because of the similarities which exist between the names of some Sierra Leonean authors and European names. The Christian Institution later developed into an institution of higher learning, in 1827,

and it became a university in 1876. It could also be assumed that whatever spare time was made available to these children might have been devoted to the reading of the Bible and religious tracts.

The Church Missionary Society also sponsored the development of agencies which could stimulate social and intellectual activities in Sierra Leone. One such body, created in 1850, was the Literacy and Scientific Institution, which had as its aim the establishment of a library and the organization of public lectures to supplement available reading materials in the community. This society was short-lived and only lasted for a couple of years. After this failure little is recorded of libraries until 1873 when Bishop Cheetham, a wealthy man, started a lending library of his own as an adjunct to his Cathedral Day School. Both institutions were financed by the profit he made from a Penny Bank which he opened for the poor, in the absence of banking facilities at that time.

Later the Sierra Leone public recognized the need for a center of public activities and reading. The Trustees of the William Wilberforce Memorial Hall in 1887 opened a subscription library which consisted of a reading room with magazines and newspapers. This was available to subscribers at a subscription rate of 7 shillings a year.

Yet another development in the history of libraries in Sierra Leone was the beginning of the J. J. Thomas Library. J. J. Thomas returned to Freetown in 1900 after working in Lagos, Nigeria. As a wealthy, public-spirited man he contributed liberally to charity and endowed a public library which originally had been his private library at his house on Howe Street. At his death this library was managed by a board of trustees, but lack of funds forced its closure in 1974. Its last location was Goodings Hall, Walpole Street, but it had changed locations several times. When the position of this library was reviewed in 1973 at the request of the Sierra Leone Methodist Church, which was one of the beneficiaries of J. J. Thomas's will, it was the intention to maintain it with the proceeds from a property which the church felt was bequeathed to them for this purpose. Unfortunately it was later discovered that this property belonged to a nephew of the deceased. Thus, with no funds for maintenance and with its original public library functions already being performed by the British Council Library and the Central Library of the Sierra Leone Library Board, the J. J. Thomas Library was closed down. By that time its reading room stock largely consisted of local and foreign newspapers, pictorial magazines, and publications from embassies. The bookstock had a few outdated reference titles, English literature books, old novels, and historical materials. The physical condition of some of these materials was unattractive because of age and others were in disrepair and in need of binding.

The services rendered by the Thomas Library to aged pensioners, who were its ardent patrons, must not be overlooked since they have not yet been replaced by any other institution. For these pensioners this library served as a social and educational complement to the more contemporary Central Library, which provides neither the facilities nor the relaxed atmosphere most appropriate to their reading and social needs—the reading rooms of the Central Library are usually crowded with schoolchildren feverishly preparing for examinations.

The late 19th century saw the rapid rise of a professional class whose library needs could not be served by either the J. J. Thomas Library or the City Council subscription library. In response to their needs they built up private collections in their homes, which consisted of not only professional books but also novels, history and travel books (particularly on Africa), and reference works. A few such collections worthy of note are that of the late Dr. Jenner Wright, and those of Dr. M. C. F. Easmon, Dr. Taylor-Cummings, Bishop T. S. Johnson, and Sir Ernest Beoku-Betts. Dr. Taylor-Cummings bequeathed his collection to Fourah Bay College Library, and the collection of Jenner Wright, though still extant, seems to form part of a family inheritance. Most of the Easmon collection was donated to the Sierra Leone Museum and the Sierra Leone Library Board.

Even with the establishment of better library facilities, the tradition of private libraries has still persisted, especially among members of the legal profession in Sierra Leone. Some senior staff of the Civil Service also build up home collections, mainly by subscribing to British book clubs.

Prior to the formation of administrative departments and their departmental libraries, the highly centralized colonial administration established a library in the central office of all administrative activities, the Colonial Secretary's Office.

The purpose of the Colonial Secretary's Office Library was to make available in Sierra Leone (where the absence of libraries had always been felt) books which provided information for the administrators of the colonial Civil Service and other persons interested in research. This library was therefore a reference collection. The materials in this library could be described as an African Collection with a strong emphasis on Sierra Leone. They included many types of materials: books with the earliest historical accounts and covering a wide range of subjects relevant to the development needs of the colony and its hinterland; travel accounts and descriptions of voyages of discovery in West Africa; reports of the Sierra Leone Company and other company reports; royal addresses; books and essays on slavery; works on health education; meteorological books; medical books (with emphasis on tropical diseases and their cures); geological books, largely concerned with development of the resources in the colonies; ethnological books dealing with studies of the peoples of the colonies; books on history and geography; vernacular dictionaries and grammars; and government publications and maps. The library included both printed and manuscript materials: purchased, donated, and unclaimed books found in public places. Official funds were also made available for the purchase of the private collection of Dr. Kenan at his death, who had himself donated quite a number of books to this library and was the author of a book, *The Sanitation of Freetown*.

With the establishment of this library in 1922 (by H. C. Luke, a British administrator), local colonial administrators were encouraged to do research. The results of their investigations were published in the journal *Sierra Leone Studies*.

This library continued to operate while Sierra Leone was a colony. In 1961, when independence was achieved, most of its collections were transferred to the Fourah Bay College Library, where they form a valuable part of the library's Sierra Leone Collection. Some of the manuscript materials in the collection were transferred to the Sierra Leone Public Archives.



In the colony, which was originally known as the "white man's grave," the maintenance of good health was very crucial. It is therefore not surprising that one of the departments that had libraries of great importance was the Medical Department, under the direct control and supervision of the director of medical services. Apart from the borrowing facilities which this library provided to doctors and other readers from the general public, it had a Medical and Sanitary Circulating Library which disseminated current medical information to doctors in Sierra Leone, in Freetown, and in the provinces by circulating current medical journals and other publications. The clerk in charge of the library had the responsibility of ensuring that journals were not retained by doctors for more than 3 days. The library was very well patronized; its readers could borrow textbooks, medical handbooks, pamphlets on tropical diseases, and monographs, which served as sources for updating the medical and sanitary information needed by members of the department and others interested in medicine and public health. This library later developed as the Medical Library, now located in a separate building with a full-time professional librarian.

Agriculture and geology had as high a priority in the colonial period as they do today. The production of cash crops for export to British markets was as important to Britain as a source of cheap supply as it was to the colony as a means of generating income for its annual budget. The Agriculture Department therefore had a library with specialized books which were useful to agriculturists in the field. There were libraries both in Freetown and at Njala, where there was a training center for agriculturists. Many of the agriculturists conducted research and wrote pamphlets and articles on agricultural problems in Sierra Leone, apart from their administrative duties.

After Mr. Junner, a colonial geologist, discovered gold in the Gold Coast (now Ghana) in 1926, he came to Sierra Leone and established the Geological Survey Department. This department provided, and still provides, an inventory of the mineral resources of Sierra Leone through mineral exploration and geological mapping. Its first director, Mr. J. T. Pollett (1928–1965), developed a collection of specialized books, maps, and other publications for the use of the staff of the department and for providing information to other departments, private individuals, and mining companies. This library is still in existence and has a full-time professional librarian.

### LIBRARY BOOKS IN THE VERNACULAR LANGUAGES

The production of books in the local languages was started by the Provincial Literature Bureau, which formed the basis of a National Literacy Campaign in 1946. Literacy programs were most successful in areas where enlightened paramount chiefs supported this effort. Books were produced to fulfill the needs of these programs: translations of the Bible into local languages, readers, volumes of short stories, and functional literacy pamphlets.

In 1957, mainly owing to financial constraints, the Provincial Literature Bureau transferred the literacy campaign aspect of its work to the Department of Social

Welfare while it intensified its effort to produce books and other materials essential for literacy programs. Between 1960 and 1962, literacy campaigns were intensified in the Kenema, Bo, Kailahun, and Tonkolili Districts.

In 1964 the Department of Extra-Mural Studies of Fourah Bay College, University of Sierra Leone, convened a meeting of all those involved or interested in adult literacy work. This meeting resulted in the formation of a coordinating committee which made a survey of existing facilities. It was noted that Kenema District had a rapidly growing headquarters at Kenema, and a stable forest industry and many thriving cocoa farmers' cooperative unions. Kenema was therefore selected as the location of a pilot literacy project, in which the language of instruction was Mende.

In 1965 the government established the National Literacy Committee under the Ministry of Social Welfare. The coordinating committee formed its nucleus, to which were added representatives from interested government departments and nongovernmental institutions. One of the efforts of this committee was the production of a Five-Year Development Plan, to cost 11 million leones, but this did not materialize.

In April 1966, at the invitation of the Sierra Leone government, the Ministry of Overseas Development of the United Kingdom sent Dr. Edith Mercer to advise the government on the establishment of a literacy project in Sierra Leone. Dr. Mercer's recommendations included a request that UNESCO send a feasibility mission to Sierra Leone, and the transfer of the responsibility for literacy work from the Ministry of Social Welfare to the Ministry of Education. Two UNESCO experts were therefore sent out in 1967, and they planned a 4-year functional literacy pilot project to be located in Kenema. No action was taken on this report as it required the Sierra Leone government to pay 53% of the total cost of the project.

Literacy work in Sierra Leone seems to have survived through the efforts of voluntary instructors and through the efforts and activities of several institutions and organizations. These include the Urban Ministry, the United Church Women, the United Christian Council, the Roman Catholic Mission, the Muslim Congress, the YMCA, the Sierra Leone Federation of Women, the Sierra Leone Development Company (prior to 1975, now liquidated), the Sierra Leone Brewery, the Sierra Leone Distillery, the army, and latterly the Sierra Leone Ports Authority.

The promotion of literacy work in Sierra Leone will continue to be based on voluntarism and self-reliance. To this end, a project for the establishment of a Literacy Work Camp Project—Long Vacation has been proposed, to be partly funded by UNESCO. Volunteers in this project will be teachers and students at college and secondary school levels, who will be given crash courses in the instruction of illiterate people.

The vernacular language spoken in each area of operation will be used as a medium of teaching, and English can be introduced as a follow-up language. The implementation of this project has been planned in two sections: (a) first phase, base-line survey and interpretation; and (b) second phase, pilot test. As to the provision of relevant literature, in the vernacular and in English, the project document vaguely states that this aspect ought to be carefully examined, bearing in mind

the availability of follow-up reading materials in three vernacular languages: Mende, Temne, and Limba.

However, it is hoped that more concrete and practical proposals will be developed in support of this important aspect of the project so that long-term success will be assured. Furthermore, it could be claimed that a successful pilot scheme of this type could lay the foundation for the development of rural libraries in Sierra Leone. It is therefore necessary that the first phase of this project include a provision for information on the types of literacy which are now in existence. In the rural areas, books are not easy to come by, owing to financial limitations; and there is lack of motivation to collect materials in the vernacular languages, since literacy in the vernacular languages has no official recognition.

There are many households in the rural areas with collections of books written in Arabic, because of their Islamic affiliations, but books in the vernacular languages and in English are often almost nonexistent. Households in the rural areas would collect and keep books other than those in Arabic if they were shown that such books contain data and information relevant to their needs and the improvement of their daily lives—as functional literacy purports to do. It is also important that the new literates be able to use the vernacular or Arabic as a means of communication in preparing income tax returns and in signing documents.

#### THE FUTURE OF LIBRARIES IN SIERRA LEONE

In 1973 the University of Sierra Leone conducted a National Education Review with two principal areas of concern: “a vigorous analysis of the best long term pattern for the educational development of the country, and a redefinition of the University’s role as an instrument of national development” (6). The review was concerned with *all* levels and types of education, at home and in the village as well as in formal school surroundings. Because of this, the participants in the project were drawn from many backgrounds. They included public servants, social workers, and trade unionists; and others attended simply as parents concerned for their children’s future.

The review was conducted by nine working groups, one of which was the group that examined the possibilities for the development of materials and media needed to support the national educational program. The review gave a detailed survey of the existing situation in Sierra Leone, formulated aims and objectives, and made recommendations which might serve as guidelines for the formulation of future policies. The first recommendation of this group is of relevance to the development of a coordinated information system in Sierra Leone. It reads:

The Ministry of Education and the Institute of Education should be re-organised and strengthened to provide an organisational and conceptual framework within which a variety of bodies could contribute to the task of improving the supply of educational materials and media, and services such as libraries, museums, archives etc. (7).

Also in the main body of the report, there is another recommendation which

deals with the supply of books and materials. This states that it should be possible for the Ministry of Education to provide for the establishment of a national coordinated system which would be responsible for the development of libraries, archives, and museums. Such a provision could underline the value of these services for both education and culture in general, and it would ensure in due course a fair distribution of these services throughout Sierra Leone.

The latter embraces the hopes and aspirations for the development of a modern national information system in Sierra Leone. If due cognizance is taken of this recommendation in the future development of libraries, archives, documentation centers, and museums, Sierra Leone will be assured of a national information network which would cater to all levels and types of education. Until such a goal is achieved, Sierra Leone libraries will continue to exist and grow as separate, uncoordinated organizations and institutions serving individual institutional needs.

### University Libraries

#### FOURAH BAY COLLEGE

##### *Background of the College*

It was about the year 1813 that an institution was founded in Sierra Leone under the auspices of the Church Missionary Society for the purpose of educating "liberated African" or "recaptured" children who were from time to time rescued from captured slave ships condemned by the Vice-Admiralty (later the Court of Mixed Commission). It must be noted that on the formal transfer of the Colony of Sierra Leone from the Sierra Leone Company to the British Crown in 1808, slave-dealing had been prohibited within the colony, and Freetown was designated the seat of the Vice-Admiralty Court where captured slaves could be adjudicated. Under the act of 1807, captured slaves were forfeited to the Crown.

A school and a chapel were built in Leicester Village about 3 miles from Freetown, where the society had a considerable grant of land. The responsibility for the development of this Christian Institution (or African Institution as it was originally called) was entrusted to the Reverend Leopold Butscher, a German missionary of Lutheran orders. He was one of the earliest missionaries in the area, who executed the purpose of the society with "piety and indefatigable energy," and with remarkable success (8). By 1816 the enrollment at this institution had reached 200, and it was the only one of its kind in Africa. It was established with full realization that evangelizing Africa by a white agency was an impossibility. If Africa was to be evangelized at all, her own sons must be the instruments.

The premature prosperity of this institution was disastrously affected by the death of Reverend Butscher on July 17, 1817. The Church Missionary Society (CMS) could not find a suitable replacement for him as manager. Missionaries were dying off rapidly because of the climate and there were very few indigenous teachers to continue their work. This adverse situation continued until 1827 when there was a revival.

A year after the death of Reverend Butscher, Governor of the Colony Sir Charles Macarthy had suggested that there should be a greater emphasis in the institute on the training of teachers, and that its intake should be limited to boys of "fair promise" (8). The rest of the entrants were allocated to schools in various towns of the colony. This was therefore considered to be the first step in the development of higher education in Sierra Leone, with the course of education mainly theological. A clergyman of good classical and general education was to be recruited, and teachers of Hebrew, Arabic, and other subjects were provided. This revision of the original purposes of the institution created a college which was on the same level as Windsor College in Nova Scotia. The new institution moved to Regent Village in about 1819, and it went through a period of instability until 1827, when the Reverend C. L. F. Hansel was appointed to revive the college. Its buildings were dilapidated, and it had dismissed its last student in 1826. As part of its revival program, the CMS bought the estate of the late Governor Turner, which included buildings that were suitable for a residential college, and which was situated at Cline Town overlooking the Sierra Leone River and Fourah Bay. The college was then named Fourah Bay College. Accommodation could not be provided for more than 70 students. The first student to register was Samuel Adjai Crowther, who had been rescued from slavery. He became the first ordained African and the first Black bishop.

The course of instruction, though still mainly theological, was slightly widened by the encouragement of the classics and mathematics.

In 1845 a Grammar School was founded in Freetown by the CMS. This was to serve as a feeder to the college and also to provide the sons of resident Europeans with the type of education which they could have obtained in England. But work at the college was suspended in 1858 and it was considered advantageous to concentrate the teaching by transferring its tutors to the Grammar School; the goal was to encourage more pupils from the masses, who would then become students of the college and spontaneously revive it. In 1864 the college was reopened. From this date on the curriculum remained unchanged, though new subjects like Arabic and physical science were introduced as the educational condition of the colony improved and its educational needs were identified. For example, basic courses were offered for students who wished to go into the professions of law and medicine.

In 1876 a bold step was taken which enriched Fourah Bay College—it became an affiliated college of the University of Durham. The instruction was brought into conformity with that pursued in Durham, and this assured students of West Africa a sound university education. As this was the first, and for a long time the only, institution of higher education in Black Africa, its student population was international; for the most part it included Nigerians and students from the Gold Coast (Ghana), the West Indies, and latterly from Gambia.

#### *Library Development at Fourah Bay College*

If little is known of the existence of a college library before 1876, the year of the Durham affiliation, there is from the establishment of this academic link abundant

evidence of the existence of a library at the college. The University of Durham library occupied a high place in the system; *The University of Durham Journal* religiously recorded its activities, chiefly appeals for material donations, in a special column headed "The Library," which appears in most of the issues which have been examined. Thus, in keeping with the spirit of the Durham tradition, in 1879 the Fourah Bay College correspondent to the *Journal* wrote the following account on the care of books:

Just a word or two about the seasons kept by the books on our shelves. For four months, from the beginning of January, they are healthy, hearty, and strong, but cannot be read for four hours in the day on account of the oppressive heat, the temperature being 90°F or more in the shade. From June to September they become mouldy, and handle them ever so often are mildewed by the moisture of the rains. This musty-smelling damp is said to make them breed diseases like the poisoned manuscripts of the "Arabian Nights." During the period between September and November they look as perfect in appearance and they well can in this climate. But now every one must have the two hour "Calm" as the Spaniards call it. Then follows the Harmattan Season, which this year promises to be early, when their covers become shrivelled, turned sometimes in and sometimes out, they break at the touch, and, if they had been under the ordeal of a couple of years or so, fall off into pieces. It remains for you to prove that inspite of this prolonged season of trial, books should still be imported into Africa (9).

In 1878, in pursuance with the Fourah Bay/Durham University "affiliation scheme," the College Regulations were enlarged. As a result of this, new phases of development were introduced, a registrar was appointed, the Chapel of Saint Clement (originally built for missionary or theological students) was recognized as the College Chapel, a High Table was formed, fellowships were established, final examinations were introduced, and much improvement was made in the status of the library. Its first Board of Curators was appointed, and a regular supply of standard newspapers and other publications was provided. Professor Richards was appointed librarian-in-chief, with Mr. T. Taylor as his assistant.

The library was located on the main floor of the college's four-story building, with easy access to all. It was adjacent to the lecture rooms.

Thus the college library management was firmly established, and it attracted valuable donations such as a special collection donated in 1881 by Reverend H. Wright, who had served as honorary secretary to the CMS. Later, in 1917, Bishop James Johnson bequeathed his set of 24 volumes of the *Encyclopedia Britannica* to the college library.

During the years from its inception until it was formally named the college library, the library was first known as the Obidiah Johnson Memorial Library (after one of its most generous donors) and then, as the Principal's Library (1933–1936). Attached to the library was a College Museum, which made regular appeals to students for liberal donations of artifacts.

The library was large enough to serve the college as an Assembly Hall until a College Hall was provided in 1886. It was the meeting place of the Prayer Union and the Reading and Debating Club, which was open to past and present students

of the college. This society was later called the Literary Association, and its activities were not limited to debating but also included essay writing. Reading was of importance to the students, and one of the association's subjects of debate in 1887 was "From which does the mind gain more knowledge, from reading or observation." Among some of the lectures delivered was one on "Systematic Reading." Another objective of the society was to promote the reading of books in order to stimulate interest in foreign missions and to encourage students to see the need for their existence, thus developing a pragmatic approach to learning. The method used was that of asking questions about the missionary work of the countries which members of the society were supposed to represent. Research had to be done in order to gain the information they needed for their answers. In this way, the students were taught how to collect and use facts for research, and they also "got knowledge of the wants and conditions of the various parts of the inhabited world" (10). This activity was therefore also called "Missionary Parliament." By 1904 the students were publishing a quarterly magazine called *Echoes from Sierra Leone*.

Some of the former students of Fourah Bay College had been so deeply affected by the need for libraries that they established their own private libraries after leaving college. One such library was that of Dr. Henry Carr, M.A., B.L.L., of Lagos, Nigeria, who was held in such high intellectual esteem that he was honored in 1934 by the University of Durham with an honorary D.C.L. Dr. Carr's library was described as the best private library that had ever been seen in Africa, not only because of the size of its collection but because of the wide range of subject interests. He also collected quite a number of periodicals. He knew his collection in detail and the subjects collected were relevant to his wide knowledge and authority in certain subjects. Though his main interest was administration, as he rose to the position of administrator of the Colony of Lagos, he published a book on algebra.

By 1926, when the college was celebrating its centenary and the jubilee of its affiliation to the University of Durham, Mr. Ormsby-Gore, in his report on his visit to West Africa, had proposed the development of "both Arts & Science sides as and when funds became available" (11). Thus the emphasis on Fourah Bay as a theological college was being transformed to that of teacher education. To this end, Dr. Dawson-Walker wrote in *The Durham University Journal* in 1927:

The sum of the whole matter is this. For the future education of Western Africa the point of central importance is the Teacher. The teacher well prepared and equipped for the particular needs of the African child he has to teach. If Durham will bend some of her efforts to strengthening Fourah Bay College as a training ground not only for clergy but for teachers, if Durham will enable Fourah Bay so to adapt its educational work as to turn out the capable teacher ready and well equipped for the educating of the African child who will indeed establish her position as a great formative agency in the coming educational system of West Africa (12).

Little could be done about the development of the college during World War II, while it was located in rural surroundings at Mabang. This was its alternative location after the navy permanently occupied its own building at Cline Town. However,

while at Mabang the college continued to maintain its library in its exile quarters, which were originally intended to be an agricultural college. The college had few teachers and a small student population of fewer than 20 students, because of the war conditions of the early 1940s, and the library was maintained mainly by student librarians.

The library was not exempt from the general lack of resources in the war years. Its rather sparse collection, which consisted mainly of theological and literary works, was transferred to Mount Aureol, to several buildings: one that served partly as one of the student dining halls, the College Chapel, the college bookshop stores, and the games and sports office.

It was also at this stage that the library facilities of the college formed part of an energetic higher education development program. Library development at Fourah Bay College was one of its areas of priority.

The history of the college on the whole has been fraught with pecuniary limitations and its library was in no exceptional position. Apart from library donations, which were rather small and sometimes infrequent, college-allocated funds for the library were rather meager. Therefore, up to the Second World War there was a stock of 3,300 volumes, including 1,000 volumes in religion and philosophy. Between 1929 and 1949 the library spent only £358 on books and periodicals, which represented an average of just under £32 a year. This amount was entirely derived from the annual library fee of £1 paid by every student.

The Womens Teacher Training College at Wilberforce was closed in 1946 and its teacher trainees were transferred to Fourah Bay College. This involved the transfer of its library to Fourah Bay College.

The 1950s were crucial years for the development of the college as a whole, and there were concomitant constitutional changes which attracted financial aid, both foreign and local. The 1940s had been a precarious period for the college, and the visit of the Elliott Commission had not given it the stability it needed. But these problems were largely resolved by the colonial government when the Fourah Bay College Ordinance No. 11 of 1950 was enacted. In April of that year the college became a government-sponsored institution. The 1950 act provided for a Teacher Training Department offering advanced certificates and postgraduate diplomas in education and theology and a Department of Adult Education. It also set up a Department of Commerce and Economics, and a Technical Department or Science Department, with a curriculum leading to degrees from the University of Durham, which were part of the University Department. Each department had its own head to forge its development plans under the direction of the principal of the college. By a charter signed by Her Majesty the Queen on December 28, 1959, due recognition was given to the college as a new University College. These changes in the life of the college created the need for improvement and provision of library materials in support of its education programs.

With the establishment of a stable institution, Fourah Bay became an attractive venue for foreign funds. In 1954, following a visit by the Fulton Commission which improved the status of the college, the library was awarded a grant of \$8,000 by the



Carnegie Corporation of New York, to be used for the purchase of essential reference and bibliographic tools.

This donation was complemented by the British in February 1955 with a grant of £15,000 from the Colonial Development and Welfare Funds. Two-thirds of this donation (£10,000) was spent on books and periodicals and the rest on equipment. These grants and other donations led to an accelerated growth of the library, and they formed the foundations of a sturdy development during the '60s. It was at this crucial period of time that the library was assigned its rightful position as a priority, and it was recognized as an academic force in the development of a worthy affiliated college of the University of Durham. Data on the growth of the library are given in Table 1.

Until 1955 there was no professional librarian in charge of the collection. In 1955 the staff consisted of one professional librarian (British), two library assistants (one of whom later became assistant librarian), one messenger, and three student assistants for evening duties.

While the first professional librarian concentrated his efforts on the improvement of the equipment in the library and collection building, the second was particularly interested in building up a strong periodicals collection as an easily accessible research facility within the college. By the time the third professional librarian arrived in Sierra Leone in 1961 it was evident that the library's growth could not continue unless there was substantial improvement in its physical facilities. Thus it was during this period of 8 years that the librarian was given professorial rank, and one-third of a new library building was completed.

The collection was noticeably improved, and a traditional philosophy of selfless service was generated. The fourth librarian's tenure was one of consolidation and future planning, for the demands of a rising student population, about the overcrowded bookshelves, and to satisfy demands for more modern and sophisticated research materials. Since his departure in 1973 the library has suffered seriously from unavailability of funds, and but for donations from local and foreign sources there could hardly have been any growth.

Also, the library's stock had grown substantially. In 1955 it had 12,000 volumes and a few periodicals; by 1959 it had almost doubled its accessions and had a stock of 22,500 books, including 858 bound periodicals and 170 current periodicals. However, the library suffered from serious staff shortages. Apart from the expatriate librarian, the staff was untrained. However, in 1958 a female graduate of the college was selected to attend library school in England in order to return and work at the College Library. This was the beginning of a library staff development program which has been training both junior and senior library staff.

The improvement of the temporary housing of the library required the constant application of ingenuity. Parts of the building were restructured to accommodate new library equipment; new and growing departments like the Sierra Leone Collection, Periodicals Section, and Acquisitions and Cataloging Departments; and a larger Issue Desk area. Bulb lighting was changed to strip lighting. The library was extended to accommodate about 55,000 volumes. The main catalog was changed

TABLE 1  
Fourah Bay College Library, 1964/65-1973/74

	1964/65	1965/66	1966/67	1967/68	1968/69	1969/70	1970/71	1971/72	1972/73	1973/74
Stock at the beginning of the year	47,429	52,888	59,854	67,391	67,657	70,834	74,007	78,058	82,562	89,518
Additions										
Purchases	3,661	5,054	6,144	1,647	2,750	2,561	3,236	1,555	3,540	2,454
Donations	1,798	1,912	1,393	446	543	619	869	2,949	3,426	1,600
Withdrawals	—	—	—	1,827	16	7	54	—	10	—
Stock at the end of the year	52,888	59,854	67,391	67,657	70,834	74,007	78,058	82,562	89,518	93,573
Library staff										
Professional	3	5	5	5	5	5	5	5	4½	4
Paraprofessional	7	6	7	10	13	13	11	11	12	14
Readers										
Students	551	552	551	511	604	747	829	882	936	1,058
Faculty	120	127	145	147	99	101	107	123	135	128
Book fund (in leones)	22,000	26,000	21,000	24,000	24,000	24,000	30,000	35,000	40,000	45,000
Total college expenditure (in leones)	1,131,538	1,205,229	1,220,521	1,214,841	1,104,370	1,400,408	1,463,117	1,494,139	1,650,830	1,799,178

to metal cabinets, periodical display racks were installed, and map and filing cabinets for microfilms and records were acquired. A new card catalog was established, with an author and title index, a classified section, and a subject index. A recataloging program was also established.

By 1959/60 the college was spending £3,500 on books and periodicals, out of its recurrent grant of £56,363. Colonial Development and Welfare Funds were also available as capital grants for purchase of library equipment.

In April 1961 the second expatriate librarian, Mr. R. S. Burkett, relinquished his appointment as college librarian after a period of 4½ years. He left his post in order to serve as librarian at the University of Western Nigeria, Ife. The first librarian, Mr. H. R. Rydings, after leaving the college had served as deputy librarian of the University College, Ghana.

As already mentioned, the third expatriate librarian—the late Mr. Michael Jollife, who was appointed in 1961—was initially concerned largely with the improvement of the physical facilities of the library. There were no more nearby buildings into which the library could expand. A large adjacent hut which could have been used was demolished to make room for a bakery. The undesirability of housing the library stock (with a probable replacement value of £75,000) in a temporary building constructed with cheap timber and a tin roof, and the objection to placing a library next door to a kitchen, bakery, and dining rooms with a multitude of people and the often pungent smells of cooking, compelled the search for a permanent home for the library.

Following the visit of Alan Pifer, an executive of the Carnegie Corporation, to the college in December 1961, the corporation in March 1962 announced a donation of \$110,000 for library development in the college. The Sierra Leone government gave a matching contribution of £48,000, part of which came from the Commonwealth Assistance Loan. These two gifts amounted to £85,000, which was considered sufficient for the first phase of the new library. The building was designed by Frank Ruther, a firm of British architects, to accommodate 95,000 volumes and 222 readers; and the whole building when completed was to accommodate 500,000 volumes and 550 readers. The first section of the library building was formally opened in 1965, though the building had been occupied for use in 1964.

The book fund, which was less than £4,000 at the beginning of the 1960s, was £30,000 at the beginning of the '70s.

The staff development program for both senior and junior staff was considerably expanded, with the introduction of local courses for the preparation of junior staff of the college for the City and Guilds Institute of London, a Library Assistant Certificate Examination, and the provision for recruitment of graduates as trainee librarians who subsequently attended library schools abroad for professional training. At that time there were only two professional library staff as assistants: Mrs. Olive Caulker, now at the University of Wisconsin Library, and the present author.

In 1968 the college received full university status, and with this elevation, the library also began to give leadership in the development of other libraries in Sierra Leone. The late librarian, Mr. Michael Jollife, was therefore involved with pro-

viding advice to many libraries—all too often this involved such practical pursuits as cataloging books and arranging them on shelves. In this role he established the Medical Department Library in its new location and the library of the Geological Surveys Department, and he gave advice on the establishment of the Law Library. All three of these libraries now have professional librarians in charge. He also helped with the establishment of several school libraries. His foresight in the creation of these libraries in several secondary schools in the 1960s formed the basis for a justification of the development of a school library movement in the '70s. Secondary school libraries were cited as practical examples to be emulated by other schools.

Within the library itself, Mr. Jollife established the Reprographic and Micrographic Sections. He successfully experimented with the use of printed catalog cards produced by the U.S. Library of Congress and the British National Bibliography, as a temporary measure for diminishing a backlog of cataloging of about 10,000 items and in recataloging the library's collection. Owing to lack of professional staff, very little cataloging had been done during the period 1953–1961. Until 1955 only some eight to nine thousand volumes could be found recorded in the library's catalog, since Mr. Rydings, apart from his administrative duties as librarian, also had to serve as cataloger. With the use of these cards and simplified cataloging procedures for books for which printed cards were unavailable, the staff was able to catalog 10,000 volumes of books in the year 1961/62, and they also classified the periodicals library at the same time. It was observed then that although the saving in total staff time by the use of these cards was negligible, the saving of senior staff time was tremendous, because the cards were the work of experts in cataloging and classification and therefore greatly reduced the amount of checking.

In his 1961/62 annual report Mr. Jollife anticipated the provision of funds under the British Technical Assistance Program for the purchase of bindery equipment and the assignment of an experienced British bookbinder who would establish a "home" bindery at the college, which would save the library the cost and risk of sending books and periodicals to England to be bound. His hopes were realized in 1963, following the visit of Mr. D. H. Watson, formerly assistant government printer in Tanganyika. By arrangement with the United Kingdom Department of Technical Co-operation, Watson advised the Sierra Leone government on the best and most economical method of meeting bindery needs of Sierra Leone libraries, and a report was produced strongly advocating the establishment of a bindery at the College Library.

This report was accepted by both governments, and the British government's Department of Technical Co-operation provided a head-binder for 3 years and book-binding equipment to the value of £4,000. Mr. W. J. Askew, bindery officer in Her Majesty's Stationery Office, was appointed to this post and arrived in Sierra Leone on August 15, 1964. By then there were about 10,000 books and periodicals for binding and rebinding.

The early months following the arrival of Mr. Askew in Sierra Leone were devoted to planning the bindery in the new library building and to formulating the

staff organization and their terms of service. The bindery was established as a subdepartment of the library. Early in 1965 the equipment began to arrive and by August 31 the bindery had completed 523 volumes. The staff consisted of the head bookbinder, two bookbinders, one assistant bookbinder, three apprentices, and two sewers. Search for a Sierra Leone craftsman to replace Mr. Askew at the end of his 3-year contract resulted in the appointment of Mr. S. T. Browne, who succeeded Mr. Askew in April 1966 as head bookbinder. He has continued to produce high quality work, for which this institution has become renowned.

The library moved from the old premises in 1964, and the new building was formally opened on April 27, 1965. Although the building has its merits, there are several defects in its features, which were observed soon after its opening. The Sierra Leone Collection Room, for example, was much too small to accommodate readers, and its shelf space was likely to be exhausted before the second stage of the building was completed. This prediction has proved to be correct but the library, which should have been extended in 1971, still remains as originally built.

On the invitation of the Library Committee, Mrs. Margaret Amosu, formerly in charge of the African Library in Ibadan, visited the library in March 1966 for a week in order to make recommendations for the expansion of the African Collection. As a result of her recommendations, it was decided that the library should develop resources on the adjoining area—a Contigual Collection of materials on Sierra Leone, Gambia, Liberia, Guinea, and Guinea-Bissau—rather than attempt a more expansive Africana collection program. Lack of funds has limited this collection's growth still more to an intensive collection of only Sierra Leone materials. A printed catalog of this collection is to be published soon.

Donations to the library from American sources have been sporadic but of considerable value. The Regional Council for International Education, University of Pittsburgh, started a donation program of Africana to the library in 1966, which continued for 3 years. This donation included a complete set of *Presence Africaine*, a long run of the *Bulletin of the School of Oriental and African Studies*, reprints of the *African Repository, 1825-1882*, etc. Princeton University Press has been most generous to West African university libraries, including Fourah Bay College. Each year since 1964, its managing director has sent its catalogs to selected African universities for a choice of books which they need for their libraries. This policy has greatly enhanced the library's collection of those finely produced and valuable Princeton books which it could hardly have afforded to buy. Latterly, Mr. George Cooper, of New York, has been donating new books published annually by Columbia University Press. Mr. Cooper received an honorary D.C.L. degree from the University of Sierra Leone in 1976 in recognition of his services to the college.

The library's greatest donors have been the British, who have a long-term donation plan arranged through the ODA Book Presentation Programme. This will have a total value of about £30,000 for the period 1973-1980.

The use of accession numbers as a method of identifying books in the library started in 1969. It is hoped that this system will form the basis for producing a computer printout catalog in the future. The system also assists in the revision of the catalog and the stock of the library.

At the end of March 1970, Mr. Michael Jollife left his post as college librarian to become librarian at Royal Holloway College, London University, London. He was succeeded by Mr. A. C. Butler, who arrived in 1971 and who resigned in 1972 to become deputy librarian of the School of Oriental and African Studies. By the time of his arrival the library was suffering from serious financial deficiencies. During Butler's short but effective stay the first inventory of the library was undertaken, and this has since become an annual activity. Also, a Reference Department was established, and the library was designated a United Nations Depository Library. A freshmen's orientation program was also started as part of the Readers Services program of the Reference Department.

Financial constraints have worsened since the departure of Mr. Butler, but new projects have nevertheless been undertaken by the library. These are the preparation of a printed catalog of the Sierra Leone Collection, to be published by G. K. Hall, Boston; the establishment of the UN Depository Library in 1973; and the creation of the Documentation Centre in 1977. The latter includes the Sierra Leone Collection and the UN Depository Library.

After the establishment of the unitary system in 1972 (discussed in the next section) one University Library Committee was established for the coordination of the work in the two University College Libraries: Fourah Bay and Njala. With greater cooperation between the two library institutions much can be achieved.

A summary of significant information on the Fourah Bay College Library follows:

1. Date of establishment: 1827
2. Address: Fourah Bay College, University of Sierra Leone, Freetown
3. Collection:
  - Books and periodicals: 101,864 volumes
  - Periodical titles: 500
  - Microfilm
  - Microfiche
  - Microcards
  - Micrographic readers
  - Sierra Leone Collection and UN Depository Collection: These form the Documentation Centre, which conducts literature searches and issues bibliographies.
4. Staff:
  - 7 professional (3 Peace Corps librarians)
  - 28 paraprofessional
5. Hours open: Monday–Friday, 8 A.M.–10 P.M.; and Saturday, 8 A.M.–12 noon  
 Vacation hours: Monday–Friday, 8 A.M.–6 P.M.; and Saturday, 8 A.M.–12 noon
6. Class system: Dewey Decimal—author and classified catalogs and an alphabetical subject index
7. Scope: To provide library service for members of the University of Sierra Leone and registered external readers. Serves as a national research and reference library.
8. Publications available:
  - Annual Report* (on exchange)
  - List of Library Accessions* (free)
  - University Calendar* (on exchange)

*Africana Research Bulletin* (on exchange)  
*Sierra Leone Bulletin of Religion* (back issues; purchase)  
*Sierra Leone Studies* (back issues; purchase)  
*Sierra Leone Historical Journal* (on exchange)  
*Printed Catalogue of the Sierra Leone Collection* (available for purchase from  
 G. K. Hall, Boston, Mass.)  
*Guide to the Library* (free)

9. Problems and prospects: The fortunes of the library are closely linked with those of the university, which has been suffering from financial constraints. Until the university's finances improve, the library will continue to depend largely on donations for improvement of its bookstock.

## NJALA UNIVERSITY COLLEGE

### *General History of the College*

Though Sierra Leone is primarily an agricultural country, the emphasis on improvement of agriculture in earlier years was not commensurate with its importance in the economy. It took a long time for anyone to realize the need for formal instruction in the modern methods of farming. Prior to the establishment of Njala University College in 1964, there was no agricultural degree program in Sierra Leone. The Ministry of Agriculture had trained a few Sierra Leoneans in a non-degree program at the Njala Agricultural Experiment Station, and for several years some nondegree agricultural training had been offered at the S. B. Thomas Agricultural Academy, at Mabang. The latter was the first institution established for the training of agricultural apprentices, as a result of the philanthropy of Samuel Benjamin Thomas, an African merchant in Freetown. At his death his trustees came into possession of £54,358.13s.11d as a permanent endowment "for the agricultural development of the Colony" (13). This scheme also had the blessings of Governor Leslie Probyn, who used his influence to secure the donation of 1,000 acres of land from the chief of Mabang. He also approved the grant of 12 government scholarships in agriculture, each of £50 annual value tenable for 4 years, and three of these were awarded annually. The construction of Mabang College was completed in 1912 with government assistance.

With the departure of Governor Probyn from this country, government interest in Mabang dwindled, and in 1912 the Agricultural Department established a new Experimental Station at Njala. It was maintained that the S. B. Thomas Trust College had failed because the site of the college had poor land, its surroundings were unsanitary, and drinking water was not easily available.

There seem to have been three agricultural colleges established at Njala. The first Njala College was founded in 1919 and situated at the Experimental Station at Njala. Its original aim was to train teachers for government schools; however, for the first 5 years of its existence there was no agricultural instructor on its staff. Governor H. R. Slater therefore convened a conference in 1925 which discussed the proposed program of a future college. It was suggested that the existing Njala College—which in terms of entrance requirements and final standard attained was no more than a school—should be upgraded. And a new Njala Agricultural

Training College was envisaged, but unlike the former college, it was not to accept applicants who lacked a working knowledge of English and arithmetic.

After 9 years of operation the first college was closed in 1928. The second Njala Agricultural Training College was not established until 1939, and it opened with 15 teachers in training, 10 agricultural students, and 6 agricultural instructors attending a refresher course. This new college continued to exist until the creation of Njala University College in 1964. It was established by an act of Parliament, when it became government policy to provide local training for young men aspiring to senior positions in the Ministry of Agriculture.

Njala University College was set up through a contractual agreement between the Sierra Leone government and the United States Agency for International Development (U.S. AID). The survey team of this project, in making its recommendations in 1963 for the founding of Njala University College, envisaged "a new institution without precedent, uninhibited by the educational traditions of the past, which will spearhead the agricultural revolution required to serve best the needs and aspirations of the people of Sierra Leone" (14). This college, which was originally established as a separate degree-granting institution, also had some affiliation with the University of Illinois in the United States.

The 1967 University Act drew Fourah Bay College and Njala University College closer to each other to form a Federal University System which granted University of Sierra Leone degrees. In 1969 the Carney Commission appointed by the government recommended the establishment of a Unitary University System. This recommendation was confirmed by the passing of the University Act of 1972. After the enactment of this legislation, a full-time vice-chancellor was appointed with the view of maximizing cooperation between the two colleges and with the Central Secretariat, in the spirit of the law which established the system.

Njala University College has two faculties—Education and Agriculture. Courses offered include: B.A. in Education, B.Sc. in Education, B.Sc. in Agricultural Education, B.Sc. in Home Economics Education, and Certificate Courses in Agriculture.

#### *The Library at Njala University College*

When the first students enrolled at the college in October 1964, a library service (though not organized on a professional basis) was adequately provided under the supervision of a member of the teaching staff. Meanwhile two Americans on the staff of the college spent considerable time on planning for the future of the library; on ordering equipment, books, and periodicals; and on the recruitment of staff.

Mrs. E. Hill, an elderly and able Peace Corps volunteer, was persuaded to move from the Sierra Leone Library Board to take charge of the college library. She headed the library from November 1964 until 1966, when she left Sierra Leone at the end of her Peace Corps assignment to return home to Seattle, Washington.

As acting librarian, Mrs. Hill brought the library's collection under one roof in a new library which was officially opened in February 1967. Hitherto the library's stock had been housed in classrooms and a herbarium. The library had inherited



the entire libraries of the Agriculture Teacher Training College and the Department of Agriculture, both of which had stocks of periodicals, reference books, texts on agriculture and related subjects, and school books. These two collections numbered about 9,000, though some of the stock was in a state of neglect.

Funding for books, periodicals, and equipment was largely provided initially by the United States through the United States Agency for International Development contract. Between 1964 and 1968 this agency provided \$22,260 for library equipment and \$58,663 for books and periodicals. During this period the budget allocations (in leones) made by the college to the library were as follows: 1964/65: Le2,460 (5-month period; includes salaries); 1965/66: Le22,172 (includes salaries); 1966/67: Le18,014; and 1967/68: Le4,500 (excludes salaries).

At the end of the U.S. AID contract in 1973 the college assumed full financial responsibility for the library. By this time also, the United States had spent \$4,500,000 on the college (in 1963–1973), excluding U.S. PL 480 funds which were provided for the building of laboratories, men's dormitories, and other purposes. However, like most departments of the university, recent financial constraints have adversely affected the growth of the library. Although in recent years the library has received some handsome donations from the governments of the United Kingdom and the Netherlands, with more generous funding, both capital and recurrent, the physical facilities of the library could be improved and more library materials and equipment provided. Expansion is needed since the present library building was designed to provide accommodation for about 160 readers and 40,000 volumes, and the present student population is a little over 500.

Comparative figures are given here to show the growth of the library's stock:

	1967/68	1975/76
Books and bound periodicals	17,900	40,000
Current titles of periodicals	700	850
Microfilm units	58	74

Other significant data on the Njala University College Library are:

1. Date of establishment: 1964
2. Address: Njala University College, University of Sierra Leone, Private Mail Bag, Freetown
3. Collection:
  - Books and periodicals: 40,000 volumes
  - Periodical titles: 850
  - Special Sierra Leone Collection
  - Microfilms: 74
  - Maps, filmstrips, film loops, slides, gramophone records, and roll films
4. Staff:
  - 5 professional
  - 13 paraprofessional
5. Hours open: Monday–Friday, 8 A.M.–11 P.M.; Saturday, 8 A.M.–6 P.M.; and Sunday, 9 A.M.–4:30 P.M.  
 Vacation hours: Monday–Friday, 8 A.M.–4 P.M.; and Saturday, 8 A.M.–12:30 P.M.

6. Class system: Dewey Decimal—dictionary catalog
7. Scope: To serve the needs of faculty, students, visiting scholars, and other members of the college community.
8. Publications:
  - Library Bulletin*
  - Library Occasional Papers*
  - Library Guide*
  - Annual Report*
9. Problems and prospects: The main problems are those resulting from such local conditions as lack of financial resources and communication facilities. Internal operations are therefore carried out under difficult conditions. Prospects for the future largely depend on the improvement of national finances.

### Libraries in Teachers Colleges

Though Sierra Leone has had more than 100 years of higher education, teacher education was not established until 1926. In 1925 the Church Missionary Society sponsored two of its workers for schooling abroad, and they successfully completed a course for a postgraduate Diploma in Teaching. That sponsorship made it possible for Fourah Bay College to introduce, in 1926, the Postgraduate Diploma in the Theory and Practice of Teaching (D.Th.P.T.).

In 1928 this course was suspended but it was resumed in 1933. This 1-year postgraduate training is still offered by the Department of Education, Fourah Bay College, University of Sierra Leone.

This was the beginning of teacher education in Sierra Leone: Male teachers were trained at Fourah Bay College, and female teachers were provided with a separate women's college at Wilberforce, under the administration of the Wesleyan Methodists. The latter merged with the Fourah Bay College Teacher Training Department in 1946/47. The department of Teacher Education at Fourah Bay College was later separated from its parent body and was established as Milton Margai Teachers College in 1960. It was housed in temporary buildings at Tower Hill until it moved to its present permanent site in Goderich. This college now offers a 3-year Higher Teachers Certificate Course in the arts, sciences, and commercial education fields. Teachers trained at this college can teach in the lower forms of secondary schools as well as at primary schools.

However, in the early 1930s it was recognized that a teachers college was needed outside the Freetown area, and Bunumbu Teachers College was established in 1935 for the training of pastor/teachers. It was the first provincial college to grant the Higher Teachers Certificate for Primary School Teachers for rural development. This 3-year program requires an admission qualification of attainment of Form V education, or three "0"-level passes in the General Certificate of Education program, including English language. This program is funded by the Sierra Leone government and UNESCO. Its aim is to promote rural development by integrating the school and the community for basic development. Initially, only the villages around the college were involved, but the goal is to affect rural development generally in Sierra Leone.

Since then, three other colleges have been established—in Bo, Port Loko, and Makeni—and a nonresidential college was set up in Freetown.

In 1972 the government initiated a rationalization policy which led to the establishment of three provincial colleges. Bo Teachers College therefore was established in 1972 as a result of the merger of the Catholic Training College (founded in 1942) and Bo Teacher Training College (founded 1963). The colleges are located 4 miles apart, and so this college has two campuses. This college is the only one which offers Teacher Education with special "Level-B" courses in geography, mathematics, and music as part of its training program for primary school teachers.

Its development plans involve the establishment of a Higher Teachers Certificate for primary school teachers in: (a) Agriculture Education, (b) Science Education, (c) Mathematics, and (d) Cookery and Home Economics.

The Central Evangelical Agency for International Aid, in Germany, has agreed in principle to fund the second phase of the building project of the college and to provide money for the improvement of the water supply in this area, which is often inadequate. It will provide £19,483 and Le7,573, respectively, for the projects. The EEC has also donated Le15,000 for the college's agricultural project.

Makeni Teachers College, Makeni, was also established in 1972, as a result of the merger of Government Training College Magburaka, Magburaka (founded in 1950) and St. Augustine College, Makeni (established in 1964). This college now offers courses in general academic subjects, and a Teachers Certificate for primary school teachers. Its future plans include its development as an institution offering courses for the Higher Teachers Certificate, Primary and Community Development, and Adult Education.

Port Loko Teachers College, Port Loko, was established as a teachers college for women in 1966, with funds provided by the Swedish government and administered through UNESCO. It originally prepared students for the elementary Teachers Certificate, which has since been upgraded to the Teachers Certificate. Its specialities are Home Economics and Infant Education. There are plans for the future development of a Higher Teachers Certificate in Home Economics and Nursery Education.

Freetown Teachers College, Freetown, is the only nonresidential teachers college in the country. It was founded by Dr. V. E. King, a celebrated Sierra Leonean educator. The aim of the college is to offer a 3-year course for the preparation of teachers for a Teachers Certificate. It also hopes to be upgraded into a Higher Teachers Certificate College and to become residential. Lectures begin at 2:30 P.M. and end at 9 P.M. Its physical facilities are shared with the Bishop Johnson Memorial School, a secondary school. The modern buildings were constructed as a school/college campus, with funds from the International Development Aid (IDA).

All of these teacher education institutions have library facilities for their staff and students.

Teacher education institutions which do not offer courses for the advanced Teachers Certificate look upon the development of these courses by their institutions as a means of improving their status and their physical facilities, in-

cluding library provisions. At present only two of these libraries have full-time professional staff. Until funds are provided for the establishment of an adequate library staff development program, the further growth of libraries in these colleges will be very limited, especially in those which lack the presence of professional expertise.

Summaries of significant information on the five teachers college libraries follow.

#### Bo Teachers College Library

1. Date of establishment: 1964
2. Address: Bo Teachers College, P.O. Box 162, Bo, Southern Province
3. Collection: 9,000 books—Towama Campus, 7,000 volumes; Gerihum Road Campus, 2,000 volumes
4. Staff: 1 qualified librarian (VSO), who runs the library and gives introductory library education courses to first-year students and senior students
5. Hours open: 2:30 P.M.—4 P.M. and 8 P.M.—10 P.M.
6. Class system: Dewey Decimal—dictionary and classified catalogs
7. Scope: There is a good reference library on each campus, and a collection of children's books for teaching practice. The main subjects are: health science, geography, history, general science, agriculture, English language and literature, mathematics, music, art, education, and religious knowledge.
8. Problems and prospects: It is hoped that in the distant future the library will be located centrally on the Towama Campus site. Meanwhile, both libraries depend on donations for building up their stock. The library has been receiving grants from the British government biannually. The next grant is due in 1979. Lack of adequate staff is one of the library's major problems.

#### Bunumbu Teachers College Library

1. Date of establishment: 1933
2. Address: Bunumbu Teachers College, Private Mail Bag, Kenema, Eastern Province
3. Collection:  
Books and periodicals: 9,070 volumes  
Periodical titles: 40  
Filmstrips: 191  
Films (16-mm): 42  
Visual aids, mainly wall pictures and charts
4. Staff: 1 paraprofessional and 20 student assistants
5. Hours open:  
Monday—Friday: 8 A.M.—12 noon, 2 P.M.—4:30 P.M., and 7 P.M.—11 P.M.  
Saturday: 11 A.M.—1 P.M.  
Sunday: 7 P.M.—11 P.M.
6. Class system: Dewey Decimal—classification for nonfiction and special schemes for reference books and fiction
7. Scope: To provide library service for students and staff of the college, and also for teachers of 20 pilot schools connected with the Bunumbu Teachers College Project. The library has therefore organized a Mobile Library Service for children in these pilot schools which began operation in 1975. It also provides information for student teachers to enable them to organize primary school libraries.
8. Problems and prospects: It is hoped that with the development funds which have been made available to the college—through UNESCO/UNDP and the African Development Bank—the facilities of the library will be improved

considerably, as a matter of priority. There are plans for the construction of a new library building and the provision of materials and equipment.

#### Makeni Teachers College Library

1. Date of establishment: 1972
2. Address: Makeni Teachers College, P.O. Box 32, Makeni, Northern Province
3. Collection:
  - Books and periodicals: 3,000
  - Periodical titles: 15
4. Staff: 1 paraprofessional
5. Hours open:
  - Monday–Friday: 8 A.M.–3:30 P.M.
  - Saturday: 8 A.M.–11:30 A.M.
6. Class system: Dewey Decimal—classified catalog
7. Scope: To serve the students and staff of the college. The library collects materials on education, agriculture, health education, history, geography, English language and literature, and religious knowledge.
8. Problems and prospects: A new library building is now under construction, financed by the Sierra Leone government and a German foundation. There will be need for more staff as the library develops.

#### Milton Margai Teachers College Library

1. Date of establishment: 1960
2. Address: Milton Margai Teachers College, Goderich, Private Mail Bag, Freetown
3. Collection:
  - Books and periodicals: 10,500 volumes
  - Periodical titles: 100
  - Films, slides and tapes, and audiovisual equipment
4. Staff:
  - 2 professional
  - 2 paraprofessional
5. Hours open:
  - Monday–Friday: 8 A.M.–3:15 P.M. and 6 P.M.–10 P.M.
  - Saturday: 8 A.M.–11:30 A.M.
6. Class system: Dewey Decimal—author and classified catalog
7. Scope: To serve teachers-in-training and members of staff of the college. The library collects books on arts and science subjects taught in secondary schools (excluding government and economics) and on commercial subjects. It has a special collection of secondary school books, fiction and nonfiction.
8. Problems and prospects: Present physical facilities are inadequate, but there are plans for the construction of a new library building.

#### Women's Teachers College Library, Port Loko

1. Date of establishment: 1966
2. Address: Women's Teachers College, Port Loko, Northern Province
3. Collection:
  - Books and periodicals: 7,025
  - Periodical titles: 45
  - Maps
4. Staff:
  - 1 professional
  - 4 paraprofessional

5. Hours open:  
Monday–Friday: 8 A.M.–9 P.M.  
Saturday: 8 A.M.–12:30 P.M.
6. Class system: Dewey Decimal—author and classified catalogs
7. Scope: To provide facilities for study and research for all members of the college, to develop an understanding of the library as a core for the college's educational program. The library collects general works and works related to the subjects taught at the college.
8. Problems and prospects: There is a lack of adequate funds to develop the library's stock. Various donations have largely aided the library's collection.

### School Libraries

School libraries are the responsibility of the individual schools. Many primary schools have Book Corners, and pupils are encouraged to join the Children's Section of the Sierra Leone Library Board's libraries. There are 1,074 primary schools in Sierra Leone and many of these are in proximity to public libraries or are served by a Mobile Library Service operated by the Central Library of the Sierra Leone Library Board's Primary School Service.

Under the International Development Agency educational project schemes, several secondary schools have had library buildings constructed, and library equipment has been provided. All sixth-form schools and most of the fifth-form secondary schools have library facilities. But in most of these libraries, books and periodicals are in short supply.

The Ministry of Education Library Grant to Secondary Schools was discontinued under the military regime in 1967 and has not been restored. Many secondary schools unofficially levy an annual library fee for each student. These funds are used for purchasing books and other library materials, in those schools administered by progressive principals. In other cases these funds are used as supplements to the General School Fund.

During recent years the British Council Book Presentation program has provided books and periodicals to the value of £27,500, mostly to sixth-form schools and schools which have had libraries constructed under the International Development Agency program. To ensure that books and periodicals provided under this program are maintained, the British Council encourages the appointment of a library assistant who will serve as the paraprofessional staff. These assistants are also encouraged to use the university library training facilities to prepare for the Library Assistant Examination of the City and Guilds Institute (London). The Ministry of Education therefore provides the salary of one library assistant who has the required educational qualification and has at least participated in one of the university's training courses, sometimes run jointly with the British Council.

Many secondary schools have appointed teacher/librarians to be in charge of their libraries. These are qualified teachers, often graduates, who are required to attend short library courses organized from time to time by the university.

There is a Sierra Leone School Library Association, which has produced Minimum Standards for Secondary School Libraries. These standards have been

endorsed and accepted by the National Conference of Principals of Secondary Schools, and they await implementation by the Ministry of Education. The text of the standards is included in a later section of this article, beginning on page 395.

### Special Libraries

The establishment of special libraries in Sierra Leone dates back to the organization of libraries in individual government administrative departments, and later in ministries. Since then, the pattern of library development has not changed substantially in this field. Special library enrichment has come through the establishment of the semiofficial and newer public institutions like the Central Bank, embassies or affiliated organizations, the Central Statistics Office, and the Sierra Leone Broadcasting Service gramophone library.

Information given here on special libraries was obtained through personal interviews and the use of the *Directory of Libraries and Information Services* (2nd ed., published by the Sierra Leone Library Association, 1976). Summaries of significant information on each of the libraries follow.

#### Bank of Sierra Leone Library

1. Date of establishment: 1964
2. Address: Bank of Sierra Leone, P.O. Box 30, Freetown
3. Collection:
  - Books and periodicals: 3,492
  - Periodical titles: 107
4. Staff:
  - 1 professional
  - 2 paraprofessional
  - 1 clerical assistant
5. Hours open:
  - Monday–Thursday: 7:45 A.M.–4:15 P.M.
  - Friday: 7:45 A.M.–3:45 P.M.
6. Class system: Dewey Decimal—dictionary and classified catalogs
7. Scope: To meet the needs of the Research Department, in particular, and all other sections of the bank, by providing a reference and loan service. It collects books and periodicals relating to economics, law, banking, agriculture, and allied subjects. The library may be used as a reference library by students from other institutions.
8. Publications available:
  - Bank of Sierra Leone *Annual Report*
  - Economic Review*
  - Economic Trends*
  - Sierra Leone Balance of Payments*
9. Problems and prospects: As the Research Section of the bank continues to expand, so will its library facilities.

#### British Council Library

1. Date of establishment: 1945
2. Address: British Council, P.O. Box 124, Tower Hill, Freetown

3. Collection:
  - Books and periodicals: 6,869 volumes
  - Periodical titles: 79
  - 16-mm films: 472
  - Gramophone records: music, 466; and spoken words, 284
  - Tapes: 66
  - Cassettes: 80
  - Audiovisual equipment
4. Staff: 2 paraprofessional
5. Hours open:
  - Monday–Friday: 9 A.M.–4:30 P.M.
  - Saturday: 9 A.M.–12 noon
6. Class system: Dewey Decimal—author and title and classified catalogs
7. Scope: The British Council Library in Sierra Leone is essentially intended as a medium for educational support and a source of professional reading for teachers and educationalists and subprofessional technologists. Over the past few years the number of books in these fields has steadily increased, and emphasis is now placed on books required by teachers generally and by more advanced students at the technical and vocational levels. It collects materials in the following fields: education and teaching methodology (works on English language teaching predominate in the methodology area); science education (in technical subjects at the subprofessional level only); British literature and dramatic literature and special collections (writers and their works series); education officers' reference library; the English Language Book Society Series (ELBS); and a reference collection on British higher and further education institutes. Film shows can be arranged on request for educational or cultural institutions or by private individuals within the Freetown area and its environs.
8. Problems and prospects: This library varies its development in relation to special needs of library development in Sierra Leone. The present scope of its collection and service is designed to meet certain inadequacies in the overall national library system.

#### Central Statistics Office Library

1. Date of establishment: 1975
2. Location: Central Statistics Office, Tower Hill, Freetown
3. Collection:
  - Books and periodicals: 1,500 volumes
  - Periodical titles: 27
4. Staff:
  - 1 professional
  - 3 paraprofessional
5. Hours open:
  - Monday–Friday: 8 A.M.–3:45 P.M.
  - Alternate Saturdays: 8 A.M.–12:30 P.M.
6. Class system: Dewey Decimal—classified catalog
7. Scope: To build up a comprehensive statistical library to serve members of staff. It collects materials on statistics and allied subjects.
8. Publication available: *Monthly List of New Accessions*
9. Problems and prospects: This library will continue to develop as financial provisions for the Statistics Office improve.

#### Geological Survey Division Library

1. Date of establishment: circa 1940



2. Location: Ministry of Lands and Mines, New England, Freetown
3. Collection:
  - Books and periodicals: 1,300
  - Periodical titles: 10
  - Maps: 1,356
4. Staff:
  - 1 professional
  - 3 paraprofessional
5. Hours open:
  - Monday–Friday: 8 A.M.–3:45 P.M.
  - Saturday: 8 A.M.–12:30 P.M.
6. Class system: Universal Decimal Classification—classified catalog
7. Scope: To serve members of staff of the division by providing relevant information in their various areas of specialization. It collects materials on geology and allied subjects.
8. Publication available: *Monthly Bulletin of New Accessions*
9. Problems and prospects: This library suffers from inadequate funding, and efforts are being made to improve its acquisition program.

#### House of Parliament Library

1. Date of establishment: 1961
2. Location: House of Parliament, Tower Hill, Freetown
3. Collection:
  - Books and periodicals: 1,500
  - Periodical titles: 10
4. Staff: 3 paraprofessional
5. Hours open:
  - Monday–Friday: 8 A.M.–3:45 P.M.
  - Alternate Saturdays: 8 A.M.–12:30 P.M.
6. Class system: None
7. Scope: To serve members of Parliament and bona fide research workers. It collects materials on politics, administration, and legislation. The library has a special Sierra Leone Collection consisting mainly of government publications.
8. Problems and prospects: This library lacks adequate staff to organize its collection.

#### Judicial Library

1. Date of establishment: circa 1935
2. Location: Law Courts Building, Siaka Stevens Street, Freetown
3. Collection:
  - Books and periodicals: 5,147
  - Periodical titles: 10
  - Microfilms: 50 (1 microfilm reader)
4. Class system: Moys Classification for Law Books—classified catalog
5. Staff:
  - 1 professional
  - 2 paraprofessional
6. Hours open:
  - Monday–Friday: 8 A.M.–3 P.M.
  - Saturday: 8 A.M.–12 noon
7. Scope: To provide library services for judges, magistrates, barristers, and solicitors.

8. Publications available:  
*Index to the Holdings of the Judicial Library, 1973*  
*Alphabetical Index to Amendments of Legislations, 1966-1974*  
*Guide to Use of the Catalogue*  
*Acquisitions List*  
*Judicial Department Guide to the Library*
9. Problems and prospects: There is need for more adequate physical facilities.

#### Law Library

1. Date of establishment: circa 1962
2. Location: Law Officers Department, Lamina Sankoh Street, Freetown
3. Collection:  
 Books and periodicals: 2,115  
 Periodical titles: 15  
 Newspaper cuttings
4. Staff:  
 1 professional  
 3 paraprofessional
5. Hours open:  
 Monday-Friday: 8 A.M.-4 P.M.  
 Saturday: 8 A.M.-12 noon
6. Class system: Dewey Decimal—classified catalog
7. Scope: To provide and exploit the documentation and bibliographical services necessary for the enhancement of the work of the Law Officers Department. It collects materials on law and related subjects, and on politics and sociology. The library has a special collection on legislation of Sierra Leone from the earliest laws to date. There are regional branches in Bo and Kenema.
8. Publications available:  
*Digests of Cases*  
*Current Awareness Bulletin*  
*Lists of Recent Acquisitions*  
*Index to Legislation of Sierra Leone, 1964-1975 (in progress)*
9. Problems and prospects: Funding is rather limited for the development of the library.

#### Medical Library

1. Date of establishment: 1967
2. Location: Connaught Hospital, Wallace-Johnson Street, Freetown
3. Collection:  
 Books and periodicals: 840  
 Periodical titles: 120
4. Staff:  
 1 professional  
 1 paraprofessional
5. Hours open:  
 Monday, Tuesday, and Thursday: 8 A.M.-3 P.M.  
 Wednesday and Friday: 8 A.M.-5 P.M.  
 Saturday: 8 A.M.-12 noon
6. Class system: Dewey Decimal (17th ed., modified)—classified catalog, author file, and alphabetical subject index
7. Scope: To provide reference facilities for medical personnel (excluding nursing staff) and lending facilities for medical personnel in the western area. It collects materials on all aspects of medicine including surgery, pediatrics, and

obstetrics and gynecology, and on peripheral subjects such as pharmacology, pure science, and social science.

8. Publications:
  - Acquisitions Lists*
  - Reading Lists* on specific topics
9. Problems and prospects: Future development will require improved physical facilities and more funding for library development.

#### Meteorological Department Library

1. Date of establishment: Waterloo, 1938; Lungi, 1947; present site, 1968
2. Location: 18 Charlotte Street, Freetown
3. Collection:
  - Books and periodicals: 300 volumes
  - Periodical titles: 10
4. Staff: 2 paraprofessional
5. Hours open:
  - Monday–Friday: 8 A.M.–3:45 P.M.
  - Alternate Saturdays: 8 A.M.–12:30 P.M.
6. Class system: Homemade
7. Scope: To serve the staff of the department and other interested persons. It collects materials on meteorology and climatology and related topics. The library includes publications of the World Meteorological Organisation and the International Civil Aviation Organisation.
8. Problems and prospects: Adequate staff and funding need to be provided for this library.

#### Ministry of Agriculture and Natural Resources, Fisheries Division Library

This library contains the collection of books, periodicals, and reprints which was purchased by the Colonial Office in 1950 from the estate of the late Dr. E. J. Allen.

The library was considerably extended after 1950, largely through the efforts of the former staff of the West African Fisheries Research Institute and the Fisheries Development and Research Unit. When the unit was taken over by the Sierra Leone government as the Fisheries Department in 1961, the library was handed over to Fourah Bay College, which became responsible for the operation of the research branch of the unit.

According to the division, the collection housed in the library building is undoubtedly one of the most comprehensive in the field of oceanography available to English-speaking research workers on the West African coast.

1. Date of establishment: 1950
2. Location: Ministry of Agriculture and Natural Resources, Fisheries Division, Kissy Dock Yard, Freetown
3. Collection:
  - Books and periodicals: 2,000 volumes
  - Periodical titles: 10
4. Staff: 2 paraprofessional
5. Hours open:
  - Monday–Friday: 8:30 A.M.–3:45 P.M.
  - Saturday: 8:30 A.M.–12.30 P.M.
6. Class system: Dewey Decimal—author and classified catalogs
7. Scope: To serve the research needs of members of staff. It collects materials on oceanography, marine science, and fisheries and has a special collection of FAO reports.

8. Problems and prospects: Lack of adequate financial support has adversely affected the development of this library. There is need for more adequate staffing and an improvement of the present physical facilities and equipment.

Ministry of Agriculture and Natural Resources Library

1. Date of establishment: circa 1961
2. Location: Ministry of Agriculture and Natural Resources, Tower Hill, Freetown
3. Collection:
  - Books and periodicals: 400 volumes
  - Periodical titles: 10
4. Staff: 2 paraprofessional
5. Hours open:
  - Monday–Friday: 8 A.M.–3:45 P.M.
  - Saturday: 8 A.M.–12:30 P.M.
6. Class system: Dewey Decimal Classification—author catalog
7. Scope: Serves the needs of the staff of the ministry. It collects materials on agriculture and allied subjects.
8. Problems and prospects: There is a lack of adequate funding for library development.

Ministry of Education Library

1. Date of establishment: 1964
2. Location: Ministry of Education, New England, Freetown
3. Collection:
  - Books and periodicals: 1,500 volumes
  - Periodical titles: 30
  - Special collection: UNESCO publications
4. Staff:
  - 1 professional
  - 1 paraprofessional
5. Hours open:
  - Monday–Friday: 8 A.M.–3:45 P.M.
  - Alternate Saturdays: 8 A.M.–12:30 P.M.
6. Class system: None
7. Scope: To serve members of staff of the ministry and to provide reference services for other educationalists.
8. Problems and prospects: There is a lack of adequate funding for the development of the library's collection.

Ministry of Finance, Development, and Economic Planning, Central Planning Unit Library

1. Date of establishment: 1974
2. Location: Ministerial Building, George Street, Freetown
3. Collection:
  - Books and periodicals: 1,400 volumes
  - Periodical titles: 30
4. Staff:
  - 1 professional
  - 1 paraprofessional
5. Hours open:
  - Monday–Friday: 8 A.M.–3:45 P.M.
  - Alternate Saturdays: 8 A.M.–12:30 P.M.

6. Class system: Dewey Decimal Classification—classified catalog
7. Scope: To serve as a library and information bureau of the Central Planning Unit. The library collects materials on economic development and planning. Its special collections include: OECD documents, Sierra Leone government publications, UN and specialized agency publications, and Planning Unit regular and technical papers.
8. Publications: *Monthly Accessions Lists* (suspended)

#### National School of Nursing Library

1. Date of establishment: 1959
2. Location: National School of Nursing, Wallace Johnson Street, Freetown
3. Collection: 1,500 volumes
4. Staff: 1 nonlibrary professional (state-registered nurse)
5. Hours open: Monday–Friday: 8 A.M.–3:30 P.M.
6. Class system: Classification for Nursing Libraries—author–title catalog
7. Scope: To provide library services for members of staff and nurses in training.
8. Problems and prospects: There is need for more funds for library development.

#### Rice Research Station Reference Library

1. Date of establishment: 1934
2. Location: Rice Research Station, Rokupur, Kambia District, Northern Province
3. Collection:
  - Books and periodicals: 2,170
  - Periodical titles: 150
  - Microfilms: 150
  - Microfilm reader
4. Staff: 1 paraprofessional
5. Hours open:
  - Monday–Friday: 8 A.M.–3:45 P.M.
  - Alternate Saturdays: 8 A.M.–12:30 P.M.
6. Class system: subject catalog
7. Scope: To provide information and reference services for members of staff engaged in research in various fields.
8. Publications: Research publications produced by members of staff.
9. Problems and prospects: There is need for more adequate staff and funding.

#### Sierra Leone Broadcasting Service Gramophone Library

1. Date of establishment: 1957
2. Location: New England, Freetown
3. Collection:
  - Gramophone records: 15,000
  - Tapes: 8,000
4. Staff:
  - 1 professional
  - 6 paraprofessional
5. Hours open:
  - Monday–Friday: 8 A.M.–12 noon and 1 P.M.–4 P.M.
  - Saturday: 8 A.M.–12:30 P.M.
6. Class system: Index system as used at the British Broadcasting Corporation Gramophone Library—catalogs of composers, artists, and titles

7. Scope: To provide tapes and commercial gramophone records for use by program staff. The library collects records on features and drama, talks, music, variety entertainment, etc.
8. Problems and prospects: New accommodation is to be provided in the building under construction for the broadcasting and television services.

#### United States Information Library

1. Date of establishment: 1959
2. Location: United States Embassy, Walpole Street, Freetown
3. Collection:
  - Books and periodicals: 3,500 (approx.)
  - Periodical titles: 62
  - 16-mm films: 300
  - Tapes
  - Videotapes
4. Staff: 2 paraprofessional
5. Hours open:
  - Monday–Friday: 8 A.M.–5 P.M.
  - Saturday: 9 A.M.–12 noon
6. Class system: Dewey Decimal Classification—dictionary catalog
7. Scope: To provide the people of Sierra Leone with information about the United States of America, its cultural life, history, educational system, etc. The library collects comprehensively, with emphasis on reference material on the United States.
8. Problems and prospects: Policies are adapted to suit the aims and objectives of the service.

#### YWCA Library/Study Centre

1. Date of establishment: 1969
2. Address: YWCA, P.O. Box 511, Freetown
3. Collection:
  - Books and periodicals: 970 volumes
  - Periodical titles: 24
4. Staff: 2 paraprofessional
5. Hours open:
  - Monday–Friday: 9 A.M.–9 P.M.
  - Saturday: 9 A.M.–12 noon
6. Class system: Dewey Decimal Classified Catalog—author and title file and alphabetical subject index
7. Scope: To meet the dearth of reference libraries in Freetown; to supplement school libraries by providing background books in support of the regular school curriculum; to provide systematic training in the use of books and libraries. It collects materials generally on all subjects in the curriculum of secondary schools.
8. Problems and prospects: There is need for more adequate staff.

### Public Libraries

## HISTORY AND BACKGROUND

As in many Commonwealth countries in Africa, the British Council of the United Kingdom seemed to have laid the foundations of a public library system in

Sierra Leone prior to the achievement of independence. Its local office in Freetown operated lending and reference libraries open to the public in Freetown, and also in Bo, located in the provinces. It also supplied books to libraries which had been established through local efforts, as in the cases of Port Loko, Bonthe, and Kenema. In places where no libraries existed, but where there were demands for books, the British Council organized a book-box scheme which provided regular supplies of books to these places from Freetown. Thus, in 1955 the British Council library in Freetown had a stock of 22,000 books. By this date it was also involved with the organization of, or was supporting, town public libraries, eleven school libraries, and one central library for teachers.

The British Council became less directly involved with the development of libraries in Sierra Leone when the Sierra Leone Library Board Ordinance was enacted in 1959. This ordinance was modeled after the Library Law of Ghana, which was the first library law in British West Africa. It empowered the board "to establish, equip, manage and maintain libraries in Sierra Leone." The minister of education is empowered to appoint the chairman and 14 other members. Its first chairman was Dr. Davidson Nicol, former vice-chancellor of the University of Sierra Leone.

The board had a good start, under the leadership of Mr. J. T. Strickland, who was appointed in 1960 as its first chief librarian and secretary. By 1962 it had established five part-time libraries in the provinces and a book service to primary schools, and it had sought the improvement of libraries in secondary schools and training colleges. At the same time the British Council donated its Freetown library and furniture to the board, and this collection formed the nucleus of its stock. The British Council library center in Bo was similarly taken over by the board in 1963 and developed as a provincial library.

The board's headquarters and central library, a two-story building, was formally opened in 1964. It was built with the financial support of the British Council (£35,000), a building appeal fund, and a substantial contribution by the Sierra Leone government. Other contributions included: \$25,000 from the government of Liberia for the purchase of reference works and bibliographies; from the Canadian government, \$5,000 for children's books; and from Barclays Bank D.C. & O., £4,000, £1,000 of which was to be spent on secondary school libraries and the rest on the building fund. The governments of France, the U.S.S.R., and the United States, and the English Speaking Union of the Commonwealth donated books to the board. Similar donations were received from the British Information Services and from Mrs. O. Berwick Sayers, who gave books and periodicals on librarianship from her late husband's library.

By the Publications Ordinance as amended in February 1962, the public library was assigned the status of one of two copyright libraries in Sierra Leone. It is therefore required to publish an *Annual List of Publications* received through the provisions of this ordinance.

The Library Board is a nonrevenue institution. It does not charge fines on overdue books and membership is free; it receives its funds from the Ministry of Education.

The board now has responsibility for the following library facilities: its Central Library in Freetown; 3 regional libraries in the main towns of the three provincial districts; 10 branch libraries (8 of which are already in existence, and 2 are being built, in the East-end and West-end of Freetown); and a Primary School Service, which is operated by mobile libraries that visit these schools once a year. There is a total stock of 347,932 volumes (Library Board figures, 1976), and the facilities serve a registered user population of 33,353 adults and 63,712 children. The Central Library also acts as the City Library.

The board once had the responsibility for secondary school libraries, but this service was discontinued when the annual library grant to secondary schools was stopped by the military regime in 1967. Secondary schools now develop their own libraries through the efforts of enthusiastic teacher/librarians, donations, and school contributions.

As mentioned earlier, the development of public libraries in Sierra Leone is to a very large extent owed to the efforts of the British Council. Its recent library development program—which would include the cost of buildings, books, and equipment—is a concrete demonstration of its interest in libraries as an educational and cultural force in a developing society.

#### ADMINISTRATION AND GENERAL ORGANIZATION

The Sierra Leone Library Board is responsible to the Ministry of Education. It forms part of the schedule of an assistant chief education officer in the ministry, who is also responsible for archives. The chief librarian, Mr. M. B. Jones, is an associate of the Library Association. Originally trained as a teacher, he now has about 30 years of library experience.

The organizational chart of the public library system is given in Figure 1. While technical services are centralized, each regional and branch library provides other services similar to those offered by the Central Library, in Freetown.

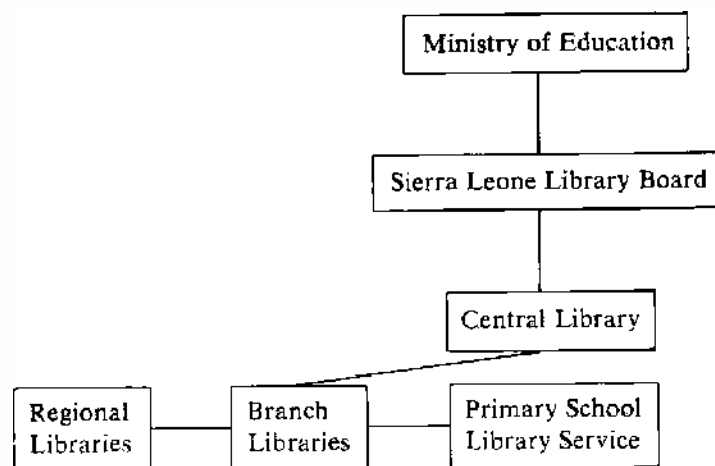


FIGURE 1. *Organizational chart of the public library system.*



## THE CENTRAL LIBRARY

The Central Library's Lending Department has a stock of fiction and nonfiction books and a small collection of books by and about African authors. There is also a fair collection of local and overseas periodicals and newspapers.

Its Reference Department maintains a West African Collection which incorporates a Sierra Leone Collection.

The Margaret Scoggin Memorial Collection forms part of the reference section of the library. This collection was established in 1971, when the Sierra Leone Library Board was selected as a suitable recipient of a repository collection of American children's books of international interest, presented annually to several libraries with an expressed interest in books for children from other countries.

These repository collections—which are also found in Tanzania, Ghana, Venezuela, Pakistan, Ecuador, and Iran—were established in honor of the late Margaret Scoggin, who served as coordinator of the Young Adult Services of the New York Public Library from 1952 to 1967, and who was active in setting up the International Youth Library in Munich. The books in the repositories are selected by the Children's Services Division of the American Library Association and are donated by publishers through the Children's Book Council.

It is the intention that these books will provide an opportunity for writers, publishers, students of children's literature, teachers, librarians, editors, illustrators, parents, and researchers to become acquainted with current writing and production of American children's books. The repository is therefore operated as a reference collection for adults.

One of the titles in this collection is *Singing Tales of Africa*, retold by Adjai Robinson. Adjai Robinson is a Sierra Leonean born in Freetown. He is a graduate of Fourah Bay College, where he obtained an Arts Degree, and he studied later at Columbia University, New York, and worked in the United States for some years. After graduating from Fourah Bay College he went to Nigeria and taught at Kings College, Lagos.

The Reference Department also operates a UNESCO Depository Collection which was established in 1964. The collection also includes secondary school and college textbooks, British Standards Institute publications, United Nations publications, and maps.

### *The Children's Department*

The Children's Department has no age limit for children who would like to join the library. The norm applied is the ability to read. A child continues to use the Children's Department until he or she reaches the third form of a secondary school, after which enrollment in the adult Lending Department can be effected.

### *Regional and Branch Libraries*

The three Regional Libraries, located in Bo, Kenema, and Makeni, were established in 1962, 1964, and 1966, respectively. Their staffs consist of a

librarian, two library assistants, and cleaners. They are open from 9 A.M. to 6 P.M., Monday to Saturday.

Though there is provision for ten branch libraries, only seven of them are in existence. Two branches are to be constructed as new buildings in the western and eastern areas of Freetown, and one is to be located in Port Loko.

According to information received from the Sierra Leone Library Board, the Branch Libraries were established as follows:

Magburaka	1961
Kailahun	1961
Kambia	1962
Pujehun	1962
Bonthe	1964
Matru	1964
Koidu	1965

The staff of each of these libraries is limited to one junior library assistant, who is supervised by a regional librarian. Their bookstock is serviced from the Central Library. Their hours of opening are: Monday to Friday, 9 A.M. to 12 noon and 2:30 P.M. to 6 P.M.; Saturday, 9 A.M. to 12 noon and 2:30 P.M. to 4 P.M.

#### *Primary School Services*

This service was established in 1961. It is concerned with primary schools located in towns where no libraries have been established. Approximately 75 schools are registered in this program. The service is operated by two mobile units staffed by two assistants and two drivers. Books are processed centrally, and schools are visited once a year. Books are therefore deposited on loan to these schools for one year. The stock of the service is estimated at 222,977 volumes, much of which consists of donations from the Ranfurly Society and similar institutions. Approximately 90,000 children and 4,000 teachers are served by this program.

A summary of significant data on the Sierra Leone Library Board Central Public Library follows.

1. Date of establishment: 1959
2. Address: P.O. Box 326, Rokel Street, Freetown
3. Collection:
  - Books and periodicals: 347,932 volumes
  - Periodical titles: 73
  - West African Collection, incorporating a Sierra Leone Collection
4. Staff:
  - Professional: 10
  - Paraprofessional: 45
5. Hours open: Monday–Saturday
  - Lending Department: 9 A.M.–6 P.M.
  - Reference Department: 9 A.M.–7 P.M.
  - Children's Department: 9 A.M.–5 P.M.
6. Class system: Dewey Decimal—dictionary catalog

7. Scope: To equip and maintain libraries in Sierra Leone, that is, to provide a nationwide library service.
8. Publications available:  
Sierra Leone publications  
*Annual Report*
9. Problems and prospects: Staff and finances are inadequate for improvement of physical facilities, transportation, and library development programs. There are bright prospects in view of British government financial aid.

### PROBLEMS AND PROSPECTS IN PUBLIC LIBRARY DEVELOPMENT

The Sierra Leone Library Board's main problem is lack of funds for the appropriate stock development and hiring of adequate professional staff to ensure a more vigorous public library development throughout Sierra Leone. Public library development from 1966 to 1976 is illustrated by the data in Table 2.

Under the British Library Development Program the government of the United Kingdom has allocated the sum of £210,000 to be spent on the construction and extension of public library buildings in Freetown, Kenema, and Makeni, and on the provision of books and equipment. This expansion program will continue through 1982.

TABLE 2  
Public Library Growth in Sierra Leone, 1966-1976

	1966	1976
Book fund (in leones)	7,818.00	16,222.00
Book and periodical stock	263,124	347,932
Loans	142,610	126,354
Number of readers	38,313	99,065
Number of staff		
Professional	6	10
Paraprofessional	25	30
Salaries (in leones)	16,590.00	32,703.00

### The Sierra Leone National Museum

The National Museum was established in 1957 as a branch of the Sierra Leone Society, which was a historical and cultural group. On the dissolution of the Sierra Leone Society, the subcommittee continued as the Museum Committee until it was accorded official legal status in 1967 by integrating it with the Monuments and Relics Commission, which was established by the Monuments and Relics Act of 1947. Under this new arrangement, provision was made for a National Museum Committee of 15 members including the chairman. This committee is responsible for museum affairs, and it serves in an advisory capacity to the minister of tourism and cultural affairs, whose portfolio includes the museum.

The Museum Committee tries to fulfill four basic functions with some degree of

success: collecting, preservation, education, and research. Most of the museum collection is obtained by purchase, and other items are donated.

Three fields of specialization are observed: history, archaeology, and ethnography. Historical items relate to the slave trade period, the colonial era, and contemporary times. Archaeological items are steatite figurines (locally called "Nomoli"), bored stones, Neolithic tools, and pottery. Ethnographic items in the museum are the most numerous; they consist of wood carvings, regalia of chiefs, secret society items, and other cultural pieces.

These items, which would otherwise have disappeared or perished, are preserved for posterity. The National Museum also protects objects of cultural value by prohibiting unauthorized exportation of them; it protects sites from willful destruction or damage and from excavations carried out by unqualified persons; and it protects ancient monumental buildings from destruction.

The museum plays a part in education by fostering a strong link between its activities and those of the schools and colleges. As teachers become aware of new teaching methods, and as they encourage pupils to adopt the enquiry method of learning and the study of all types of source materials, the museum's role in education is increasing in importance and becoming more and more valuable. For this reason, and in spite of the museum's size and limited resources, between 2,000 and 3,000 children visit the museum in Freetown each year. There are organized tours and also special times for these visits, when it is not open to the public, between 8:45 A.M. and 10 A.M. Many pieces in the museum are relevant to the history syllabus of schools and colleges, and teacher education students are annually exposed to its contents as a tool of education.

In spite of limited staff, the National Museum spares no effort in conducting small-scale research on collected objects and declared monuments. Research students, local and foreign, make extensive use of such materials. The museum's library forms part of its research facilities.

In the museum, the culture of the land is portrayed both to the citizen and the foreign visitor. The objects speak for themselves and are appreciated even by the illiterate visitor, thus playing an important role in adult education. The museum records about 300,000 visitors each year despite its size.

#### PROBLEMS AND PROSPECTS

The museum suffers from an acute shortage of funds. This has resulted in inadequate physical facilities, poor equipment, lack of staff, and lack of archaeological research projects which could establish professional excavations and lead to more discoveries on Sierra Leone history before the arrival of the Portuguese.

With the provision of modern physical facilities, loan services and circulating exhibitions to schools, colleges, and adult education and community education centers would be established; joint mass media programs with the radio and television systems would be organized and encouraged; and the training of museum

personnel and provision of attractive conditions of service could be undertaken. The availability of trained personnel in various aspects of museum work would enable the pursuit of research projects in support of the museum's collection and study of pieces, and the publication of research results.

#### SIERRA LEONE NATIONAL MUSEUM LIBRARY

Captain Butt-Thomson's library was donated to the museum and it forms the basic collection, originally cataloged by a Peace Corps volunteer. The following list gives some significant information on the library.

1. Date of establishment: 1957
2. Location: The Sierra Leone National Museum, Cotton Tree, Freetown (P.O. Box 908)
3. Collections:  
Volumes: 200  
Current periodical titles: 10
4. Staff:  
4 professional  
4 nonprofessional (same as museum staff)
5. Class system: Dewey Decimal—dictionary catalog, classified index
6. Hours open:  
Monday–Friday: 10 A.M.–4 P.M.  
Saturday: 10 A.M.–1 P.M.
7. Scope: Strong bias toward collecting books on history, archaeology, and art.
8. Problems and prospects: Subject to the availability of funds, a better, specialized research library will be established as part of a new museum complex. Meanwhile, within the proposed extension of the present building, provision has been made for the improvement of the physical facilities of the present library.

#### Sierra Leone Public Archives

##### HISTORY

The development of Sierra Leone's Public Archives, in relation to other African countries south of the Sahara, provides a historical dimension which tends to be generally overlooked. Archival development in Africa, though considered to be a novelty, is in fact quite an old phenomenon.

##### *Archives in Sub-Sahara Africa*

The growth of archives repositories in Africa south of the Sahara first started not on the continent itself but on the islands of the Indian Ocean. Reunion set up its archives as early as 1739, and Mauritius followed in 1815. On the sub-Sahara con-

continent itself, the lead was taken by the Cape Colony, where the archives were established in 1876. This was followed by the Transvaal in 1887, and the Orange Free State made a start after the South African War in 1863.

The next archival advancement was made in the former French West African territory, where steps were taken, just before the First World War, to ensure the proper preservation of records which had been accumulated by the colonial government. It is generally assumed that it was also during this period that many of the archival documents relating to the historical development of these countries were transferred to France.

In 1915 a chief archivist was appointed for the Union of South Africa as a whole. He was responsible for all existing Archival Depots, and ensured the establishment of the Provincial Archives for Natal in 1925. Southern Rhodesia, now Rhodesia, appointed its first government archivist in 1935, and the Historical Archives of Mozambique came into existence in 1939.

The Second World War was an impediment to archival development, not only in Africa, but some valuable work was done even during this period of great difficulty and grave limitations. In Guinea, for instance, steps were taken for the preservation of records by an extensive transfer and organization of materials in 1942. However, with the end of the war a period of dramatic expansion began.

Thus in 1946 the archives of the Gold Coast (now Ghana) were established; and in that same year the government archivist of Rhodesia (Southern) was empowered to reorganize the archives of Northern Rhodesia (now Zambia) and those of Nyasaland (now Malawi). In 1947 the Belgians established the archives of the Belgian Congo (now Zaire). And 2 years later the British established the archives of Uganda. A year before that an Archives Board had been created in the Sudan.

The 1950s brought further growth. The archives of French Equatorial Africa (now the Central African Republic, Republic of Chad, Democratic Republic of the Congo, and the Gabon Republic) were established in 1950. This was followed by Sierra Leone in 1950/51 and Nigeria in 1954. In 1956 the archives of Kenya and Zanzibar were established; while in 1957 South Africa established a Union Archives, in addition to its already existing Provincial Archives. In that same year Basutoland (now Lesotho) appointed an archivist; and in the following year Madagascar made further advances in the development of its archives, and the present archival system of Mauretania was established.

The contrasts in methods and manners of approach for the creation of various archival institutions may seem quite considerable. This complexity owes its existence to the fact that African archives receive most of their materials from government sources, and they are therefore taken as originating for the specific administrative machinery which they serve. As their problems are different in nature, so is their general background. For a variety of political and economic reasons, some countries have been able to take the lead and to build up institutions of considerable size, while others are only just beginning to create the barest of archival facilities which a modern state requires. What is therefore crucial and important for the development of African archives is the enactment of national archival legisla-

tion which would give the archives their rightful place within the context of national development.

### *Archive Development in Sierra Leone*

The Sierra Leone Public Archives are as old as the administration of the settlement that came into existence in 1792, and the earliest extant treaty in the archives is that of 1788, signed by King Naimbana and the British and effecting the transfer of the Colony of Sierra Leone to Britain.

Before the Second World War the archives were kept in the Legislative Building, on the topmost floor above the old Legislative Council Chamber. These quarters were known as the Records Room. The Legislative Chamber was adjacent to the Secretariat Building, which was erected in 1929. The Records Room contained almost all of the records of Sierra Leone from its inception to the most recent acquisitions. These records were very well organized and systematically arranged so that documents could be quickly located. A civil service officer was in charge of them and he ensured proper storage and easy location of items requested for use.

During the Second World War it was thought that the Vichy French might attack Sierra Leone. This fear and the lack of space were good reasons for the transfer of records to Moyamba in the Southern Province, 76 miles from Freetown. In Moyamba these records were partly stored in provincial lock-ups (jails) and partly in railway coaches. No particular care or attention was given to them until the end of the war.

At the end of the war some of these records were returned to Freetown and others were left in Moyamba. There does not seem to have been any special reason for leaving some of these records behind—except that it was believed that there would be insufficient space for all of them to be accommodated in the old army huts at New England Ville, Freetown, which were used for housing the archives.

As a result of these two moves, the bound volumes and bundles of papers which then formed the archives were disarranged, and their physical condition deteriorated owing to bad storage conditions and exposure to damp and insects. In order to save the collection from complete destruction it was decided to engage an archivist temporarily, who was to rearrange the records in the order of the prewar system.

When this decision was taken in 1950, there were very few trained archivists available in Britain. The Diploma in Archives Administration at London University had only just been started and so it was not possible to recruit a trained archivist. Christopher Fyfe, then a history teacher in Britain, was therefore appointed to the task of organizing and arranging the archives collection of the postwar era. This he performed with great competence and in great detail, by cataloging and inserting descriptive entries in each of the volumes or bundles he examined. Bundles of loose sheets of minute papers were either stored in wooden boxes or put in manila pamphlet boxes. However, both of those types of storage material later proved to be hazardous because of the infestation of termites and the damp caused by humidi-

ty. Thus by 1966, when the archives were reorganized at Fourah Bay College, most of the manila boxes had completely disintegrated, and in wooden boxes were found bundles of minute papers which had been transformed into termite-ridden masses. Fyfe also prepared a list, or catalog, of the materials that were in stock, which was of invaluable help to researchers who used the collection after Fyfe's departure and in the early years of the '60s.

On the expiration of Fyfe's contract in 1952, the colonial government decided that Sierra Leone, being a poor country, could not afford to employ a full-time archivist. The archives were therefore removed to Fourah Bay College, where they have been ever since. And in 1954 Dr. Peter Kup, associate professor of history, was appointed honorary archivist by the Sierra Leone government.

During Professor Kup's period of office, more archival documents were transferred from the provinces, particularly from Bonthe, and an accessions register was established. Dr. Kup also encouraged foreign interest in the archives as a source of development. As a result of this policy, the Danish Board of Technical Assistance for Underdeveloped Countries (Copenhagen) sponsored the visit of Dr. Meyer-Heiselberg, museum curator of the National Museum of Denmark, to Sierra Leone, in order to prepare a historical evaluation of the Sierra Leone archives for the benefit of researchers' use. After a month's stay, Dr. Meyer-Heiselberg produced a detailed report on the archives; this reflected its historical research value, size, and condition of preservation and included recommendations for its improvement. He also labeled and prepared descriptive notes for new accessions which had been examined by the archives after Fyfe's departure.

Professor Kup was also interested in the development of provincial archives, despite the lack of archival staff. He therefore encouraged members of staff of the History Department to visit Provincial Records Offices and to prepare surveys of archival records found in them.

Thus in 1964 Allen Howard, an American lecturer in history at Fourah Bay College, produced a survey of archival materials in the Northern Province and described the condition of the local archives and the types of documents they contained relevant to research. The earliest document he located was dated 1914.

#### PUBLIC ARCHIVES ACT OF 1965

On September 2, 1965, an act was passed "to establish the Public Archives Office of Sierra Leone and to provide for the preservation of the Public Archives of Sierra Leone and for purposes connected therewith."

The archives bill was steered through Parliament by the Ministry of Education, which is responsible for archives. It provides for a director of archives, "who shall be a Public Officer under the Direction of the Minister of Education, responsible for Government records and documents and other historical matters of every kind which may be transferred to or acquired by the Public Archives Office."

The act also provides for the establishment of a Public Archives Committee to advise the minister on all matters relating to archives in Sierra Leone. When the act came into operation in June 1966, Professor Kup was appointed honorary govern-



ment archivist, as provided in the act, pending the appointment of a director of archives. On his departure from Sierra Leone in 1967, the writer of this article was appointed as his successor.

At the request of the Sierra Leone government in 1966 UNESCO sent an archivist—Mr. L. Bell, of the Public Records Office, London—to make a survey of archives in Sierra Leone. He investigated particularly the storage and use of modern materials for the period 1940–1960. This was a crucial period for Sierra Leone, covering the war years and the period when it was gradually achieving independence from the British. Mr. Bell's main criticism—that there was no clearly defined policy for the selection and destruction of documents—was later satisfied by the creation of Departmental or Ministerial Archives Committees. These formulate policies on the scheduling for selection and destruction of records, in consultation with the Public Archives Office, which is represented on these committees.

### THE COLLECTION AND FACILITIES

The archives, though housed at Fourah Bay College, are the property of the Sierra Leone government. The librarian of Fourah Bay College serves as honorary public archivist and is responsible for the daily supervision of the archives, while the Public Archives Committee advises the minister of education on policy matters.

The oldest document in the collection is the 1788 treaty between the British and Chief Naimbana, purchasing that portion of land which later developed into the Colony of Freetown. Other records in the archives include documents relating to the Sierra Leone Company, the colonial period, and the post-Independence era.

The bulk of the archives in the repository date from 1788–1919. Most materials after this date are located in various offices. Members of the archives staff therefore make regular visits to the government offices and ministries in order to organize their records initially and to give advice on the maintenance and preservation of records in the registries. Records which are of archival value are transferred to the Fourah Bay College repository, but this is handicapped by space limitations. In spite of this and other inherent limitations caused by the humidity of the tropical climate—as evidenced by brown rot, mold, and the brittleness of the documents—the Public Archives of Sierra Leone are now properly a part of the government machinery. More and more there is a growing awareness in government departments and ministries of the role of the Public Archives Office as the repository for accumulated governmental decisions and policies. The Public Archives Office involvement with the education and training of records officers also contributes to the development of confidence and cooperation with the Civil Service.

Other facilities in the archives are its Reprographic and Restoration Units. While the former was originally established by funds and expertise provided by UNESCO, the latter was developed with local funds. Provisions have been made for giving these units a more satisfactory location in the new University Planning Unit Building, which will soon be under construction.

A summary of significant information on the Sierra Leone Public Archives follows.

1. Date of establishment: 1964
2. Location: Fourah Bay College, University of Sierra Leone, Freetown
3. Collection: Documents relating to the precolonial, colonial, and post-Independence periods; 1788–
4. Staff:
  - 3 professional
  - 3 paraprofessional
5. Hours open:
  - Monday–Friday: 8:30 A.M.–4 P.M.
  - Saturday: 8:30 A.M.–12 noon
6. Scope: Open to all researchers within and outside Sierra Leone. A search fee is levied.
7. Problems and prospects: Owing to lack of adequate staff and space, modern records management in Sierra Leone is in its infancy of development. Funds for capital development are rather limited, and the prospects for constructing an archives building and a records management center are rather remote. Rented premises will probably be used in the future to develop a more systematic records management operation.

The development of provincial archives is a matter for the future, in view of the lack of suitably qualified staff to work in the provinces and to establish records management centers.

If the future development of the Sierra Leone Public Archives is to be substantial, the local annual recurrent subvention of £12,000 provided by the central government for the operation of the Public Archives Office would need to be significantly increased, and funds for capital development would need to be established.

### **Book Development in Sierra Leone**

Under the auspices of UNESCO, a meeting of experts on book development in Africa was held at Accra in February 1968. The conference offered five points as guidelines for the establishment of priorities for book development planning. The first two of these points were:

1. Authors of educational and cultural books should as far as possible be Africans.
2. The first languages to be promoted should be African languages.

It was also recommended at this meeting that National Book Development Councils should be established in African countries.

With a view to implementing these recommendations, the Sierra Leone government requested the services of a UNESCO expert who would be required to base his investigations on the following terms of reference:

1. To assess the present needs for both text and nontext books at all levels.
2. On the basis of this assessment to draw up an integrated program for Sierra Leone covering all aspects of book development—planning, production, printing, distribution, libraries, and bibliographies—for a 5-year period.
3. To make a cost estimate for the program drawn up and to recommend non-governmental and intergovernmental sources of financial aid.

4. To make practical recommendations to the government as regards the establishment of a Book Development Council, in accordance with the proposals made by the Regional Meeting of Book Development Experts, Accra, February 1968.

In response to this request, Mr. Phillip Harris arrived in Sierra Leone on April 4, 1970, in order to make suitable recommendations relative to the stipulated terms of reference. At the end of his stay in Sierra Leone, on June 19, 1970, he was able to give a report which emphasized, among other things, the need for an integrated book development program in Sierra Leone. This need is succinctly expressed in the following quotation from his introduction:

Books are not only needed for efficient educational communications, they are also instruments of liberty, joy, beauty, individual maturity and national identity. An integrated program for book development must encourage a nation's writers, artists and poets, have regard for indigenous languages and culture, promote fluency in the official language, care for the happiness of children, and provide for the needs of life-long education. Special provision must be made for those who acquire literacy late in life or outside the school system. A library system to make all such books available, an efficient pattern of distribution and retail setting to encourage individual ownership of books, local publishing and printing industries to provide economies and reduce dependence on experts are among the concerns of a book development programme (15).

He continued by highlighting the need for providing essential books for the education system as the largest part of a book development system. However, the need for educational books must be seen within the total system of instructional communications and plans for the development of educational technology, including sound broadcasting, television, language laboratories, tapes, records, projectors, films, teaching machines, and computers. In a developing country, books must also be produced cheaply so that they can be reasonably priced and economically available to all types of people. The use of educational broadcasting in developing countries is quite relevant to the point of making knowledge available to the majority of people, whose language of communication need not be English, the official language of Sierra Leone. Thus one of the prime objectives of books used in the education system must be to ensure that English becomes more widely and fluently read, spoken, and written. But if book development is to be an instrument of social cohesion and enrichment for individual personalities, high priority must be given to the production of books in the main languages of the country.

In a paper read to the Leverhulme conference on "Universities and the Language Problems of Tropical Africa" (Ibadan, 1961), Dr. Robert Armstrong wrote as follows:

We may begin by remembering that it is through the language native to us that we become the human being we are (16).

The language question is, he pointed out, "therefore intimately bound up with the respect we bear other people and our self-respect." The argument continued by observing that the lack of respect for the work of agriculture and for traditional

values may be made good at least in part if more books are available in the languages in which the things of the farm, the home, and the chiefdom are usually discussed. It must be borne in mind that there are rural areas in the provinces of Sierra Leone where English is a strange tongue for the majority. The availability of books only in English in these areas is delaying the transmission of essential crafts and skills, and little incentive is offered to those who leave school early and to the newly literate to continue their education or to maintain their proficiency. The absence of books in the vernacular languages in primary school in these areas may serve to bring about the commencement of the process of social alienation in the first year of education. The child of a subsistence farmer may therefore, from entering school, begin to feel that what he learns in school through English can have nothing to do with the real life of his village and the farm, and this might make him long for an escape to the towns.

With this background in mind, Philip Harris strongly recommended the publication in the main vernacular languages of primers, dictionaries, and books designed for the acquisition of literacy by children and adults; of storybooks, including folk tales and novelettes, designed for juveniles and adults; of practical manuals to impart agricultural, health, and mechanical skills; and of books to assist the transition from literacy in the vernacular to English.

As a back-up support for these recommendations, he expressed the need for the establishment of the Department of Applied Linguistics at the university and for the convening of specialized, programmed writers' workshops to accelerate the production of books and booklets. He finally urged that the Provincial Literature Bureau, which is concerned with the production of books in the vernacular, should be developed to increase its production not only in relation to quantities of titles produced, but also in relation to the variety of materials.

Local production of primary and secondary school texts was to be encouraged so as to ensure their availability at low prices. Their distribution and retail trade by local commercial bookshops and the university bookshops, it was stated, could be made possible only by the improvement of the physical facilities and equipment of the existing printers and publishers. Until these goals had been achieved, Sierra Leone would continue to depend largely on the importation of books as its main source of supply.

Some of these recommendations were implemented. Others have been taken up by the Sierra Leone Education Review and through the establishment of the Mano River Union's Curriculum Planning and Instructional Materials Production and Book Development Committee (called the CIB Committee for short). The Mano River Union is an economic and social agreement between Sierra Leone and Liberia, the social aspect of which includes cooperation in education, training, and research.

While the Ministry of Education deliberated the Philip Harris report, the International Book Year Committee, which had organized the celebrations of this event in 1972, evolved into the National Book Committee of 1973. It then continued as the Book Development Council, until it was dissolved and superseded by the Mano River Union Book Development Committee in 1975. This committee

has been classed as an "operational institution" of the union. This body also serves as a coordinator of the National Book Development Committees which look after local specialized needs.

The Mano River Union cooperative organization has established cultural, social, and economic relationships between Sierra Leone and Liberia, which lies south of Sierra Leone. While Sierra Leone has a British background, Liberia has an American one. Liberia became independent on July 26, 1847.

Prior to the formation of the Mano River Union Curriculum Planning, Instructional Materials Production, and Book Development Committee, it could be said that Sierra Leone and Liberia had similar backgrounds in book development. One interesting feature about the Liberian system is the centralization of ordering and distribution of books and some school supplies. Orders are based on a list of books approved by the Ministry of Education, which also makes available the necessary funds for purchase.

Local book production for educational purposes in Liberia is limited to mathematics textbooks at the teacher education level, and social studies, mathematics, language, and arts at the primary level. Readers are also produced for this level. Literature books are also produced for grades 7, 8, and 9 of the secondary level.

In Sierra Leone, local book production has been limited to the publication and introduction of texts and teachers' handbooks for the new mathematics course given in the first class of the primary level. Book distribution is operated by private companies. The Sierra Leone Government Bookshop sells only government publications. Apart from the Government Printing Department, Sierra Leone has a variety of mission and commercially run printing presses which produce a very high standard of work. A high quality of binding can also be undertaken locally.

The production of books and materials in the local languages in Sierra Leone, developed as part of successive literacy programs, has a well-established operation within the book development system. A reasonably coordinated library system is also in existence.

Given these differing backgrounds in the two countries, the CIB Committee seems to have limited itself to certain areas of cooperation which will solve some of the existing problems common to both countries. Thus it has been agreed:

1. That a single union Book Development and Instructional Materials Production Center should be established.
2. That textbooks for which contracts are given by the union should be written for use by both member states.
3. That guidelines should be prepared for persons bidding for textbook contracts.
4. Cooperative textbook production should be limited to mathematics, social studies, English, adult education, teacher education, and technical, commercial, and vocational education—with particular reference to senior high school levels in woodwork, metalwork, and agricultural science.
5. That National CIB Committees should send half-yearly reports to the union CIB committee.
6. That trial use of textbooks and other instructional materials already developed by one member state should be made available in the other member state for

- a 1-year period in at least 10 sample schools chosen cross-sectionally. After this trial period, the National CIB Committee of the state testing the materials should make an evaluation of the experiment and pass on its findings to the union CIB Committee for appropriate action.
7. That orientation and evaluation meetings be held at the beginning and at the end of the process of the trial of a book, arranged so that one representative of the writing team can meet with the pilot teachers and administrators in the other member state.
  8. That where the member states have developed two suitable textbooks in the same subject area, such material should be considered by the union CIB Committee and recommended for use in the member states as supplementary material.
  9. That the textbook-evaluating organizations of both member states should exchange lists of recommended textbooks from time to time.
  10. That a research study on Standard English Usage should be conducted in the member states, with a view to identifying possible significant differences in the use of the language, and to provide guidelines for writers of textbooks, particularly in the language arts.

The union CIB has formulated a policy with long-range and immediate objectives. The former include: the achievement of integrated curricula development in the member states at all levels of the formal and informal educational systems, for the enrichment of educational provisions to the mutual benefit of both member states; the production and distribution of textbooks and other instructional materials at low cost; and the evolution of methods and materials to ensure universal literacy in the member states. The immediate objectives involve practical approaches which will ensure implementation. In this regard, the CIB will concern itself with efforts to ensure the following:

1. The review and harmonization of the curricula of member states at all levels of the formal and informal educational system.
2. Steps to ensure the establishment of a union book development and instructional materials production center within a period of 3 years.
3. The production of at least one primary-level textbook in each of several fields: language arts, mathematics, science, and social studies—and their dissemination and trial use within member states during a period of 3 years.
4. The production of at least one textbook each in the following major subject areas of the secondary school curriculum: language arts, mathematics, science, social studies, and technical, commercial, and vocational subjects—and their wide dissemination and trials in member states within the next 5 years.
5. A similar program at the secondary level, to be carried on at the teacher education level in the same subject areas during the same period.
6. The local production of instructional materials such as journals, newsletters, film strips, laboratory equipment, transparencies, tape recordings, wall charts, etc.
7. Steps to devise methods and provide materials which would ensure that the literacy rate of member states is increased by at least 2% each year.
8. The development of an informal community education program which would include training of personnel to staff community education centers.
9. The establishment of at least one new community education center in each member state within 3 years; and efforts to broaden the activities of the

community education center concept so that public and private service agencies may be brought into focus for the benefit of the inhabitants of the area, with these services offering provisions for:

- a. adult literacy
  - b. African culture
  - c. arts and crafts
  - d. health, nutrition, and sanitation
  - e. transportation
10. The effective conduct of problem-solving activities in the production and distribution of books in member states.
  11. Organization of training courses and seminars relating to book development and instructional materials; and the collection and distribution of information and statistical data relating to book development and the instructional materials center in member states.
  12. Efforts to encourage the activities of the National Book Development Committees of the union.
  13. Steps to encourage the development of libraries and library services.
  14. Development of union co-publications.
  15. Organization and coordination of on-going research programs and studies relating to book development and instructional materials.

It is planned that details of the CIB Project, including these objectives, will be worked out by the union's Secretariat with help from its technical assistance facilities. On the implementation of the CIB Project, a feasibility study was to be conducted with the help of educational development experts from the United States; while at the same time the union Secretariat effected immediate implementation of the project by coordinating the work of the national CIB Committees.

The union project as outlined seems quite ambitious, well planned, and relevant to the needs of both member states. Hitherto, Sierra Leone had suffered from the lack of a large market to absorb its output of books and educational materials, produced at low cost and a reasonable marginal profit. With the establishment of a wider market by the two countries, it is hoped that a more sophisticated book trade will develop, one which will ensure provision for the requirements of all educational levels including the general public, and which will engender the spirit of continuing education.

#### **Technical Institutes and Trade Centers**

These two types of educational institutions were set up by the government to train technicians and craftsmen, respectively, for employment as middle-level manpower in the government service, commerce, and industry. In addition to general education, they provide facilities for the study of technology and related sciences; and for the acquisition of practical skills relating to occupations in the industrial, agricultural, and commercial sectors, and also in related services, the social services, and other sectors of the economy.

Thus, though there are more than 50 other educational institutions, mainly at the

secondary level, which offer some technical and vocational skill training, they give very little attention to preparation for employment.

Technical and vocational education in Sierra Leone is therefore being offered on a full-time basis in seven institutions, four of which require postsecondary and Form 3 secondary-school-level entry qualifications. The scope of this article is limited to these four insofar as library development is concerned.

The first Technical Institute was established in Freetown in 1953. It offers technician courses in construction, civil engineering, and mechanical engineering. Instruction is given on a full-time basis and leads to the Ordinary Technician Diploma of the City and Guilds Institute (London). Commercial education is also the responsibility of the Freetown Technical Institute, and full-time courses are run in preparation for the Ordinary Certificate in Business Studies. Private Secretarial Certificate Courses and other courses in secretarial and office practice are offered, and there are evening classes.

There are three institutions concerned with full-time craft-training programs designed to provide basic training for skilled workers in a wide variety of industrial activities. Some students, on completion of their courses, enter industry as advanced apprentices or follow curricula in preparation for the City and Guilds Institute (London) examinations. They include the Technical Institute in Kenema, Eastern Province, established in 1956; the Trade Centre located in Magburaka, established in 1962; and the Trade Centre located in Kissy, Freetown, established in 1964.

#### ADMINISTRATION AND FINANCE

The minister of education is responsible for the general policy, as for the other aspects of education in Sierra Leone. He is advised by the administrative and professional staff of his ministry, which comprises a principal education officer (technical and science), a senior technical officer, and two education officers, one commercial and one agricultural. The last-mentioned officers are responsible for the day-to-day control of policy relating to technical and vocational education. There is also a National Advisory Committee on technical and vocational education and training, composed of representatives from the Ministry of Education, other ministries undertaking technical and vocational training, employers, and labor organizations. Each institute and center has a principal who is responsible for its organization and administration. Funding is directly from the government, or from the International Labour Organization/United Nations Development Programme for special projects.

#### PROBLEMS AND PROSPECTS

In the view of staff, parents, and pupils, entry into technical vocational education is synonymous with mediocrity. The upgrading of staff in these institutions is therefore essential. For example, about 60% of the staff in the government institutions have academic training but they possess limited industrial experience.

The salary scales for technicians and craftsmen are reasonable in comparison



with other jobs, but in status and other conditions of service, parallel positions in other categories are more popular and respected.

### LIBRARIES OF TECHNICAL INSTITUTES AND TRADE CENTERS

Library facilities in these institutions are not a priority, although efforts are being made to improve on these provisions through International Development Agency and ILO/UNDP projects.

Summaries of significant information on the libraries follow.

#### The Technical Institute, Freetown, Library

1. Date of establishment: 1969
2. Location: Technical Institute Drive, Congo Cross, Freetown
3. Collection:  
Volumes: 5,000  
Current periodical titles: 10
4. Staff:  
1 professional  
2 paraprofessional
5. Class system: Dewey Decimal Classification—classified card catalog and dictionary catalog
6. Hours open: Monday–Friday, 8:30 A.M.–3:45 P.M.
7. Publications:  
*Library Hand Book*  
*Accessions List*
8. Scope: Covers all subjects taught at the institute.
9. Problems and prospects: There is lack of adequate funding for books and periodicals. Building and library equipment is provided by IDA funding.

#### Technical Institute, Kenema, Library

1. Date of establishment: 1963
2. Location: Main Administrative Building, Technical Institute, Kenema, Eastern Province
3. Collection:  
Volumes: 1,700  
Current periodical titles: 6
4. Staff: 1 tutor/librarian
5. Class system: Dewey Decimal Classification to be adopted—no catalog
6. Hours open: Monday–Friday, 8:30 A.M.–2:30 P.M.
7. Scope: Covers trade books on engineering and construction, mathematics, fiction, English literature texts, and reference books.
8. Problems and prospects: Space and funding are inadequate for provisions of books, periodicals, and other library materials.

#### Trade Centre, Magburaka, Library

1. Date of establishment: 1962
2. Location: Government Trade Centre, Magburaka, Northern Province
3. Collection: 1,246 items
4. Staff: 1 tutor/librarian
5. Class system: Stock arranged according to trades—no catalog
6. Hours open: Monday–Friday, for borrowing only, 2:30–3 P.M.

7. Scope: Covers carpentry and joinery, masonry and block laying, plumbing, and interior decoration.
8. Problems and prospects: There is lack of adequate physical facilities, funding, and staff.

#### Trade Centre, Kissy, Library

1. Date of establishment: 1975
2. Location: Kissy Dockyard, Freetown
3. Collection: 400 volumes and a few periodicals
4. Staff: 1 tutor/librarian
5. Class system: Dewey Decimal—no catalog
6. Hours open: Monday–Friday, 8 A.M.–3 P.M.
7. Scope: Mainly textbooks on subjects taught at the institute.
8. Problems and prospects: There is lack of adequate funding for books and other materials and a lack of staff. The library will move into a new building in 1979.

### Library Training and Education in Sierra Leone

While the education of Sierra Leone's professional librarians has always been undertaken abroad, preprofessional training and the training of paraprofessionals is usually done locally. Preprofessional training is often necessary as a qualification requirement for entry into library schools in England, the United States, and West Africa. Students wishing to attend library schools therefore sometimes seek employment in, or nonpaid attachments to, one or another of the different types of libraries in Sierra Leone, in order to acquire at least a year's experience in library practice. Also, the British Library Association demands 3 years of library working experience before or after passing the association's Registration Examination in order to qualify for its Associateship. The fulfillment of this requirement is also sometimes undertaken through employment in the local libraries. On completion of the necessary period of apprenticeship, the professional librarian under whom a candidate has worked will certify to the Library Association of Great Britain that the necessary training period has been satisfactorily fulfilled.

The training and education of paraprofessionals was first started at Fourah Bay College Library, where it was felt that there was a need for special conditions and regulations governing the promotion of junior staff, because of the nature of its services. Thus, the minimum qualification required for promotion to the grade of Library Assistant I was "a pass in the First Professional Examination of the Library Association; or in an Internal Examination of comparable standard set by the College Librarian for those who were not eligible to pass the Library Association examination" (17). Prior to this regulation of May 1968, the College Council had stated, in 1962, that those employees of the library who could not take the Library Association examination could be promoted "after completing three years satisfactory service in the library and obtaining from the Librarian, a certificate that they had sound practical knowledge of the subjects prescribed for the Library Association Entrance Examination" (18).

Both these regulations became obsolete when the Library Association Entrance and First Professional Examinations were abolished. They were therefore superseded by the regulation which required 2 years satisfactory service in the library and a pass in the Fourah Bay College Library Assistants Certificate, which was still of a standard comparable to the Library Association Entrance Examination. A syllabus was drawn up and senior members of staff of the library were requested to prepare eligible junior members of staff for this examination. But, by the end of 1968, which was also the first year of operation of the new certificate program, the City and Guilds Institute (London) had introduced a Library Assistant Certificate which is "intended to provide a basic qualification for more mature people employed by libraries and information bureaux, in a nonprofessional capacity and who do not aim at professional status" (19). The scheme is not intended to provide an alternative method of entry to the examination of the Library Association. Library staff in this category are required to work under the supervision of professional librarians, and the emphasis of this examination is on practical skills: "The syllabus covers library practice and its underlying principles, but the theoretical content must be taught only to the level and standard necessary for an understanding of library practice." With the library's adoption of the City and Guilds Library Certificate as a basis for a career structure for its paraprofessional staff, courses for the preparation for this certificate's examination were administered under the auspices of the Department of Extra-Mural Studies of the college.

Though initially the introduction of the City and Guilds Library Certificate was considered as an internal training scheme for Fourah Bay College Library, it soon became apparent that this certificate could be useful as a basis for the training of paraprofessional library staff throughout Sierra Leone. Thus in 1973, on the advice of the library, the Department of Extra-Mural Studies publicly invited applications for this course from candidates who had already acquired at least 2 years of library experience and had obtained at least two General Certificate of Education "O"-level passes. Candidates who applied but had not yet acquired the 2 years of experience were requested to take the examination at the end of a 2-year structured program of course work and practical experience, part of the latter being gained at Fourah Bay College Library.

The response from all types of libraries in Sierra Leone, including school libraries, has since been very encouraging. Many candidates have been sent to the 1-year course leading to the examination, which is held during the month of December each year. The examination itself consists of two written papers—on Organization, Purpose, and Users and on Aids, Activities, and Routines—and a practical assessment which is graded locally. The tutors for the course are members of staff of the College Library. The course work consists of lectures, seminars, practical projects, courses on special topics (for example, on school libraries, readers services, and technical services in small libraries), and intensive continuing education courses. The latter are sometimes organized as a part of the Department of Extra-Mural Studies, or presented at the Annual Library Science Easter Residential School.

Prior to the inauguration of the Annual Library Science Easter Residential School, the Sierra Leone Library Association had, in 1970, organized a Library Science Workshop for primary school teachers. This was part of a British Council Summer School which was held at Milton Margai Teachers College, July 30–August 1, 1970, for instruction in the English language. The participants at this school were 37 primary school teachers; their teaching experience ranged from none to 20 years, and almost 50% of them were connected with provincial schools, and the rest with schools located in the western area. From the information received from questionnaires completed by these participants, it was apparent that many primary schools have class libraries rather than central libraries serving the whole school. It was also revealed that most participants felt that such workshops would be most valuable for all types of teachers, head teachers, and inspectors of schools, with special sessions for head teachers and inspectors. They felt that this arrangement was necessary to ensure a coordinated effort among the classroom staff, the school administration, and the Ministry of Education, for the effective development of the school library in Sierra Leone. Some comments on the workshop, such as the following, were found useful in the evaluation of that particular workshop and in planning for future programs:

After a two day course in the Library Workshop, I have realised that it is an essential study for all teachers. Having a library in a school is one thing, making use of it is another. . . .

The Library Workshop does not only teach us to use libraries well but also to maintain them efficiently. It even guides our choice of books for the library. . . .

I hope the authorities will make it a point of duty to arrange such courses especially in the Provinces (20).

After this workshop, two training programs were held for school librarians, one by the British Council and one by the Sierra Leone Library Association. The university has organized four Library Science Easter Residential Schools and one International Library Science Summer School, all of which either catered for teacher-librarians specifically and/or for their library assistants working in schools.

The university's programs for teacher-librarians and library assistants have been largely operated in support of two projects: the British Council Books Presentation Program to secondary schools and the provision of library facilities in some secondary schools through International Development Agency (IDA) funding. It was felt that if IDA provided the buildings and the British Council, the books, then Sierra Leone should provide the necessary manpower to maintain these physical facilities, equipment, books, and other materials. Thus there was a change in emphasis in the training program. The first Library Science Easter Residential School (April 8–13, 1973) had reviewed the present state of readers services in Sierra Leone libraries and examined their problems and prospects relative to the fundamental principle of getting the "right book to the right reader, at the right time and at the right place"; and the second (April 5–11, 1974) was based on the theme "Organization of Small Libraries in Sierra Leone: A Practical Guide." The

third and fourth schools, held in 1975 and 1976, were specifically organized for teacher-librarians who were directly involved with the development of libraries in sixth-form schools and schools which had received IDA funding for their physical development. The British Council Books Presentation Program was by then starting its first phase of development, and in support of a National School Library Development Program, the Ministry of Education had agreed to provide the salary of one suitably qualified library assistant in each secondary school.

Participants at the third Library Science Easter Residential School were highly motivated, by the ideas developed by various speakers and by the course director, Mr. Michael Cooke, who delivered most of the lectures on the theme "The Development and Management of Learning Resources in Secondary Schools." A Sierra Leone School Library Association was formed during the course, in order to promote the development of school libraries in Sierra Leone. At the fourth Easter Residential School, the objectives of the Sierra Leone School Library Association were consolidated by the production of a draft of Minimum Standards for Secondary School Libraries. These were later presented to, and discussed and accepted by, the National Conference of Principals of Secondary Schools, and they were transmitted to the Ministry of Education with recommendations for implementation. The full text of these standards is given here for the comments and suggestions of all educationalists for their improvement.

#### A STATEMENT OF MINIMUM STANDARDS FOR SECONDARY SCHOOL LIBRARIES IN SIERRA LEONE

1. The following statement was prepared by the Fourth Annual Library Science Easter Residential School, held at Fourah Bay College, 5-15th April 1976, University of Sierra Leone, by the Department of Extra-Mural Studies in co-operation with the College Library. Acknowledgement is also made to the Ministry of Education for its support for the Course.

##### *Introduction*

2. The importance of a good library in a school cannot be over-estimated. There is not the slightest doubt that it is an indispensable element in the learning process, and it follows that every Secondary School should be equipped with a sound and effective one if an enlightened educational policy is to be achieved. There are certain basic requirements which should be the prerogative of every Secondary School Library. Unfortunately, it is evident that the general situation is far from satisfactory, and many school libraries exhibit serious shortcomings, or are indeed, virtually non-existent. Some can boast of little more than a collection of out of date, unattractive fiction books which have little relevance to the needs of children in Sierra Leone. Apart from the acute shortage of books and other learning materials, there are problems of uncongenial surroundings, inadequate finance, poor administration, and lack of understanding amongst teachers, whether responsible for the library or not, about the true potential of a library. Consequently, the benefits and pleasures of reading are unknown to many children who will leave school with limited reading ability, and little inclination to read for personal development. There is no single aspect of our national educational policy in more urgent need of development, and it was with this in mind that it was felt that a statement of

minimum standards would do much to provide the national stimulus and direction required.

*The Educational and Recreational Aims of a School*

3. Before going into matters of detail, it will be helpful to outline the goals to which a school library should be reaching, since without an awareness on the part of teachers, and those responsible for the administration of schools, they will be difficult to achieve.

They can be summarized as follows:

- (a) to support the formal teaching programmes throughout the school with a rich and varied collection of books and other learning materials for staff and children alike.
- (b) to promote the habit of reading for pleasure, and to provide systematic training in the care and use of books.
- (c) to provide individual guidance to pupils in research skills.
- (d) to instill an awareness of libraries outside the school to ensure a life long interest in reading.

*Administration, Organization and Finance*

4. The Ministry of Education should have a clearly defined policy on the provision of Secondary School Libraries, formulated by consultation between the Minister for Education, the Chief Librarian of the Library Board, the School Library Association, Library Association, the Conference of Principals, Library Educators and other interested parties. A senior member of the Ministry of Education should be given responsibility for the promotion and systematic development of Secondary School Libraries.
5. Within the school, it should be the responsibility of the Principal to ensure that the Ministry policy is implemented by delegating the administration of the Library to a teacher/librarian. It is further recommended that the Principal should promote and support representatives of staff and pupils, to draw up an advisory library committee. Within this framework, the teacher/librarian should carry out the routine administration and organization in the best possible manner. Particular attention should be paid to the task of acquiring materials most suited to the school's needs, in consultation with other teaching staff, and in ensuring that these materials are fully exploited.
6. All the learning materials in the school library should be catalogued, classified and arranged according to recognized practices. Ideally, they should be available to all the children in the school throughout the day, and there should be opportunities for home borrowing.
7. It is recommended that all Secondary School Libraries should receive an adequate grant from the Ministry of Education, and should seek to add to this grant in any way within their power, e.g. by monetary contributions from pupils, old scholars, parents, by the raising of funds from social and sporting events. If this grant cannot come from the Ministry, the Board of Governors will recommend that the Ministry allow the levy of a library fee as part of school fees. The grant should be of two kinds—(a) a substantial initial grant for a new school, or for an established one where the library is non-existent, or seriously deficient, and (b) an annual maintenance grant for all schools for new books, replacement copies, re-binding, periodicals, library stationery etc. In times of inflation it is difficult to suggest what size these grants should be and they should obviously be linked with the number of pupils, but at the time of writing (April 1976) it is recommended that (a) should be not less than Le500, and (b) not less than Le200 per annum. These figures, if adopted, should be reviewed periodically. The teacher/librarian

should be responsible for the maintenance of proper records of expenditure from the library budget.

*Staff: Status and Qualifications*

8. It is axiomatic that the school library needs to be properly staffed by people trained to carry out the multifarious activities demanded. Although the ideal for the largest Secondary Schools would be a full time professional librarian, every school library should at least be in charge of an experienced professionally qualified teacher who has attended a residential course in library science. Further, it is recommended that there should be recognition in the teacher/librarian's time-table of the need for him/her to spend a number of hours every week on library duties. The amount of time will vary according to the particular circumstances of a school, and its employment of a full time library assistant, but it is suggested that in a well developed library pursuing an active program, ten periods a week would be appropriate for the teacher/librarian. It is further recommended that because of the special position held by the teacher/librarian, the post should carry an allowance similar to that given to Science and Mathematics teachers.
9. To support the teacher/librarian, to ensure that the library is constantly staffed, and to carry out routine clerical and administrative duties inappropriate for a qualified teacher, it is recommended that every secondary school should have a library assistant. Suitable qualification is suggested to be not less than 2 "O" levels, and Library Assistants should be given opportunity to take the London City and Guilds Examination.
10. Because of the need for every teacher to be library-orientated, it is recommended that courses in library utilization, given by a professional librarian, form part of the curriculum of all Teacher Training Institutes as well as in the Department of Education in both Fourah Bay College and Njala University College.

*Stock*

11. To be really effective, a school library must contain a carefully selected, well balanced stock of books and other materials which is wholly related to the needs of the curriculum and to the leisure interests of pupils. It cannot be over-emphasized that quality is as important as the quantity, and that every book should be worthy of its place on the shelf. It is recommended that every Secondary School should have a minimum of 2,500 books to achieve the aims set out earlier in this statement. Furthermore it is suggested that increasing attention be paid to the provision of non-book materials, and educational technology in schools so that developments in teaching and learning may be supported by the most up to date techniques.

*Planning, Accommodation and Furniture*

12. A successful school library derives from a number of factors, not least its physical attributes. It needs to be centrally located, easily accessible to its users, situated in a reasonably quiet area of the school, and capable of expansion should the need arise. Its size will need to vary with the number of pupils, but the smallest secondary school library should not be smaller than 800 square feet. In every case, it should be possible to seat at least 10% of the pupils in the school at any one time. The library should be so furnished and equipped as to be a pleasing and functional place for staff and pupils to work in, with attention paid to adequate storage for books and other materials, adequate lighting and ventilation, comfortable seating, and sufficient table-top

space for those working in it. Consideration should be given to the various uses to which the library will be put, and the best disposition of furniture to permit them; e.g. small group discussion, display area, reference work, periodicals consultation, etc. The need for a small office for the library staff should also be borne in mind.

13. In installing furniture the need for the utmost flexibility should be considered so that changes in lay-out can easily be achieved. As a basic minimum the following items of furniture are likely to be required by every secondary school:

- (a) Shelving, wall and island
- (b) Storage for a/v materials and equipment
- (c) Tables and study chairs
- (d) Easy chairs
- (e) Periodicals rack
- (f) A Librarian's desk
- (g) A catalogue cabinet

Before ordering library furniture and equipment, it is urged that the advice of professional librarians be sought to ensure wise expenditure.

The training of teacher-librarians is not solely dependent on in-service training programs such as those provided by the Library Science Easter Residential Schools. Both Milton Margai Teachers College and the Department of Education of Fourah Bay College offer library education programs for teachers in training, as part of the Advanced Teachers Certificate and the Diploma in Education, respectively.

At Milton Margai Teachers College the library education program was started in 1971 as one of the cultural optional subjects which are part of the 3-year program for the Higher Teachers Certificate. Other cultural subjects include art, music, drama, and physical education. The library education cultural option is a 2-year course held twice weekly, excluding teaching practice periods. The average intake is about 20 students each year, and it aims at providing students with an introductory knowledge on the use and organization of libraries in secondary schools.

The level of library education in the 1-year course for the Diploma in Education at Fourah Bay College is that of an advanced optional subject. There are three parts to this course: (a) theory, (b) practical experience, and (c) assessed project work. Students of this course are required to take a total of 40 hours of lectures and to perform teaching practice of one term, during which they are observed in teaching the use of the library. Every student is obliged to do a project and to write it up under the supervision of a lecturer. Each project should be typewritten and then bound copies are presented for examination. The course is meant primarily for those students who want to become teacher-librarians. There is excellent scope for such people in the Sierra Leone teaching service.

Students of English, history, and government are also advised to consider this course; a qualification in school librarianship helps them to secure good jobs in a market that is already glutted with teachers of these subjects. Students who have undertaken this course successfully are advised to continue their library education by attending the annual Library Science Residential Schools, which are designed as in-service training courses.



This program was started in 1974 and has been taught by Fourah Bay College Library staff, including a Peace Corps librarian, and by short-term visitors from library schools in the United Kingdom, sponsored by the Inter-University Council for Overseas Education. The professional advice given by these visitors and students' evaluation of the courses have been most valuable in the development of a practical and relevant program.

Between the Easter Residential Schools and the Department of Education program, about 150 teacher-librarians and library assistants have undergone training. Teachers and library assistants who have participated in local courses have been able to take the City and Guilds Library Certificate Examination successfully. Teachers who pass this examination are given an additional salary increment, and library assistants are confirmed in their jobs and given special increments in recognition of their success.

However, the whole question of library education in Sierra Leone needs to be reviewed, with the aim of providing local certification. In 1974, with the help of the British Council, Professor Wilfred Saunders responded to an invitation from the University of Sierra Leone to visit this country and look into the problems of training and education of middle-level personnel for Sierra Leone's libraries, including school libraries. Professor Saunders in his report endorsed the use of the City and Guilds examination as a means of certification at this level of training. However, with the reorganization of library education in Britain, the City and Guilds Library Certificate might be superseded by a British Library Association Certificate of comparable standard. But whether this change is effected or not the University of Sierra Leone should respond more positively and more directly to the need for providing education and training for teacher-librarians and library assistants. This could be adequately done by a Senate endorsement of special certificate courses for school librarians and library assistants.

### Professional Associations

#### SIERRA LEONE LIBRARY ASSOCIATION

The Sierra Leone Library Association was formally launched on June 20, 1970. Its first president was Mrs. Gladys Jusu-Sheriff, librarian, Fourah Bay College; and its first secretary was Mr. Reginald Clarke, librarian, Law Officers Department Library. The association has held several workshops, seminars, and conferences to further the development of the library profession in Sierra Leone.

The association publishes *The Sierra Leone Library Journal*, which was first produced in January 1974 (two issues a year). It also publishes a directory of libraries and information services.

All inquiries about the association should be directed to the following address; The Secretary, Sierra Leone Library Association, Sierra Leone Library Board, Rokel Street, Freetown.

## SIERRA LEONE SCHOOL LIBRARY ASSOCIATION

This association was founded in April 1975 at the end of an Easter Residential School which was held for teacher-librarians at Fourah Bay College, University of Sierra Leone. The association, though in its infancy, has produced a statement of minimum standards for secondary school libraries, and these have been adopted by the Conference of Principals of Secondary Schools and are being reviewed by the Ministry of Education for national adoption.

The association operates through its four regional branches. It has an annual conference which has already met in Freetown, Bo, and Makeni.

All inquiries about the association should be directed to the following address: The Secretary, Sierra Leone School Library Association, St. Edwards Secondary School, Freetown.

### Conclusion

The main recommendation of the *Sierra Leone Education Review . . . Final Report*, for libraries, museums, and archives, aptly summarizes the Sierra Leone situation, by suggesting that:

The Ministry of Education should find it possible to provide for the establishment of a national co-ordinated system which would be responsible for the development of libraries, archives, documentation and museums. Such a provision would underline the importance and value of these services both for education and culture in general and would ensure in due course a fair distribution of these services throughout the country (21).

Since the review was conducted under the auspices of the University of Sierra Leone, and in view of the unique role of universities in the national growth of developing countries, it is hoped that in due course the University of Sierra Leone will devote its attention to the implementation of this main recommendation. Until such a bold step is taken, library development in Sierra Leone will continue to be unjustifiably uneven.

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GLADYS M. JUSU-SHERIFF

## SIMMONS COLLEGE, SCHOOL OF LIBRARY SCIENCE

In 1902 New England had two small summer programs in library science, at Amherst and at Pittsfield. The larger libraries were training their employees themselves; the smaller libraries were staffed by persons who had no formal instruction in library science. Boston, then, was the obvious location for a library school, and Simmons College did not fail to take advantage of this opportunity for vocational education. Ms. Mary E. Robbins, a graduate of the New York State Library School in 1892, was appointed to direct the work of the Simmons Library School when it was established as one of the charter schools at the opening of the college in 1902. She was assisted later by the Advisory Library Council, which consisted of the librarians in charge of the Boston Public Library, the Harvard University Library, the Massachusetts State Library, the Boston Athenaeum, and two other librarians. Charles K. Bolton, of the Athenaeum, was particularly influential in the development of the school and its reputation during those formative years. The first Bachelor of Science degree was awarded in 1906. That first graduating class was composed of 27 students—22 from New England.

The first announcement of courses specified that technical work would be given in all 4 years of the program. However, after an experience of 2 years, the courses of the first year were made introductory in nature, and they were required of all students in the program. In 1908, to conform with general college policy, the courses of the first year were all academic, the technical work of the second and third years being slightly increased. This arrangement was continued for some years, until 1917. The program was then reorganized and the total amount of time given to library science was reduced, with only the equivalent of one technical course being given the second year. Two years later all library courses but one in the third year were postponed to the final year. After 1923 consolidation of

technical training in the senior year was made complete and it occupied the entire time of the student. The instruction was divided into a large number of courses of various weights instead of into courses meeting three or four times a week through the year or semester as in other departments.

About that time, a 1-year program for college graduates became an important part of the instruction given by the school. These graduate students were taught in separate courses since under the regulations of the college, graduates and undergraduates might not be included in the same classes. Duplication of courses really was not as inefficient an arrangement as might be thought because the total number of students was so large that most classes would have been divided into sections in any case. As in some other professional schools, a degree was not granted to those who had completed this 1-year program until they had supplemented their courses by professional work of a character approved by the college. This requirement was withdrawn in 1918.

In those days much of the academic curriculum for the 4-year student was prescribed. These required courses included 3 years of English; 3 years of courses in foreign languages; 2 years of history; 1 year each in economics and physics or chemistry; and 1 term each of government, sociology, and psychology. Little time was left for free electives.

Ms. Robbins remained as director of both the school and the Simmons College Library until 1913, when she was succeeded by Ms. June Richardson Donnelly. Ms. Donnelly had been an instructor in the department from 1905 to 1910; she had resigned to become the director of the Drexel Institute Library School, where she remained until her return to Simmons. Ms. Donnelly had a national reputation as a leader in library education and was able to attract college graduates of high academic quality to the school.

The school was first visited by representatives of the Board of Education for Librarianship in 1924 and then—following the early custom of frequent visits—again in 1926 and 1928. The school's two programs were accredited by the American Library Association in 1926. Outside support from the Carnegie Corporation was provided from 1926 through 1930.

In 1932 a gift from the Detroit Friends and Co-workers of Elizabeth Knapp established a memorial collection illustrating the development of children's literature.

The "Minimum Requirements for the Library Schools" adopted by the ALA Council in October 1933 provided for classification and accreditation by type of program. Simmons was classified as meeting the requirements for both Type II and Type III schools. Type II required bachelor's degrees for entrance into the graduate program, and Type III included the first professional degree within the four undergraduate years.

In spite of the Depression, the school continued to maintain a steady enrollment. In 1936 it was visited by Mr. Joseph Wheeler and Mr. Keyes Metcalf, as representatives of ALA's Board of Education for Librarianship. During 1938/39 a major reorganization of the curriculum was undertaken, and in 1941 the summer school program was instituted. Upon Ms. Donnelly's retirement in 1937, Mr. Herman H.

Henkle assumed the directorship of the school and he remained until 1942. When Mr. Henkle left in 1942, Ms. Nina C. Brotherton was appointed acting director. During the war years the program continued to be strong and to keep up its enrollment. The faculty was quite stable at this time and consisted of five full-time faculty members and a few part-time instructors.

In 1946 Professor Kenneth R. Shaffer assumed the directorship of the school. During the period 1946–1948 the faculty worked on curriculum changes and planned for a master's program. It was at this time that the school began admitting men into its program, and it also began to admit substantial numbers of part-time students. In 1949 the School of Library Science for the first time offered its graduate program for the master's degree. It was among the original ten schools accredited under the "Standards for Accreditation" presented by the ALA Board of Education for Librarianship and adopted by the ALA Council in Chicago on July 15, 1951.

The 1950s saw a number of developments: the addition of faculty members; increased part-time enrollment of both men and women, who came on a work-study basis; and the institution of evening classes. In that decade the school became a pioneer in adopting the case method in library education. This emphasis continues today and is evidenced by the publication, thus far, of six case books by members of the faculty. A variety of problem-oriented instructional approaches of a noncase nature have been developed in several curricula areas over the years. Many independent seminars and special study projects directed by individual faculty members were also started and have continued to develop since that time.

During the 1970s the faculty has increased and the curriculum has been further expanded. In 1973 the Corporation of Simmons College authorized establishment of a new program in the School of Library Science leading to the degree of Doctor of Arts. The Doctor of Arts program is intended to provide experienced librarians with intensive advanced preparation for administrative and supervisory careers in libraries, media centers, and information centers.

Professor Shaffer resigned as director of the school in 1974, and Dr. Robert D. Stueart became dean in January of 1975. The faculty is currently composed of 17 full-time and several part-time members.

Today the program in library science at Simmons is wholly graduate in character and is open to both men and women of high academic attainment and professional promise who hold liberal arts baccalaureate degrees. Men currently number about one-quarter of the total student body in library science at Simmons, a proportionate representation roughly the same as found at present in the practicing library professions. Some 5,000 of the school's alumni have served in libraries and research centers of all types and sizes both in the United States and throughout the world.

The school conducts various workshops and institutes on topics as diverse as public library personnel administration, implementation of the media center concept of the school library, and international standard book description. Especially noteworthy in this respect were two multinational institutes for foreign librarians conducted by Simmons under the joint sponsorship of the American Library Association and the U.S. Department of State.

The school has a strong continuing education program. Among the many specialized courses offered are those in Archives Management, Medical Librarianship, and Arts Librarianship.

The school has long enjoyed the active support and counsel of the large and vigorous body of alumni. This group is an independent organization with its own alumni publication, *The Simmons Librarian*. It sponsors fund-raising activities to support the interests of graduates and current students, ranging from continuing education efforts to fellowships for current students.

Beta Beta Chapter of Beta Phi Mu was instituted at Simmons in 1972.

ROBERT D. STUEART

## SIMULATION

### Introduction

Simulation can be defined as a numerical technique for conducting experiments on a digital or analog computer using mathematical/logical models describing the behavior of a system over time. The system to be simulated can be the operation of a fast food restaurant, an oil refinery, the flight of an airplane, a computer system, or a library. The system may also be a part (subsystem) of any of the preceding. Thus, a simulation may model the technical services subsystem of the total library system. Systems can be classified as discrete or continuous. The flight of an airplane is a continuous system because the flight is not readily modeled as a series of discrete steps but rather as a continuous flow of movement through time and space. Variables in a continuous system, such as speed, take any real value in a prescribed interval. This is not to say that it is impossible to construct a model of the flight of an airplane or the flow of electrons through a conductor as a discrete system, but the accuracy and capability of such a model are questionable. In addition, a great amount of information would be lost. In a discrete system, events in the system occur in a finite manner. Variables in this type of system, such as the number of books ordered, take on particular values among a finite set of alternatives. In a discrete system, the system is viewed as changing from one distinct state to another as events occur in a series of steps.

Systems can also be viewed as being stochastic or deterministic. This depends on the cause and effect relationship between input and output. If the output of a system can be exactly predicted based on the inputs and initial state of the system, it is deterministic. In a stochastic system a given state of the system cannot be predicted exactly; only a range or distribution of possible outputs can be predicted.

Many systems that fall in the domain of information science or library science can be simulated as discrete stochastic systems. These types of systems are modeled using a critical-event or a time-slice approach. In a critical-event approach the

system is viewed as proceeding from one event to another until a specified sequence of events is completed. The time-slice approach views the system as changing in all its aspects over time. The status of the system is updated at periodic time intervals until some specified amount of time has elapsed.

### **Model Building**

The key to a simulation is the model that is constructed of the system. This begins with a conceptualization of the system to be investigated. This involves formulation of the questions to be answered, definition of the scope of the system, and the breakdown of the system into its component parts. The next step is to analyze the system and define the variables, parameters, and constants to be utilized in depicting the system. The variables must be classified as exogenous or endogenous. Endogenous variables are those that donate internal characteristics of the system, while exogenous variables denote characteristics outside the system. In a technical processing system, the number of books cataloged per day would be an endogenous variable, while the amount of time between order and delivery by the vendor would be an exogenous variable.

Once the variables have been defined, the types of approximations to be used for producing values for the variables must be made. This may involve collecting data from the actual or an analogous system or from experts on such a system, and then establishing an empirical probability distribution or selecting a theoretical distribution that best fits the empirical data. An example of this might be a simulation in which the arrival of patrons at the reference desk must be generated in the simulation. A sample of actual arrivals over time could be collected and a relative frequency distribution (as well as a relative cumulative frequency distribution) could be established. If the arrival of patrons can be assumed to occur at random, and if the arrivals are independent of one another, it may be possible to use a theoretical distribution instead of the empirical one. For example, the Poisson distribution may fit the arrival pattern, and the exponential distribution may fit the interarrival times of patrons. The simulation could then randomly sample from these theoretical distributions to produce the arrival of patrons at the library, instead of using the empirical distribution collected in the sample. It may be necessary to test the empirical distributions against the theoretical ones to ensure a goodness of fit. The techniques of curve fitting are available to provide statistical tests between two distributions. In some cases it is impossible or impractical to collect empirical data about certain aspects of a system. In these cases it is necessary to find a theoretical distribution that fits the assumptions of the variables in the system being simulated.

A crucial determination in building a model is that of the relationships among the variables. These relationships must be stated in mathematical or logical terms. The important aspect in establishing the mathematical relationships is to ensure internal consistency among the mathematical statements.



### Assumptions and Hypotheses in Simulation

Since a simulation is a simplification of the actual system, certain assumptions must be made. These assumptions should be clearly stated and carefully examined in terms of their impact on the validity of the simulation.

A simulation is an experiment that produces data about a system. Consequently, it is important that hypotheses be formulated that relate to the purpose of the simulation in terms of the questions to be answered. A simulation is typically run numerous times using varying values of the input variables. This will produce outputs that vary according to the changes in the input variables. This is the power of a simulation. A range of conditions for operating the system can be created by the appropriate setting of the exogenous and endogenous variables. For example, by increasing the number of active terminals on a time-shared computer system, the simulation will produce varying outputs for the time required to service the individual terminals connected to the system. A hypothesis for this example might be:

Doubling the number of active terminals will not produce a significant difference in service time to the active terminals.

The hypothesis can be tested by performing a test of significance on the service times of the active terminals. This same procedure can be used on any output variables that pertain to the purpose of the simulation.

It is important to note that a simulation does not optimize a system or provide direct solutions to problems. It produces data about the system which must then be statistically analyzed in order to select the optimum solution or the strategy to be utilized.

### Monte Carlo Methods for Determination of Values

Simulations are required to produce values for variables in the model of the system under investigation. In many cases these values must be derived by taking samples from a population. Frequently the actual population is replaced by its theoretical counterpart. The theoretical universe is described by a probability distribution, and values for the variable are obtained by sampling from this distribution by means of a random number. To draw an item from a universe described by the probability density function  $f(\chi)$ , one would do the following (see Figure 1):

1. Plot a cumulative probability function

$$Y = F(\chi) = \int_{-\infty}^{\chi} f(\mu) d\mu$$

2. Choose a random number between 0 and 1
3. Project the random number from the  $Y$  axis onto the curve of the distribution function until it intersects the curve  $y = f(\chi)$
4. Select the corresponding value of the  $X$  axis as the value for the random variate

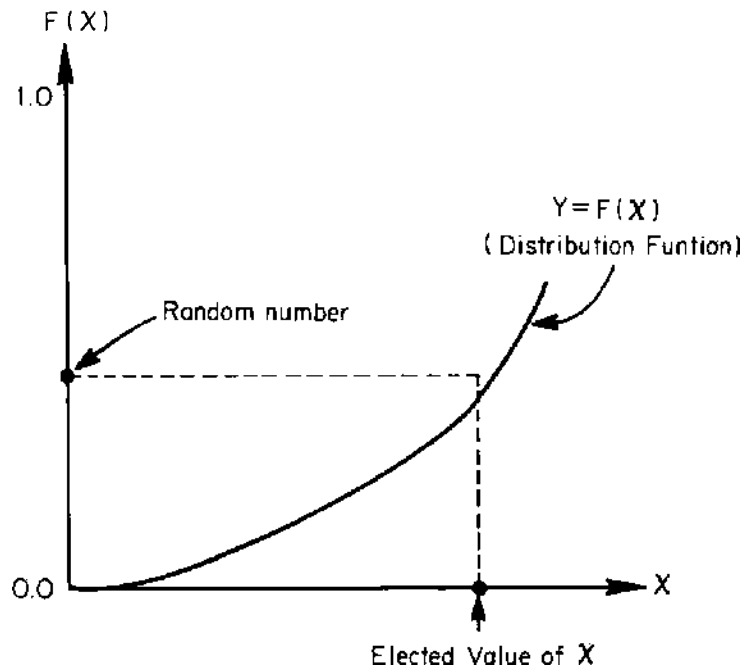


FIGURE 1

In order to justify this method of sampling, every item in the universe must have an equal chance of being selected. This will be dependent on the random numbers generated for choosing the selected values of  $\chi$  from the distribution. Thus simulations are heavily dependent on the availability of random-number generators. Random numbers can be generated on a digital computer, but these numbers are pseudo-random since pure randomness is not achievable. The important aspect of a random-number generator is that it be capable of producing large sets of random numbers that are valid. The random numbers generated by a computer program are determined by calculations that meet the appropriate tests for random properties. The congruential method is the one most widely utilized for mathematically generating uniformly distributed random numbers. This can be represented as:

$$\gamma_{N+1} = a\gamma_N + c \pmod{M}$$

where  $\gamma_{N+1}$  is the generated random number from a preceding random number  $\gamma_N$ ,  $\gamma_N$  is the preceding random number,  $a$  is the multiplier,  $c$  is the increment, and  $M$  is the modulus. The initial value of  $\gamma_0$  is called the seed for the random-number generator.

#### Advantages and Disadvantages of Simulation

The advantages of using simulation are:

1. Complete control over the system is guaranteed.
2. Many alternatives can be explored in a short period of time.

3. It may be cheaper to simulate than to build a prototype or experiment with the actual system.
4. A simulation does not perturb the existing system.
5. A simulation may produce insights into a system that would be difficult to uncover in the real system.
6. A simulation can compress years into minutes, thus reducing the time to obtain outputs for evaluation.
7. Simulation can be used for systems that do not yet exist.

The disadvantages are:

1. A simulation can be quite costly in terms of development time, testing, and implementation.
2. A high level of skill is required to develop and implement a simulation.
3. Simulations typically require the use of computers.
4. A simulation hides many assumptions that the model makes of the real world.
5. In some cases a simulation requires field studies, which can be expensive and time consuming.

### **Validation of the Model**

A simulation is only useful if it represents the system it is modeling in a valid way. Although there is no absolutely foolproof way to validate a simulation model, several methods are utilized. One criterion for validity is that the model be internally consistent in mathematical/logical construction. This does not guarantee that it is an adequate isomorphism of the real system, however.

It is possible to compare the results of a simulation with historical data collected from the system being simulated. If there are no statistically significant differences between the historical data and the simulation data, the simulation can be assumed to be valid for the cases being tested. Of course, there is no guarantee that the simulation will produce valid results for all other cases.

Many simulations are validated by having a panel of experts pass judgment on the structure, content, and consistency of the model. This method must be used when the system being simulated does not yet exist and little is known about the environment in which it will function.

### **When to Use Simulation**

Simulation is used as a technique for investigating systems or problem situations in cases where one of the following conditions exist: (a) there is no known analytical method that will provide a solution; or (b) the calculations required for an analytical solution are either extremely complex or voluminous, so as to make the analytical approach infeasible. Simulation should also be used when it is important to test a number of alternatives relating to procedures, policies, or behaviors that do not have the preciseness desired for analytical solutions.

### Simulation Languages

A number of computer languages have been designed specifically for purposes of simulation. The nature and structure of these languages permit relatively easy translation of a simulation problem into a computer program via one of these languages. Several languages are utilized quite widely, such as GPSS (General Purpose System Simulator), SIMSCRIPT, SIMULA, and DYNAMO. In addition to these, there are literally dozens of other simulation languages available, some for very specialized purposes. Some simulation languages are designed to handle continuous simulation problems, while others are for discrete-event simulations only.

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JAMES G. WILLIAMS

## SINGAPORE, LIBRARIES IN

### Historical Development

#### GENERAL BACKGROUND

The Republic of Singapore consists of the island of Singapore and some 54 smaller islands totaling approximately 602 square kilometers in area.

The modern period of Singapore's history began with the founding of a trading station of the East India Company in Singapore in 1819 by Sir Stamford Raffles, who recognized the potential growth of Singapore as a port and trading center based on its advantageous position at the crossroads of the Indian and the Pacific Oceans. In 1826 Singapore was joined with Penang and Malacca, two British settlements in the Malay Peninsula (now Malaysia), to form the Straits Settlements, which were ruled first from India and from 1867 directly by the Colonial Office. After a period of Japanese occupation during World War II, Singapore became a separate Crown Colony in 1946. It achieved internal self-governing status in 1959 and independence within the Federation of Malaysia in September 1963. On

August 9, 1965, Singapore became a fully independent and sovereign nation, on separation from Malaysia (1).

The total population was estimated to be nearly 2.3 million in 1976. Its multi-ethnic composition reflects the largely immigrant origin of its people during the earlier years of Singapore's development up to World War II. The population consists of 76.1% Chinese, 15.1% Malays, 6.9% Indians (including those of Pakistani, Bangladesh, and Sri Lanka origin), and 1.9% other ethnic groups (including Europeans, Eurasians, Arabs, and others) (2).

The population density in 1976 was 3,800 persons per square kilometer (2), one of the highest densities in the world. About 55% of the total population lives in high-rise public housing estates (3). Vigorous and stringent family planning measures have resulted in a marked decline in the birth rate, but, in common with other developing countries, Singapore still has a predominantly youthful population. In 1975, 45.8% of the population was aged 19 years or below; 31.8%, between 20 and 39 years; 15.8%, between 40 and 59 years; and only 6.6% of the people were 60 years and over (4).

#### LITERACY AND EDUCATION

Singapore is a multilingual state with four official languages: Malay, Chinese (Mandarin), Tamil, and English. Malay is the national language, while English is the language of administration and, increasingly, of business and industry. A number of Chinese dialects (including Hokkien, Teochew, Cantonese, Hainanese, Hakka, and Foochow) are also used, while Telegu, Malayalam, Punjabi, Hindi, and Bengali are spoken by those of Indian origin.

Any one of the four official languages may be chosen by parents as the language of instruction for their children in school. Apart from the language of instruction, a second language is compulsory in order to promote bilingualism. At the same time, Malay is taught as the national language.

The general literacy rate in any one language was 722 per thousand in 1970 (the date of the latest census of population), compared with 523 per thousand in the 1957 census. The literacy rate in 1970 was 838 per thousand for males and 601 per thousand for females. Of the total literate population, 49.4% were literate in Chinese, 46.7% were literate in English, and 15.8% were literate in Malay; but these figures are not additive, since the number of persons literate in any one language also includes persons who may be literate in other official languages. Of those literate in two official languages, 46.5% were literate in English and Chinese, 37.7% were literate in English and Malay, and 8.2% were literate in English and Tamil. Thus the general trend is toward increasing literacy in two languages, usually English and the mother tongue (5). The literacy rate (defined as the ability to read and write in one or more languages for persons 10 years and above) in 1975 was 75.6% (85.6% for males and 64.9% for females) (4).

Primary education is free but not compulsory for children of Singapore citizens; it lasts for 6-8 years, starting from the age of six. Secondary education continues for 4 years, followed by 2-year junior college or preuniversity courses or by trade

courses at 12 vocational/industrial training institutes. There are five institutions offering tertiary level education, including two universities, a polytechnic, a technical college, and a teacher training institute. The total student enrollment in all types of educational institutions in 1976 was 526,602, or nearly one-quarter of the total population. Of this number, 316,265 (60.06%) were enrolled in primary schools, 177,992 (33.8%) in secondary schools, 11,751 (2.23%) in technical and vocational institutes, and 20,594 (3.91%) in tertiary level institutions (6).

### THE BOOK TRADE

The small size of the domestic market, further reduced because it is fragmented by language, is reflected in the limited volume of publishing, which averages around 1,000 titles a year for books and serials. The 1976 figures show an appreciable increase in the number of titles (books and serials) registered by the National Library under legal deposit compared with the previous year, as shown in Table 1. The number of books (titles) published in each language also clearly reflects the multilingual nature of the population; see Table 2.

All textbooks at the elementary level and most at the high school level are now published locally, and the textbook market is consequently the most attractive to publishers. However, in the last few years there has been an encouraging, if small, increase in the volume of general publishing; this includes works of fiction, economics, history, biography, and poetry. Most books and periodicals required by libraries, as well as those ordered by individuals, are imported from diverse sources, including Britain, Australia, the United States, Hong Kong, and India.

All professional and trade associations of publishers, booksellers, printers, librarians, and authors are represented on the National Book Development Council

TABLE 1  
Number of Titles Published in  
Singapore, 1975 and 1976<sup>a</sup>

Year	Serials	Books	Total
1975	207	785	992
1976	297	1,511	1,808

<sup>a</sup> Ref. 7.

TABLE 2  
Number of Titles Published in Each Language, 1975 and 1976<sup>a</sup>

Year	English	Chinese	Malay	Tamil	Other languages	Bilingual or multilingual
1975	397	119	159	6	52	52
1976	869	401	123	11	28	79

<sup>a</sup> Ref. 7.

of Singapore, formed in 1969 as a nonprofit society. This group also includes representatives of the Ministry of Education, the Ministry of Culture, the National Library, the National Museum, tertiary level educational institutions, and the various teachers' unions. The council's main objectives are to promote and encourage the reading of books among all sections of the population and to cooperate and liaise with all members of the national and international book world.

The council has held an annual Festival of Books and Book Fair since 1969 (8), which has been organized jointly with the Singapore Book Publishers' Association since 1972. It has also conducted a survey of book activities in Singapore; organized courses for publishers, booksellers, and book designers; initiated national book awards; sponsored the formation of the Society of Singapore Writers, which represents the four major language streams; and formulated standards for title leaves of books and for publishers' catalogs. Through the council, which is run entirely on a voluntary basis and is wholly dependent on donations and grants, the various sections of the book industry in Singapore have come to appreciate their interdependence and to work together on an increasing number of valuable projects.

#### DEVELOPMENT OF LIBRARIES

Books and libraries are known to have existed in early Singapore, as in other precolonial states of Southeast Asia which were part of the early kingdoms of Funan (1st century–637 A.D.), Srivijaya (7th century), and Majapahit (14th century) (9). However, these books were mainly religious texts or state archives kept in temples and monasteries, and their use was confined to state officials, priests, monks, and scholars.

The development of libraries in modern times began within a few years of the founding of modern Singapore, when the Singapore Institution, the oldest school in Singapore, was established by Sir Stamford Raffles. A small library was attached to the institution, and it was open to students and teachers as well as to subscribers and donors to the institution. The Singapore Institution was intended by Raffles to be an institution of higher learning but it eventually served as a secondary school; it later became the Raffles Institution, which still flourishes today.

In 1844, following a public meeting, the Singapore Institution Library became a proprietary library, to which a museum was added in 1849. Financial difficulties led to its formal transfer to the government in July 1874, when it was renamed the Raffles Library and Museum. It was "formally constituted as a government department on 16 December 1878, with the passing of the Raffles Societies Ordinance, whereby the management of the Raffles Library and Museum was confided to a Committee appointed by the Governor" (10). Membership was available on a subscription basis. The library became a legal deposit library with the passing of the Book Registration Ordinance of 1886, and an archives department was started in 1938. In 1955 the library and museum were separated administratively, and each was headed by a director. In 1957 the Raffles Library Ordinance was passed, whereby the Raffles Library became a free public and national library. The ordinance came into force on April 1, 1958, when subscriptions were abolished. It

was called the Raffles National Library until December 1960; at that time "Raffles" was dropped from the name and it became known as the National Library.

In November 1960 the National Library moved to its present building next to the National (previously Raffles) Museum; in these quarters it discharged its public library functions while also serving as the legal deposit library for Singapore publications, and it also housed the archives. Following the passing of the National Archives and Records Centre Act of 1967, the archives were separated from the library and administered as a separate department. The archives, however, continued to be housed in the National Library up to 1970, when they were moved to another building.

An amendment to the National Library Act was passed in 1968, which extended the scope of the library in respect of its functions as a national library and emphasized its leadership role in relation to the development and coordination of national library services in Singapore. The National Library has issued the *Singapore National Bibliography* since 1969; it also compiles the *Singapore Periodicals Index* and maintains union catalogs of library science materials and of scientific and technical serials held in Singapore libraries. The National Library is thus an example of an institution combining national and public library functions; its success is due to many factors, including the small geographical size of Singapore and its highly centralized form of government.

The few other libraries established during the colonial period were mainly libraries of government departments, the oldest being the Botanic Gardens Library, founded by the first curator, appointed in 1876. Other older government department libraries, started before World War II, were those of the High Court (later the Supreme Court), the Customs and Excise Department, and the Department of Chemistry (now the Department of Scientific Services). Nongovernment libraries included those of the Ramakrishna Mission, founded in 1928; a number of Chinese libraries attached to associations, clubs, and schools; and smaller libraries catering to the needs of ethnic minorities.

The oldest tertiary level libraries were those of the King Edward VII Medical College (founded in 1905) and the Raffles College (founded in 1928), which provided diploma courses in arts and sciences. In 1949 the two colleges were amalgamated to form the University of Malaya, serving the two territories of the Federation of Malaya and Singapore. Following the attainment of independence by Malaya (now Malaysia) in 1957, the university established additional facilities in Kuala Lumpur, the federal capital. In 1959 the university was split into two autonomous divisions, the University of Malaya in Kuala Lumpur and the University of Malaya in Singapore. From January 1, 1962, the former became known as the University of Malaya and the latter, the University of Singapore.

The Teacher's Training College was established by the government in 1950 and reconstituted as the Institute of Education in 1972. A second university, Nanyang University, was founded in 1956, mainly to cater to the needs of Chinese-educated students. Ngee Ann College was similarly founded in 1963; it originally provided both arts and technical courses, but it has served solely as a technical college since



1968. The Singapore Polytechnic was founded in 1958 and is the largest institution providing technical education. Two private college libraries are those of the Southeast Asian Union College, founded in 1945 to cater to the needs of the Seventh-Day Adventist community, and the Trinity Theological College, founded in 1948.

There are also smaller libraries attached to technical and vocational institutes as well as the junior colleges, all established in the late 1960s and the 1970s.

A unified Library Service for the professional staff of the National Library and other government department libraries was adopted in 1966 and led to the provision of professional posts in a number of such libraries. There are now 17 libraries of government ministries and departments which come under the Library Service; each provides services to the staff of their ministry or department in such fields as economics, law, education, social welfare, and defense. Some of these are among the largest special libraries in Singapore, while the combined number of professional posts in the National Library and these libraries (amounting to 96 in 1977) makes the government the largest employer of librarians in Singapore today.

An increasing number of statutory bodies, which fall outside the government Library Service, have also established libraries in the 1960s and '70s. One of the first was that of the Housing and Development Board, founded in 1960. Like the special libraries of government ministries and departments, they cover a wide range of subjects, including economics, finance, housing, metrication, shipping, telecommunications, and family planning. Not all these libraries, however, are staffed by trained librarians, and their facilities and collections vary considerably.

Singapore's geographical position and ease of communications have also influenced its selection as the location for a number of regional institutions (11). These include the Regional Language Centre (formerly the Regional English Language Centre) set up in 1968 by the Southeast Asian Ministers of Education Organisation (SEAMEO); the Regional Institute for Higher Education and Development (RIHED), 1970; the Asian Mass Communication Information Centre (AMIC), 1971; the Centre for the Production of Adult Education Television (CEPTA TV), 1972; and the Colombo Plan Staff College for Technician Education, 1974. Of regional significance too is the Institute of Southeast Asian Studies founded in 1968, a nonteaching institution devoted to the promotion of research on Southeast Asia.

Few good school libraries existed during the pre-World War II period, and these were mainly in the more affluent government-aided schools, including English-medium schools founded by various religious denominations and Chinese-medium schools founded by Chinese clan and business associations. Several circumstances delayed the development of school libraries. The rapid expansion of primary education and later of secondary education, after 1959, and the attendant problems of crash teacher-training programs, maximum use of school buildings by means of double-session schools, and curriculum reform did not permit much attention to be paid to the provision of school libraries until 1970. Following a major seminar on school libraries held that year and organized jointly by the Ministry of Education,

the Library Association of Singapore, and the British Council, the Standing Committee on Libraries (Ministry and Schools) was set up by the Ministry of Education. The director of the National Library was appointed chairman of the Standing Committee while members included principals, teacher-librarians, and librarians from the National Library, the Institute of Education, and the Library Association of Singapore. Among the committee's main tasks was the drawing up of recommended standards for primary and secondary school libraries, which are gradually being implemented.

The development of a strong professional library association has also been of great importance to the development of libraries. The Library Association of Singapore was founded as the Malayan Library Group at a meeting of a small number of librarians from Singapore and the Federation of Malaya, held in Singapore in 1955 (12). The rapid constitutional changes in both territories led to several changes in the name and the constitution of the group. It became the Library Association of Malaya and Singapore in 1958, after the attainment of independence by the Federation of Malaya in 1957; then, the Library Association of Singapore, after Singapore achieved the status of internal self-government in 1959; next, a branch of the Persatuan Perpustakaan Malaysia [Library Association of Malaysia] during the period of Singapore's merger with Malaysia; and in 1966, after Singapore's separation from Malaysia, it became a separate professional association again.

The association has been particularly active in the field of library education through the work of its Standing Committee on Library Education (jointly organized with Malaysia from 1966 and separately from 1972), which has conducted courses for candidates attempting the Library Association (Britain) external examinations as well as continuing education courses for qualified librarians. A Standing Committee on School Libraries was set up in 1966; this was succeeded in 1969 by the School Library Section, which organizes courses and workshops for teacher-librarians, issues booklists, and promotes the development of school libraries. The association is represented on the National Library Board and the National Book Development Council of Singapore. It was also a founder member of the Commonwealth Library Association (COMLA) in 1972 and joined the International Federation of Library Associations (IFLA) in the same year, while the School Library Section joined the International Association of School Librarians (IASL) in 1973.

Because of their common origin and history, the two library associations of Malaysia and Singapore have maintained close and friendly relations through their Joint Liaison Council consisting of council members of both associations. Other cooperative efforts include: two earlier joint standing committees (one on library education, which has since been dissolved, and the other on library cooperation and bibliographical services, which is still active and has initiated a number of important projects); a joint journal, up to 1969; and joint annual conferences, held alternately in Malaysia and Singapore. In 1970 the two associations sponsored the first Conference of Southeast Asian Librarians (CONSAL) in Singapore, the suc-

cess of which led to subsequent conferences, CONSAL II in Manila in 1973, CONSAL III in Jakarta in 1975, and the fourth conference (now congress) held in Bangkok in 1978.

### Public Libraries

When Raffles Library was transformed into a free public library on April 1, 1958, it was housed in the National Museum building, had about 50,000 volumes (mostly in English), was headed by an expatriate director, and had no qualified local staff (13). By the end of 1958, it had lent just over half a million books and had a limited readership of 19,965, mostly English-educated. Today the public library system operated by the National Library consists of the central library in the main building (completed in 1960) and two full-time branch libraries in public housing estates, at Queenstown (opened in 1970) and Toa Payoh (opened in 1974)—all operating six days a week; two part-time branches at community centers; and 10 bookmobile service points, also at community centers, in more distant and less populated areas. The total number of hours of service per week for the whole system was 255½ hours for a total of 325,649 registered readers at the end of the financial year April 1976/March 1977 (FY 76). Since 1965 the staff members have been almost entirely local, with 45 out of 85 professional posts filled by staff possessing American, Australian, British, Canadian, or New Zealand training and qualifications, as Singapore lacks a library school of its own. The book collection exceeded 1 million volumes in FY 76, while the number of loans was over 2.6 million. Apart from books, the collection also contained over 47,000 items of special materials, including bound serials, music sheets and orchestral scores (acquired from 1956 onwards), microfilms, microfiches, maps, prints, films, slides, and tapes (14).

Perhaps the most striking feature of the public library system is that it is multilingual (or quadrilingual), in keeping with the nature of the multilingual population it serves. Out of the total collection of just over 1 million books in FY 76 (including books acquired for the third branch that was opened in 1978), 505,946 were in English and European languages, 291,909 in Chinese, 129,434 in Malay, and 72,715 in Tamil (14). The staff is also increasingly bilingual and in some instances even trilingual. Library forms, notices, correspondence, and publications are issued in any of the four official languages of Singapore. Separate catalogs are also maintained in each of these languages in the central library, and to a lesser degree in the branch libraries (15).

The public library services "are identical to those of any public library serving a large metropolitan community" (16). Loan services—which are also extended in the form of bulk loans to welfare homes, homes for the handicapped, army units, residents' associations, and a variety of other organizations—are the most popular and well known. These include not only the loan of books but also of popular periodicals, braille books, music sheets and scores, and pamphlets. Reference and

information services are provided at the rate of nearly 900 inquiries a day in the central library, which has a larger and more specialized collection, and at a lesser rate in the branch libraries, which are gradually developing into community information centers. Photocopying services are available at the central and branch libraries, but the use of microforms is presently confined to the central library.

Great emphasis is placed on public relations and the promotional aspects of library service through programs organized in all the four official languages for three main groups of readers: children up to 14 years of age, teenagers or "young people" between the ages of 15 and 19, and adults aged 20 and above (17). Apart from the traditional practice of storytelling, other programs for children include arts and crafts sessions, film and filmstrip shows, sing-a-long and folk dance sessions, quizzes, games, competitions, puppet shows, and visits to places of interest.

Programs for teenagers are organized jointly by librarians, teenagers, and teachers. These include talks, forums, debates, book discussion groups, excursions, film shows, concerts, and book reviews and creative writing published in the teenagers' own magazine, *Teen Talk*. "In order to reach out to out-of-school youth and young working adults, informal clubs have been formed at the central and branch libraries" (17), including clubs for drama, creative writing, music, debating, Malay and Chinese dance, and stamp collecting.

Adult programs include film shows, exhibitions, arts and crafts and cookery demonstrations, excursions, and lectures. The most popular are those of practical concern, including advice on filing out one's income tax form or dealing with problems of marriage, divorce, adoption, car maintenance, health, and family care.

All these programs are open to members of the public, free of charge, regardless of whether they are members of the library or not, and they are publicized by means of the press, radio, and television as well as through invitations mailed to readers and those identified as potential audiences. Support for these activities has come not only from volunteers who freely give of their time and their expertise but also from a variety of government departments and cultural, social, and educational societies and institutions, which often organize their programs jointly with the library.

By the end of FY 76, it was estimated that 50.8% of the primary school population and 36% of the secondary school population were members of the library. In terms of the three main groups of readers, 53.2% were children; 19.7% were young people between the ages of 15 and 19; and 27% were adults, in keeping with the youthful character of Singapore's population (14). With increasing literacy, a decline in the birth rate, and higher standards of living, the demand for public library services is expected to increase in the coming years and will be met through the planned expansion and decentralization of services, to be provided by additional branch libraries in the main housing estates and new towns.

Apart from the National Library, the British Council Library and the American Resource Center operated by the United States Information Service may also be considered public libraries, as they provide free services—although their collections and clientele are more restricted. Both libraries gave up providing children's

services once those of the National Library started expanding in the early 1960s. The British Council Library now has emphasis on "British life and institutions, education, literature and drama, social and applied sciences and fiction" (18). Its collection includes films, speech and music records, and tapes on English literature. Similarly, the American Resource Center specializes in material on the "United States of America, government and politics, arts, American society, US government publications, technology, international relations, economics" (19). It has a large collection of microfiches, microfilms, films, audiocassettes, and videotape recordings, and it provides borrowing, reference, photocopying, and delivery services for a select clientele, including businessmen, academics, civil servants, and members of various professions.

Two government department libraries, those of the Department of Statistics and the Department of Trade (which provide loan and reference services for their own staff), are also freely open to the public for reference during office hours. Both are manned by qualified staff who come under the government Library Service. The Department of Statistics Library, founded in 1946, was merged in 1976 with that of the National Statistical Commission Library-cum-Archive, founded in 1972, and their combined collections totaled over 19,000 volumes on March 31, 1977. The Department of Trade Library is smaller and newer, having been founded in late 1972 (20).

### **Academic Libraries**

The main academic libraries of tertiary level institutions are those of the University of Singapore, Nanyang University, the Singapore Polytechnic, Ngee Ann Technical College, and the Institute of Education (a teacher-training institution). There are also libraries attached to two private colleges, the Southeast Asian Union College and the Trinity Theological College. Libraries have also been provided at all 12 technical/vocational institutes and at the seven government and government-aided junior colleges which provide 2-year postsecondary or preuniversity education.

The largest and oldest academic library is that of the University of Singapore. The University of Singapore Library system now consists of six libraries: the Main Library and five special libraries, the Medical, Chinese, Law, Architecture, and Engineering Libraries. These serve altogether seven faculties, including the Faculties of Engineering and of Architecture and Building established in 1969; two schools, Accountancy and Business Administration; two postgraduate schools, Medical Studies and Dental Studies; and a total of 44 departments. The total student enrollment in the 1976/77 session was 6,513, including 10 part-time, 314 higher degree, and 111 diploma students; but the resources and services of the library have been made available to an increasingly larger number of persons "outside" the university, who made up as much as 20.4% of the total number of 12,534 registered borrowers during the year (21).

The total collection in 1976/77 was about 602,928 volumes, and 5,636

periodical titles were currently received, the largest number received by any library in Singapore (21). The Medical Library, as the oldest component of the library system, is "the largest medical library in the English language in Southeast Asia" and "extends its specialized services to the many Singapore Government hospital doctors and graduate medical trainees" (22). The Law Library "is considered one of the best equipped common-law libraries outside the United States and Canada" and "its services to law firms are much valued" (22). The Main Library also has a special Singapore-Malaysia Collection, a catalog of which was published in 1968 and a supplement in 1972.

At present, the Medical, Architecture, and Engineering Libraries are in separate locations, while the Main Library and other branch libraries are at the main University Campus on Bukit Timah Road. An acute shortage of space for readers and collections began to be increasingly felt from 1967, but extensions to the Main Library were deferred in view of the projected move of the university to a new campus at Kent Ridge, which will eventually accommodate all faculties of the university. The new Kent Ridge Library, completed in 1978, has a gross floor area of 162,000 square feet and presently houses the Accountancy, Business Administration, Architecture, and Engineering Collections. The Law Library is located in the same building. Two additional libraries are planned to be completed in mid-1980: the Biomedical Library (approximately 60,000 sq. ft.), which will serve the Medical and Dental Faculties as well as the biological science departments, and the Law Library (approximately 22,000 sq. ft.), which will be in the Faculty of Law building. The three libraries will remain under one central library administration (23).

Nanyang University has three faculties (previously termed colleges), Arts, Sciences, and Commerce, with 11 departments; and a College of Graduate Studies. The latter also coordinates the work of four institutes: the Institute of Humanities and Social Sciences, the Institute of Economics and Business Studies, the Lee Kong Chian Institute of Mathematics and Computer Science, and the Institute of Natural Sciences. The total student enrollment in the academic year 1976/77 was 2,362, including 22 diploma students, 39 postgraduate students, and 72 students taking non-degree courses (24).

Nanyang University degrees have been recognized by the government since 1968, but employment opportunities for Nanyang University graduates have been less favorable than those for University of Singapore graduates as courses were originally conducted only in Chinese and covered a narrow range of subjects. It is the declared policy of the government to upgrade the status of Nanyang University to be equal to that of its sister university, hence uniform standards of admission, curriculum, and administration are now being developed. All undergraduates are now required to study English, which is now being used as a medium of instruction along with Chinese. These recent policy changes will undoubtedly affect the future development of the library; however, 90% of its current acquisition materials are already in English. The total book collection amounted to 284,375 volumes in 1976/77. The Lee Kong Chian Mathematical Resource Centre, previously administered as a separate library, was absorbed as a branch library for mathematics and computer science on October 1, 1976 (24).

The library building, completed in 1966, has no space problems, as it has a total area of nearly 60,000 square feet of floor space and can accommodate a maximum of 400,000 volumes and 1,200 readers. There is also provision for vertical expansion by the addition of two floors when required (25).

In a recent move to further upgrade Nanyang University standards, a Joint Campus was set up with the University of Singapore in July 1978. First-year undergraduates of both universities can attend these joint classes, which are held at the University of Singapore. The new development will undoubtedly affect both university libraries.

The Singapore Polytechnic provides technician training. It has four departments, Civil Engineering and Building, Electrical Engineering, Electronics and Communication Engineering, and Mechanical and Production Engineering; two divisions, Chemical Process Technology and Marine Engineering and Shipbuilding; and a School of Nautical Studies. In the 1976/77 session it had a student enrollment of 8,441, including 4,643 full-time students, but its registered borrowers totaled 8,983, including 580 students of the Faculty of Engineering of the University of Singapore. The library collection included 92,295 volumes and 640 periodicals currently received in the 1976/77 session (26).

The library outgrew its original location at the Prince Edward Road Campus and established two additional libraries, at the Dover Road Campus, opened in 1971, and the Ayer Raja Road Campus, opened in 1972. All academic departments of the polytechnic will eventually operate from the latter two campuses. A new library building of 34,790 square feet was completed at the Dover Road Campus in 1978 and has a capacity for 81,000 books and 850 readers (27).

Ngee Ann Technical College has five departments which provide "courses leading to the Technician Diplomas in Mechanical Engineering, Electrical and Electronic Engineering, Shipbuilding and Repair Technology and Building Services and the Diploma in Business Studies" (28). Its total enrollment for the 1976/77 year (a two-semester intake) was 4,152. Its collection included 45,824 books, 543 periodicals currently available, and numerous films, filmstrips, multimedia kits, slides, tapes, and transparencies (28).

The Institute of Education (which also has a two-semester intake) had a student enrollment of 1,727 in 1976/77, including diploma, certificate, and higher degree students. It also provided in-service courses for 1,524 teachers in various subject fields and for 192 teachers undertaking other special courses. It had 74,383 volumes in 1976/77, and it has begun to build up its microfilm resources, including educational theses and ERIC reports. The librarian of the institute conducts an optional half-credit course in School Librarianship while a similar course in Chinese is conducted for the institute by National Library staff (29).

Their historical development has enabled all five academic libraries to develop close links in the interests of library cooperation. Staff and students of the two universities have reciprocal borrowing privileges. Professional courses in engineering, architecture and building, and accountancy, originally provided by the Singapore Polytechnic, were transferred to the University of Singapore in 1969, along with the collections in these fields (30). Conversely, diploma courses in

education were transferred from the University of Singapore to the Institute of Education in 1971 (30), and the education collection of the former School of Education was transferred to the institute library.

The Southeast Asian Union College has a collection of over 13,000 volumes, and the Trinity Theological College Library has over 23,000 volumes as well as microfilm resources on missionary activity in Southeast Asia (31).

Central libraries have been provided at the technical/vocational institutes and junior colleges; the former are run by clerical staff while the junior colleges have been provided with professional posts. There are also libraries attached to schools catering for the various foreign communities in Singapore, such as the Singapore American School, with modern and well-equipped libraries on two campuses; the United World College of Asia; the Dutch, Swiss, German, and Japanese Schools; and various private academic, commercial, and language schools. However, these have not been surveyed and are not listed in the *Directory of Libraries in Singapore*.

### Special Libraries

Special libraries fall into four main categories: libraries of government ministries and departments that come under the unified Government Library Service; libraries of statutory bodies that fall outside the Government Library Service; libraries of international or regional organizations located in Singapore; and a small group of miscellaneous special libraries of embassies, firms, associations, and other organizations.

The libraries which come under the Government Library Service include those of the Ministry of Foreign Affairs, the Ministry of Education, the Ministry of Social Affairs, and Parliament; the three law libraries, of the Supreme Court, the Subordinate Courts, and the Attorney-General's Chambers; the Development Division, the Trade Department, and the Statistics Department of the Ministry of Finance; the Singapore Armed Forces Training Institute and the Staff and Command College of the Ministry of Defence; the Civil Service Staff Development Institute; the Police Academy; the three government junior colleges, the National Junior College (1969), Temasek Junior College (1977), and Nanyang Junior College (1978); and the Marine Fisheries Department. Twenty professional posts have been provided for these libraries, most of which are filled by qualified staff who were posted from the National Library, as library staff of professional and other grades are transferable within the Library Service. The annual book budgets of these libraries range from S\$8,000 to over S\$60,000, but many collections are also increased through gifts or exchanges of publications. All provide loan and reference services, and most also have photocopying services and undertake special bibliographical and indexing projects. While administratively not under the National Library, their collections and services are closely coordinated with those of the National Library by means of frequent interchanges of information, distribution of accessions lists and other publications, a staff newsletter, reports, and visits.



Other libraries which come under the Library Service are those considered too small in terms of numbers served, budgets, or collections to warrant provision of professional staff. Instead, these are run by a new grade of subprofessional staff termed library technicians, introduced in 1976 (14). These smaller libraries receive more assistance from the National Library on the organization of their services and collections than the first group. They include libraries attached to the Botanic Gardens, the Civil Aviation Department (originally provided with professional staff), and the Primary Production Department of the Ministry of National Development.

However, there are still a number of government libraries with small but important collections, less than 10,000 volumes, which do not yet come under the Library Service. These include the libraries of the National Museum, now confined to fine arts and anthropology as its zoological collection has been transferred to the University of Singapore; the Department of Scientific Services; the Meteorological Services; the Marine Department; and the Broadcasting Department, this last run by a qualified librarian graded as a research officer. Such libraries can always fall back on the larger resources of the National Library, and a review of their staffing needs according to the various grades of the Library Service is made periodically in accordance with recommended standards for government libraries drawn up by the National Library.

The libraries of statutory bodies have been established since 1960 (11). The oldest are those of the Adult Education Board and the Housing and Development Board (1960), the Economic Development Board (1961), and the Science Council of Singapore (1967). The majority were set up in the 1970s. These include: the Port of Singapore Authority and the Metrication Board (established in 1971); the National Statistical Commission (now merged with the Department of Statistics), the National Productivity Board (formerly the National Productivity Centre, a division of the Economic Development Board), and the Monetary Authority of Singapore (1972); Telecentre Library (a training center for telephony, radio, and telecommunications established by the Telecommunication Authority of Singapore), the Singapore Institute of Standards and Industrial Research (SISIR), the Singapore Family Planning and Population Board, the Industrial Training Board, and the Singapore Science Centre (1973); and the Singapore Sports Council and the Urban Redevelopment Authority (1974). Only a few have full-time professional staff: the libraries of the Housing and Development Board, the Port of Singapore Authority, the Monetary Authority of Singapore, the Telecentre, the Singapore Institute of Standards and Industrial Research, and the Singapore Sports Council. The budgets and collections of libraries of statutory bodies vary considerably.

In terms of size of collections in 1975 (11), the Port of Singapore Authority ranked first (over 10,000 volumes and over 400 current periodicals), followed by the Telecentre (6,000 volumes and 200 current periodicals). The Monetary Authority of Singapore had 1,078 current periodicals, the largest number in this group of special libraries. The services of the Singapore Institute of Standards and Industrial Research Library are particularly important in view of Singapore's industrialization program and development as a manufacturing center. Apart from its

collection of American, British, and other standards, SISIR also provides a computerized Industrial Technical Information Service (ITIS) for nearly 1,000 clients based on interest profiles (32). In addition, it operates Technonet Asia, a regional network for scientific and technical information for 11 member institutions in Asian countries (33).

Of the libraries attached to regional or international organizations, three are teaching or training institutions (11). The Regional Language Centre of the Southeast Asian Ministers of Education Organization (SEAMEO) has a fine collection of language-teaching materials, including reel and cassette tapes, records, filmstrips, microforms, and cineloops. The center provides training and research facilities for language instruction for nationals of Southeast Asian member countries, particularly English-language teaching and, more recently, the teaching of Southeast Asian languages. The Centre for the Production of Adult Education Television (CEPTA TV) is a training center for producers of adult education television programs in Southeast Asia, and the Colombo Plan Staff College for Technician Education provides training and research facilities for teachers in the field of technical education. These libraries also serve as documentation centers and clearinghouses of information in their fields. The Regional Institute of Higher Education and Development (RIHED) Library and the Asian Mass Communication Information Centre (AMIC) have no training functions but were set up to provide documentation and clearinghouse services in their fields, with AMIC covering the whole of Asia. The International Development Research Centre, an international aid agency with its headquarters in Ottawa, has its Asian Regional Office in Singapore, for which a small library is provided. The Institute of Southeast Asian Studies, unlike the other regional libraries, is a statutory body. Its rich research resources have been provided to enable research on Southeast Asia to be undertaken by Southeast Asian scholars and hence it has rapidly developed a regional function and importance. Unlike the University of Singapore Library and the National Library, its Southeast Asian collection includes material in the various languages of Southeast Asia, particularly Burmese, Indonesian, Thai, and Vietnamese.

In addition to the American Library Resource Center and the British Council Library, mentioned earlier, the Australian, British, Indian, and New Zealand High Commissions also have libraries. These include films for loan, while books and periodicals are available to the general public for reference, and in some libraries, for loan as well. The American Library Resource Center also has a separate Commercial Service Unit staffed by a professional librarian, which provides reference services for businessmen and others "interested in trade with or consultancy services available in the United States" (34). The Alliance Française maintains a large library for its members and students.

Various firms—including architecture, law, manufacturing, shipbuilding, electronics, trading and financial firms, and banks—are also known to have set up libraries, but only 10 are listed in the latest *Directory of Libraries in Singapore*, including Singapore Airlines and the Stock Exchange of Singapore. Multinational or foreign-based firms such as Shell, Texas Instrument, and Rollei have small libraries

foreign-based firms such as Shell, Texas Instrument, and Rollei have small libraries since they rely on their parent companies for technical information and research and development. Other firms generally depend on the resources of the University of Singapore Library, the Singapore Polytechnic Library, SISIR, and the National Library for scientific/technical information.

Finally, there is a small group of libraries attached to associations such as the various Chambers of Commerce, the Automobile Association of Singapore, the Metropolitan YMCA, the Supervisory and Management Training Association of Singapore (SAMTAS), the Iron and Steel Institute, and the Institute of Banking; all of these provide library facilities for their members. The Ramakrishna Mission Library, the Naval Base Kerala Club, the Sree Narayana Mission Library, and the Sri Aurobindo Society provide books in various Indian languages, such as Hindi, Malayalam, and Bengali. The Singapore Teachers' Union opened a Teachers' Centre in 1975 to provide books and teaching materials for teachers.

A distinctive aspect of special library development in Singapore has been pointed out:

... there is a tendency in newly established countries for special book collections to proliferate ... without national planning or any conception of financing or staffing. ... Establishment of libraries with overlapping functions and duplication of printed resources, which have a predictable, limited clientele, represents a dissipation of professional manpower and financial resources... This wasteful aspect of library development has been largely avoided in Singapore because of the developmental responsibility of the National Library, the strong professionalism of librarians and the Library Association of Singapore (35).

However, the rapidity with which special libraries have emerged within the past 20 years in response to changing conditions points to the need for continuous vigilance on the part of all concerned. This attention is needed to minimize, if not prevent, such problems arising from the growth of special libraries, as their establishment (except for government libraries) has generally been uncontrolled and uncoordinated.

### School Libraries

The first survey of school libraries was made by the Library Association of Singapore in 1960, which resulted in the *Memorandum on the Provision of School Libraries in Singapore* submitted to the Ministry of Education and subsequently submitted to and endorsed by the Commission of Inquiry on Education. Its recommendations included the provision of annual library funds for the purchase of books; training in school librarianship for all trainee teachers and some experienced teachers; separate library accommodation in all new secondary schools; and the appointment of a qualified library adviser at the Ministry of Education "to plan and advise the schools on the development of their libraries, to integrate the development of school library facilities with those of the National Library, and to coordinate the training of teacher-librarians" (36).

The Library Association of Singapore set up its School Libraries Standing Committee on December 12, 1962, to work toward implementation of the recommendations of the *Memorandum*. The committee was active in the compilation of book lists for school libraries, development of library courses for teachers, and other projects.

The National Library also concerned itself with the development of school libraries. It provided advice to teacher-librarians, book lists, and lecturers for courses in cooperation with the Library Association of Singapore. In 1966 it drew up *Basic Requirements of Location, Furniture and Equipment for a Secondary School Library* at the request of the Ministry of Education, which was subsequently approved by a Working Party on School Buildings in 1967. In 1967 the ministry and the National Library also organized a meeting on school libraries, attended by principals and teacher-librarians of 25 primary and 25 secondary schools, to stimulate interest in school libraries and their improvement (37).

In 1968/69, courses in school librarianship were given at the Teachers' Training College for qualified primary and secondary school teachers and for trainee teachers; these were conducted by an American lecturer on a Fulbright grant. Altogether, 260 teacher-librarians completed the courses, and it is from this group that a core of trained and dedicated teacher-librarians has emerged to provide further impetus and support to school library development. They also formed the nucleus of the membership of the School Library Section of the Library Association of Singapore, set up in August 1969 to replace the previous Standing Committee (37).

Despite these promising developments, the provision of school library facilities in the 1960s lagged behind those of other facilities, owing to the concentration of efforts, as noted earlier, on meeting more pressing priorities in working toward the goal of universal primary education. The next turning point came with the Seminar on School Libraries held in February 1970, which drew attention to the deficiencies of school libraries (particularly those of secondary schools) that had been identified in a survey made in 1968 (38). While most secondary schools had a central library, the survey noted that book collections were limited and disorganized, that most teacher-librarians were untrained, and that services to students were largely confined to the loan of books.

Major recommendations of the 1970 seminar included the setting up of a School Library Unit at the Ministry of Education, headed by a school library adviser; the appointment of a lecturer in library science at the Teachers' Training College to provide courses for teacher-librarians; and the drawing up of minimum standards for school libraries (37).

With universal primary education achieved and with a new emphasis on qualitative education, the time was ripe for school libraries to receive more serious attention. Following the seminar, the Ministry of Education in March 1970 set up the Standing Committee on Libraries (Ministry and Schools) under the Advisory Committee on Curriculum Development, with the director of the National Library as chairman and an assistant specialist adviser in the teaching of English as secretary. During its first 5 years the committee undertook two surveys of school libraries, in May 1970 and in July 1974; drew up recommended standards for secondary and

primary school libraries which were approved by the ministry in 1972 and 1974, respectively; organized workshops and in-service courses for teacher-librarians; prepared a syllabus for the teaching of library skills in primary schools; compiled lists of periodicals for the primary and secondary levels; and undertook bulk orders and centralized processing for books in various fields for primary and secondary school libraries, in cooperation with the National Library. In 1973 a full-time liaison officer/librarian was provided for the first time at the Ministry of Education, who also served as the secretary of the Standing Committee.

Since 1972 optional courses in school librarianship for trainee teachers have been provided at the Institute of Education (formerly the Teachers' Training College). Originally conducted in English by the institute's librarian and by staff of the National Library, they have been conducted in Chinese as well since 1975. In-service courses for qualified teachers continue to be organized by the Standing Committee and by the School Library Section of the Library Association of Singapore.

Further reorganization took place in late 1976. At that time the Standing Committee was reconstituted as the Subject Committee on Libraries of the Curriculum Development Committee, under the assistant director of education in charge of curriculum, while the liaison officer/librarian was redesignated the library development officer. The reorganization has promoted broader support and understanding of the role of the school library, which had previously tended to be considered of concern mainly to the teaching of English. Every primary and secondary school now has a library coordinator responsible for the school library. Library coordinators meet regularly every term at area or group meetings, each area consisting of about 12 to 15 schools. The key coordinators of each area form a Working Committee which in turn liaises with the Subject Committee.

The bulk orders project continues to help schools improve and enlarge their collections, which are not confined to books but increasingly tend to include periodicals, filmstrips, slides, cassette tapes, and videotapes. Schools may also borrow films through membership in the Singapore Educational Media Service, which provides radio and television programs for schools.

There are as yet no full-time school librarians except at the Singapore American School and the United World College of Asia, which serve the foreign community. However, school libraries now present a greatly improved picture over that of 1970, particularly with regard to physical facilities. A 1977 report stated:

... out of a total of 480 schools, all secondary schools and about 81 per cent of the primary institutions have central libraries. . . . The school library is a standard provision in all new school buildings and the school library unit is responsible for giving advice on the planning and building of library rooms. These rooms are fully furnished and equipped at a cost of S\$7,000 for a primary school and S\$15,000 for a secondary school. On top of that are book grants of S\$5,000 at the primary and S\$15,000 at the secondary level to help new schools build up an initial book collection (39).

With larger numbers of teachers being trained in school librarianship and with many school libraries, previously confined to the size of one classroom, now ex-

panding to the size of two or three classrooms, standards of school library provision are expected to improve still more rapidly in the future.

### Library Cooperation

Library cooperation has been a marked feature of librarianship in Singapore since the founding of the Malayan Library Group in 1955. The main areas of cooperation include staff training, bibliographical projects, cooperative acquisitions, microfilming, and interlibrary loans.

Training awards have been provided by the National Library under the Colombo Plan since 1964. These are in the form of junior and senior fellowships for in-service training for periods of up to three months (40). Between 1964 and December 1977, 47 trainees from Cambodia (now the Khmer Republic), Indonesia, Iran, Laos, the Maldives, Pakistan, the Philippines, South Vietnam, Sri Lanka, and Thailand received training awards (41). In 1976–1977 the University of Singapore Library similarly provided training for four persons under the Colombo Plan (42).

In addition, the National Library has provided training—under the sponsorship of various other agencies such as the Brunei government, the Asia Foundation, the Commonwealth Fund for Technical Cooperation, UNESCO, and various local and state governments in Malaysia—for trainees from Brunei, Fiji, Malaysia, Papua New Guinea, and South Vietnam. It has also served as a training ground for professional, paraprofessional, and other grades of staff in libraries of government departments, statutory boards, firms, and associations in Singapore.

The Library Association of Singapore (LAS) has also been active in the organization of courses for its members. This was first done through the Joint Standing Committee on Library Education of the LAS and the Persatuan Perpustakaan Malaysian [PPM; Library Association of Malaysia], which functioned from 1966 to 1971 and provided courses for members sitting for the external examinations of the Library Association (Britain)—as Singapore lacks a library school. When that group was dissolved, a new organization, the Standing Committee on Library Education, was set up by the LAS in 1972, and it organizes courses for the continuing education of its members (43).

A staff exchange program was also organized by the National Library and Nanyang University Library in 1976/77.

The Joint Standing Committee on Library Cooperation and Bibliographical Services (JSCLCBS) of the LAS and PPM initiated and undertook several bibliographical projects between 1966 and 1975 (43). These included: the formulation of policies for the current national bibliographies of Singapore and Malaysia; compilation of the 1967 and 1968 issues of the *Index to Current Malaysian, Singapore and Brunei Periodicals*, subsequently undertaken separately for each country by their respective national libraries (the Singapore index including Brunei titles); compilation of standard bibliographical terms in Malay, Chinese, and Tamil; establishment of cataloging rules for Malay, Chinese, and

Tamil names; compilation of library statistics; and expansions of the Dewey Decimal Classification for Malay and Southeast Asian languages and literatures and for the history of Malaysia and Singapore, which were adopted in the national bibliographies of both countries.

In 1976 the JSCLCBS was reconstituted as BILCO (Committee on Bibliographical and Library Cooperation), with its chairman alternately provided by Malaysia and Singapore every 2 years. BILCO's role now lies more in the field of interchange of information and coordination of activities rather than the direct undertaking of projects, which are instead increasingly being carried out by the national libraries as they develop the capacity to undertake additional responsibilities and services.

In a small country like Singapore, with rapid and easy means of communication, the advantages of cooperative acquisition have been readily appreciated. Cooperative acquisition is undertaken by means of informal agreements among the major libraries in Singapore. Information on specialized or expensive titles is circulated among the libraries before a decision is made on whether or not to acquire them. Lists of duplicates or unwanted materials offered on exchange are also circulated among Singapore and overseas libraries. Rationalization of resources, particularly in government libraries, has led to collections being dispersed, made available on permanent loan, or otherwise donated to libraries where they are more appropriate or relevant.

The Subcommittee on Microforms (SCOM) was set up by the JSCLCBS in May 1968, and it continues to operate under BILCO to ensure cooperation in the acquisition of microfilm resources and the initiation and coordination of microfilming programs. Membership in SCOM is confined to institutions undertaking microfilming operations.

SCOM members have agreed to accept responsibility for the filming of specific titles or groups of materials, to consult each other before embarking on new filming, to lend material to fill up gaps before filming, and to make positives available by sale or exchange (44).

Regional cooperation in the field of microfilming has also been developed through the Regional Microfilm Clearing House established in 1971 by the Southeast Asian Regional Branch of the International Council on Archives (SARBICA) and CONSAL. The chairman of SCOM is the coordinator of the clearinghouse's activities, which include the compilation of the *Directory of Microfilm Facilities in Southeast Asia* and the publication of the semiannual *Southeast Asia Microfilm Newsletter* (44).

A major regional project, the *Masterlist of Southeast Asian Microforms*, has been sponsored by SARBICA and CONSAL. This compilation of microform holdings of Southeast Asian institutions was undertaken between 1975 and 1977. The first *Masterlist* was published in 1978, and it will be continued by the National Library of Singapore (44).

An interlibrary loan code was formulated by an ad hoc committee of the JSCLCBS in 1968 and approved the following year. The standard interlibrary loan

forms agreed upon are now printed and sold to Singapore libraries by the Library Association of Singapore (43).

### The Future

With the infrastructure of library services well established, future developments are likely to be in the direction of further expansion of the National Library network of branch libraries, the computerization of library operations, and the provision of more sophisticated services by all types of libraries. Library cooperation is being increasingly institutionalized and broadened to cover the Southeast Asian region. A major unresolved issue is that of indigenous library education, Singapore being the only member of CONSAL which still lacks a library school. Future manpower needs are currently being surveyed by the LAS Standing Committee on Library Education, and it is hoped that a fresh approach toward solving this problem will be forthcoming soon.

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HEDWIG ANUAR

## SLAUGHTER, HENRY P.

Henry P. Slaughter, collector of Afro-Americana, historian, and fraternal leader, was born in 1871 in Louisville, Kentucky. Slaughter was the son of former slaves and attributed his interest in the subject of Negro history to an incident in his boyhood. As a youngster he was puzzled by the treatment in textbooks of slavery in the Americas and the moral and ethical conditions surrounding slavery. The biased approach on slavery and the glossing over of its true nature in school textbooks were the motivating factors, according to Slaughter, that encouraged him to seek and acquire many sources on Afro-American history. The insatiable desire to know and understand the history of his people was the basis of a lifelong pursuit.

After completing his public school education in Louisville, young Slaughter went to Washington, D.C. In 1899 he received the bachelor's degree in law from Howard University and a year later earned his master's degree. In 1896 he went to work for the Government Printing Office. On the limited income of a civil service employee, Slaughter began collecting everything he could locate in the field of Afro-Americana. As a result of his collecting interests he became friends with book dealers in every part of this country and abroad. His name became legendary among collectors and buyers as a zealous and authoritative collector of Afro-Americana.

As Slaughter's income increased so did the intensity of his collecting interests. His sound financial investments in stocks and bonds helped to support his purchases. Not only did Slaughter collect books, but artifacts and memorabilia as well. By 1944 his collection had approximately 10,000 items, according to Wallace Van Jackson, who was then library director of Atlanta University (*1*). Slaughter offered to sell the collection to Atlanta University in 1944, because of his age and be-

cause the university was interested in building an outstanding research collection on Afro-American life and history.

The collection consisted of 8,500 books and pamphlets; 70 folders of newspaper and magazine clippings; approximately 100 rare etchings, lithographs, and sketches; and many original music scores by Afro-American composers. Slaughter collected rare items from Africa, Haiti, and Cuba, comprising histories, travelogues, and narratives. The collection included 35 volumes devoted to the life of the abolitionist and martyr, John Brown. Slaughter also located and purchased 50 volumes concerning the activities of the Ku Klux Klan dating back to the Reconstruction period. There were many first editions by such writers as Phyllis Wheatley, Frederick Douglass, and William Wells Brown. Slaughter spent years tracking down Gregoires's *De la litterature de Negres* (1808).

Also among the very rare items Slaughter collected were books and manuscripts on the life of Abraham Lincoln. He consistently built a file on Monroe Trotter which included antilynching papers and clippings.

Van Jackson commented that:

While the Slaughter Collection does not contain the quantity of foreign titles found in the Schomburg Collection (now owned by the New York Public Library and Howard University), its range in time and interest is greater. The Moorland Collection (owned by Howard University) has a famous collection of prints, but the Slaughter Collection has many of these and some not in the former collection. The Slaughter Collection contains almost twice as many items as either the Schomburg or Moorland collections [had] when they were transferred to libraries (2).

Arna Bontemps noted that the collection "filled a medium-sized house"—a house purchased by Slaughter specifically to accommodate his personal library, which he collected over a period of 40 years.

A catalog of the collection was compiled by the Work Projects Administration in the 1930s, at the suggestion of Dorothy Porter and other librarians at Howard University. This catalog was made available to the library at Howard University and to the Library of Congress. Slaughter would make his library available only to scholars who were recommended by Howard University or the Library of Congress.

Atlanta University acquired the collection in 1946. This outstanding collection led to the university becoming a mecca for Afro-American study and research. Today, many of the materials in the Slaughter Collection are unique; they can be found only in the Trevor Arnett Library of Atlanta University, where the collection is housed.

Henry P. Slaughter's bookish interests were the cause of his selection as editor of the *Odd Fellows Journal*, the official publication of the Odd Fellows. He held this job from 1910 until it discontinued publication in 1937. His dedication to fraternal life can be seen in his appointment as permanent secretary of the Corinthian Lodge 3857 of Odd Fellows (Washington, D.C.). For many years he was a member of the Board of Directors of the Odd Fellows Hall Association. He was also a 33rd-degree Prince Hall Mason.

From the time he was a schoolboy in Louisville until his death in 1958 in Wash-

ington, D.C., Henry P. Slaughter dedicated his life to pursuing the truth about his people.

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MILES M. JACKSON

## SLAVIC PALEOGRAPHY

### Background and Definitions

Slavic paleography is concerned with the study of ancient Slavic manuscripts.

It has become customary to divide the family of Slavic nations into three distinct geographical and linguistic groups; (a) the Western Slavs (Czechs, Kashubes, Poles, Slovaks, and Sorbs, or Wends), (b) the Southern Slavs (Bulgarians, Croats, Macedonians, Serbs, and Slovenes), and (c) the Eastern Slavs (Belorussians, Russians, and Ukrainians).

Although the common Slavic language separated from the Indo-European family of languages around 1000 B.C., it is not until the late 800s A.D. that a Proto-Slavic can be identified as a discrete language. Furthermore, Slavic literary languages proper have originated at widely scattered points in history, ranging from the 9th century A.D. when the Old Church Slavonic was first recorded in writing, down to the 15th century when a literary Polish language began to develop, probably in the area of Małopolska.

The alphabets adopted by the major Slavic nations follow their religious affiliations. Those who embraced Christianity via Rome use the Latin alphabet (Croats, Czechs, Poles, Slovaks, and Slovenes), while others who were converted to the Greek Orthodox version of Christianity use the Cyrillic alphabet (Belorussians, Bulgarians, Macedonians, Russians, Serbs, and Ukrainians). A third alphabet, the Glagolitic, was used by some Southern and Western Slavs but soon was replaced by the Latin or Cyrillic alphabet.

The earliest extant Slavic manuscripts are those produced by or for the Eastern and Southern Slavs, using the Cyrillic or Glagolitic alphabet and the common Old

Church Slavonic language. In contrast, early manuscripts and codices of Western Slavic origin are mostly copies of Latin or German ecclesiastical and courtly writings. Secular works and translations into the vernacular were written and copied in modest numbers only as late as the 11th (Slovenian) through the 13th (Czech and Polish) centuries. Significant national literary output by Western Slavs was actually achieved in the 15th century, and the invention of printing, first from blocks and later with movable type, removes these texts from the field of interest of paleography—thus our emphasis on the 9th- through 14th-century Cyrillic and Glagolitic monuments of writing.

### A Survey of Research in Slavic Paleography

The following is a concise account of the research accomplished in the field of Slavic paleography by individuals, scientific societies, and institutions.

Although the discussion is divided into three broad categories—Russian, Soviet, and Western contributions—efforts have been made to identify main trends which transcend the limitations of the arbitrary grouping. Furthermore, the Russian and Soviet preoccupation with Cyrillic paleography and the distinct interest by Southern and Western Slavs and also non-Slavic Western scholars in Glagolitic paleography should make the proposed geographical division more acceptable.

### RUSSIAN CONTRIBUTIONS

#### *The Phase of Hoarding and Collecting*

Critical study of ancient Russian manuscripts began more than a hundred years after the publication of the first scholarly work on Latin paleography by Dom Jean Mabillon (1). This considerable lag must have prompted I. I. Sreznevskii to state: "For us Russians there was nothing left but to do things as they have been done by others—to imitate" (2). The apologetic attitude of the Russian scholar is unwarranted because paleography in Russia, just as in France, Germany, and England, had gone through an early stage of development when rudimentary paleographical techniques were applied spontaneously to the critique of manuscripts.

Two of the best-known instances of early use of relatively involved paleographical evidence are the cases of Ivan Permiakov *contra* Nikita Maslov (3) and of Prince Dolgorukii (4).

There is one particular Russian document which, by its subject matter and the circumstances of its creation, bears strong similarity to Mabillon's *De re diplomatica*. It is the *Answers from the Pomor'e* (1723), a polemic study generally attributed to Andrei Denisov (5). The author of the *Answers* tried to defend the Raskolniks against the attacks of Peter I's official church and Patriarch Nikon by exposing the spuriousness of the *Acts of the Church Council in the Case of the Heretic Armenian Monk Martin*, an allegedly 12th-century document (6), and the *Missal of Metropolitan Feognost* (7). The recognition and skillful exploitation by

Denisov of paleographical evidence such as chronology, catch words, hand, ink, the use of palimpsests, binding, and some linguistic characteristics make the *Answers* the first systematic work to apply paleographical lore to a Cyrillic text.

The mid-18th and early 19th centuries were marked by a cultural awakening and considerable strengthening of national feelings in Russia. The victory over Napoleon's Grande Armée led to a peak of patriotism. Noblemen-historians and feudal landlords, together with the developing Russian bourgeoisie, demonstrated deep interest in the past of their country. As a reaction to the destructions caused by the French invasion, they tried to save the surviving monuments of bygone times, including ancient manuscripts.

This increased public interest resulted in two major developments: first, it secured the publication of textual reproductions of ancient Russian charters, treaties, and other rare historical source material; second, it stimulated private collecting. By putting high price tags on the relics of the nation's past, it also intensified the search for these lost and long forgotten objects.

Russian historians such as V. I. Tatishchev (1686–1750), N. M. Karamzin (1766–1826), Count M. M. Shcherbatov (1733–1790) (8), I. N. Boltin (1735–1792) (9), and the *polyhistor* V. M. Lomonosov (ca. 1711–1765) (10), devoted themselves to the task of recreating in their works the past of Russia. Their search for documented evidence resulted in the identification and analysis of old codices, deeds, and chronicles. Thus, V. I. Tatishchev is credited with the discovery and original analysis of two ancient codices of Russian law: the shorter version of the *Russkaia pravda* and the *Code of Law of Ivan the Terrible* (1550) (11); while N. M. Karamzin's *History of the Russian State* (1819–1826) abounds in references to primary sources, many of which have not come down to us (12).

The young Russian Academy of Sciences (1724) recognized the need for the publication of historical and linguistic source material. In 1767 the first volume of *Nikon's Version of the Russian Chronicle* left the press under the sponsorship of the academy (13). However, this early attempt to print the text of an old Russian manuscript clearly indicates the lack of experience on the part of the sponsor and the editorial committee.

Shortcomings have plagued many subsequent Russian paleographical endeavors (cf. the case of the inscription on the Tmutorokan Stone, *infra*) and some of the unique Cyrillic manuscripts are still awaiting publication by the use of modern facsimile and printing techniques.

The inept overture of the academy was followed by a more efficient publishing venture launched by N. I. Novikov (1744–1818), the patriotic Freemason enlightener of Russia during the reign of Catherine I. His 10-volume *Ancient Russian Bibliotheca* (1773–1775; Ref. 14) was in fact the first printed collection of the texts of early political and ecclesiastical documents, treaties, etc.—all transcribed and edited with great care and with relatively few mistakes.

The role played by 18th-century private collectors has already been mentioned. Two Russian aristocrats in particular were involved in the collection of Cyrillic manuscripts and other antiques. Count Aleksei Ivanovich Musin-Pushkin

(1744–1817) was an extremely energetic collector. Holder of high office in the Synod and enjoying the personal support of Catherine II (1762–1796), the count organized the systematic gathering of manuscripts from monasteries all over Russia. He was responsible for the discovery of the oldest known copy of the *Larent'ev Chronical*, the 15th- or early 16th-century copy of the *Tale of Igor's Expedition*, the text of the *Testament of Vladimir Monomakh*, and of several copies of the *Ruskaia pravda*. The publishing ventures of the count proved to be less successful. Although they included the first printing of most of the manuscripts he had discovered (15–18), the lack of a critical approach, inconsistencies in the rendering of the texts of the originals (19–21), and possible biases of a dilettante private collector seriously impaired the scientific value of the publications. Musin-Pushkin was also responsible for the controversial study *Historical Investigation Concerning the Location of the Ancient Russian Principedom of Tmutorokan* (1794; Ref. 22).

The circle of outstanding historians and paleographers who enjoyed the count's patronage and made extensive use of his unique collection included N. M. Karamzin, N. N. Bantysh-Kamenskii (23), A. I. Ermolaev, A. N. Olenin, A. F. Malinovskii (24), and others.

Another 19th-century collector and patron whose beneficial influence promoted the cause of Russian paleographical research was Count Nikolai Petrovich Rumiantsev (1754–1826). Statesman, diplomat, and author of the 1809 peace treaty with Sweden, he devoted much of his time after retirement to rallying official support for the publication of the *Collection of State Documents and Treaties* (1813–1894; Ref. 25). While various editors were diligently toiling on the parchment rolls and codices of the huge collection of the Russian Ministry (Collegium) of Foreign Affairs, the count set out to lay the foundations of his famous library and private museum which, upon his death, was bequeathed to the Russian state (26).

The discovery of the so-called Tmutorokan Stone in 1792 electrified not only historians, archaeologists, and paleographers but also a large segment of the Russian public. The stone carried the oldest dated Russian inscription ever found within the boundaries of the country. It recorded the fact that in 1068 A.D. Prince Gleb had measured the width of Kerch Bay between Tmutorokan and Kerch.

Musin-Pushkin (22), Vaksel' (27), and Pallas (28) wrote about the newly discovered inscription. All three authors offered reproductions of the text. The discrepancies among the three "reproductions" and the misinterpretation of the text by Musin-Pushkin and also by Pallas resulted in years of heated discussions and even in doubts as to the authenticity of the inscription itself.

The argument was finally settled by the publication in 1806 of A. N. Olenin's *Letter to Count A. I. Musin-Pushkin about the Tmutorokan Stone, Found on the Island of Taman' in the Year 1792* (29). This excellent historical and paleographical exposé not only corrected the mistakes made by Musin-Pushkin and Pallas in their accounts but also introduced new evidence in order "to convince the venerable, indefatigable and prudent analysts of our chronicles of the un-

questionable antiqueness of the Tmutorokan stone" (30). Olenin prepared several rubbings of the inscription and turned them into good illustrations for the folio-size work. The letter also included facsimile fragments and samples of individual characters taken from the *Sviatoslav Miscellany of 1076* [Izbornik Sviatoslava 1076 g.], from the *Lavrent'ev Chronicle* and the *Radziwill, or Königsberg, Chronicle*, from a 1414 copy of the *Sermon of Law and Grace* [Slovo o zakone i blagodati], and from other manuscripts. By comparing the hands used in these manuscripts with the characters of the inscription on the Tmutorokan Stone, Olenin successfully proved the authenticity of the controversial find.

While describing a manuscript copy of the richly illuminated *Königsberg, or Radziwill, Chronicle*, A. N. Olenin—for the first time in Russia—pointed out the paleographical significance of watermarks in paper (31). His discovery of a forged date in the 1414 copy of the *Sermon of Law and Grace* was another interesting byproduct of the investigation.

Finally, Olenin launched a passionate appeal for the creation of a complete collection of Russian chronicles and for the development of Slavic paleography as an ancillary to historiography.

Olenin's *Letter* is generally considered as the first Russian work in which the method of scientific paleography was applied to the critical analysis of an ancient Cyrillic text. We might add here that the *Letter* also marked the end of the initial period of Russian paleography, that is, the end of an era of plain gathering and hoarding, which gave way to a new phase, the period of inventory and description.

### *The Phase of Inventory and Description*

A most significant mission was fulfilled at this new stage of development by the young Russian scientific societies and institutions, which invited historians, paleographers, and archaeologists to publish their research results in society-sponsored periodicals. The Society for Russian History and Antiquities at the Moscow University (32), the Russian Archaeological Society (33), and the two very active Archaeological Institutes (34) played leading roles in this respect. Various departments of the Russian Academy of Sciences, the Synod, the *Journal of the Ministry of Public Education*, and some literary magazines also welcomed contributions of the same kind.

In 1818 the *Herald of Europe* (35) printed a study by E. A. Bolkhovitinov (1767–1837) of a patent known as the *Mstislav Charter*, of ca. 1130 (36). The paleographical review also included a historical investigation of the possible dates of the *Charter*; a relatively detailed chronological enumeration of the seals used by church and lay dignitaries in medieval Russia; and, significant in the advance of paleographical technique, an analysis of materials to receive writing, and a comparative study of pigments and inks.

In the 1830s A. Kh. Vostokov (1718–1864), poet, translator, and linguist, was commissioned to prepare a detailed study of the most important manuscripts in Count Rumiantsev's collection. The resulting *Description of Russian and Slavic*



*Manuscripts of the Rumiantsev Museum* (1842; Ref. 37) offers a fairly detailed treatment of 473 manuscripts containing brief indications of their contents and transcribed fragments of the texts, with paleographical and historical comments on each.

Besides his linguistic and descriptive paleographical activities, Vostokov (a former art student) was especially interested in the problems of making faithful reproductions of original manuscripts. When P. I. Keppen (1793–1864; alias P. I. Koeppen or P. I. Köppen)—compiler and publisher of a useful list of Russian monuments of writing known at his time (38) and editor of the journal *Bibliographical Pages* (39)—asked Vostokov to contribute to his *Collection of Slavic Monuments of Writing to Be Found Outside Russia* (1827; Ref. 40), the latter sent to him the text of the colophon of the *Ostromir Gospels*—the oldest known dated Russian Cyrillic manuscript—and also a table of tracings of letters and various signs in that codex. Keppen printed the colophon with a type specially developed for that purpose. Later Vostokov used a slightly modified version of the same type for the printing of the full text of the *Ostromir Gospels*.

The publication in 1843 of the text of the famous *Gospels* set an example for this type of venture and proved Vostokov's qualities as a scholar (41). The parallel presentation of the Russian and Greek versions of the text, the accompanying grammatical analysis and word list, and various plates with samples of characters, together with a careful enumeration of the errors made by the scribe Grigorii, enhance the practical value of this almost perfect work (42).

Another Rumiantsev protégé was K. F. Kalaidovich (1792–1832), a man of admirable perseverance and patience. His thousands of hours spent in libraries and archives brought their unique reward: the young paleographer-linguist discovered the manuscript of the works of Cyril, bishop of Turov (i.e., Kiril Turovskii), and a 12th-century manuscript of the Bulgarian Exarch Ioann (i.e., Ioann, ekzarkh bolgarskii).

The matchless collection of the Moscow Synod Library presented a permanent challenge for Kalaidovich. As early as 1813 he completed a short catalog of the manuscript material, but it was only in 1824 that, with Count Rumiantsev's help, he was able to begin serious work on the collection. The death of the patron in 1826 interrupted the research and it was later continued—but not completed—by V. M. Undol'skii.

The first significant publication of Kalaidovich was his *Monuments of the Twelfth-Century Russian Literature* (1821; Ref. 43), which is a collection of fragments of representative 12th-century Russian manuscripts printed in a simplified form.

The discovery of the work of Exarch Ioann prompted an even more important Kalaidovich study entitled *Ioann, the Bulgarian Exarch: An Investigation Elucidating the History of the Ninth- and Tenth-Century Slavic Language and Literature* (1842; Ref. 44). The salient features of the study are the author's communication concerning the possibility of dating of manuscripts by the variants of letters; a clear distinction of the three main hands used in Russian manuscripts, that

is, the *ustav*, *poluustav*, and the *cursive*; a further development of Bolkhovitinov's observations on abbreviations and over-written letters and signs; and, finally, the consideration of watermarks in paper as a means of dating manuscripts.

There were two significant projects that Kalaidovich undertook with the noted paleographer P. M. Stroev, namely, the description of Slavic manuscripts in Count Fedor Alekseevich Tolstoi's library (1825) and the organized search for ancient manuscripts in the armaria of monasteries in the vicinity of Moscow (1817–1820). These projects are discussed later in connection with the work done by their initiator, P. M. Stroev.

In the year 1817 P. M. Stroev (1796–1876) completed his work on an annotated checklist of Slavic manuscripts in the Monastery of Volokalamsk. Although there was only one earlier example of this type of work in Russia (45), it was not the description that made the name of the young Russian paleographer suddenly a household word in paleographical circles of Saint Petersburg and Moscow. Fame came to him when, during one of his "archaeographical expeditions," he discovered one of the oldest dated Russian manuscripts, the *Sviatoslav Miscellany of 1073* [Izbornik Sviatoslava 1073 g.]. These field trips to the monasteries near Moscow subsequently brought to light such documents of the past of Russia as the unique copy of Ivan the Terrible's *Code of Law of 1497* and the decrees of the 1503, 1547, and 1554 Moscow Church Councils.

The year 1825 was marked by the publication of *A Detailed Description of Slavo-Russian Manuscripts Deposited in Moscow, in the Library of the Privy Councilor . . . Count F. A. Tolstoi*, which was the result of a joint undertaking by Kalaidovich and Stroev (46). Stroev also prepared a folder of plates with facsimiles illustrating typical 11th- through 18th-century Cyrillic hands. The folder was published in 1825 as a supplement to the *Detailed Description*. Two further supplements to the main work were published later, in Stroev's edition.

The extraordinary success of field trips in the vicinity of Moscow must have made Stroev entertain the idea of gathering official support for a series of well-planned "archaeographical" expeditions. His intensive canvassing at the Society for Russian History and Antiquities and at the Russian Academy of Sciences finally brought its results, and Stroev and his friends were able to spend 6 years (1829–1835) traveling and collecting manuscripts all over Russia. Their search was mainly focused on the northern and central parts of the country. It resulted in an impressive collection of more than 3,000 literary, legal, ecclesiastical, annalistic, and other manuscripts, and also in the abstracting and copying of many others. The Russian Academy of Sciences displayed a remarkable initiative in the publication of this unrivaled source material. As early as 1834 the permanent Archaeographical Committee was established to print the texts. The four volumes of the *Acts of the Archaeographical Expedition* (1836–1838; Ref. 47) and the five basic and 15 supplementary volumes of the *Historical Acts* (1841–1873; Refs. 48 and 49) were the first tangible results of their efforts. The work of the committee was crowned by the compilation and printing of the *Complete Collection of Russian Chronicles* (1841–; Ref. 50), which is still being published. One should note here that the whole effort was basically guided by the idea of making the texts available to the

general public, and the publications were prepared with an almost complete disregard for the needs of historians, linguists, and paleographers. In the second half of the 19th century, however, the committee published several volumes of good photographic reproductions of early manuscripts, such as the *Tale of Bygone Years* (51, 52) and the *Novgorod Chronicle* (53).

In 1845 Stroev published his work *The Library of the Society for History and Antiquities* (54, 55) and, 3 years later, the *Description of Russian and Slavic Manuscripts of the Merchant Tsarskii* (1836, 1848; Ref. 56). Both works followed the basic pattern established in his earlier volume dealing with the Tolstoi collection.

K. F. Kalaidovich was unable to complete the catalog of the manuscript collection at the Moscow Synod Library, and V. M. Undol'skii (1815–1865) completed the task. The printing of the work began in 1844 but remained unfinished (57). Undol'skii later undertook the detailed description of Slavic manuscripts of the same collection, but publication was halted by the restrictions imposed on printing in Russia as a reaction to the European revolutions of 1848. Only part of the study was printed, as late as 1867 (58).

A complete *Description of the Slavic Manuscripts of the Moscow Synod Library* was finally compiled and published by A. V. Gorskii (1812–1875) and by K. I. Nevostruev (1815–1872). The first five volumes came out between 1855 and 1869. An additional volume, based on the compilers' notes, was published in 1917 (59). The excellent work done by Gorskii and Nevostruev and the significance of their publication for the study of the Russian past were duly recognized in 1867 when the Russian Academy of Sciences awarded the authors the Lomonosov Prize (60).

#### *The Phase of Comparative Study, Analysis, and Specialization*

By the end of the 19th century, almost all significant Russian collections of Cyrillic manuscripts had been described in a more or less satisfactory manner. Thus, the period of inventory-taking and simple description came to an end, giving way to the new phase of comparative study, analysis, and specialization.

*Facsimiles and Samplers.* An early realization that the study of an original manuscript or a good facsimile was much more effective than any research based on a description or transcript has resulted in new efforts to find ways and means of producing facsimiles in Russia. From artists' concepts based on superficial impression to the casting of special fonts and photographic reproduction, all available methods have been tried and applied with varying success.

One should point out that, although scattered instances of the use of illustrative matter in paleographical writings can be found earlier, M. P. Pogodin was the first to recognize fully the significance of a true facsimile. He set as his goal the gathering of "reproductions made from all the important manuscripts in Russia and, by publishing them, to lay the foundations of Slavo-Russian paleography" (61).

Two issues of his *Specimens of Ancient Slavo-Russian Writing* (61) printed excellent facsimiles representing various phases of the development of the Russian

hand from the earliest known manuscripts to contemporaneous cursive hands. The plates were the work of K. Ia. Tromonin (d. 1847), the artist who was a publisher of archaeological material in his own right and also an expert on watermarks (62).

In addition to the printing of two well-illustrated and documented volumes describing the manuscript collections of several state institutions (63), in 1844 P. I. Ivanov (1794–1864) published a *Collection of Paleographical Reproductions of Hands of Ancient and Modern Writing, of Various Periods of Time . . .* (64). The volume contains 102 pages of illustrative matter with brief historical and linguistic comments. Comparative tables of alphabets and descriptions of seals on the cited documents are also included. Not all plates are of satisfactory quality.

F. G. Solntsev's 12-volume opus, the *Antiquities of the Russian State* (65), has some paleographical significance because many of the early inscriptions reproduced in the work have perished since then. Forty plates of 11th- through 18th-century hands compiled by I. P. Sakharov in 1841 have similar value (66).

The Lenin Library has about 100 facsimiles prepared by V. M. Undol'skii of the rare Slavic manuscripts that he owned (67). The famed collector's plan to publish an annotated paleographical folder of his reproductions has never been realized.

The Moscow Synod Library and its unparalleled collection served as the source for two works of outstanding quality. In 1855 the lithographer I. Shelkovnikov completed his task of producing a set of 22 facsimiles for F. I. Buslaev's *Paleographical and Philological Materials for the History of Slavic Writings; Compiled from Fifteen Manuscripts of the Moscow Synod Library* (68). The paper and the accompanying facsimile reproductions—which, according to Karskii, “in many cases were better than the originals” (69)—were part of a *Festschrift* commemorating the 100th anniversary of Moscow University (70).

In 1863 Savva, the bishop of Mozhaïsk, published his *Paleographical Reproductions of Greek and Slavic Manuscripts of the Moscow Synod Library; of the Sixth Through Seventeenth Centuries* (71). This work offers good facsimiles with accompanying notes and also comparative tables of the various hands as they occurred throughout the centuries. The skillful lithographer was I. Shelkovnikov.

With the approach of the phase of synthesis in paleographical work, the best representatives of the new trend united and made worthwhile contributions to the cause of publishing facsimiles.

I. I. Sreznevskii, the noted linguist and paleographer, supplemented his chronological listing of *Ancient Monuments of Russian Writing and Language* (72) with a folder of excellent reproductions. Another study by I. I. Sreznevskii, the *Ancient Slavic Monuments of Cyrillic Writing* (1868; Ref. 73), was also accompanied by reproductions of sizable fragments or manuscripts.

Many publications appeared in the third quarter of the 19th century, including various “guides” and “self-instructors” for the reading of ancient Russian manuscripts. These were in fact extensive collections of reproductions of hands, accompanied by introductory studies and brief instructions. The best-known titles in this category were published by G. V. Esipov (74), I. S. Beliaev (75), V. V. Maikov (76), I. M. Kamanin (77), A. I. Sobolevskii (78–81), S. Ptashitskii (79), Ia. I.

Trusevich (82), N. A. Marks and I. F. Kolesnikov (83), and by V. K. Klein (84).

The Kiev Archaeographical Committee (1843) and the Vilna Archaeographical Committee (1864) were only two of the many resourceful provincial bodies with active programs for the publication of facsimiles of manuscripts related to their respective geographical areas. The Society of the Amateurs of Ancient Writing (i.e., *Obshchestvo liubitele drevnei pis'mennosti*, founded 1877) also considered the publication of facsimile editions of rare Russian manuscripts as one of its vital roles.

E. F. Karskii, the Belorussian linguist and professor of Slavic paleography at Warsaw University, also contributed to the printing of facsimiles by publishing a supplement to his textbook (69). This supplement, *Specimens of Slavic Cyrillic Writing from the Tenth Through the Seventeenth Centuries*, had three editions (1901, 1902, and 1912; Ref. 85).

In 1905 P. A. Lavrov (1856–1929), a specialist in South Slavic paleography and reader in the subject at the Saint Petersburg Archaeological Institute, published his *Paleographical Reproductions of South Slavic Manuscripts of Bulgarian and Serbian Writing: Part 1, Eleventh Through Fourteenth Centuries* (86). Ten years later V. Jagić, the editor of the monographic series entitled *Encyclopedia of Slavic Philology* [*Entsiklopediia Slavianskoi filologii*], printed both P. A. Lavrov's earlier paleographical survey of Cyrillic writing (87) and a selection of about 100 excellent plates from the *Paleographical Reproductions*.

When the Saint Petersburg Public Library decided to prepare a folder of their most valuable Greek, Latin, and Slavic manuscripts, they commissioned N. M. Karinskii (1873–1935), a lecturer in paleography at the Archaeological Institute, to select and edit the Slavic material. The resulting *Paleographical Reproductions of Certain Greek, Latin, and Slavic Manuscripts of the Public Library* was published in 1914 (88). Later, in 1925, Karinskii published a folder of 29 plates with 68 facsimile reproductions of Slavic manuscripts, mainly from the 11th century. There are several aspects of this publication which deserve recognition. The reproductions are preceded by an in-depth study and letter-by-letter analysis of the 11th-century Russian hands. The editor succeeded in grasping the typical characteristics while selecting original manuscripts for his work. The manuscripts are reproduced in their actual sizes, and the printing is excellent. The folder was published under the title *Specimens of Writing of the Most Ancient Period of the History of the Russian Book* (1925; Ref. 89).

Karinskii, in cooperation with V. Jagić, also produced a volume of *Specimens of the Glagolitic Writing* (1908), which is still the best collection of facsimiles of that kind (90).

The printing of facsimiles was a prerequisite for the enhancement of comparative study, analysis, and specialization. The increase in the available reference material of this kind was directly responsible for the shaping of the third phase in Russian paleographical work.

Comparative study, analysis, and specialization at this stage were restricted to single topics such as watermarks, paper, decoration, illumination, *viaz'* (91), and hands.

*Paper and Watermarks.* The significance of watermarks as paleographical

evidence was first pointed out by A. N. Olenin in his *Letter* (1806) to Count Musin-Pushkin (29, 30). In 1824 I. P. Laptev (1774–1838), a Vologda merchant and amateur paleographer, published a collection of watermarks with the title *Experience in Ancient Russian Diplomatics, or the Method of Recognizing from the Paper the Time when Ancient Manuscripts Were Written* (92). Laptev's work, the first of its kind in Russia, consisted of 28 plates with 150 watermarks reproduced with varying degrees of precision and arranged in chronological order.

The number of reported watermarks was increased to 1,827 in a work by K. Ia. Tromonin (d. 1847), *Marks of Writing Paper: An Elucidation of the Marks Which Can Be Seen in Writing Paper, by Means of Which It Is Possible to Find Out When Books, Documents, Drawings, Pictures and Other Ancient and Non-Ancient Things on Which the Years Have Not Been Indicated Were Written or Printed* (62), which was published in 1844. From among the randomly arranged watermarks, about 100 can be related to Russian paper mills (93).

Russian research in the field of watermarks and paper culminated in the publication of two major works by N. P. Likhachev (1862–1935). The first, entitled *Paper and the Most Ancient Paper Mills in the Moscow State* (1891), reproduced 783 dated watermarks found in paper used between the 14th and 18th centuries in Muscovy (94). Thirty-three watermarks were actually related to Russian paper mills. Of all studies dealing with the history of papermaking in Russia, from the paleographical point of view, this volume is considered as the definitive work on the subject. The other Likhachev work was the three-volume *Paleographical Significance of Watermarks in Paper* (1899), which recorded 4,258 designs to be found in paper manufactured by Russian and foreign paper mills between 1293 and 1832 (95). The Russian watermarks number 74. An extensive essay on the subject by Likhachev is included.

The highly specialized study *Paleographical Significance of Watermarks* (1958), by V. N. Shchepkin (1863–1920) and M. V. Shchepkina, principally deals with the theoretical problems of dating manuscripts by the means of watermarks (96).

This account would be incomplete without mentioning the specialized collection of reproductions of Ukrainian watermarks by I. Kamanin and O. Vitvits'ka. Their *Watermarks in the Paper of Sixteenth- and Seventeenth-Century Ukrainian Documents* (1566–1651), the result of a research effort of two decades, was published in 1923 (97). It contains reproductions of 1,336 dated watermarks divided into two basic groups by the century of their origin.

Some other studies discuss Russian papermaking and certain aspects of watermarks. A. F. Griaznov's *The Iaroslavl' Large Manufactura in the Period Between the Years 1722 and 1856*, for example, describes the history of the Manufactura and its paper mills (98). The account is accompanied by reproductions of 24 watermarks arranged in chronological order. P. A. Kartavov's *Historical Information about Embossed Paper: Part I. 1697–1801* (1900) is a review of the development of embossed paper manufacture in Russia with facsimiles of 40 designs, most of them with coats of arms (99).

In 1912 N. A. Reztsov published a series of articles entitled *Paper in Russia* 100

*Years Ago*, in which he described 77 early 19th-century Russian watermarks (100). The articles are accompanied by 34 reproductions of reduced size.

*Illustration, Illumination, and Decoration.* During this period of comparative study, analysis, and specialization, considerable attention was paid by paleographers, historians, and artists to the decoration, rubrication, illumination, and general illustration of Russian manuscripts.

The paleographical significance of the form, content, and style of manuscript decoration and illumination was first investigated by F. I. Buslaev (1818–1897). In 1881 he wrote the introduction to a volume of specimens of writing and decoration contained in a 15th-century Book of Psalms and offered a detailed discussion of the topic (101).

A collection of Buslaev's writings, most of them brilliant studies in the field of decoration and illumination, was posthumously published in 1917 under the title *Historical Sketches on Russian Decorations of Manuscripts* (102).

Several atlases and folders of reproductions of manuscript decorations were published during the last quarter of the 19th century. As early as 1870, V. I. Butovskii produced his collection of 100 plates. The work, *History of Slavic Decoration of the Tenth Through Sixteenth Centuries*, was printed in Paris (103).

Four years later, the Moscow Industrial Art Museum started the publication of a three-part folder entitled *A Collection of Eastern Ornaments from Greek and Ancient Russian Manuscript Codices of the Tenth Through Sixteenth Centuries Inclusive: Material for the Industrial Draughtsman* (1874–1877; Ref. 104). Published for purely utilitarian purposes, the folder had little significance for the paleographer or art historian.

The year 1887 witnessed the publication of two new works dealing with ornaments. G. G. Gagarin printed his *Collection of Byzantine and Ancient Russian Decorations*, consisting of 50 plates drawn by the compiler (105). In the same year V. V. Stasov (1824–1906), the noted art historian, published the results of 25 years of research on manuscript decoration and illustration. The 156 plates of Stasov's atlas bring to the reader a collection of interesting and refreshingly new designs. Although the work was severely criticized by contemporary reviewers, the *Slavic and Eastern Decoration According to the Manuscripts of Ancient and Modern Times* is one of the best, if not the foremost, collections of its kind (106).

In 1914 A. I. Nekrasov published his *Sketches on the History of Slavic Decoration: The Human Figure in Sixteenth-Century Russian Teratological Manuscript Decoration* (107).

*Viaz'.* A disciple of Buslaev and a devoted supporter of his so-called historical-comparative method in research, V. N. Shchepkin (1863–1920) not only completed the work of systematization of styles of ancient Russian decoration but went one step further and developed the method of establishing the approximate date and area of origin of any specific decorative element (108).

Subsequently, Shchepkin focused his attention on one single topic in the field of manuscript decoration. He devoted much time to the systematic study of decorative writing, or *viaz'*. The first version of Shchepkin's definitive study about *viaz'* ap-

peared in the *Archiv für slavische Philologie* under the title "Cyrillische Ligaturschrift" (1903; Ref. 109). A year later the magazine *Drevnosti* [Antiquities, the Proceedings of the Moscow Archaeological Society] printed the richly illustrated study in its final form with the laconic title "Viaz'" (110).

In 1916 I. A. Shliapkin contributed a folder with 35 specimens of *viaz'* but without any explanatory text (111).

*Hands, Cryptography, etc.* The comparative study of hands at this stage was restricted to the compilation and brief interpretation of representative specimens. Some typical works of this kind are included in our review of facsimile collections.

Other topics also found their first interpreters, such as materials and techniques applied by the medieval Russian scribe (112, 113), and areas such as cryptography (114–118), epigraphy, folklore, chronology, linguistics, diplomatics, sphragistics, and even music. The foundations for further research generally were laid down before the beginning of the 20th century.

New information produced by the comparative study of manuscripts and by the analysis of their special characteristics (decoration, writing materials, hands, watermarks, language, etc.) soon made the earlier manuscript descriptions obsolete. Improvements in facsimile techniques, which came to Russia about the turn of the century, further emphasized this shortcoming.

Linguists and historians joined paleographers in preparing analytical descriptions of significant manuscripts and in publishing high quality facsimile editions of the texts. Virtually hundreds of studies of this kind were printed in the second half of the 19th century; for a more or less complete listing, the reader is referred to Sreznevskii (119), Karskii (120), Chaev and Cherepnin (121, 122), and also to some recent Soviet retrospective bibliographies (123, 124).

Among the facsimile editions of texts, the matchless reproduction of the *Arkhangel'sk Gospels of 1092* is the foremost achievement to date (125).

### *The Phase of Systematization and Synthesis*

The accumulation of reference material produced during the first three phases of Russian paleographical work (i.e., gathering; inventory-taking and primitive description; comparative study, analysis, and specialization) had made the time ripe for systematization and synthesis.

At the advent of the 19th century, there were impatient calls, in Russia and from abroad, for the creation of a comprehensive and systematic work on Russian (i.e., Slavic or Cyrillic) paleography. A. L. Schlözer (126), J. Dobrovsky (127), A. N. Olenin, A. Kh. Vostokov, K. F. Kalaidovich, and others thought that a study of this nature was long overdue.

By the middle of the century, Slavic paleography not only had a huge reservoir of source materials but also had acquired prestige as an acknowledged ancillary discipline to historiography, bibliography, and linguistics. With the introduction of regular courses in the subject at universities and various scientific societies, the systematization and synthesis of the large body of available information and material soon resulted in the publication of several comprehensive works.



In 1849 the Academy of Sciences undertook the printing of three folio-size volumes of the work *A Survey of Slavo-Russian Bibliography* (128), by I. P. Sakharov (1807–1863). The second part of the first volume is completely devoted to the problems of paleography, and it should be considered as the first systematic study of the subject in Russia. Nevertheless, the book, entitled *Slavo-Russian Paleography I: Book Hand*, has been overlooked or inadequately reported by most reviewers of the literature on the subject (129). In defining the purpose of his work, Sakharov wrote that it was aimed “exclusively at the topographical study of the Slavo-Russian book hand,” and that he had decided to leave discussion of all other sections of paleography for a future time.

The author’s paleographical observations were based on the investigation of 400 dated Russian and South Slavic manuscripts. The first part deals with the characteristics of the Russian book hand. The second part offers a chronological description of Slavo-Russian manuscripts originating from the 9th through 17th centuries. The *Supplement* of the work is devoted to the *Miscellany of 1076*.

Some time before 1854, I. P. Sakharov’s lectures on paleography—another first in Russia—at the Aleksander Lyceum and at the School of Law were lithographed (130), and they were circulated under the title *Readings in Russian Paleography* (131).

The posthumous publication in 1885 of the text of the lectures on Slavo-Russian paleography delivered by I. I. Sreznevskii (1812–1880) signified a new step in systematization and synthesis of the knowledge acquired earlier. Sreznevskii lectured at the Saint Petersburg University between 1865 and 1880. The full text of his lectures was prepared for publication by his son, under the title *Slavo-Russian Paleography of the Eleventh Through Fourteenth Centuries: Lectures Delivered at the Saint Petersburg Imperial University During the Years 1865–1880* (1885; Ref. 2).

The work offers a detailed survey of Russian and Western Slavic paleographical studies up to the 1870s. This is followed by a scrupulous analysis of dated Cyrillic manuscripts starting with the 11th and ending with the 14th century. The basic rules and requirements which Sreznevskii had set earlier in his review of a study by Gorskii and Nevostruev (132) were strictly applied to his own descriptions, most of which include the important paleographical, linguistic, and literary characteristics of the particular manuscript.

The *Slavo-Russian Paleography* was followed in close succession by two other studies of lesser significance. In 1892 D. I. Prozorovskii, an expert on ancient Russian metrology and reader in paleography at the Saint Petersburg Archaeological Institute, published his lithographed lectures, and in 1889 N. S. Tikhonravov (1832–1893), a literary and art historian and lecturer in paleography at Moscow University, published a lithographed edition of his *Russian Paleography: A Course Taught in the Years 1887–1888* (133). A systematic analysis of the 16th-century Russian hands is an asset of this study, while the parallel presentation of Greek, Latin, Western European, and Russian paleographical material is its puzzling peculiarity. The work also includes the first scientific discussion of the paleographical contributions of the Old Believers.

After Sreznevskii's death, his place at Saint Petersburg University was filled by V. Jagić (1838–1923), who was a Croatian linguist and paleographer, a former professor at the University of Berlin, and an expert in problems of Glagolitic writing. His work is discussed in detail later, in the paragraph devoted to foreign (non-Russian) contributions to the field of Slavic paleography.

The chronological approach so typical in the works of Sreznevskii and his followers was replaced by a more efficient thematic arrangement of the material. This was first applied by A. I. Sobolevskii (1856–1929), lecturer in paleography at Saint Petersburg University and at the Archaeological Institute of the same town, in his *Slavo-Russian Paleography* (1901, 1902; Ref. 81). Another improvement in Sobolevskii's work was the widening of the spectrum of his studies, which included a fairly detailed review of the cursive hands of the 15th–17th centuries—a topic so sadly neglected by others. Finally, in addition to the by now customary topics of hands, writing materials, watermarks, etc., Sobolevskii, a linguist, devoted a special chapter to the analysis of orthographical peculiarities of various South Slavic and 11th- through 17th-century Russian schools, and to the impact of the so-called Second South Slavic Influence on Russian Orthography (134).

To the previously reported collections of facsimile reproductions, another was added in 1913. Sobolevskii, together with G. F. Cereteli, printed the *Specimens of Greek Uncial Hand Mostly of the Ninth Through Tenth Centuries*—a useful tool for those tracing the origins of Russian *ustav* (135).

One of the most important systematic works on Cyrillic paleography had its origin in a series of articles in a linguistic magazine in Poland. E. F. Karskii (1861–1931), the founder of Belorussian philology, first printed the text of his lectures on paleography, delivered in 1896–1897 at Warsaw University, in the *Russian Philological Herald* (136). After substantial revision, the text was printed in book form in 1901, under the title *An Outline of Slavic Cyrillic Paleography* (137). A new, enlarged edition was published in 1903, and its last version, entitled *Slavic Cyrillic Paleography*, was printed in 1928 in the edition of the Academy of Sciences of the U.S.S.R. (69).

Karskii's work is a treasurehouse of valuable information. In addition to a systematic discussion of almost all aspects of Cyrillic paleography, the author offers a list of over 1,000 paleographical sources and reference tools (pp. 9–88), a roster of Slavic scribes from the most ancient times to 1500 (pp. 288–308), a brief survey of early Slavic printing, some reflections concerning the elements of Glagolitic writing to be found in Cyrillic texts, and more than 100 pages of illustrative matter—mostly facsimiles of Russian and South Slavic manuscripts.

E. F. Karskii is also renowned for his excellent editions of a number of Slavic manuscripts (138–142). A chapter of his work *Belorussians: The Language of the Belorussian People* contains material most valuable for the development of Belorussian paleographical research (143).

In 1910 R. F. Brandt (1853–1920) published his *Lectures on Slavo-Russian Paleography, Delivered at the Moscow Archaeological Institute in the Years 1908, 1909 and 1910*—a rather colorless volume of no consequence (144).

The uncertainty about a clear definition of paleography and the resulting haziness of dividing lines between paleography proper and other, ancillary disciplines (epigraphy, sphragistics, archaeology, etc.) were responsible for the birth in the early 1900s of the concept of the so-called object paleography. This trend was fully reflected in the lectures and textbook of I. A. Shliapkin (1858–1918) and in the supplement to the text prepared by M. I. Mikhailov (145, 146).

In the early 1900s N. M. Karinskii (1873–1935) presented a series of systematic lectures on Slavic paleography at the Saint Petersburg Archaeological Institute. A portion of the material dealing with the origin of Slavic alphabets was printed by a group of students in 1907 (147). A further development of this text resulted in the volume *Slavic Paleography: Lectures, Read at the Imperial Archaeological Institute* (148). In its new form, the work includes a lengthy study about Cyril and Methodius, which is followed by the almost unaltered text of the earlier class notes. A new chapter was added by the author on the various recensions of the Church Slavonic language. The review of ancient manuscripts which follows these preliminaries did not progress beyond the analysis of Tsar Samuil's inscription of 993.

Karinskii's introduction to a collection of facsimiles offers useful information concerning the development of individual letters in 11th-century hands (89). Other parts of the study, such as the attempts to reconstruct certain East Bulgarian writings from material obtained through the analysis of early Russian hands, provoked justified doubts and protest.

The strongest exponent of the study of South Slavic manuscript material at the turn of the century was P. A. Lavrov (1856–1929). The text of his systematic discussions of South Slavic paleography at the Saint Petersburg Archaeological Institute was published in 1904 (149). This modest volume contains a brief account of the evolution of various characters as represented in the most significant monuments of early Bulgarian and Serbian writings.

Lavrov's other contributions to Slavic paleography are his study of Cyrillic writing, an atlas of facsimiles of South Slavic manuscripts (87), and several editions of individual monuments of writing. He also authored a volume on the history of Slavic writing and another on Cyril and Methodius (150, 151).

Another research worker who focused his interest on a group of highly specialized problems of Slavic paleography was M. N. Speranskii (1863–1938). He was actually not a systematizer in the same sense as Sreznevskii, Sobolevskii, and Karskii were; however, no case history of manuscript forgery or description of cryptography used in Slavic manuscripts would be complete without a reference to Speranskii's works (152, 153). Speranskii was also the author of one of the earliest descriptions of Bulgarian and Serbian manuscripts (1898; Ref. 154). His study *From Slavic Epigraphy* (1930) caught the attention of learned circles (155).

Many years of successful paleographical work preceded V. N. Shchepkin's (1863–1920) activities as a reader of Russian paleography at Moscow University. The noted archivist and linguist conducted detailed studies on the language of *Savva's Book* (156), which is considered to be the oldest known Cyrillic manuscript. The publication of the text of this important monument of writing and the printing

of Shchepkin's dissertation about the manuscript signaled a remarkable beginning to a distinguished career (157, 158). A linguistic-paleographical study written about the *Bologna Book of Psalms* (159) and an epigraphical analysis of the graffiti in the Novgorod Sophia Cathedral (160) are representative of the initial period of Shchepkin's work as a paleographer.

His interest soon turned to the problem of *viaz'* and other decorative elements of Slavic manuscripts. Shchepkin's study on *viaz'* is still the definitive work on that topic (109–111). The same thoroughness and precision of style and method that he displayed in these studies were characteristic of his other works (161), and of his systematic lectures on paleography. The text of the lectures was published in its final version in 1920, under the title *A Textbook of Russian Paleography* (162).

The main assets of the work are its clarity and conciseness. The systematic grouping of the letters of various hands is extremely helpful in dating medieval manuscripts. The ingenious selection of certain "control letters" which are characteristic for a particular era is another useful feature. The book deals with the ancient Slavic language and Slavic alphabets, with writing materials and hands, with Cyrillic writing and the South Slavic monuments of writing, and with cryptography and chronology. The chapters on *viaz'*, decoration, and illumination are beyond compare.

In closing our review of Russian contributions to Cyrillic paleography, it seems proper to dwell briefly on certain negative aspects of this otherwise extremely creative period.

Following the Napoleonic wars, a sense of history and tradition spread among the peoples of Europe and Russia. A strong desire for self-identification brought about a romantic movement in literature, which, in its turn, served as justification for a similar approach in the examination of the national past. The urge was very strong, and when the evidence of a national heritage in "the dark backward and abysm of time" turned out to be too scanty, the temptation to create such evidence was not easy to resist. The ranks of misguided idealists soon were joined by professional forgers who tried to cash in on the increasing demand for rare documents.

Early 19th-century Moscow collectors of antiques were offered on the market at least 20 "ancient" manuscripts produced by A. I. Bardin—among them five copies of the *Russkaia pravda* and four copies of the *Tale of Igor's Campaign* (163). Another prolific forger was A. I. Sulakadzev, who "discovered" the text of a song allegedly written by Boian (164), the bard mentioned in the *Tale of Igor's Campaign*. Some of the techniques applied by Sulakadzev were the changing of certain words, names, and dates in genuine ancient manuscripts (165, 166), and the addition of fake marginal notes suggesting a fabulous antiqueness. The activities of these adroit forgers caused deep concern in collectors' circles.

The damage done by forgers to Russian historiography was not serious. It is ironic, however, that some of Sulakadzev's inventions found their way into Soviet textbooks and even into the second edition of the *Large Soviet Encyclopedia* (167).

Slavic paleography in general benefited from the uproar. The imminent danger of the addition of forged manuscripts to various collection improved its stature as a

scientific discipline and, consequently, the problems related to the identification of forgeries were intensively studied by three generations of experts—A. N. Olenin (168), A. N. Pynin (169), V. N. Korablev (170), M. N. Speranskii (152), N. S. Chaev (171), D. S. Likhachev (172), L. P. Zhukovskaia (173), and others.

The remarkable continuity in the four phases of Russian paleography can be attributed to the presence and participation of such outstanding paleographers, linguists, and historians as Olenin, Stroev, Buslaev, Sreznevskii, Sobolevskii, Karskii, Likhachev, and Shchepkin. They were responsible for bringing Russian paleographical work from its primitive state of collecting by amateurs to the level of an ancillary discipline supported by a considerable body of literature and a number of fairly advanced research tools.

This was the heritage that Russian paleographers left to their Soviet colleagues when they gradually withdrew from the scene in the 1920s.

## SOVIET CONTRIBUTIONS

### *The Lean Decades*

In the years following the October Revolution paleographical work gradually tapered off. Some results of the research conducted during the two decades immediately preceding the establishment of the Soviet state were published in the 1920s. As years passed and the best representatives of the old school one by one left the stage, there was hardly anybody to take their places. In the 1930s Soviet work on the documents of the national past came to an almost complete halt.

The reasons for the standstill were numerous. This is how L. P. Zhukovskaia, the Soviet chronicler of Slavo-Russian paleographical work, describes some of them:

However, the entire trend of historical development and of the development of science did not further the appearance of new investigations and materials in the field of paleography and antiquities in general. The cause for this boils down to the fact that, on the one hand, during that period of time the people themselves were actively involved in the creation of a new history never seen before by the world and the masses were less interested in the past; on the other hand, there was the fact that following first the imperialistic war and then the civil war there were no resources available in the country for the costly publication of paleographical materials and investigations. By the 30's the situation became even more complicated because the old scientists who had devoted a significant part of their creative potential to paleographical research died. During the years of the first five year plans when all energies of the Soviet people were directed to the industrialization of the country, to the creation of a material basis for the building of the socialist society and to the strengthening of defense potentials, the publication of the monuments of writing and in particular manuscripts of the most ancient era could not take place on a significant scale. Photomechanical and especially facsimile editions were completely out of the question as these require substantial financial resources. Even the publication of Cyrillic editions composed by hand was interrupted. Not only were the Church-Slavonic fonts, which were considered as useless, melted down but also Cyrillic and other special types which would have been essential for scientific publications.

Besides this, continues Zhukovskaia:

... the domination of M. N. Pokrovskii's vulgar-sociological school right up to the mid 30's did not promote the thorough study of the historical past. . . . In the 30's and 40's linguists were unable to deal with paleography because in the field of Soviet linguistics that was the era of the domination of the so-called "new teaching about the language" of N. Ia. Marr and his disciples who in a nihilistic manner denied all traditions of the linguistic sciences of the past. After N. Ia. Marr's death in 1934, persons who called themselves his "disciples" declared that N. Ia. Marr's research methods were the only Marxist and scientific methods. They persecuted the supporters of the comparative-historical study of the language who alone would have been able to conduct linguistic investigations of ancient manuscripts. As such investigations are impossible without the application of paleography, they would have led to the further development of paleography in the USSR. . . . Only the historians of the USSR published in this period investigations of a paleographical nature. . . . (174).

This statement by Zhukovskaia clearly reflects the barren and hostile atmosphere of the 1920s and '30s in which the new generation of Soviet linguists and historians—two groups which traditionally produced paleographical works—had to operate. The resulting breakdown of research in this field lasted for almost 20 years. The air was gradually cleared by a special resolution of the Central Committee of the Communist Party (1937) on the teaching of history and by the coup de grâce delivered by Stalin (1950) to the Japhetic Language Theory of Marr (175).

The lean years of Soviet paleography were characterized by the publication of short papers, addenda, and some specialized studies on illumination, decoration, and hands.

In 1927 G. Pavluts'kii printed a *History of Ukrainian Decoration* (176). The work, which investigates the elements of decorative initials, illumination, and the binding of manuscript codices, is supplemented with 12 plates of illustrative matter.

The illuminated *Radziwill, or Königsberg, Chronicle* attracted the attention of several paleographers and art historians (177). In 1931 M. I. Artamonov published the first volume of a work with the somewhat ambiguous title *Illumination in the Königsberg Version of the Chronicle* (178). The second volume of the study was the contribution of A. V. Artsikhovskii and was entitled *Illumination in the Königsberg Chronicle* (1932; Ref. 179). This was published later in a revised and enlarged version as *Ancient Russian Illumination as Historical Source Material* (1944; Ref. 180).

The manuscript collection of the Lenin Library served as the source for the selection of illustrations in the folder *Ancient Russian Illumination* (1933; Ref. 181). Explanatory notes and descriptions of illuminations were supplied by M. Vladimirov and G. P. Georgievskii.

Valuable information concerning the techniques applied by the makers of paint in ancient Russia are to be found in V. A. Shchavinskii's *Studies in the History of Painting and the Technology of Pigments in Ancient Rus'* (1935), which offers interesting additions to the materials and information published earlier by Simoni (182).

In 1937 A. I. Nekrasov printed his work on ancient Russian graphic arts (183). The volume includes a brief study about manuscript decoration, illumination, decorative initials, etc.

Investigations of watermarks in this period are represented by the writings of A. A. Geraklitov (184).

Some of the few linguistic studies published during the lean years included paleographical analyses of the manuscripts under investigation (185–188).

### *The Years of Recovery*

By 1937 the impact of the resolution of the Central Committee began to be felt. A collection of papers entitled *Ancillary Historical Disciplines* was published under the editorship of A. S. Orlov (189). His keynote study emphasized the significance of paleography and other ancillary disciplines, whose mission is to “enrich historiographical synthesis with additional facts.”

While Marr’s disciples still dominated the field of Soviet linguistics, Soviet historians renewed their paleographical activities. The rebirth of this ancillary discipline, however, reflected the structural changes resulting from the creation of a new type of state and society. The study of ancient manuscripts was removed from the sphere of amateur archaeological and historical societies and became part of the curriculum at certain universities and military-political institutions. Another interesting change was the narrowing of the scope of this research, which, for good reason, for more than a century had covered both general Slavic and specifically Russian paleography. New works consistently restricted themselves to Russian paleography alone, thus reflecting the new, more concrete, and utilitarian goals set for the discipline.

The organizational change resulted in the publication of a number of systematic textbooks designed for particular types of courses. In 1938 M. D. Priselkov published his lithographed *Course of Russian Paleography* (190), which he wrote for the students of correspondence courses at Leningrad University. This elementary discussion of the main topics of Russian paleography closely followed the arrangement and method developed by Russian authors of the 1900s. However, no account of the origin of Slavic alphabets was given in the work. Priselkov’s notes can hardly be considered as a significant contribution.

Between 1936 and 1942 A. N. Speranskii read Russian paleography at the Moscow Institute of History and Archives. The text of his course—which was hailed by some as the first treatment of the topic from the standpoint of Marxist historiography—has remained unfinished, and because of the author’s death, it has never been seen by the printers.

The first systematic Soviet work on Russian paleography was printed in 1947 (121). The authors of the book, N. S. Chaev and L. V. Cherepnin, designed the text for their courses at the Institute of History and Archives in Moscow. *Russian Paleography* was a fairly concise and modern discussion of the basic questions related to the history of paleographical work in Europe and Russia, the characteristics of significant sources, writing implements and materials of writing, the

basic Russian hands and their development, decoration and illumination, *viaz'*, and cryptography. A good bibliography by E. N. Danilova was a true asset of the volume.

The book, which was published after Chaev's death, was met with a barrage of criticism. The essence of the criticism was that *Russian Paleography* "discussed the history of writing in complete isolation from the economic, social and political as well as cultural development of the Russian state" (191). Some also accused Cherepnin with narrowing down the scope of paleographical research. Finally, the book was rejected as a text for the courses of paleography at the Institute of History and Archives. L. V. Cherepnin undertook the task of rewriting.

Nine years later, in 1956, L. V. Cherepnin's own version of *Russian Paleography* left the printers (192). The new book has very little to do with its previous version. Its richly illustrated text is accompanied by copious bibliographical references. An index of names, one of authors of manuscripts, and a third index of *termini technici* are helpful devices without which effective use of the more than 600-page volume would be almost impossible. The usefulness of the indexes is enhanced by the fact that L. V. Cherepnin, in strict adherence to the advice of his critics, eliminated the topical approach and presented the otherwise excellent material in chapters which closely follow the changes in the socio-political structure of the Russian state.

The year 1956 was also marked by the publication of a brief syllabus of Russian paleography by A. T. Nikolaeva (193).

In addition to the printing of systematic works, several paleographical atlases were also issued in the late '30s and the 1940s. The poorly executed collections of facsimile reproductions were not designed for original research but rather for those wishing to obtain practical paleographical skills. Most of the reproductions included were copied from earlier publications, and most of the folders emphasized 15th- through 17th-century cursive hands.

Some illustrative titles are: A. M. Selishchev's *Specimens of Ancient Russian Writing of the Eleventh Through Seventeenth Centuries* (194), N. V. Stepanov's *Instructional Paleographical Atlas* (195, 196), and the *Instructional Aid for Practical Classes in Paleography* by S. S. Gadziatskii and N. V. Ustiugova (197).

The most significant contribution to the study of the Cyrillic cursive hand in the 1930s was made by I. F. Kolesnikov (1872–1952), former reader in paleography at the Moscow Archaeological Institute and author of numerous studies in archival work and history (198). In 1939 the journal *Arkhipnoe delo* printed Kolesnikov's long article "Paleography of the Document (Chancery) Hand" (199), which, in fact, was a concise study of Russian, Belorussian, and Ukrainian chancery hands of the 15th through 18th centuries. The paper also included a discussion of the language and format of manuscripts.

A useful addition to Kolesnikov's paper was the detailed study of 18th-century Russian hands by N. G. Koroleva and A. K. Panfilova (200). They successfully identified and classified the main characteristics of typical hands by period—first or second half of the century—and by place of origin.



*Recent Soviet Research*

The 1950s through the '70s represent a period of revitalization in Soviet paleographical research. The change should be attributed to two independent but subsequently interacting developments, namely, the discovery in Novgorod (1951), Smolensk (1952), Pskov (1958), and Vitebsk (1959) of a number of 11th-through 15th-century private documents carved or impressed in tree bark (201), and the elimination of the crippling influence of "Marrism" from the scene of Soviet linguistics (1950).

The discovery by A. V. Artsikhovskii of the rich Novgorod cache of documents on bark finally settled the argument between S. N. Valk (202) and M. N. Tikhomirov (203) concerning certain pre-14th-century Russian private deeds, the authenticity of which Valk previously had refused to acknowledge.

The Novgorod finds were soon given full archaeological, paleographical, and linguistic coverage in a series of carefully prepared and well-illustrated publications by A. V. Artsikhovskii and various coauthors (204). The paleographical analysis and dating of many of the texts praise the scholarship of M. N. Tikhomirov and L. P. Zhukovskaia.

The first descriptions of the Novgorod finds were reviewed by many scholars. Some cautioned against the imminent danger of dating the documents too far back in the past. One of the commentators, M. V. Shchepkina—a specialist on the paleography of the famed *Tale of Igor's Expedition*—in 1952 coauthored a study with M. N. Tikhomirov (205). In the light of the newly discovered Novgorod texts, they examined the paleographical traits of the oldest known Russian business document, *The Will of Clement of Novgorod, 1258–1268*.

Other contributors to the study of the bark inscriptions were L. P. Zhukovskaia (206), B. A. Rybakov (207), S. N. Orlov (208); and, among linguists, V. I. Borkovskii (209), L. A. Bulakhovskii (210), V. P. Kurashlevich (211), R. I. Avanesov (212), and N. B. Bakhilina (213); while T. V. Rozhdestvenskaia investigated the paleography of certain Novgorod graffiti (214).

Looking now at certain special topics of Cyrillic paleography and related fields we find that between the 1950s and '70s, most of them were given adequate attention by Soviet authors. One of these areas is research on paper and watermarks.

In 1934 S. I. Maslov printed the unpublished portions of K. Ia. Tromonin's *Marks in Writing Paper* (1848; Ref. 62), under the title "From the History of the Russian Study of Watermarks" (215). This was followed in 1952 by a study of S. A. Klepikov entitled "Watermarks and Stamps of the Eighteenth- Through Twentieth-Century Papers of Russian Manufacture" (216). The work included the description of 273 Russian watermarks and 213 stamps with reduced-size reproductions of the designs of 43 watermarks. Another Klepikov study, "Paper with the Watermark 'The Coat of Arms of the Town of Amsterdam' (Materials for Dating Handwritten and Printed Texts)," followed in 1958 (217).

These two Klepikov works laid the foundations for his most important opus,

*Watermarks and Stamps in Seventeenth- Through Twentieth-Century Paper of Russian and Foreign Manufacture* (1959; Ref. 218). The study describes 1,444 watermarks and 292 stamps—881 watermarks and 222 stamps found in paper of Russian manufacture. The beautifully printed and illustrated volume—with a half-title in English—offers a brief sketch of the history of the subject; various tables with monograms, descriptions of designs, etc.; a bibliography; and four indexes. The second part of the volume includes full-size facsimiles of several hundred watermarks.

In 1961 Klepikov published his review article “New Works in the Field of the Study of Watermarks” (219). Later, in 1965 and 1973, his essays “The ‘Pro Patria’ Watermark in Paper of Russian and Foreign Manufacture” were printed by the Library of the Academy of Sciences. They list M. V. Kulushkina as the coauthor and offer useful information on the dating of manuscripts and printed documents (220).

Finally, in 1974 Klepikov published a paper about his reservations concerning the Keenan study which had promoted the theory that paper was manufactured in Russia as early as the 16th century (221, 222).

Z. V. Uchastkina devoted much time and energy to the systematic study of various aspects of paper manufacture in Russia. In 1954 she published her first work on the history of the topic. This first attempt was followed in 1956 by another study entitled “Watermarks in Russian Paper” (223). The detailed analysis of 49 Russian watermarks is accompanied by good illustrations and by tables giving not only descriptions of individual marks but also their symbolic meaning as seen by the owners of various paper mills. Some minor mistakes in Uchastkina’s work were commented upon in a special note printed in Klepikov’s *Watermarks and Stamps* (224).

In 1962 an English edition of Uchastkina’s writings was printed by the Paper Publications Society at Hilversum, Holland, in their series *Monumenta Chartae Papyraceae Historiam Illustrantia*. The attractive volume, which is entitled *A History of Russian Hand Paper-mills and Their Water-marks*, was edited and adapted for publication in English by J. S. G. Simmons. The expert discussion of the topic is accompanied by 392 plates and several maps (225).

Another study on Russian watermarks by Uchastkina was printed in English by the magazine *Paper-maker*, in 1961 (226).

Part of P. A. Kartavov’s famous collection of Russian paper belongs to the library of the Academy of Sciences of the U.S.S.R. The collection was reviewed in 1958 by M. V. Kukushkina. The review, which is in fact a study of Russian watermarks, was printed under the title “Watermarks in the Paper of Eighteenth-Through Early Nineteenth-Century Russian Paper Mills” (227).

In the same year, the posthumous study of V. N. Shchepkin on the paleographical significance of watermarks in paper was published (96).

Bibliographical and paleographical aspects of watermarks and paper were also investigated and discussed in Soviet works dealing with the history of printing, for example, by A. S. Zernova (228) and T. N. Protas’eva (229).

There have been only a few noteworthy contributions during the past three decades to the study of manuscript decoration and illumination. In 1950 A. N. Svirin published his work *Ancient Russian Illumination* (230); while A. S. Zernova's study followed the transition from manuscript decoration to the design and printing of initials and decorative borders by early Russian printers (231).

Other contributions include N. E. Mneva's "The Icon Painters of the Moscow Armory and Their Art of Book Decoration" (232) and Ia. P. Zapasko's handsome volume about the decoration of manuscript books of the 11th–18th centuries in Kiev Rus', in the South Russian principalities, and in the Ukraine (233). A. N. Svirin's work *The Art of the Book in the Ancient Rus' of the Eleventh Through Seventeenth Centuries* also offers excellent chapters on the illumination and decoration of medieval Cyrillic codices (234). Another significant monograph on the subject, the *Illumination of Russian Historical Manuscripts*, by O. I. Podobedova, was published in 1965 under the sponsorship of the Institute of Art History of the Ministry of Culture (235).

Other papers reporting on research in manuscript decoration and illumination were written by L. A. Dmitriev, Iu. Begunov, G. I. Vzdornov, T. N. Kopreeva, V. D. Likhacheva, and N. V. Rozanova (236–241), and by the numerous contributors to the volume *Ancient Russian Art—Codices*, which was published in 1972 (242).

The art of Russian book binding was studied in depth by S. A. Klepikov, whose comprehensive paper on this topic was printed in *The Book: Research and Materials* (243)—the only scholarly Soviet serial publication in the field of book arts.

The problems of the origin of Slavic writing have been discussed in considerable detail—though not specifically from the point of view of paleography—in V. A. Istrin's book *The Development of Writing* (244). Several papers have been devoted by E. E. Granstrem to the still unresolved controversy over the place of Glagolitic writing in the general history of Slavic alphabets (245), and also to the relationship between the Byzantine uncial hand and the Cyrillic *ustav* (246). In addition, Granstrem has investigated the abbreviations used in 11th-century Cyrillic manuscripts (247).

The participation of linguists brought a new aspect to Soviet paleographical research, which by the '30s and '40s had tended to become far too lopsided in its interest toward the "technicalities" of manuscript production and decoration. In addition to the numerous studies published about the Novgorod and other birch bark inscriptions, linguists and literary historians dealt with the analysis of individual manuscripts and wrote about the problem of the history of Cyrillic writing. Some of the most outstanding contributors were D. S. Likhachev (172, 248–254), A. M. Selishchev (255), T. N. Kandaurova (256), O. A. Kniazevskaia (257), L. P. Iakubinskii (258), S. D. Nikiforov (259), P. Ia. Chernykh (260), T. A. Sumnikova (261), V. E. Ushakov (262), and N. E. Popova (263).

Commemorating the 1100th anniversary of Slavic literacy, in 1966 A. M. Zhivoderova (Sabenina) published a lengthy review of foreign contributions writ-

ten for this occasion (264). Other papers of the late 1960s dealt with problems such as the circumstances of the creation of the Cyrillic writing system (265), the beginning of Slavic literacy in the light of recent discoveries, and its impact on Ancient Rus' (266).

In 1971 S. O. Visotskii's paper investigated certain characteristics of 9th- and 10th-century Russian hands, on the basis of texts taken from various archaeological finds (267).

M. V. Brazhnikov reopened a much neglected field of Russian paleographical research, that is, the interpretation and analysis of ancient Slavic musical manuscripts. One of his significant contributions published in 1949 was the paper "Russian Choral Manuscripts and Russian Paleography," which contained interesting material concerning the interpretation of hook-shaped neumatic signs (268). V. M. Beliaev's *Ancient Russian Musical Recording* was another study published in the field of Slavic musical paleography (269).

During the late 1950s and the '60s, the description of manuscripts and the publication of facsimile editions somehow fell behind. Among the few contributions, however, there were some excellent efforts, such as the *Description of Russian and Slavic Manuscripts on Parchment: Russian, Bulgarian, Moldavian-Walachian, Serbian Manuscripts*, authored by E. E. Granstrem (270); the description of the "museum collection" of the Moscow State Lenin Library (271); the paleographical and linguistic analysis of 13th- and 14th-century Smolensk documents by P. A. Avanesov (272); and a number of research papers on the codices and other rare books located in the Library of the Academy of Sciences of the U.S.S.R. (273).

Noteworthy publications dealing with individual medieval Cyrillic codices were the *Sviatoslav Miscellany of 1076* (274), which is a tribute to the editorial work of S. I. Kotkov and his colleagues, and the illustrated edition of the text of an early 15th-century volume of Gospels in the collection of the Uspenskii Cathedral, in the Moscow Kremlin (275).

Careful analyses and descriptions of individual manuscripts were published during these years by D. S. Ishchenko, S. O. Schmidt, L. P. Zhukovskaia, T. N. Protas'eva, and by V. M. Danilova (276–280). A dissertation by G. I. Vzdornov on the artistic qualities of some 12th- through 15th-century codices of Northeastern Rus' also deserves attention (281).

Activities can be observed during the late 1960s and the '70s in the field of the study of medieval codices as precursors to the printed book. Several conferences were held in Moscow and Leningrad (in 1969, 1971, and 1973) on the problems of research concerning codices and the hands used in various medieval scriptoria. They have given impetus to further study in this area (282–285), and also have led to the adoption of "codicology" as a term to describe work with medieval codices (286–288).

N. N. Rozov studied the geographical distribution of codices and speculated about the characteristics of their possible readership in the 16th–19th centuries (289). A monograph on codices was published by him in 1971 under the title *The Russian Codex: Essays and Characteristics* (290).

A strong interest in the study of ancient codices of law by historians and social

scientists yielded a number of good manuals with reproductions of known manuscript versions of *Russkaia pravda* (291).

Efforts were made during the 1960s and early '70s to record the Slavic manuscript holdings of Soviet and foreign libraries. Thus, V. I. Malyshev and others periodically reviewed and listed the manuscript holdings of Pushkin House (292–295), and N. B. Tikhomirov printed the second part of his "Catalog of Eleventh–Twelfth-Century Russian and Slavic Manuscripts on Parchment, in the Manuscript Department of the V. I. Lenin State Library of the U.S.S.R." (296). In 1966 N. M. Dylevskii published his roster of "Russian and Ukrainian Manuscripts and Early Printed Books in Bulgarian Libraries" (297), and M. V. Kukushkina completed a checklist of the manuscript holdings of the Academy of Sciences of the U.S.S.R. (298); while N. Iu. Bubnov and his co-workers were responsible for the publication of the third volume (Part 3) of the description of holdings at the Manuscript Section of the Academy of Sciences Library. The volume contains paleographical information about historical miscellanies of the 18th and 19th centuries (299).

L. P. Zhukovskaia contributed several significant studies. In 1966 she printed her *Study of the Sources of the History of Russian Language and Literacy*, and in 1969 she published the "Ancient Slavic Translations of Byzantine and Syrian Monuments in the Libraries of the U.S.S.R." and the "Monuments of 11th–14th-Century Russian and Slavic Literacy in Soviet Libraries" (300, 301). D. N. Al'shits offered a list and descriptions of 10th- through 17th-century manuscripts in the Hermitage collection of Leningrad (302), while L. V. Cherepnin was the editor of the description of Collection Number 135 at the State Archives of Ancient Parchments and Manuscripts (303).

Several minor collections were also described. Thus, information has been made public about the holdings of the State Archives of Iaroslavl' province (304), the Tikhomir manuscript collection (305), the Slavic manuscript collection of the Research Library at the University of Tomsk (306), and about some well-known Ukrainian and Russian illuminated codices and other manuscripts (307, 308).

T. N. Protas'eva published a list of addenda to the A. V. Gorskii and I. I. Nevostruev inventory of manuscripts at the Moscow Synod Library (309), while in 1973 A. S. Myl'nikov and M. Ia. Stetskevich reported about new additions to the manuscript collection of the Saltykov-Shchedrin Library (310). Several manuscript books belonging to Peter I's personal library have been described, and volumes analyzing the manuscript holdings of the Library of the Academy of Sciences also have been made available (311). The first volume of *Codices and Printed Books in the Collection of the Research Library of Moscow University* was published; it contains in-depth studies of some codices by O. A. Kniazevskaia, G. V. Popov, and others (312).

Specialized papers on the subject of the study of codices and certain characteristics of individual works were offered by O. I. Podobedova, N. N. Rozov, M. V. Shchepkina, G. I. Vzdornova, V. P. Grebeniuk, and others (313). Individual codices were studied in great detail by V. F. Pokrovskaia (314), I. I. Gumnitskii (315), T. O. Izmailova (316), and G. M. Prokhorov (317).

Finally, mention should be made here of the efforts of many to create a union list

of Slavic and Russian manuscripts and codices. In 1972 I. P. Staroverova published a 1960 lecture by M. N. Tikhomirov on this subject (318). In the same year O. P. Likhacheva gave an account of the process of preparing a union catalog of 11th-through 14th-century Slavic and Russian manuscripts (319). A progress report concerning the preparation of a preliminary union list of 15th-century manuscripts was printed in 1972, in the *Arkheograficheskii ezhegodnik za 1971 god* (320, 321).

An interest in the work of scribes, the organization of scriptoria, and the social and economic aspects of manuscript production has found its expression in several studies published in recent decades.

In 1973 B. V. Sapunov published his study "The Production of a Codex, Its Price and Value in the 11th Through 13th Centuries" (322). The well-documented paper offers an analysis of production cost in terms of the materials used, the wages of the scribe and illuminator, etc.

Some minor papers by G. I. Vzdornov (323), N. N. Pokrovskii (324), N. N. Rozov (325), M. V. Kukushkina (326), V. G. Dem'ianov (327), and others have shed further light on this topic. Also, I. M. Kudriavtsev's study entitled "The 'Publishing' Activities of the Foreign Office" (1963; Ref. 328) and M. N. Speranskii's posthumous book *Eighteenth-century Manuscript Anthologies: Materials for the History of Eighteenth-century Russian Literature* (1963; Ref. 329) offer added information about the practices and the volume of Russian manuscript book production in the late 17th and early 18th centuries.

The tradition of "archaeographical expeditions" has been renewed by Soviet paleographers and bookmen. In 1962 a single trip by the members of the Department of Manuscripts at the Leningrad Saltykov-Shchedrin State Public Library reportedly yielded more than 100 17th-century printed books and codices and a number of 16th-century manuscript fragments. These items were found in the restricted stacks of the local museum of a small provincial town (330).

Successful expeditions were conducted in the 1960s and '70s by the libraries and other departments of the Academies of Sciences of the U.S.S.R. and of the federative republics (331).

A number of useful papers were published on minor topics, such as manuscript anthologies (332), graffiti (333), the dating of manuscripts (334), photoreproduction of medieval manuscripts (335), the development of Russian paleography in the early 19th century (336), and the interaction between Russia and other Slavic countries in the field of early manuscript and codex production (337).

This account of Russian paleographical work on Cyrillic monuments of writing would not be complete without citing the valuable contributions that epigraphists have made to this field. The papers and books of A. S. Orlov (338, 339), D. A. Avdusin (340), B. A. Rybakov (341-344), V. Girshberg (345), S. A. Vysotskii (346), and their colleagues—as well as almost every issue of the periodical *Numismatics and Epigraphy* (347)—contain information and data most valuable for Slavic paleographers.

Mention should be made here also of the excellent bibliographies published by

the Academy of Sciences of the U.S.S.R. They offer full coverage of Russian and Soviet work in the field of ancient literature and include numerous entries of paleographical interest. Among these works, the following are the most useful: V. V. Vinogradov's *A Bibliographical Guide to the Literature of Russian Linguistics from 1825 Through 1880* (348); R. P. Dmitrieva's *A Bibliography of Russian Analytical Work* (349); D. S. Likhachev (ed.), *A Bibliography of Soviet Works about Ancient Russian Literature, Published in the Years 1945–1955* (350); and *A Bibliography of Soviet Works on Ancient Russian Literature of the Eleventh Through Seventeenth Centuries, Published in the Years 1917–1957*, prepared under the editorship of V. P. Andrianova-Perets (351).

Two titles are of particular significance for the Slavic paleographer. One is an exhaustive bibliography of the literature written about individual Slavic—mainly Cyrillic—manuscripts and codices (352), while the other is a study of the lexicology of the monuments of Slavic literacy, by A. S. L'vov (353).

Russian paleographers and historians also made significant contributions to the study of codices, illumination, and medieval manuscripts in other Slavic countries and in ancient Byzantium. M. V. Shchepkina's most attractive volume of 14th-century Bulgarian illumination (the Tomić Book of the Psalms; Ref. 354) and A. S. Myl'nikov's work on the history of the Czech book (355) illustrate such activities.

On the negative side, in this period N. V. Engovatov (in the tradition of Bardin and Sulakadzev) claimed the discovery of an inscription allegedly written with Slavic letters older than the Cyrillic or Glagolitic alphabets. The "mistake" of Engovatov was exposed and placed in a correct light by B. A. Rybakov and V. L. Ianin (356).

In closing this review of Russian and Soviet contributions, one should mention that during the last two or three decades there has been a most remarkable paleographical activity among the various nationalities of the Soviet Union. Following the Russian experience of the late 19th and early 20th centuries, historians, archaeologists, linguists, and paleographers—at the national universities and archives, and in libraries from Erevan, Tbilisi, Alma Ata, and Tashkent to Kiev, Baku, and Tallin—have been deeply involved in the search for the written monuments of the past of their peoples. Papers by these most prolific scholars are published in Soviet magazines and are cited in bibliographies. Their enthusiasm and devotion to the task can be likened only to the attitude of the 18th-century Russian paleographers who were actually the pioneers of this ancillary discipline.

#### WESTERN CONTRIBUTIONS

From its very inception, the systematic study of Slavic manuscripts centered in Saint Petersburg and Moscow. The attraction of these foci was so powerful that some foreign Slavists—among them paleographers—moved to Russia and joined the Russian scientific community. Neither this apparent Russian hegemony in the field nor the scarcity of original Cyrillic manuscripts outside Russia, however, could prevent foreign Slavists working all over Europe from making original, and in

some cases brilliant, contributions to Slavic, and especially Glagolitic, paleography. The following is a brief review of the highlights of this scholarship.

*Slavic Systems of Writing*

The still unresolved mystery surrounding the origins of the Cyrillic and Glagolitic alphabets and the much disputed role played by Bishop Cyril in the creation of at least one of these scripts have always challenged the interests of non-Russian scholars. While for Western linguists, historians, and paleographers this problem is merely one of the many puzzles in their fields, for Slavic scholars of Eastern Europe it represents one of the missing links essential for a successful re-creation of the early histories of their nations. The degree and significance of Western participation in research in this field has been influenced by many factors. The traditionally reserved attitude of Russian scholars toward theories borrowed or imported from the outside world—first the Catholic and later the capitalist world—is just one of them. Professional jealousy by certain 19th-century Slavists who tried to bar the Russians from the use of vital Western manuscript collections could be another factor that enhanced the importance and weight of Western contributions (357).

The scarcity of available material evidence has resulted in a peculiar parallel use of historical sources to support hypotheses concerning the origins of the Cyrillic and Glagolitic alphabets. This makes it appropriate to begin our survey with foreign contributions to the history of both of these writings.

Brief references to a system of signs used by Slavs occurred in foreign geographical and historical sources as early as the 10th century. The validity and exact meaning of such references are still awaiting clarification and material proof; for example, those in the works of such 10th-century Arabic authors as Abū-al-Hassan 'Alī al-Mas'ūdī (d. 956; Ref. 358), Ahmad ibn-Fadlān ibn Hammād (fl. 921–922; Ref. 359), and ibn-abī Ya'qūb al Nadīm (d. 955; Refs. 360 and 361); in the *De administrando imperio* of the Byzantine Emperor Constantine (905–959); and in the 11th-century chronicle by Thietmar, the bishop of Merseburg (975–1018). The detailed description of the 9th-century Slavic alphabet by a contemporaneous Bulgarian using the pseudonym Khrabr offers no concrete leads either. Although Khrabr speaks about one single alphabet which he attributes to Bishop Cyril, he fails to specify whether the 38 letters listed are Cyrillic or Glagolitic characters (362). Similar, if not identical, weaknesses are typical of many other early foreign references to the topic.

In 1538 Guillaume Postel, a French author, published his study entitled *Linguarum duodecim characteribus differentium alphabetum introductio ac legendi modus longe facilimus . . .* (363), in which he clearly described the Glagolitic alphabet and—following the Croatian-Dalmatian popular tradition of the time (364)—attributed it to Saint Jerome (ca. 342–ca. 429). This hypothesis was rejected in 1711 by the noted Byzantologist Anselmo Banduri in his *Imperium orientale, sive antiquitates Constantinopolitanae* (365). In 1727 a study with the title *Origo characteris Sclavonici vulgo dicti Cirulici paucis generatim monstrata, ortus*



*vero et progressus characteris vulgo dicti Glagolitici . . . descriptus* left the printers' in Berlin (366). The author of this "academic invitation," Johann Leonhard Frisch (1666–1743), German linguist and one of the early Slavists in the West, also refuted Postel's Jeromian theory and considered the Glagolitic characters as distorted versions of their Cyrillic counterparts.

In 1755 Guisepe Simone Assemani (1687–1786; Syrian orientalist, custodian of the Vatican Library, and discoverer of the 10th- or 11th-century Glagolitic *Codex Assemani*) entered the discourse. Writing in one of the volumes of the *Kalendaria ecclesiae universae*, Assemani supported the theory of the authorship of Bishop Cyril and, referring to the Jeromian hypothesis, he declared: "Falsa haec Slavorum traditio inde orta, quod s. Hieronymus Dalmata Fuerit. Ceterum literas slavicas excogitasse Cyrilum non Hieronymum res est certo certior" (367).

Eleven years later the Venetian printer J. B. Pasquali issued a work entitled *In originem et historiam alphabeti sclavonici glagolitici vulgo hieronymiani, disquisitio* (368). The author of the book, Clemens Grubissichius (alias K. Grubisich or K. Grubišić), refused to accept the authorship of either Saint Jerome or Bishop Cyril and did this without proposing any new hypothesis.

The problem of the origin of Slavic alphabets was also investigated by the historian Anton Linhart in his *Versuch einer Geschichte von Krain und der übrigen sudlichen Slaven Oesterreichs* (1796; Ref. 369). Linhart, just as Banduri, Frisch, and Assemani, argued against the Jeromian theory and found Postel's supporting evidence unconvincing.

New and somewhat bizarre color was introduced into the discussion in 1853 by Carl Friedrich Pertz. In his book about the *Cosmographia* of Aethicus (370), Pertz suggested that the Glagolitic characters were designed in the fourth century by the philosopher and author Aethicus Ister and were subsequently popularized by Saint Jerome, who was a translator of *Cosmographia*. Although it was only in 1951 that *Cosmographia* was identified as an elaborate forgery produced by Fergal, the Irish abbot of Salzburg (371), this new version of the Jeromian theory was received with scepticism by colleagues and contemporaries of Pertz.

There was a revival of national feelings in the late 18th and early 19th centuries among the Slavs living in the Austro-Hungarian Empire. Young Czech and South Slavic "awakeners" such as Josef Dobrovský, Pavel Josef Šafařík, and Jernel Bartel Kopitar soon proved to be prolific contributors to the literature of Slavic linguistics, history, and paleography. Special note should be made here of the name of Vatroslav Jagić (1838–1923). This Croatian linguist, a man of legendary productivity and initiative whose pan-Slavic philosophy and robust character did not exactly fit into the pattern of the young Slavic nationalists, made unique contributions to the field.

In this new setting, strongly influenced by sentimental and political stimuli, the search for the origins of Slavic characters continued. In addition to the old questions about the identity of the creator of those letters, a new facet of the problem occurred, namely, the search for the source alphabet or alphabets from which the Cyrillic and Glagolitic characters could have been borrowed by the unknown origina-

tor. The argument, which began in the 1860s and produced at least a dozen hypotheses, has puzzled linguists of almost all countries in Europe and has remained basically unresolved to date.

In 1783 Josef Dobrovský, in a paper about the new Czech translation of the Holy Scriptures (372), touched upon the problem of Cyrillic and Glagolitic literatures and expressed the view that the Glagolitic alphabet was created by the modification of Cyrillic letters sometime during the 13th century. This idea was rejected in 1785 by G. Dobner, who in his paper “Aufwerfung einer historisch-kritischen Frage: Ob das heut zu Tage sogenannte cyrillische Alphabet für eine wahre Erfindung des heiligen slavischen Apostels Cyrills zu halten sey?” proposed the hypothesis that Glagolitic writing was created by Cyril long before the so-called Cyrillic characters came into existence (373). Dobrovský, however, refused to accept Dobner’s plausible argument and restated his original theory in two subsequent contributions, that is, in the paper “In welche Zeit fällt mutmasslich die Erfindung der Glagolitischen Buchstaben” (1807; Ref. 374) and in his best-known work, *Institutiones linguae slavicae dialecti veteris, quae quum apud Russos, Serbos aliosque ritus graeci, tum apud Dalmatas Glagolitas ritus latini Slavos in libris sacris obtinet* (1822; Ref. 375).

Franz Carl Alter in his *Beitrag zur praktischen Diplomatie für Slaven, vorzüglich für Böhmen* (1801) suggested the possible Latin origin of Glagolitic writing, which he considered to be the predecessor of the Cyrillic system (376). The same Latin theory was later advocated by C. Wessely (377) and also by M. Hocij (378).

A new element was introduced into the discussion by Fortunatus Durich, who, in the first volume of his *Bibliotheca slavica antiquissimae dialecti communis et ecclesiasticae universal Slavorum gentis* (1795), suggested that Saint Methodius had created Glagolitic writing by combining the elements of Cyrillic characters with the traits of some ancient runic writing (379). This theme of using the elements of a no longer extant runic system as a model returned in two remarkable papers by J. Hanuš: “Zur slavischen Runen-Frage mit besonderer Rücksicht auf die obotritischen Runen-Alterthümer sowie auf die Glagolica und Kyrillica” (380) and “Zur Glagolica Frage” (1858; Ref. 381).

As the waves of controversy engulfed the pages of contemporaneous Slavic linguistic literature, the acute need for material evidence and the need for easy availability of such evidence became more and more apparent. Answering this quest, Jernel Bartel Kopitar entered the arena of discussion with the printing in 1836 of the annotated Cyrillic transcript of the text of the so-called *Cloz Glagolitic Codex*, or *Glagolita Clozianus* (382)—a collection of sermons by the Greek Fathers translated into Church Slavonic and written in Glagolitic. The publication of the text significantly increased the volume of available material evidence, which at that time was essentially restricted to reports by C. F. Toustain and R. P. Tassin (1750; Ref. 383) and by Adelung (1759; Ref. 384) about the *Abecedarium bulgaricum* (a list of characters of the Glagolitic alphabet with the names of individual letters indicated in Latin; see Figure 1), and to the description of the *Codex Assemani* in 1755 by the librarian of the Vatican.

Kopitar’s contribution to the theory of the origin of Slavic writings was the

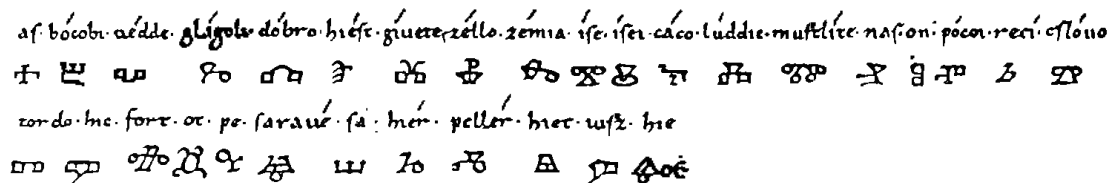


FIGURE 1. *The Abecedarium bulgaricum* (Manuscript Collection of the Bibliothèque Nationale, Paris, Item No. 2340). Above the individual characters of the incomplete Glagolitic alphabet, their names are indicated in Latin.

hypothesis of the simultaneous development of the two sets of characters. He can be credited also with the identification of two distinct Glagolitic hands: the round (Bulgarian) and the square (Croatian). His other significant paleographical contribution, *Hesychii glossography discipulus . . .*, was published in 1839 (385).

Pavel Josef Šafařík (1795–1861), librarian and professor of philology at the University of Prague, was one of the many foreign scholars who entered the discussion about the origin of Slavic writings during the second half of the 19th century, by presenting a new theory. In 1851 Šafařík published his work entitled *Památky dřevního písemnictví Jihoslovanův* (386), which was followed in 1853 by the *Památky hlaholského písemnictví* (387). The latter included the text of the shorter version of the legend about Saint Clemens, bishop of Velica, allegedly a student of Bishop Cyril and the inventor of one of the Slavic alphabets—a theory which had been promoted by V. J. Grigorović just a few years earlier. In these early

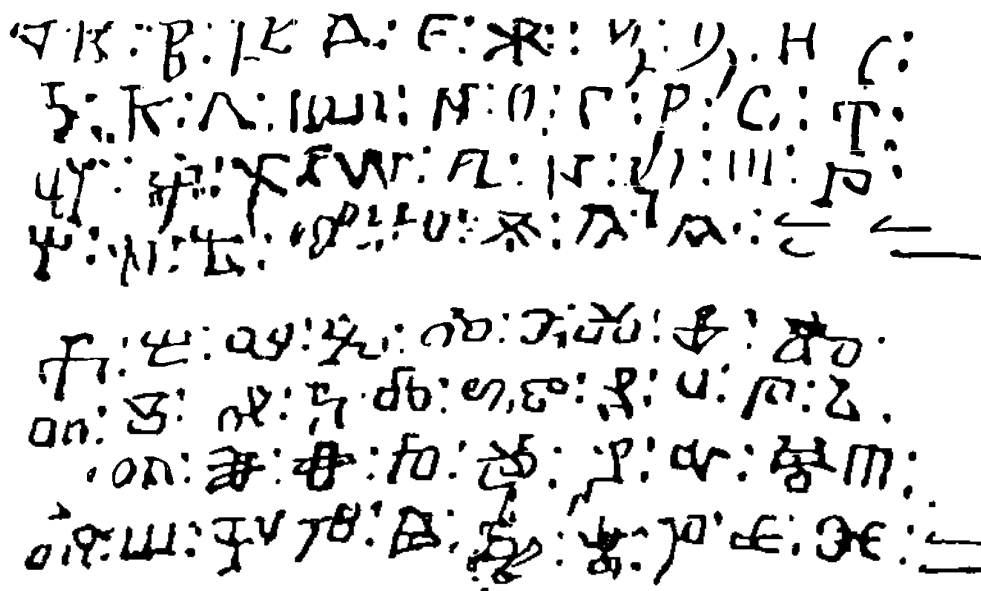


FIGURE 2. *The Munich Abecedarium*, found in a 10th-century Latin codex (Cod. Lat. 14.485) in the Munich Library. It offers a parallel presentation of the letters of the Cyrillic and Glagolitic alphabets.

works Šafařk seemed to accept the idea of the priority of Cyrillic writing. He also opened Pandora's box by hinting at the possibility of the derivation of some of the Glagolitic characters from Greek, runic, Phoenician, Samaritan, Coptic, Armenian, Albanian, Old Hebrew, and certain other writings.

Some years later, in the light of new evidence produced by K. Höfler, the discoverer of the so-called *Prague Fragments* (1855; Ref. 388), Šafařk became convinced of the priority of the Glagolitic writing, and his view was subsequently elaborated in detail in his *Über den Ursprung and die Heimath des Glagolitismus* (1858; Ref. 389).

The Greek element in the theory of Šafařk was readily adopted and defended by Franjo Rački (1829–1894), who in his *Pismo slovjensko* (1861) maintained that Glagolitic characters were modeled by Cyril after certain Greek cursive, Phoenician, and Latin letters (390). The same theory was supported by the Englishman Isaac Taylor, in a paper entitled "Ueber den Ursprung des Glagolitischen Alphabets" (1881; Ref. 391) and also in the book *The Alphabet: An Account of the Origin and Development of Letters* (1883; Ref. 392). Using some statements made by Khrabr and also the results of the research done by Archimandrite Amflokhhii (393), Taylor succeeded in producing a complete table of parallel presentation of the Glagolitic and cursive Greek alphabets, stressing the point that the majority of Glagolitic characters are stylized versions of their Greek minuscule counterparts. A similar, though more conservative, stand was taken by Franz Miklošić (1813–1891), the founder of modern Slavic philology and professor at the University of Vienna (394).

Vatroslav Jagić contributed two brilliant pieces to the clarification of problems related to the history and origins of Slavic writings. In 1884 the paleographical study entitled "Four Critico-Paleographical Articles" was published in Saint Petersburg (395), and in 1911 Jagić devoted one issue of his *Encyclopedia of Slavic Philology* to a state-of-the-art report on and a definitive study of Glagolitic writing, entitled *Glagolitsa* (396). Jagić found Taylor's argument strained and his conclusions farfetched. However, he endorsed the Greek theory and succeeded in applying it to at least 10 Glagolitic characters. Other significant Jagić contributions—besides the publication of several annotated facsimile and transcribed editions of various monuments of 11th-century Cyrillic and Glagolitic writing—are his *Comments of the South Slavic and Russian Antiquities on the Church-Slavonic Language* and *A History of Slavic Philology* (1910; Refs. 397, 398). The latter contains valuable information on paleographical work done in Russia and in various Slavic countries. The period covered extends from the Middle Ages down to the beginning of the 20th century.

The Greek theory was also investigated by the German Slavic linguist August Leskien (1840–1916). In his paper "Zur glagolitischen Schrift" (1905)—using the authority he had gained through the publication of the excellent *Alt-bulgarische Grammatik*—Leskien took an unequivocal, and perhaps somewhat hasty, stand by declaring that all the characters of the Glagolitic alphabet had come from the 10th-century Greek minuscule (399). He considered Bishop Cyril as the creator of that much disputed writing. And, indeed, Leskien's position had its impact (400).

The Old-Albanian writing as a possible source for the Glagolitic characters was considered by Leopold Geitler (1847–1885) in his work entitled *Die albanischen und slavischen Schriften* (1883; Ref. 401), while Rajko Nachtigal's attention was attracted by those parts of the Šafařík theory which dealt with the possibility of the use of Hebrew-Samaritan sources by Cyril. In "Doneski k vprašanju o postanku glagolice" (1923), Nachtigal developed a theory advocating that phonetical considerations must have compelled Cyril to borrow certain characters from the Hebrew, Samaritan, Coptic, and Georgian writing systems (402). Although Ellis Minns, in his paper "Saint Cyril Really Knew Hebrew" (1925), supported the Hebrew theory, he emphasized that Cyril's possible borrowing from that alphabet was restricted to only three characters (403).

Moses Gaster (1856–1939), in his *Ilchester Lectures on Greeko-Slavonic Literature and Its Relation to the Folk-lore of Europe During the Middle Ages* (1887), was in fact the first to raise the possibility of the use of certain Georgian elements by Cyril (404). His views were later shared by R. Abicht, and the whole theory was then eloquently presented in a book by the latter under the title *Ist die Aehnlichkeit des glagolitischen mit dem grusinischen Alphabet Zufall?* (1895; Ref. 405). The Gaster–Abicht Georgian theory was later disputed by V. Vondrák, who, referring to information to be found in the Pannonian version of the Cyril legend—depicting the bishop as the owner of Hebrew and Samaritan books—considered the possibility that Cyril created the Glagolitic alphabet using some oriental characters as convenient models. His theory was first published in a paper entitled "Zur Frage nach der Herkunft des glagolitischen Alphabets" (406). In essence, Vondrák also disagreed with Taylor and Jagić.

The Greek theory was also rejected by Alfred Rahlfs, who had failed to see any significant resemblance between the Greek cursive (i.e., the minuscule) writing and the Glagolitic alphabet (407).

Finally, mention should be made here of Jacob Grimm of Göttingen, who in 1836 raised the question of the direction of the writing in Glagolitic texts and recommended the use of this factor as evidence (408).

By the end of the first decade of the 20th century, the question of the origin of Slavic alphabets had been thoroughly explored and—judging from the large number of theories developed—no stones had been left unturned by scholars considering the sources of various characters and the identity of their creator. Consequently, the interest in this problem gradually faded away. However, from the 1930s to the mid-1950s a resurgence of activities took place in Yugoslavia (409) and Bulgaria (410), where the Bulgarian Emil Georgiev appears to be the most prolific author in this field. His theory concerning the existence of a pre-Cyrillic writing among the Slavs has been eloquently stated in the papers "The Origin of Cyrillic Writing" (1936; Ref. 411) and "The Beginning of Slavic Writing in Bulgaria: Old Bulgarian Alphabets" (1942; Ref. 412), and also in his two books, *Slavic Writing Before Cyril and Methodius* (1952; Ref. 413) and *Cyril and Methodius: The Founders of Slavic Literature* (1956; Ref. 414).

As far as Russian, and later Soviet, reactions to various foreign theories are concerned, Russian and Soviet scholars soon fell into one of two sharply divided

groups, that is, the group of partisans of the Greek theory and those maintaining that Glagolitic writing originated from a source, or sources, other than Greek (415). A new path was broken by F. F. Fortunatov (416) and V. Lamanskii (417), who independently arrived at the theory of a Coptic origin of Glagolitic writing. However, as decades passed, the complete impasse in the research in this field became clear. In fact, the symptoms were so discouraging that the new generation of Soviet scholars—following the way opened by the theory of the Bulgarian Emil Georgiev and also by some of their archaeologist compatriots—virtually abandoned the topic and shifted the focus of their attention to the problem of the existence of a pre-Cyrillic writing among the Slavs. They were E. E. Granstrem (245, 246), Ogienko (418), Nikol'skii (419), Likhachev (420), and others, and more recently, V. A. Istrin (244).

As a byproduct of a four-century-long linguistic, paleographical, and historical discussion concerning the Slavic alphabets, a large body of Western literature about Bishop Cyril and Bishop Methodius has come into being. Among the contributors to this literature, one finds Josef Dobrovský (421), V. Jagić (422), A. T. Balan (423), J. Friedrich (424), F. Dvorník (425), M. Rešetar (426), F. Pastrnek (427), and L. K. Goetz (428). Because these writings contain information relevant to our topic, it seems proper to mention here some of the excellent listings of Cyrillic and Methodian literature. First of all, the reader is referred to two good bibliographies originating from Bulgaria: a publication of the Bulgarian Academy of Sciences, entitled *A Contribution Toward a Bibliography of Cyril and Methodius* (429), which was compiled and annotated by G. A. Il'inskii and covers Russian and foreign literature up to 1934; and *A Bibliography of Cyril and Methodius of the Years 1934–1940*, by M. Popruzhenko and S. Romanski (430).

Two other bibliographical sources which list foreign contributions to Slavic paleography are *A Croatian Glagolitic Bibliography* (1911), compiled by I. Milčetić (431), and the *Bibliographische Übersicht über die slavische Philologie, 1876–1891*, by F. Pastrnek (432).

#### *Textual Criticism and Publication of Texts*

Foreign contributions were also significant in the area of the publication of annotated transcriptions and transliterated or facsimile editions, principally of Glagolitic manuscripts. They have been duly recorded in bibliographies and in various textbooks of Cyrillic and Glagolitic paleography (433). We shall restrict ourselves here to the mention of only a few scholars, who either pioneered in this field or whose diligent labor has made the most important and unique manuscripts available to the interested public. The names of J. B. Kopitar (382, 385, 434), V. Jagić (435–439), F. Rački (440), L. Geitler (441, 442), F. Miklōsić (443, 444), I. Goshev (445), P. J. Šafařfk (386–389, 446), V. Vondrák (447), J. Vajs (448–454), and L. Leger (455) represent this group of learned contributors. The tradition established by them seems to flourish to this day. It demonstrates itself mainly in the publication of facsimiles and scholarly descriptions sponsored by Western academic institutions, individuals, and publishing houses (456–466).

The holdings of Slavic manuscript collections in Western libraries and archives have been recorded, mostly by traveling Russian scholars who frequently visited these institutions during the mid- and late-19th century. An attractive booklet was published in Paris in 1858 by the Russian Jesuit P. Martynov. The work, entitled *Les manuscrits slaves de la Bibliothèque Impériale de Paris*, enumerated the Slavic manuscript holdings of the Bibliothèque Nationale (467).

Some excellent chrestomaties with early Slavic texts were edited by V. Vondrák, F. Miklošić, and M. Weingart (468–470). Western scholarship also produced one of its most curious contributions to the literature of the topic, that is, the *Abececlarium paleoslovenicum in usum Glagoliticum* (471), a complete primer and grammar, and a collection of supplementary reading matter and musical scores, all in the long extinct Glagolitic writing. This curio was written by J. Vajs and was printed in Prague, with a specially designed font. This Glagolitic font was also used for the printing of certain Safařík publications.

Western scholarship was no more immune than the Russian to attempts to introduce forged texts or to misrepresent realia as objects of fabulous antiquity. Some of the best-known cases—such as the “Vlesovaia kniga” of S. Paramonov and the so-called Glagolitic Inscriptions of Štupava—provoked almost instant criticism by paleographers, linguists, and historians, and the forgers were soon discredited (472).

Although Slavic paleography has served Western historical scholarship for over a century, and although numerous individual studies of a paleographical nature have been printed in learned journals and books, it was not until 1932 that the first systematic work on this subject left the press in Prague. The *Handbook of Glagolitic Paleography*, by Josef Vajs, was written in the Czech language and still is the only comprehensive study produced by a Western scholar on this subject (400). As far as Cyrillic paleography is concerned, the 1951 publication of *A Textbook of Russian Paleography*, by Bohdan Horodyski, was the first attempt to introduce Slavic paleographical knowledge in a language other than Russian (473). This modest volume, however, was printed in Polish and could reach only a limited audience.

Non-Slavic scholars were offered a comprehensive work on Slavic paleography for the first time in 1967, when I. L. Káldor completed his extensive study *Slavic Paleography and Early Russian Printing: The Genesis of the Russian Book* (474). Another Káldor publication is a two-part investigation of the origins of the Russian *Grazhdanskii shrift*, in which the author analyzes the characteristics of certain medieval hands as possible models for the design of the early 18th-century printing type of Peter I (475).

Slavic paleography does not have its own Western periodical forum. Scattered papers on problems related to this field appear from time to time in journals such as the *Revue des études slaves* (476), *Oxford Slavonic Papers* (447), *Archiv für slavische Philologie*, *Zeitschrift für slavische Philologie*, and others (478).

International meetings devoted to Slavic studies are frequented by Western scholars; however, contributions to ancillaries like paleography and chronology are scarce.

## SUMMARY ON RESEARCH IN SLAVIC PALEOGRAPHY

Russian scholarship can be credited with the creation of the ancillary discipline of Slavic paleography.

The remarkable continuity in the four phases of Russian paleographical activities (hoarding and collecting; inventory and description; comparative study, analysis, and specialization; and systematization and synthesis) can be attributed to the hard work and high scholarship of such outstanding paleographers and historians as Olenin, Stroev, Buslaev, Sreznevskii, Sobolevskii, Karskii, Likhachev, and Shchepkin. They have brought Russian paleographical work from its primitive state of collecting by amateurs to the level of a much respected ancillary discipline.

This was the heritage that Russian paleographers handed down to their Soviet colleagues when they gradually left the scene in the 1920s.

Preoccupation with the problems of the civil war and foreign intervention—together with the lack of material resources in the 1910s and 1920s, and the domination of M. N. Pokrovskii's vulgar-sociological doctrines and of N. A. Marr's "new teaching about the language" in the 1930s and early 1940s—created an atmosphere which was prohibitive for the development of Slavic paleographical work in the U.S.S.R. The effect of these negative forces could be felt also in the field of linguistics and, to a certain extent, in the field of history. Consequently, true Soviet paleographical research began in the late 1940s and in the 1950s.

The first fruitful years were marked by serious attempts to create a systematic manual of the subject—though with a scope restricted chiefly to the study of Russian manuscripts in Cyrillic. Noteworthy activities can also be reported in the study of illumination, watermarks, and paper.

The discovery of the Novgorod birch bark inscriptions revitalized Soviet paleographical work and opened an era of worthwhile contributions to this ancillary, not only by paleographers but also by a considerable number of historians, archaeologists, and linguists.

A general shift in interest from the study of single manuscripts to research related to Slavic codices has clearly demonstrated itself lately. Another noteworthy development which marks recent decades of Soviet paleographical work is the significant increase in contributions by scholars of various nationalities who are involved in the search for written monuments documenting the past history, achievements, and cultural ties of their peoples.

In spite of these activities, little progress has been made regarding the study of the still unresolved problem of the origins of the Cyrillic and Glagolitic alphabets. Research is also lagging concerning the transitional period between the manuscript era and the beginning of early Slavic printing. The apparent stalemate in these and in some other fields can be attributed to the tendency of Soviet paleographers to conduct investigations based on Russian material alone and to disregard the broader implications suggested by the findings of general Slavic paleography.

However, the greatest debt that Soviet paleographers owe to the scholarly world.



and also to themselves, is the organization of a comprehensive publishing program of high quality facsimiles of the treasures of the manuscript collections in Soviet and foreign libraries and archives. This lack is becoming even more apparent in an age when relatively inexpensive facsimile and printing techniques are at hand.

Foreign (non-Russian) contributions to the study of Slavic manuscripts seem to fall into three broad categories: research related to the problem of the origin of the two alphabets, and especially of the Glagolitic script; the publication, analysis, and interpretation of early Slavic texts; and the creation of comprehensive works on Cyrillic and Glagolitic paleography.

As a result of relatively easy access to Glagolitic manuscripts and the close ties this writing has had with the history of certain European Slavic nations, the study of Glagolitic writing for many years enjoyed preference among non-Russian scholars of Europe, who actually became the founders of Glagolitic studies. The middle and late 19th century saw the culmination of Slavic paleographical and historical research in non-Russian scholastic centers such as Vienna, Berlin, Prague, and Rome. The initial drive, however, tapered off by the 1930s, and it has been revived only partially in Bulgaria and Yugoslavia.

Recently there have been some promising signs of a renewed interest in Slavic paleography by Slavicists in the United States and some West European countries.

### **The State of the Art in Slavic Paleography**

#### **CYRILLIC AND GLAGOLITIC WRITING SYSTEMS**

The elusive problem of the genesis of the two Slavic alphabets has been attacked by an impressive number of scholars for over two and a half centuries. In spite of their diligent efforts, the sources and initial stages of development of Cyrillic and Glagolitic writings have remained hidden in the midst of the uncharted early history of the nomadic tribes that moved across the vast steppes between the Volga, the Dnieper, and the Vistula. The most prominent factors hindering progress in research are the scarcity of material evidence and the ambiguity of the few contemporaneous sources. The simultaneous use of Cyrillic and Glagolitic alphabets right from the beginning of the recorded history of Slavs is an added hindrance.

The main objective of this section is to survey briefly the relevant source material and to consider some hypotheses in the light of evidence furnished by historical research. This general overview is introduced by a listing and comparative analysis of Cyrillic and Glagolitic characters and is followed by a brief survey of the evolution of Cyrillic hands in Russia during the 11th through the 18th centuries.

Since the impact of Glagolitic writing on the subsequent development of general Slavic literacy seems to have been rather limited, the problems related to that alphabet are touched upon only in the discussion of the earliest formative stages when neither the precedence nor the predominance of either of the two Slavic

alphabets can be satisfactorily proved and documented. For further information concerning Glagolitic writing, the reader is referred to the preceding survey of research and also to the sources cited there.

The term "literacy" is used here in its widest sense, meaning the ability to read and write as well as the availability of a system of writing.

### THE TWO SLAVIC ALPHABETS—AN ANALYSIS

The documented history of Slavs embraces well over 1,200 years. For about 1,000 years in this period, Slavic literacy was based mainly on the use of the Cyrillic and Glagolitic alphabets. Both systems possess characteristics which may point to a common source of origin. They also display puzzling signs of kinship with the Greek alphabet as used in the 8th through 11th centuries by the amanuenses of Byzantine scriptoria. Table 1 is a parallel presentation of the characters of the Greek (uncial), Cyrillic, and Glagolitic alphabets. It also lists the words which have served as mnemonic devices for the identification of individual letters in both alphabets, and the values of these characters when applied as numeral notations.

A scrutiny of the comparative table yields general observations which have proved useful when problems such as the following are discussed: the origins of Slavic literacy, the role of the two alphabets and their relationship, the identity of their creator, the authenticity of contemporaneous sources, and the validity of relevant modern theories. Some of these points are as follows:

1. The total number of Cyrillic characters used at any time was 43. The original version of that alphabet apparently had only 41 letters. Two characters,  $\text{Ѡ}$  and  $\text{Ѳ}$ , appear to have been added at a later time.
2. The Glagolitic alphabet consisted of 40 letters. Two typical Greek borrowings in the Cyrillic, that is,  $\text{Ѣ}$  (ksi) and  $\text{Ѥ}$  (psi), did not have any Glagolitic counterparts. There were no letters equivalent to the two more recent additions to the Cyrillic:  $\text{Ѡ}$  and  $\text{Ѳ}$ . At the same time, the sole Glagolitic letter without a Cyrillic counterpart was  $\text{Ѧ}$  (derv'), denoting the phoneme "g'" or the numeral 30.
3. The phonetical values of the individual Cyrillic and the corresponding Glagolitic characters were identical.
4. The words used as mnemonic devices to identify or name the individual letters were the same in both alphabets. For example:  $\text{Ѧ}$  = Az (Cyrillic),  $\text{Ѧ}$  = Az (Glagolitic);  $\text{Ѣ}$  = Buki (Cyrillic),  $\text{Ѣ}$  = Buki (Glagolitic).
5. The sequence of characters representing the same phonemes in both alphabets was almost identical.
6. It is obvious that 24 (i.e., 56%) of the Cyrillic characters have been borrowed from the Greek uncial. Only 19 letters—most of them representing phonemes peculiar to the Slavic languages—point to sources different from the Greek, or could be indicative of the creativity of an individual designer.

TABLE 1  
Comparative List of the Letters of the Byzantine Uncial, the Cyrillic,  
and the Glagolitic Alphabets

Letter (Slavic name)	Byzan- tine uncial	Cyrillic	Glagolitic	Numerical value		Latin tran- scrip- tion
				Byzantine and Cyrillic	Gлаго- litic	
Az	Α	Α Α	Ɀ Ɀ	1	1	a
Buki	none	Б Б	Ѣ Ѣ	none	2	b
Vedi	Ϟ	В В	Ѵ Ѵ	2	3	v
Glagol'	Г	Г Г	Ѧ Ѧ	3	4	g
Dobro	Δ	Д Д	Ѫ Ѫ	4	5	d
Est'	Ϛ	Е Е Е Е	Ѧ Ѧ	5	6	e
Zhivete	none	Ж Ж	Ѹ Ѹ	none	7	ž
Zelo	Ϝ	З з з з з	Ѩ Ѩ	6	8	z
Zemlia	Ζ	З з з	Ѭ Ѭ	7	9	z
Izhe	Η	И И И	Ѫ Ѫ	8	20	i
I	Ι	І І (У) І	Ѧ Ѧ Ѧ	10	10	ï
Derv'	none	(Ѧ)	Ѧ Ѧ	none	30	ǰ
Kako	Κ	К К	Ѧ Ѧ	20	40	k
Liudi	Λ	Λ Λ	Ѫ Ѫ	30	50	l
Myslete	Μ	М М М	Ѧ Ѧ	40	60	m
Nash	Ν	Н Н	Ѧ Ѧ	50	70	n
On	Ο	О О	Ѧ Ѧ	70	80	o
Pokoi	Π	П П	Ѧ Ѧ	80	90	p
Rtsy	Ρ	Р ρ	Ѧ Ѧ	100	100	r
Slovo	Ϛ	С С	Ѧ Ѧ	200	200	s
Tverdo	Τ	Т Т	Ѧ Ѧ	300	300	t
Uk	none	У у у у	Ѧ Ѧ	400	400	u

(Continued)

TABLE 1 (continued)

Letter (Slavic name)	Byzan- tine uncial	Cyrillic	Glagolitic	Numerical value		Latin tran- scrip- tion
				Byzantine and Cyrillic	Gлаго- litic	
Fer't	ϕ	Ф Ф	ⱱ Ⱳ	500	500	f
Kher	χ	Х Х Х	Ɀ Ȿ ⱽ	600	600	ch
Ot	ω	Ω ω ω	Ɱ Ɐ	800	700	o
Tsy	none	Ц ц	Ɀ Ȿ	900	900	c
Cherv'	Ϟ	Ч ч ч	Ɀ Ȿ	90	1,000	c'
Sha	none	Ш ш	Ш ш	none	none	s'
Shta	none	Щ щ	Щ щ	none	800	št, šc
Er	none	Ъ ъ	Ɀ Ȿ ⱽ	none	none	'
Ery	none	Ы ы ы	Ɀ Ȿ ⱽ Ȿ ⱽ Ȿ ⱽ	none	none	y
Er'	none	Ь ь	Ɀ Ȿ ⱽ	none	none	"
Iat'	none	Ѧ ѧ	Δ Δ	none	none	e
Iu	none	Ю ю	Ɀ Ȿ	none	none	ju
Ia	none	Ѧ ѧ	none	none	none	ja
Ie	none	Ѧ ѧ	none	none	none	je
Ius Malyi	none	Ѧ ѧ Ѧ	Ɀ Ȿ	900	none	ę
Ius Bol'shoi	none	Ѧ ѧ	Ɀ Ȿ	none	none	q
Ius Malyi (Iotovanyi)	none	Ѧ ѧ Ѧ	Ɀ Ȿ	none	none	ję
Ius Bol'shoi (Iotovanyi)	none	Ѧ ѧ Ѧ	Ɀ Ȿ	none	none	jq
Ksi	ξ	Ѧ ѧ	none	60	none	ks (Greek ξ)
Psi	ψ	† Ψ Ψ	none	700	none	psi (Greek ψ)
Fita	θ	Θ θ	Ɀ Ȿ	9	none	theta (Greek θ)
Izhitsa	Ϛ	Ѧ ѧ Ѧ	Ɀ Ȿ	400	none	i

7. At first glance the Glagolitic characters show very few common traits with their Cyrillic or Greek uncial counterparts. The letter  $\text{Ш}$  (sh), which is identical in the Cyrillic and Glagolitic, is an exception to this general statement.

However, a more careful and thorough comparison of characters reveals some similarity in the basic structure of those letters which were not derived from the Greek uncial; for example:  $\text{Ш}$  and  $\text{Ш}$ ;  $\text{Ж}$  and  $\text{Ж}$ ;  $\text{Ѡ}$  and  $\text{Ѡ}$ ;  $\text{Ѳ}$  and  $\text{Ѳ}$ . Another likeness which deserves some attention can be found in the application of ligature techniques for the creation of the letters "Uk" and "Ery":  $\text{Oy}$ , Cyrillic "Uk,"  $\text{Ѡ}$  Glagolitic "Uk";  $\text{Ѡ}$ , Cyrillic "Ery,"  $\text{Ѡ}$  Glagolitic "Ery."

One of the most intriguing differences between the two alphabets lies in the treatment of characters when used as numerical notations. The Cyrillic alphabet denotes numerals through the use of the characters which are identical with their Greek models—letters peculiar to the Slavic languages are not used in such capacity. In contrast, the creator of the Glagolitic alphabet assigned numerical values to each of the first 28 letters.

There were problems which led to certain changes: the unwarranted presence of some of the original "Greek" letters in the Russian alphabet, that is, letters not representing any distinct phonemes, but only indicating Greek etymology (e.g.,  $\text{Ξ}$ ,  $\text{Ψ}$ ,  $\text{Φ}$ ,  $\text{ϕ}$ ); and letters which through loss of certain phonemes (e.g., the nasal vowels) became redundant. This situation brought about the reforms of 1707–1710, 1735, 1738, 1759, and 1917–1918. Consequently, seven letters of Greek origin ( $\text{С}$ ,  $\text{І}$ ,  $\text{ω}$ ,  $\text{Ξ}$ ,  $\text{Ψ}$ ,  $\text{Φ}$ ,  $\text{Ѳ}$ ) and five typically Slavic letters ( $\text{А}$ ,  $\text{Ѡ}$ ,  $\text{Ѡ}$ ,  $\text{Ѡ}$ ,  $\text{Ѡ}$ ) were eliminated, and two new characters were added to the Cyrillic alphabet ( $\text{Ѳ}$  in 1735, and  $\text{Ѳ}$  in 1797).

### *Material Evidence*

The efforts of scholars of many nationalities have resulted in several theories concerning the history and sources of the Cyrillic and Glagolitic alphabets. Although the scope of the present study does not permit a detailed consideration of these theories, frequent references are made to them and some of the significant findings are utilized. For further, more detailed information, the reader is referred to special works on Slavic paleography.

Any investigation probing developments as remote as the dawn of graphic presentation of thoughts by a particular nation is bound to rely heavily on every bit of material evidence available. In the case of Russian literacy, this evidence consists of epigraphic materials and paleographical sources, and also of such secondary sources as chronicles, reports, legends, and *vitae*. Owing to an aggressive archaeological and epigraphic work conducted by both the Russians and the Southern Slavs, in the past two or three decades a number of objects and inscriptions have been discovered—each of them unique in its kind—which make it

necessary to take a fresh look at the problems associated with the genesis of Slavic writings.

*Epigraphic Material*

The earliest known Slavic texts have come down to us in the form of inscriptions. By its very nature this category produces problems of authenticity, dating, and authorship. The solution of such problems is seriously hindered by the brevity of the texts. Consequently, inscriptions are open to interpretation and may easily give rise to farfetched hypotheses. Slavic paleography, epigraphy, and archaeology are not immune to these temptations.

A.D. 893. The chronological list of Slavic epigraphic and archaeological finds is headed by the ninth-century Preslav inscription (see Figure 3). Two Bulgarian scholars, K. Miiatev and I. Goshev, are responsible for the discovery of what appears to be the oldest known Slavic (Bulgarian) text. The inscription, consisting of one line carved in Glagolitic and two lines in Cyrillic, was found on the wall of the vestibule of Saint John Church at Preslav (Bulgaria). On the basis of cumulative evidence obtained from other epigraphic materials at the ancient church site, K. Miiatev dated the text A.D. 893. His assumption that the Preslav church had been built during the reign of the tsars Boris and Simeon, and the argument supporting the date he had assigned to the inscription, provoked considerable controversy among Slavicists.

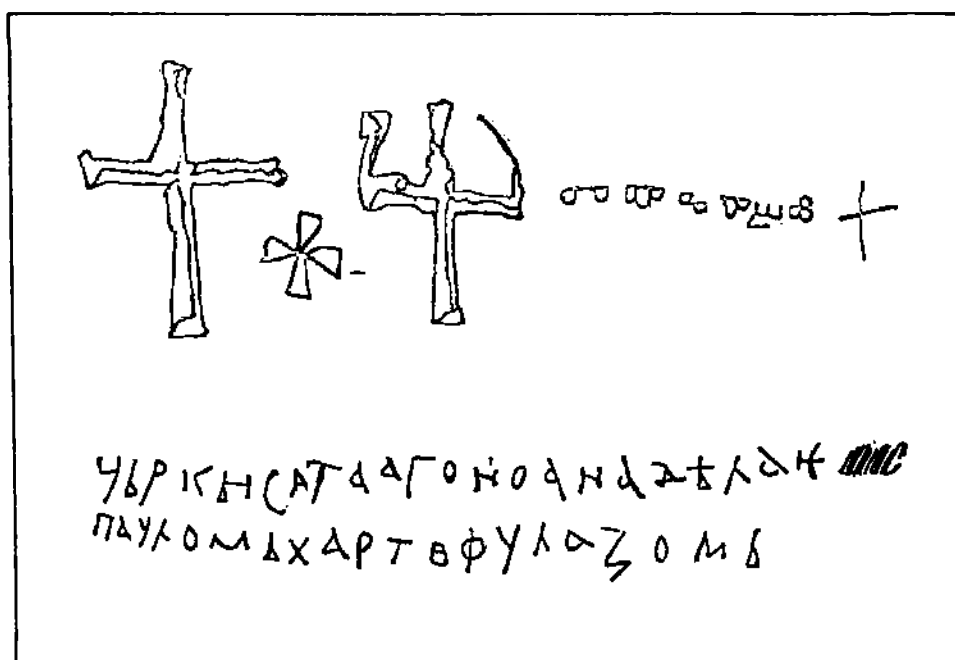


FIGURE 3. The oldest known Slavic text, discovered on the wall of Saint John Church at Preslav (Bulgaria). An interesting feature of the graffiti is the parallel use of Cyrillic and Glagolitic writings. The tentative date of the inscription is A.D. 893. (This figure shows the text of the Preslav inscription as presented by K. Miiatev in B'lgarski pregled, Vol. 1, Part 1 [1929].)

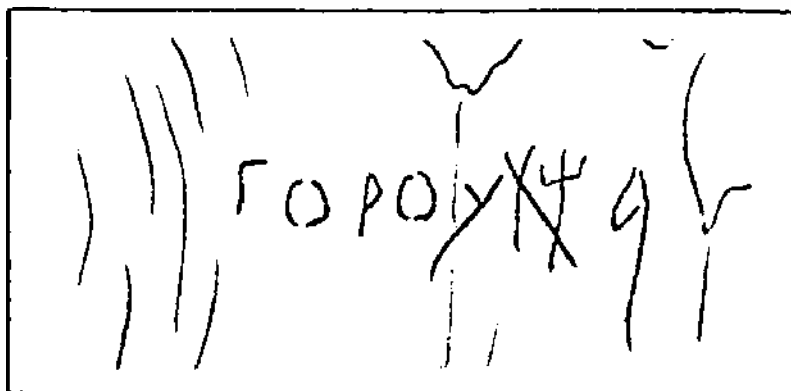


FIGURE 4. *Early 10th-century (?) Cyrillic inscription discovered by D. A. Avdusin on a medieval amphora unearthed near Ghezdovo (U.S.S.R.).*

*Ca. A.D. 900–ca. A.D. 925.* A brief inscription ( ГОРОУХЩА or ГОРУШНА ) found on the side of an amphora in a medieval Russian barrow near Gnezdovo is the oldest Russian text known to date (see Figure 4). Both D. A. Avdusin, who unearthed the two-handed clay storage jug, and M. N. Tikhomirov, who published the text and described the object, dated the Cyrillic word to the first quarter of the 10th century.

*A.D. 943.* In the year 1950, at the site of the excavations of the Danube–Black Sea Canal (Dobruja), a stone was found with a Cyrillic text carved in it. The brief statement, which also included the date A.D. 943 (see Figure 5), was published and analyzed for the first time by E. Comsa and D. Popescu. In epigraphic circles the text has come to be known as the Dobruja inscription. The language of the text is Bulgarian.

*A.D. 993.* One of the best-known and most studied 10th-century epigraphic texts is the so-called Samuil inscription. The marble plate with the 11-

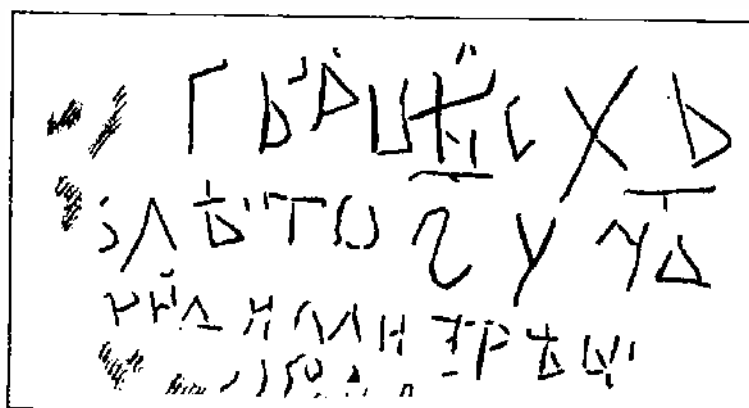


FIGURE 5. *The Dobruja inscription reported in 1950 by E. Comsa and D. Popescu. The Cyrillic (Bulgarian) text includes the date A.D. 943.*

+ вѣ нма ѡтѣца н сѣ  
 нна н сѣго доуха а  
 зъ самонѣ рабъ бѣ [и]  
 полагаж наматъ [шц]  
 ѣ н матери н брат [оу н]  
 а крѣстѣхъ снхъ [нн]  
 имена оусѣпъш [нхъ нн]  
 кола рабъ бѣн [патали]  
 ѣ дедѣ написа [шасѣ вѣ]  
 лѣто отъ сѣтв [рениѣ миро]  
 у ѣзъ: фѣ . виѣди [кта ѣ .]

+ ВЪ НМА ѡТѢЦА Н СѢ  
 ННА Н СѢГО ДОУХА А  
 ЗЪ САМОНѢ РАБЪ БѢ  
 ПОЛАГАЖ НАМАТЪ  
 Ѣ Н МАТЕРИ Н БРАТ  
 А КРѢСТѢХЪ СНХЪ  
 ИМЕНА ОУСѢПЪШ  
 КОЛА РАБЪ БѢН  
 Ѣ ДЕДѢ НАПИСА  
 ЛѢТО ОТЪ СѢТВО  
 У ѣЗЪ: ФѢ . ВИѢДИ

FIGURE 6. *The Samuil inscription of A.D. 993. The marble plate with the text was discovered in 1888, in Macedonia (formerly Western Bulgaria).*

line Cyrillic text carved in memory of the parents and the brother of the Bulgarian tsar Samuil was discovered in Macedonia in 1888. The inscription is clearly dated A.D. 993 (see Figure 6).

A.D. 996. The intensification of the use of the Cyrillic alphabet among the Slavs at the end of the 10th century and especially during the 11th century is clearly documented by the increased number of epigraphic texts which have come down to us. From South Slavic (mainly Bulgarian) sources, the Varosh inscription of A.D. 996 and the 10th–11th-century Prison inscription are of interest.

Early Russian inscriptions which can be dated with certainty originate from the 11th and 12th centuries.

A.D. 1068. The text of the Tmutorokan Stone, commemorating the event that Prince Gleb Sviatoslavich measured the width of Kerch Bay on ice (see Figure 7), is dated A.D. 1068.

Some carved texts on tools, household articles, and on a few of the recently discovered birch bark documents are related to medieval artisans and other townspeople of 11th-century Kiev, Novgorod, and Riazan'.

ВЪ ЛѢТО 6576 ІИИ 6 ГЛѢБЪ КНАЗЪ МѢРПЛЪ М(ОРЕ)  
 ПО ЛЕДУ ѡ ТЪМЪТОРОКАНА ДО КЪРЧЕВА 10,000 В 4000 СЛЖЕ(ВЪ)

вѣ лѣто 6576 іиі 6 Глѣбъ князь мѣрплъ м(оре)  
 по леду ѡ Тъмѣторокана до Кърчева 10,000 в 4000 слжѣ(вѣ)

FIGURE 7. *Inscription on the Tmutorokan Stone commemorating the event that Prince Gleb Sviatoslavich measured, on ice, the width of Kerch Bay in A.D. 1068.*



There is a noticeable increase in the frequency of the occurrence of such inscriptions during the 12th century. Since the dates of these texts approximately coincide with or follow the dates of the earliest extant Russian manuscripts, their significance lies not so much in their contents or form but rather in the fact that they may serve as useful measures of the extent of general literacy in Russia during the 11th and 12th centuries—a literacy which was clearly based on the knowledge and the use of the Cyrillic *ustav*.

### *Paleographical Material*

Slavic manuscript materials originating from the 10th and 11th centuries are scarcer than epigraphic texts. As a matter of fact, no dated 10th-century Slavic manuscript has come down to us, and none of the undated manuscripts—Cyrillic or Glagolitic—can be attributed with reasonable certainty to that century.

The list of the earliest known Slavic manuscripts consists of two Glagolitic and two Cyrillic texts. The utmost rarity of these documents and their unique characteristics should forbid any attempts to draw generalized conclusions about them. Furthermore, the uncertainty of the origins of some of the texts would make any hypotheses concerning their age, prototype, and place of origin difficult to substantiate.

*Ca. 10th Century A.D.* A seven-page Glagolitic text, which has come to be known as the *Kiev Fragments*, is believed to be the oldest extant Slavic manuscript. On the basis of the Glagolitic uncial hand used by one of the amanuenses, the text has been dated 10th century A.D.

*Ca. 10th Century A.D.* In the Prague Archives there are two parchment leaves (8.7 in. by 5.9 in.) with Glagolitic text on them. They were discovered in 1855 by K. Höfler in the binding of a medieval Latin codex.

Among other significant, and also more complete, Glagolitic manuscripts, the following rate highly by reason of their antiquity: the 10th-century *Codex Marianus Glagoliticus*, the *Assemani Codex* of the Vatican Library, the *Zograph Gospels*, the *Sinai Book of Psalms*, the *Sinai Euchologium*, and the *Cloz Glagolitic Codex*. The *Okhrida Fragments* and the recently discovered *Rila Fragments* make the list of the most ancient Glagolitic monuments of writing more complete. None of these manuscripts originates from Russian territories.

*A.D. 1056–1057.* On May 12, 1057, the “sinner” Grigorii and his team completed their work on a parchment copy of the *Gospels*. The richly illuminated 294-leaf codex with its text written in two columns, in laborious *ustav* hand, was copied at the order of Ostromir, a wealthy Novgorod businessman. The unique volume, which has come to be known as the *Ostromir Gospels*, is the oldest extant dated Slavic (Russian) manuscript written in Cyrillic script.

This beautiful document of early Russian literacy is now part of the collection of the M. E. Saltykov-Shchedrin State Public Library in Leningrad.

Mention should be made here of the fact that there are some Bulgarian, Moravian, and even Russian texts which could claim the position held by the *Ostromir Gospels*. However, their lack of a date or their extreme brevity (e.g., a signature in

Cyrillic, single word notes in Cyrillic inserted in Latin texts, etc.) definitely disqualify such claims.

*Early 11th Century A.D.* In the class of undated Cyrillic manuscripts, the early 11th-century Bulgarian copy of the *Four Gospels* occupies a prominent position. The quarto codex was apparently copied from a Glagolitic original by the Bulgarian priest Savva. Sometime during the 14th century, *Savva's Book* appeared in the Pskov area of Russia, where several pages were added to it by local scribes to replace missing parts. The codex was discovered later in Moscow by the Russian paleographer I. I. Sreznevskii, and today it is part of the collection of the Moscow Typographical Library (Code No. 14).

In Russia the last quarter of the 11th century was clearly marked by an intensification in manuscript production. The masterfully executed volume of the *Ostromir Gospels* opens the list of an impressive number of extant codices such as the *Sviatoslav Miscellany of 1073*, the *Sviatoslav Miscellany of 1076*, the three *Menaion* volumes, and the 1092 *Arkhangel'sk Gospels*.

As a matter of fact, the Volkov census of 11th- and 12th-century Russian codices indicates that there are over 20 extant 11th-century codices of Russian origin, and the number is about four times as high for the 12th century. I. I. Sreznevskii estimates that the total number of lost and destroyed 11th-century Russian codices would run into the hundreds.

*Vitae, Chronicles, etc.* There are several direct references in *vitae*, chronicles, etc., to the writing systems used by the ancient Russians and to the origin and development of those systems. Such sources include eyewitness accounts of 10th-century Arabian travelers and Muhammadan missionaries, a 10th-century essay on Slavic letters, several versions of *vitae* of Slavic saints, South Slavic folklore surrounding Saint Jerome, references to copies of trade and political treaties exchanged between Byzantium and the Russians, the 11th-century chronicle of Thietmar, the *Primary Chronicle*, and others.

While individually almost all of these sources on Slavic writing could be taken at face value, when considered in the context of the information offered by the others, this credibility is shattered. For instance, the discovery of additional information concerning the origins of Slavic writing systems has turned the once seemingly clear and simple Cyrillic-Methodian theory into a hazy uncertainty that has haunted Slavists for over a century.

Brief mention has been made earlier of some sources that include information relevant to the history of Glagolitic writing. In that which follows, the most significant sources with definite bearing on possible pre-Cyrillic systems and on Cyrillic writing proper are considered.

Several early Arabic travelers and Muhammadan missionaries reported on the 10th-12th-century Russians or Slavs who lived in the regions adjoining the Black Sea. The degree of authenticity of the reports may vary according to the ratio between actual eyewitness accounts and hearsay recorded by the authors or, for that matter, added by any of the later copyists. Fortunately, the references made to writing and literacy are completely casual—a fact which in the given circumstances tends to enhance their credibility.

Ahmad ibn-Fadlān ibn-Hammād (fl. 921–922). In the year 921 A.D. the Caliph al-Muqtadir dispatched a quasi-missionary delegation to the king of the Bulgars residing along the river Volga. Ibn-Fadlān was a member of the delegation. His report is highly rated by Sarton, who considers it as “the earliest reliable account of Russia.”

The rather candid, lengthy description of a group of traders, whom ibn-Fadlān identifies as Russians, is of great interest to us. He met the group at the river Itil and witnessed their everyday routines, their ways of trading slaves, and their rather ghoulish immolation rites. There is a brief reference to writing in the paragraph which records the pagan Russian funeral ceremony.

This and other indisputably fascinating passages from ibn-Fadlān are widely, if not indiscriminately, quoted and referred to by modern authors, who seem to ignore the notes of doubt sounded by J. P. Krug and by other exponents of the so-called Normanist theory. The Normanists believe that the anthropological and ethnographical details given by the Arabic traveler would fit a Scandinavian tribe rather than a Slavic one.

Ibn abī Yaqūb al-Nadīm (d. 995). The “stationer from Baghdad” was actually a historian and a bibliographer of high standing. In 987–988 A.D. he completed his main work, entitled *Index to Sciences*, or, in Arabic, *Fihrist al-'ulūm*.

The *Fihrist* contains valuable information about the 11th-century Russians. The passage which is of particular interest to those searching for proofs of pre-Cyrillic Russian literacy reads:

I was told by someone on whose veracity I rely, that one of the princes of the Kabk Mountain had sent him to the tsar of the Russians; he confirmed that they had letters which were carved in wood. He showed me a piece of white wood on which there were signs, I do not know whether they were words or individual letters. . . . (479).

The date of the incident, according to the *Fihrist*, was 987 A.D., and the text of the inscription is reproduced in the work. Unfortunately, the brief set of eight enigmatic symbols (see Figure 8) may have been Arabicized during repeated copying, and it has defied all efforts by linguists and paleographers who have attempted to read or interpret it.

The Monk Khrabr. The late 9th and early 10th centuries brought about heated controversy between the then powerful Bulgarian Kingdom and the Byzantine Empire. The polemic, so typical for the medieval mind, flared up over the question of whether Slavic or Greek writing should be considered “more sacred.” A

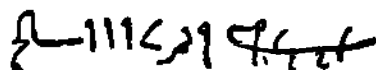


FIGURE 8. Enigmatic text offered by the 10th-century Arabic traveler, geographer, and historian Ibn abī Yaqūb al-Nadīm as the copy of a 10th-century Russian inscription carved in wood.

byproduct of the discussion was an essay entitled *About Letters*.

The 9th- or 10th-century Bulgarian (probably Glagolitic) original of the essay has not come down to us. However, the apparently popular text was extensively copied throughout the medieval Slavic world and today there are over a dozen good Cyrillic copies available. The oldest extant copy is the Bulgarian version of 1348. Some additional copies were found in 1963–1964, in Bulgaria.

The authorship of the essay is still open to debate. Some think that “the Monk Khrabr” was a pseudonym used by the author, whom individual scholars identify as being Bishop Cyril, the Bulgarian Tsar Simeon, Ioann the Bulgarian Exarch, Bishop Clement, or others.

As far as the date of *About Letters* is concerned, the casual remark in the Moscow Theological Seminary copy that “there are still people alive who have seen them” (i.e., Bishop Cyril, d. 869, and Bishop Methodius, d. 885) is considered to be the strongest supporting evidence for dating the original the late 9th or early 10th century A.D. Other, more speculative assumptions also seem to support such a date.

The essay concretely refers to several pre-Cyrillic writing systems which had been used by the Slavs. The first two paragraphs state:

Being pagans, at the beginning the Slavs did not have any letters, but they counted and divined by lines and notches. Having been baptized, they needed to use Roman and Greek letters [to record] Slavic speech without adjusting them. But how can one write correctly in Greek letters: “bog,” or “zhivot,” or “zelo,” or “tserkov’,” or “chaianie,” or “shirota,” or “iad’,” or “udu,” or “iunost’,” or “iazuk,” and others, similar to these? and it was so for many years (480).

In the third and subsequent paragraphs, the Monk Khrabr describes how, by Divine Providence, Constantine the Philosopher (i.e., Bishop Cyril) was directed to the Slavs and how he created a Slavic writing. The essay ends with a listing of the individual characters of what appears to be the Cyrillic alphabet. The characters that are “similar to the Greek letters” and those “of the Slavic language” are listed separately, forming two groups of 24 and 14 characters, respectively.

Thietmar (975?–1018). Thietmar, the bishop of Merseburg and author of the eight-volume medieval *Chronicon*, was one of the first Western historians to report about the Slavs living east of the river Elbe.

Thietmar’s descriptions of the wealth and splendor of early 11th-century Kiev, with its “more than 400 churches”; of the heterogeneous nature of the Kiev area population, consisting chiefly of runaway slaves and “swift Danes”; and his penetrating portrayal of Vladimir the Saint are unique and carry the authenticity and vivid atmosphere of the account of a knowledgeable, though not impartial, eyewitness.

Describing the classical town of Petra, the *Chronicon* mentions that in the local Slavic pagan temple the idols had their “names” indicated on them by means of special signs.

Vitae. Turning now to references included in *vitae*, one should first of all consider the episode described in Chapter 8 of the ninth-century *Pannonian Vita* of Bishop Cyril. According to the text (which has come down to us in not less than 23 Russian and South Slavic copies), the bishop stopped in Cherson during his journey to the Khazars, about 960 A.D., and:

he found there a copy of the Gospel and the Psalms written in Russian letters and he found a man speaking that language and spoke to him and understood the meaning of what he said, and, adjusting it to his own language, he analyzed the various letters, both for the vowels and the consonants, and praying to God, started quickly to read and interpret, to the astonishment of many who then praised God (481).

A similar reference to pre-Cyrillic Russian writing is to be found in the *Vita* of the Bishop Methodius: "There God showed to the philosopher Slavic books and he immediately created letters and composed a sermon and departed for Moravia" (482).

The 11th-century Latin *Italian Legend* essentially confirms this statement and interprets the invitation of the Bishops Cyril and Methodius to Moravia as a direct consequence of Cyril's successful mission to the Khazars.

Other *vitae* and also several legends seem to indicate that Greek writing had been modified and adapted to Slavic needs by church leaders, missionaries, and national saints from Croatia, Bulgaria, and other South Slavic regions. Thus, the legend about Saint Jerome (ca. 347–ca. 420), still part of the oral tradition of the Catholic South Slavs, is based on the belief that the saint created a Slavic writing system and translated the Scriptures into Slavic. This would date the beginning of Slavic (Glagolitic) literacy as the fifth century A.D.

The Bulgars have their own version of the story of the invention of a writing system modeled on the Byzantine Greek alphabet. According to the *Thessalonica Legend*, far back in the seventh century A.D., Cyril of Cappadocia attempted to introduce a 32-letter, modified Greek alphabet to the Bulgarians living in the region of Thessalonica.

O. M. Bodienskii and P. Uspenskii both cite Greek and Arabic sources which seem to support the theory that in the year 836 A.D. the Byzantine Emperor Basil of Macedonia (812?–886) sent an archbishop as his emissary to the Russians. The archbishop converted and baptized the pagans and designed for them a 30-letter, modified version of the Greek alphabet.

Finally, it is reasonable to believe that medieval political and trade agreements between the Bulgars and Byzantium and also between the Russian princes and the Byzantine emperor necessitated at least the appending of the signatures of the parties. The earliest such agreement between the Bulgars and Byzantium goes back to 714 A.D. Another treaty was concluded, apparently in writing, in 774 A.D.

There are Russian translations available of what are believed to be the texts of agreements between the Russian Prince Oleg (911 A.D.) and Prince Igor (944 A.D.), on one hand, and the Byzantine rulers, on the other. However, no originals of these texts, neither Greek nor Russian, are extant.

From the translations of the texts of treaties and from the description in the *Primary Chronicle* of the preparations involved in dispatching a Russian delegation for the signing ceremonies, one learns that the texts of the agreements were prepared in two copies, the names of the members of each delegation "were written" on one of the copies, and the copies were subsequently exchanged. Furthermore, in the text of what is believed to be the Russian translation of the original 911 A.D. agreement, there is mention of the tradition of solving disputes between Russians and the Byzantine Empire "not only orally but also in writing." Finally, the mention in the *Primary Chronicle* of golden and silver seals and credentials which had been given to the members of the Russian delegations strongly implies that there was some kind of writing system in use at the court of the Russian prince.

#### *Hypotheses and Evaluation*

Although physical objects and early accounts provide evidence of early Slavic writing, they do not explain the origins of the script. Consequently, scholars interested in the beginnings have formulated several hypotheses, explaining the evidence by means of assumptions and conjecture.

Most 19th-century Russian historians and paleographers uncensoriously accepted the theory which was based on the assumption that the Russians *were given* their literacy at the time of their conversion to Christianity. The extreme scarcity of material evidence and the social and professional status of some of these scholars—many were active and practicing agents of the Orthodox church—could serve as plausible explanation for such an otherwise unforgivable oversimplification of the problem.

Exponents of this school considered Russian literacy as part of the 10th-century "package deal" with the emperor of Byzantium which brought to the people of Vladimir I a princess, trade contracts, Christianity, prayer books and the Bible in the vernacular, and also a Russian church which was subject to the patriarchate of Constantinople.

A similar trend of thought is still predominant among Western Slavicists and is also shared by some Soviet paleographers and historians of writing.

In spite of its wide acceptance, the hypothesis has never been left unchallenged. The ever-growing body of material evidence sooner or later was bound to impair its validity. As early as the mid-19th century, I. I. Sreznevskii and V. I. Grigorevich raised the question of the possible existence of a pre-Cyrillic Russian script.

Soviet scholars—yielding to the frustration caused by the lack of progress in research in the 1940s, and mainly in the 1950s—conceived and promoted a number of new hypotheses. The basic assumptions that these authors introduced can be summarized as follows:

1. There was a system of writing ("proto-Glagolitic," "proto-Cyrillic," or "pre-Cyrillic") widely used by the East Slavs prior to their conversion to Christianity.

2. The beginnings of the system can be dated anywhere between the fourth century B.C. (!) and the sixth century A.D.

3. The system was an original one and was gradually developed into alphabetical writing by the Slavs (Russians) themselves.

4. This writing system was in use until the ninth century A.D. and was subsequently eradicated by Byzantine and Bulgarian missionaries who enforced the general adoption of a modified version of Greek uncial script (known later as the Cyrillic alphabet or *kirilitsa*).

Some authors would allow for the possibility of interaction or borrowing. However, even they tend to reject the 8th–10th-century Greek uncial as a source or model. Instead, with an utter disregard for all established theories of the development of writing, they profess speculations which would suggest an exotic source of great antiquity going back several thousand years. Furthermore, in view of the extremely high proportion of Cyrillic characters which beyond doubt are direct borrowings from the Greek, promoters of the theory of a "proto-Slavic" alphabet shifted their attention to the Glagolitic script. By doing so they seem to have ignored the fact that all available evidence suggests that Glagolitic writing was probably created for and used almost exclusively by the Western Slavs.

Among others, N. A. Konstantinov considers the Glagolitic characters as an original alphabet gradually developed by the Russians. The highly debatable evidence of a number of unrelated signs—which earlier had been identified as property marks and tribal names of certain fourth-century nomadic Scythian and Sarmatian groups—led the Soviet scholar to propose that the Glagolitic alphabet was based on fourth- through fifth-century B.C. Cypriot syllabary writing. This had been handed down to the Scythian and Sarmatian tribes via the Greek settlers of the Black Sea shore and, subsequently, was adopted by the "proto-Slavic" groups which moved into that area. Furthermore, Konstantinov allows the reader to believe that during a relatively brief "hibernation period" of five or six centuries, separating the most recent Sarmatian inscriptions from the oldest extant Slavic text, the "proto-Slavs" not only adapted the Cypriot syllabary to the phonetic peculiarities of their own language but also developed it into a more advanced alphabetic system.

Other Soviet authors went even further. A. A. Formozov published his theory according to which a general system of writing consisting of a set of conventional signs was widely used in Russian territories as early as 1500 B.C. (483). The scholar A. S. L'vov reported that he had successfully identified in the cuneiform writings of the Middle East the models for certain configurations of Glagolitic characters (484). L. V. Cherepnin, in his exhaustive study on Russian paleography, came to the conclusion that Russian writing must have had its ideographic, pictographic, syllabary, and phonetic stages (485). Finally, P. Ia. Chernykh, in his *Origins of the Russian Literary Language and Writing*, expressed the view that there had been a continuous tradition of literacy in Russian territories starting from prehistoric times (486).

Most of these assumptions can be invalidated by references to logic or by invoking material evidence produced by archaeology. In the following, a combination of the two is applied.

It is still uncertain which neolithic tribes were the ancestors of the Slavs. Furthermore, it is only from the middle of the first millennium B.C. that archaeologists can distinguish certain batches of finds that can be related to Slavic antiquities of a much later time.

The urn-field culture, reminiscent of the Lausitz culture and dated as the end of the first millennium B.C., is the first archaeological find that can be definitely identified as Slavic. In the case of the East Slavs, even such vague references seem to date from a much more recent era. In addition, the usefulness of archaeological evidence in the areas east of the Vistula is seriously affected by the high mobility of the peoples involved. Thus, objects unearthed during the excavations in the urn-fields of Zarubintsi and Korchevatoe—in the Kiev area and dating from the last centuries B.C.—tend to be linked with farming Scythians rather than East Slavs.

The second large complex of antiquities discovered and explored by Russian and Soviet archaeologists is the Cherniakhovo system of urn-fields, which chronologically overlaps the Zarubintsi culture. The Cherniakhovo finds reflect a higher state of development, with Roman coins, glass vessels, wheel-made pottery, *fibulae*, and red-glazed vessels in the graves.

Since this culture seems to have ended sometime in the fourth or fifth century A.D., and the first definite Slavic remains are dated to the sixth or seventh century A.D., according to the Soviet archaeologist A. L. Mongait, "a gap of some two centuries is left to guesswork, for it cannot be filled by other remains" (487). This hiatus, together with the fact that remains of many tribes other than Slavic are lumped under the name of Cherniakhovo culture, make it impossible to establish a much wanted direct link between the early Slavic cultures and the Kiev Rus'. Doubts of some archaeologists in the Slavic origin of the Cherniakhovo remains are fully justified because the *Völkerwanderung* evidently had brought some Germanic tribes into the area in question.

The sixth-century Byzantine historian Procopius of Caesarea and the Gothic author Jordanes both considered the Sclavinae (or Sclabeni) and Antes as two major Slavic tribes or clans with the same language, customs, and institutions.

As early as the second half of the fourth century A.D., the Sclavinae occupied the area between the Carpathian Mountains and the Dnieper. Later, by the end of the fifth century A.D., the bulk of the tribe began to move to the region of the lower Danube.

The Antes, probably an Iranian tribe which gradually became Slavicized, in the fourth century A.D. occupied the Southern Bug region. Somewhat later two groups of the Antes are known to have populated the middle-Danube area. Literature refers to them under the name Danubian Antes. They represented the western branch of a vast clan. The eastern branch, often referred to as the Russo-Ukrainian Antes, was located by Procopius in the Dnieper region and in the Donets basin.

While the Danubian Antes, after a period of wars, recognized the authority of Byzantium and gradually retired to the Balkan peninsula, the Russo-Ukrainian



Antes, in the mid-sixth century A.D. (in alliance with the Bulgars) looted Thrace and Macedonia and even menaced Gallipoli (Thracian Chersonese) and Constantinople.

Two and a half centuries after this most active period in the history of the Russo-Ukrainian Antes, the first references to a clan called Ros (Rosy, Rusy, Rus, etc.) appear in Syriac, Arabic, and Byzantine sources.

The new clan—to which we refer here as the Russes, in order to distinguish them from the modern Russians—was of an unknown ethnic origin and might have been in part identical with the sixth- and seventh-century Russo-Ukrainian Antes living in the same area. In that case, the difference is only in the nomenclature. Whatever the ethnic origin might have been, it was one of the Southeastern Slavic clans living in the Dnieper–Donets region that formed the nucleus of Kiev Rus’.

In the second half of the eighth century A.D. a group of Norsemen merged with the Russes. Though such a merger is vehemently denied by Russian and Soviet historians and archaeologists, the evidence supporting the theory is overwhelming. The real question that still remains unresolved is not so much the fact of the merger but rather the amount of Norse (Varangian) blood that flows in Russian or Ukrainian veins and the degree of Norse initiative and participation in the foundation of the military, economic, and political might of Kiev Rus’.

Let us return now to the hypotheses promoted by N. A. Konstantinov, A. A. Formozov, A. S. L’vov, and others.

Even a brief sketch of the history of some key peoples who inhabited the area north of the Black Sea and the Sea of Azov suggests that the kaleidoscopic pattern of their rise, migration, and eclipse would have precluded any meaningful continuity in cultural tradition—not to mention literacy. Basic differences in the ethnic, linguistic, and religious backgrounds of the clans or tribes reduced to a bare minimum the chances for fruitful exchanges or borrowings.

The absence of any mentionable impact of Greek and Roman loot (including coins, jewelry, and weapons) on the arts and crafts of Slavic nomads is another indication of the singular constellation of unfavorable circumstances. In addition, constant raids by “barbaric” tribes of Asia systematically destroyed any chances for an early birth of a significant and lasting Slavic material culture and tradition. The vivid and colorful description of the nomadic primitiveness of Sclavinae by the sixth-century Byzantine author Procopius seems to corroborate these conclusions (488). And so does archaeology.

The intensive archaeological and numismatical research conducted by Russian and Soviet scholars during the last 70 years has led to the emergence of a new concept of Slavic life in classical and medieval times. In many respects, facts that could have been only assumed a generation ago are now being revealed. Unfortunately, none of the new findings can be related to early Slavic literacy and none of them allows the scholar to approach this problem from a new angle and in a new way. As a matter of fact, there is no material evidence which would indicate, beyond reasonable doubt, that prior to the ninth century A.D. any Slavic group, tribe, or clan living in the area in question would have possessed the knowledge of writing.

If, by an extremely liberal interpretation of the concept, some descriptive-in-

interpretational or identifying devices were considered as writings—which they are not—the dawn of literacy for some peoples of the Bug–Donets area could be placed in the third or fourth century A.D. In terms of Slavic literacy, however, even such a loose interpretation would be applicable only subject to the following two conditions: first, the Slavic origin of the finds should be proved beyond doubt, and second, the gulf of two centuries between the ethnic history of the Antic era and that of the Kiev Rus' should be filled with solid evidence.

One might also add that the shift of the beginnings of East Slavic (Russian) literacy to the ninth century A.D. takes the paleographer and historian to the immediate neighborhood of the era of widespread Cyrillic literacy in medieval Russia, which *eo ipso* seems to preclude the validity of any “Glagolitic theory.”

Undue attention has been paid lately, within the context of “proto-Glagolitic” theories, to certain secondary references and archaeological and numismatic finds which would suggest the use of a primordial writing system by the peoples of Rus'.

A close scrutiny of those sources, however, seems to indicate that the “systems” suggested by them would barely satisfy the criteria of any forerunner of writing. Thus, ibn-Fadlān's 10th-century reference to the poplar tree “in which they [i.e., the Russians] inscribed the name of the man and the name of the Russian tsar,” appears to point at the use of the royal and family *tamgas*, that is, a descriptive-representational device known to have been used by the sixth–ninth-century East Slavs. Had the names been inscribed in “Greco-Slavic,” that is, in a rudimentary imitation of the Byzantine Greek writing, or in any of the widely known alphabetical systems of the Middle East, this circumstance hardly would have escaped the keen eyes and meticulous reporting of ibn-Fadlān.

The only other reference to the writing of the late 10th-century Russians is to be found in abī Yaqūb al-Nadīm's *Fihrist* (see *supra*). The author of the *Fihrist*, however, did not observe directly the original text, but described it from the account of another person, “someone on whose veracity I [i.e., al-Nadīm] rely.”

All other available sources that have information concerning early writing refer generally to Slavs rather than to Russians. Thus, the Monk Khrabr, a Bulgarian himself, stated that prior to their conversion to Christianity the Slavs—and this might include the Russians—had “counted and divined by lines and notches.” Writing about the postconversion literacy of Slavs, he seems to differentiate between West Slavs and East Slavs by stating that “having been baptized, they needed to use Roman [West Slavs?] and Greek [East Slavs?] letters. . . .”

Another secondary source, the 11th-century *Chronicon* of Bishop Thietmar, is less helpful: the text mentions that the idols in the pagan Slavic temple of Petra had their “names” indicated on them but there is no hint as to the system of writing used to indicate the names.

A number of apparently unrelated systems of “lines and notches” have been produced by Russian and Soviet archaeologists and numismatists (e.g., the Alekanovo inscription, the Chernigov inscription, the Drogichin enigmatic signs, various household articles and instruments with text-like patterns, and the calendrical signs on the Lipesovka cup, the Romashka jug, and some more recent finds). Although the dating and identification of the objects with the enigmatic patterns are far from

being satisfactory and no solid progress can be reported in the research aimed at the solution of the code of "lines and notches," the existence of these signs and patterns must not be ignored.

However fascinating the mystery of these primordial systems may be, their significance from the point of view of the history of Russian literacy is fairly limited, if they have any at all. As a matter of fact, the primitive drawings, the descriptive-representational devices, and the possible identifying-mnemonic devices used by the people (Slavic or non-Slavic, for that matter) in the areas which had come to be known as Rus' cannot be considered either as the direct source of or as the model for the Greco-Slavic writing of the 9th and 10th centuries A.D.

Let us turn now to a discussion of the possible use of a Greco-Slavic writing system by the Russians prior to their mass conversion to Christianity in and after 988 A.D.

Apart from the brief inscription on the Gnezdovo amphora fragment (see *supra*), there is no material evidence to support a hypothesis concerning Russian literacy prior to the mid-11th century. There are, however, secondary sources which seem to suggest that a primitive Greco-Slavic alphabet might have been used by a handful of amanuenses-translators in the courts of certain Russian princes and by Byzantine craftsmen and traders dealing with the Russians.

The seventh- or eighth-century Byzantine uncial has been identified by some as the possible model for such a script, and the basic configurations of the letters of the Cyrillic alphabet definitely support the assumption. This theory, however, would also imply that the modified Greek script was originally created for the Bulgarians rather than for the Russians, since the establishment of statehood by the Bulgarians, their conversion to Christianity, and their ties with Byzantium historically preceded similar Russian developments. If so, the primitive Greco-Slavic alphabet was merely transferred from Bulgaria to Rus' by the Byzantine Greeks—the principal mentors of medieval Eastern and Southern Slavs. Greek concern with these problems demonstrates itself in the fact that, as E. Georgiev points out (489), by the ninth century A.D., Greek authors with remarkable consistency applied an established system of transliteration of Slavic geographical and personal names—a system based on sound phonetic principles.

Returning to *vitae*, chronicles, etc., one might ask the question, Why do they fail to prove the existence of an early Russian literacy?

The evidence offered by the *Primary Chronicle* and other secondary sources is considerably weakened because no originals of the Russian versions of the Russo-Byzantine agreements are available. References to the credentials given to Russian envoys fail to mention the language in which the credentials were written. Neither is there reference to the language of the copies of early Russo-Byzantine agreements allegedly used as sources by the compiler of the *Primary Chronicle*. Consequently, all our knowledge concerning the agreements would be equally valid if the language used were Greek or Russian alone, or, for that matter, if both languages were used simultaneously.

The language problem also impairs P. Ia. Chernykh's argument concerning wills drafted by Russians working for Greek employers and in Greek territory in the 9th

and early 10th centuries (490). *Vitae* are not free from contradictions either. Just as in the case of annalistic literature, repeated copying of the text throughout centuries by amanuenses with varied and often rather poor educational backgrounds was bound to introduce errors and distortions. Furthermore, "interpretations" by religious zealots might have added fictional matter which, with the passing of centuries, might have acquired the ring of truth.

The *Pannonian Vita* of the Bishop Cyril is an appropriate text for the illustration of problems springing from the possibility of intentional or unintentional alterations in any manuscript. A. S. L'vov has found that most of the description of the episode in which Bishop Cyril, on his way to the land of the Khazars, visits the town of Kherson and discovers religious codices written in Russian (cf., Chapter 8 of the *Vita*) must have been created during the 10th century A.D. (484).

These and similar weaknesses of relevant secondary sources seriously affect their claim to authenticity and tend to spoil the chances for a clear-cut solution of the puzzle of a possible Greco-Russian script.

Thus, the answer to the question whether there was any Russian literacy prior to the mass conversion of Rus' to Christianity can be only a qualified "yes." On one hand, circumstantial evidence would imply that some kind of modified Greek alphabet was indeed used by the translator-amanuenses of the Byzantine court when the alleged Russian copies of the agreements were prepared. Linguistic analysis of the texts, which are believed to be copies of the original Russian versions of the agreements, seems to indicate that the translators of the Byzantine court were of Bulgarian origin. This would also imply that the modified version of the Greek uncial script had been originally (i.e., at a considerably earlier time) created for use in diplomatic and religious intercourse with the Bulgarians and was subsequently introduced into Byzantine-Russian protocol and religious practices. The gradual adaptation of such a script and its development into a Greco-Russian system was apparently done by translator-amanuenses of the Russian princes and by Greek builders and other craftsmen working for medieval Russian princely courts or households. Furthermore, there is reason to believe that the early Byzantine, and probably Bulgarian, missionaries who were involved in the task of converting minor Russian groups to Christianity—an emphatically bookish religion—also made use of this Greco-Slavic or Greco-Russian script. The fact that several legends and *vitae* credit different church personalities with the creation of this "Slavic" script seems to support this assumption.

On the other hand, there is no material evidence indicating the use of a Greco-Russian script by the population of Rus' in a wider sense. The quality of craftsmanship displayed in the 11th-century *Ostromir Gospels* and in a few other early Russian documents cannot be considered as sufficient evidence either. At a time when (in Bulgaria as well as in Rus') crafts, arts, and literacy had to rely so heavily on the skills and experience of missionaries and imported craftsmen, no far-reaching conclusions can be drawn from the mere existence of a handful of monuments of art and writing, however remarkable their qualities might be.

Thus, it seems more proper to state that available evidence supports the assumption that there was an imminent capacity or potential of literacy in early Rus',

though only a small group of professionals was involved in actual writing. An analysis of the language of the earliest Russian monuments of writing—most of which were written in Church-Slavonic—would place a further curb on the scope of this statement.

### Cyrillic and Glagolitic Hands

#### CYRILLIC HANDS

There were three major Cyrillic scripts used by Russian and South Slavic amanuenses: *ustav*, *poluustav*, and cursive.

##### *Ustav (Cyrillic)*

The earliest extant dated Slavic texts—such as the *Ostromir Gospels* of 1056–1057 (see Figure 9), the *Sviatoslav Miscellany* of 1073, the Gnezdovo inscription, the Tmutorokan Stone, and the birch bark documents of Nov-

ВЪСЪНѢМБНСА  
 НОСНФΟΥГІА ВЪ  
 СТАВЪ ПОНМНО  
 ТРОУА ИМАТЕРЬ  
 НГО НБѢЖНВЪ  
 ЕГУПТЪ НЕЖДИ  
 ТОУ ДОНДЕЖЕ  
 ТИРЕКА ХОЩЕ  
 ТЬБОНРО ДЪНСКА  
 ТНОТРОУАТЕ ДА  
 ПОГОВЕНТЬЕ О  
 НЪЖЕ ВЪСТАВЪ  
 ПОИАТЪОТРОУА

FIGURE 9. Eleventh-century Russian *ustav* (*Ostromir Gospels*, 1056–1057).

gorod—indicate that the first standardized hand used by medieval Russians and Southern Slavs was basically a calligraphic uncial book-hand called *ustav*. Modeled on the 9th–11th-century Byzantine liturgical book-hand, the early Russian *ustav* was an upright, heavy script with evenly spaced characters. The individually “drawn” letters were reminiscent of *quadrata* since they were all approximately of the same height, and they were as wide (or half as wide) as they were high. There was no prominent difference between the impact of light and dark strokes. Abbreviations in *ustav* texts were relatively infrequent and they were virtually absent from documents carved in tree bark.

The pen-hold and posture necessary to produce an *ustav* text were far from being natural, and the progress of amanuenses involved in this meticulous “lettering” process must have been extremely slow. At the same time, the inscriptional characteristics of early *ustav* had made it conspicuously suited to the materials and instruments used by lay people (see Figure 10). The material to receive writing was usually tree bark, and the characters were carved with a sharp or pointed needle-like tool.

The early version of *ustav* was used in both liturgical and vernacular texts. From the late 13th and early 14th centuries, however, this classical hand underwent a series of gradual changes: the individual characters grew higher in proportion to their width, the distances between letters decreased, the contrast represented by light and dark strokes became more accented, and most cross-strokes seem to have been shifted upward. Another noteworthy change was the gradual increase in the number of standard, frequently used, abbreviations. This latter change, however, was restricted to vellum *ustav*.

Beginning with the 14th century, *ustav* hands tended to be restricted to liturgical texts, giving way in the vernacular to a new script known as *poluustav*. Although deteriorating in its calligraphic qualities, *ustav* lingered in various ecclesiastical books and documents as late as the 17th century.

### *Poluustav (Cyrillic)*

In its early form, *poluustav* was basically a diminutive version of *ustav*, preserving the uprightness, most of the geometrical characteristics, and also the general appearance of the former. The almost print-like size and the ever-increasing number of abbreviations and over-written letters, however, are clear indications of a transition to a new hand. The 1440s and '50s witnessed the crystallization and wide acceptance of the so-called late *poluustav*. This development is regarded by V. N. Shchepkin as the result of an intensification of South Slavic influence following the mass flight of Serbian and Bulgarian bookmen to Russia (491). And indeed, it has characteristics developed by South Slavic amanuenses as early as the 13th century: it is a less formal hand with a growing number of “four line” type minuscules, ascenders, and descenders; it has numerous abbreviations and ligatures; and it shows a gradual departure from the vertical toward a slight right or left slope.

*Poluustav* might be considered as the starting point for two trends of development: first, it was clearly the basis for the evolution of a new calligraphic book-hand, and second, in answer to the demands of practical life, it gradually

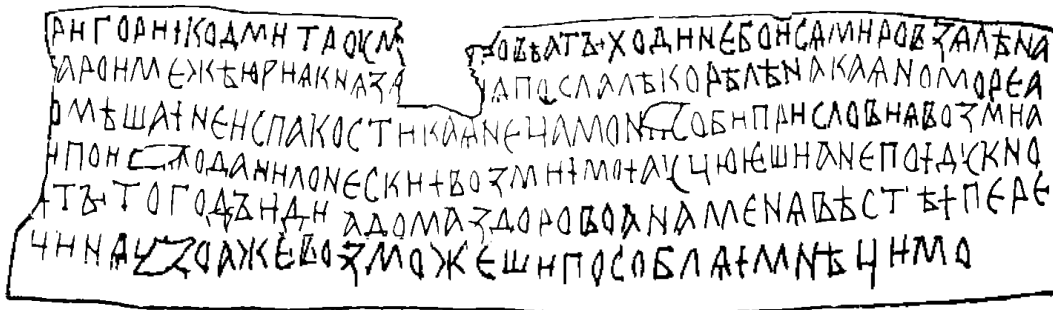


FIGURE 10. Typical 14th-century ustav text carved in birch bark (Novgorod excavations, 1957: Item No. 286).

“degenerated” into a transitional hand leading to the development of various cursive styles.

The early form of *poluustav* flourished during the last decades of the 14th century and at the beginning of the 15th century. Its more recent version (with an ever-growing number of special signs, abbreviations, accents, etc.) was the dominant book-hand in Russia from the 15th century to the time of the introduction of printing in that country.

Nevertheless, the first signs of the emergence of a cursive hand almost coincided with the gradual transformation of *ustav* into the less ceremonious *poluustav*. Starting from the end of the 14th century, the evolution of cursive writing might be observed in the texts of Slavic business documents, diplomatic correspondence, and other matter of a nonbook type.

#### *Cursive (Cyrillic)*

The earliest cursive hand, the so-called *poluustav-cursive*, was the model and source for the development of two distinct types of Russian cursive writing: the Moscow cursive hand and the Lithuanian cursive. While the hands practiced in Moscow Rus' of the 16th and 17th centuries reflect a great freedom in style,

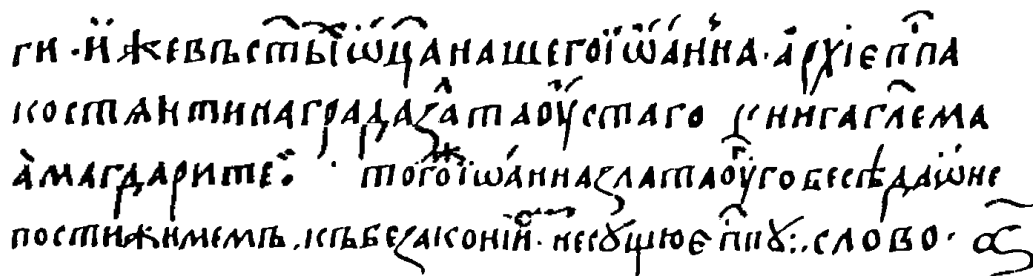


FIGURE 11. Typical late 15th-century Russian *poluustav*, fragment (source: Savva . . . , Ref. 71).

dashing speed in the execution, and a definite preference toward heavy and oversized ascenders and descenders (see Figure 12[a]), the cursive hands of Lithuanian Rus' of the same centuries clearly indicate the impact of Latin or Polish hands with their carefully drawn, somewhat rounded characters and with the restraint exercised when the precise and almost pedantic descenders are drawn (see Figure 12 [b]).

The cursive hands of Moscow and Lithuanian Rus' soon were subjected to pressures urging consolidation. In this process, which actually lasted until the beginning of the 19th century, several new hands developed. One of them was the Russian civil hand. Carrying unmistakable signs of a strong impact of the Latin hands of the era (see Figure 12, [c] and [d]), the civil hand—with its rounded  $\text{O}$ , the strictly vertical minims of  $\text{M}$  and  $\text{H}$ , and a number of other features—is believed to have influenced the design of certain characters of the first modern Russian printing type: Peter I's "grazhdanskii shrift."

### GLAGOLITIC HANDS

An analysis of the hands used in Glagolitic manuscripts and manuscript codices indicates that, just as in the case of Cyrillic writing, three major book-hands were used by the amanuenses involved in the copying of these texts.

Extant Glagolitic texts suggest that during the earliest period of Slavic literacy *ustav* must have been the standard book-hand among some of the Western and Southern Slavic nations. The oldest known Glagolitic manuscript texts (i.e., the *Prague Fragments* and the *Kiev Fragments*; see Figure 13) were written in pure *ustav*. Even later, when *poluustav* was fully established as the main book-hand, variants of *ustav* still were used in Glagolitic titles and chapter headings. To some extent this was due to the difficulties that scribes had to face while trying to create traditional interlaced titles in Glagolitic, and the use of *ustav* script in chapter headings and titles persisted for centuries. The pages of the *Vienna Fragments* illustrate this point.

The majority of extant Glagolitic texts were written in a more refined, small, round *poluustav*. This minuscule writing remained the standard hand for centuries. There was, however, a slight variation in the shapes of the letters in the so-called Croatian hand, which was a clearly identifiable variant used mostly by Croatian scribes and some scriptoria in Dalmacia and Istria, and on the islands of the Adriatic Sea. The general appearance of the "square" Croatian hand is in clear contrast with the round characters of the traditional Bulgarian minuscule. Prefigurations of the square minuscule have been identified by some in the *Cloz Glagolitic Codex*.

The cursive Glagolitic hand first appeared in the marginal notes of codices. It was not until the 14th century that this hand was used in legal documents, correspondence, etc. The development of a Glagolitic cursive proper was substantially hindered by the inhospitableness of the Glagolitic characters to the techniques of continuous writing. As a matter of fact, cursive was the final result of a lengthy



- 
- (a) *Handwritten text in Moscow Rus' cursive, showing highly connected and slanted letters.*
- (b) *Handwritten text in Lithuanian Rus' cursive, showing highly connected and slanted letters.*
- (c) *Полное пѣстодое пришло ѡнѣ пѣпѣтѣ  
пѣторѣ переѣти по сламо присе писатѣ;*
- (d) *Пѣпѣтѣ иандѣтѣ матѣтѣда потѣрѣе пѣдѣзѣне:  
тѣзѣбѣ устанѣленнѣдѣ блѣеннѣдѣ пѣчѣтѣ .*

FIGURE 12. Russian cursive and civil hands: (a) typical Russian cursive hand of Moscow Rus' and (b) typical Russian cursive hand of Lithuanian Rus', from the 16th and 17th centuries; (c) and (d) early 18th-century Russian civil hands.

transitional phase during which *poluustav* minuscules were tied together with small connecting lines, thus producing a pseudo-cursive script.

### Abbreviation Techniques

Abbreviations are a common feature of surviving graffiti and inscriptions on tombstones and household articles. Their use, motivated by sectarian or utilitarian

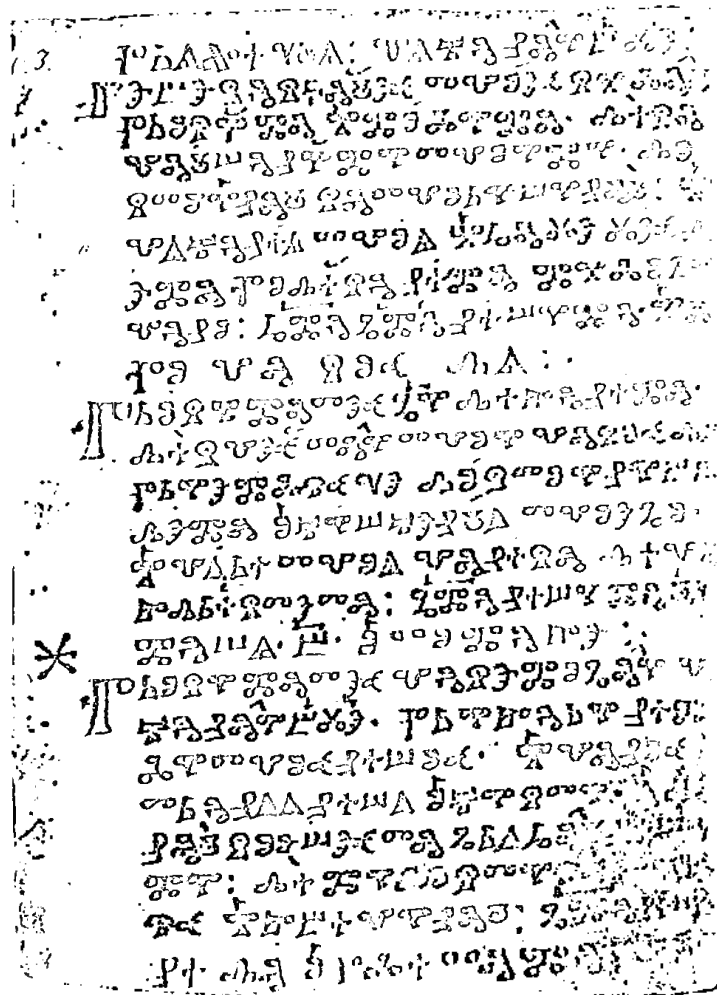


FIGURE 13. Page 3<sup>r</sup> of the Prague Glagolitic Fragments.

reasons, goes back to the very beginning of Slavic literacy. The scribes of both Cyrillic and Glagolitic manuscripts thoroughly exploited this device, and the texts of Russian and South Slavic manuscripts of the 11th through the 16th centuries—not to mention the decorative headlines written in *viaz'*—remain almost completely unintelligible to a reader not versed in the technique.

The basic principles and technique of abbreviation in Cyrillic and Glagolitic manuscripts show a striking similarity—if not identity—thus making possible a simultaneous investigation of the topic in both systems.

Paleographers generally agree that the scribes of the early Russian and South Slavic manuscripts were influenced by the Greco-Latin techniques of contraction, suspension, and *sigla*. It should be noted, however, that after the easing of the sectarian control and formalism of the 10th–14th centuries, and about the time of the introduction of *poluustav*, Slavic scribes and copyists displayed remarkable inventiveness and creativity in the application of the Greco-Latin techniques to the peculiarities of their own language.

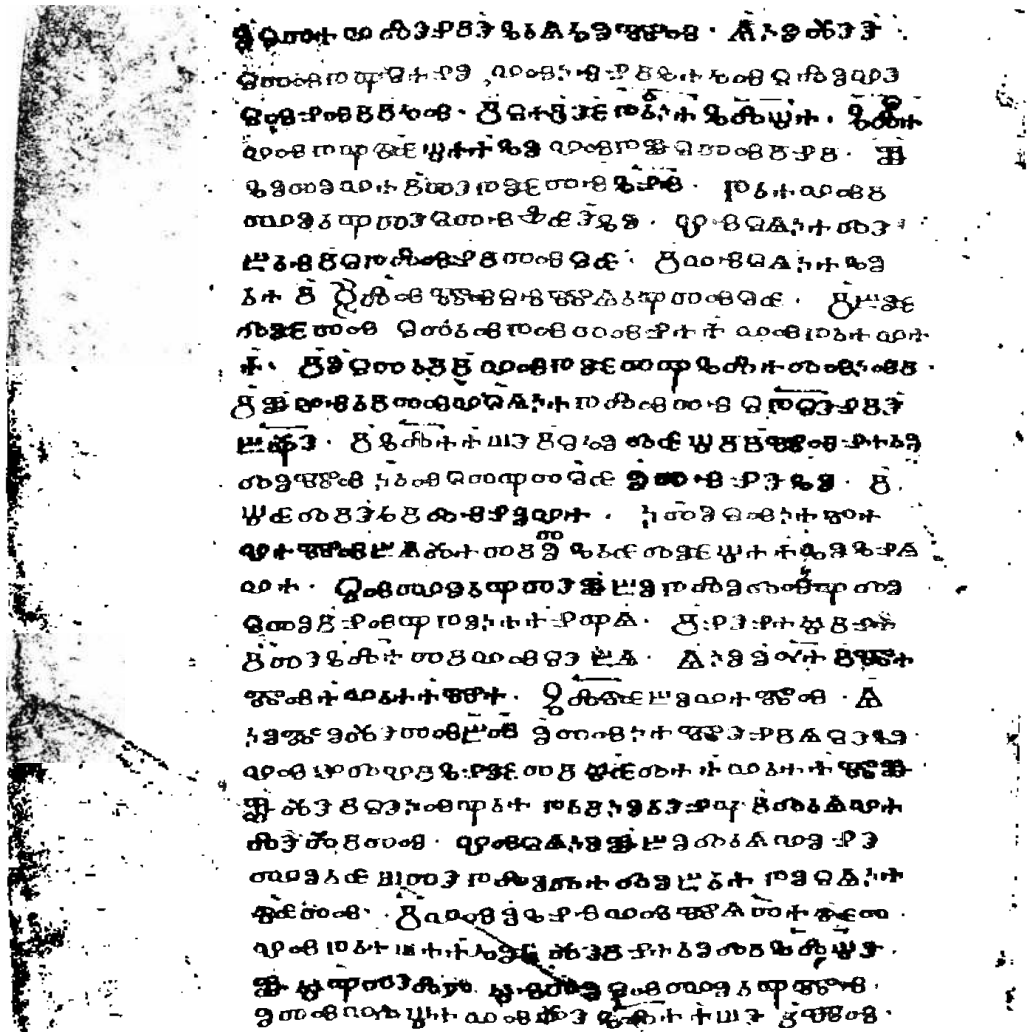


FIGURE 14. Page from the Glagolitic Assemani Codex.

GRECO-BYZANTINE AND LATIN SYSTEMS

The basic abbreviation systems of Greco-Byzantine, Latin, and medieval West European manuscripts can be identified as:

1. Single letter abbreviations, or *sigla* (*singulae litterae, litterae singulares*)—the ancient form of Latin abbreviation in which the initial letter represents a word, thus being an extreme form of suspension.
2. Abbreviation by suspension, or *abbreviatio per suspensionem*—the ancient Greek system based on the omission of the end of the word or of some letters from its body together with the ending. The abbreviated word thus was represented by its first letter with an abbreviating dash ( $\mu$ ), or by several letters, in which case the letter immediately preceding the omitted part was marked by a horizontal stroke above it ( $K\bar{\alpha}$ ) or was over-written ( $\epsilon\bar{\circ}$ ). In certain cases two letters were over-written in the same manner ( $\tau^{\epsilon\kappa}$ ). The Greek word for the horizontal



FIGURE 15. Page from the 14th-century Glagolitic Vatican Missal.

stroke indicating an abbreviation was *TITAOI* (see the use of *TITAOI* with numerals).

3. Abbreviation by contraction, or *abbreviatio per contractionem*, in which words are shortened by the omission of letters from the body, retaining the beginning and the end (e.g.,  $\overline{\alpha \nu \varsigma} = \alpha \nu \rho \omega \pi \omega \varsigma$ ). The sign of contraction was a horizontal stroke placed above the letters representing a word. From the ninth century the sign of contraction gradually changed its shape and turned into a waved line (—) or was formed with hooks at the ends (← →).

Contraction was a Christian system of abbreviation. It was widely used in the Septuagint translation of the Old Testament, in the earliest vellum codices, and in other theological writings. Being one of the peculiarities of the Greek uncial codices, it claims special attention from the Slavic paleographer as it is beyond reasonable doubt that the early Greek and Byzantine copies of the Scriptures served as sources and models for the South Slavic and Russian translators and amanuenses.

4. Abbreviation by over-written letters, or *abbreviatio per litteras superpositas*, when a small letter written above the word represents the omitted syllable or ending (e.g.,  $\overline{\lambda} = \lambda\epsilon\pi\tau\acute{o}\varsigma$ ;  $\overline{t} = \text{tres}$ ). This system could also be considered as a peculiar combination of the techniques of suspension and contraction. There are many variants of this approach.

5. Abbreviation by superimposition of letters, or *ligatura*. Depending on the number of letters combined, it can be primary ( $\mathcal{P}, \mathcal{B}, \mathcal{F}$ ), secondary ( $\mathcal{ME}, \mathcal{PH}, \mathcal{NE}$ ), tertiary ( $\mathcal{MNH}, \mathcal{F}\zeta = \mathcal{VTE}\zeta$ ), etc., ligature. In the case of primary ligature, two letters are simply superimposed. In secondary, tertiary, and other ligatures, two, three, or more letters share certain lines, thus forming an indivisible unit.

## CYRILLIC AND GLAGOLITIC SYSTEMS

The general adoption of a new abbreviation system is usually connected with the spread of a new script suitable to accommodate the innovation. This statement is also valid in the case of Glagolitic and Cyrillic writings.

### *Abbreviation by Contraction*

In the earliest manuscripts written in *ustav*, the technique of abbreviation by contraction was predominant. This system—just as in the Byzantine uncial book-hand—was first applied to the “sacred names.” The fragment of the 11th-century *Ostromir Gospels* (1057) shown in Figure 16 is indicative of the frequency of use of contracted forms of sacred names by Slavic scriptoria.

Because they are the earliest abbreviations used equally in canonical and secular manuscripts and inscriptions, Slavic versions of sacred names deserve special attention from the paleographer. The circumstances and reasons behind their use, their identical application in Glagolitic and Cyrillic manuscripts, the consistency in the translation of Greco-Byzantine techniques, and, last but not least, certain rules of the early scriptoria concerning these abbreviations—all these factors demand interest.

A comparison of the traditional 15 Greek sacred names with their Glagolitic and Cyrillic counterparts suggests direct borrowing from Greco-Byzantine sources.

Besides the use of contracted forms of sacred names following the Greek models, the 11th and 12th centuries also witnessed the introduction and spread of other abbreviated words modeled after Latin manuscripts.

A third group of abbreviations was soon added to the repertoire of Slavic scrip-

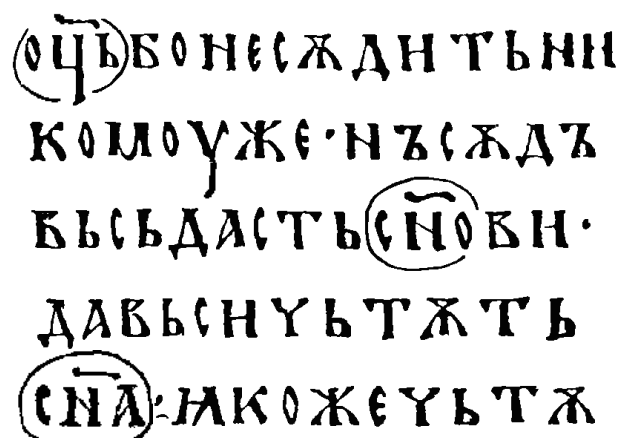


FIGURE 16. Fragment of the 11th-century Ostromir Gospels (1056–1057). The circles indicate "sacred names" abbreviated by contraction.

toria. They were contracted forms of words created independently from the Greek and Latin models. It is in this category that the first discrepancies between Cyrillic and Glagolitic abbreviation systems can be traced: the number of original Slavic contractions in the 11th and 12th centuries is approximately ten times higher in Cyrillic than in Glagolitic manuscripts. The selection of words also differs. E. E. Granstrem found that certain abbreviations were common to both the Cyrillic and Glagolitic writings, and that some occurred only in Glagolitic and others only in Cyrillic manuscripts (492).

Original Slavic abbreviations by contraction used in Cyrillic and in Glagolitic manuscripts, and those used in Glagolitic manuscripts alone, are shown in Table 2.

The growth of differences between Glagolitic and Cyrillic writings in general and between their abbreviation systems in particular truly reflected the changes in the function of those writings. Cyrillic writing soon ceased to be the property and privilege of a small group of literati associated with the church, and it became widely used by men of trade, artisans, builders, potters, and businessmen. This development brought about the addition of several new abbreviations representing words which belonged mostly to the professional vocabulary of various trades.

At the same time, in the South Slavic territories and especially in Croatia, Glagolitic writing basically remained the tool of the church and continued to be used for the primary purpose of disseminating biblical literature and other ecclesiastical texts. Its dependence on Latin led to the introduction of a large number of contracted forms of Latin words (e.g.,  $\overline{\text{P}}\overline{\text{Q}} = \text{P}\overline{\text{Q}}\overline{\text{R}}\overline{\text{S}}\overline{\text{T}}$ , i.e., epistola;  $\overline{\text{P}}\overline{\text{Q}} = \text{P}\overline{\text{Q}}\overline{\text{R}}\overline{\text{S}}$ ,  $\text{P}\overline{\text{Q}}\overline{\text{R}}\overline{\text{S}}$ , i.e., psalmus;  $\overline{\text{B}}\overline{\text{W}} \overline{\text{B}}\overline{\text{A}}\overline{\text{W}} \overline{\text{B}}\overline{\text{E}}\overline{\text{W}} = \overline{\text{B}}\overline{\text{A}}\overline{\text{W}}\overline{\text{P}}\overline{\text{Q}}\overline{\text{R}}\overline{\text{S}}\overline{\text{T}}$ ,  $\overline{\text{B}}\overline{\text{E}}\overline{\text{W}}\overline{\text{P}}\overline{\text{Q}}\overline{\text{R}}\overline{\text{S}}\overline{\text{T}}$ , i.e., responsorium;  $\overline{\text{W}}\overline{\text{P}}\overline{\text{Q}}\overline{\text{R}}\overline{\text{S}}\overline{\text{T}}$   $\text{P}$   $\overline{\text{W}}\overline{\text{P}}\overline{\text{Q}}\overline{\text{R}}\overline{\text{S}}\overline{\text{T}}$  =  $\overline{\text{W}}\overline{\text{P}}\overline{\text{Q}}\overline{\text{R}}\overline{\text{S}}\overline{\text{T}}$ ,  $\text{P}$   $\overline{\text{W}}\overline{\text{P}}\overline{\text{Q}}\overline{\text{R}}\overline{\text{S}}\overline{\text{T}}$ , i.e., sexta, ad sextam, and others).

These additions, being technical terms coded in Glagolitic characters but retaining their original Latin bases, represented considerable difficulty even to a well-versed reader.



The 13th through 17th centuries did not produce any significant changes in the number of words abbreviated by contraction. Although certain new abbreviations appeared in the decorative headlines written in *viaz'*, they should be considered as highly individual creations which have very little to do with the generally used contractions in the text proper. The stagnation can be partly ascribed to the development of *poluustav* and later of *skoropis'* (Slavic cursive), which could accommodate new abbreviation techniques more efficiently.

The tradition of the use of abbreviations by contraction survived all changes in the Cyrillic and Glagolitic writing systems. It was handed down from generation to generation of scribes and can be traced in *ustav*, *poluustav*, and cursive manuscripts from the 10th through 17th centuries. Slavic incunabula also abound in words abbreviated by this technique.

#### *Abbreviation by Over-Written Letters*

The second, and probably the most important, Slavic abbreviation system is abbreviation by over-written letters. The earliest documented instances of the use of this technique go back as far as the 11th century. By the time of the general adoption of *poluustav* (a script which is characterized by the copious application of abbreviations), that is, by the middle of the 14th century, the use of abbreviation by over-written letters was predominant.

The technique essentially is the same as the one used in Greek and Latin: certain letters are omitted entirely and others, mainly those representing consonants, are taken from the body of the word and placed above it. Each over-written letter is then covered with a *titlo* with the shape of a semicircle or inverted V ( $\frown$ ,  $\wedge$ ).

The fragment of the *Ostromir Gospels* (1056–1057) shown in Figure 17 illustrates the use of abbreviations by over-written letters in the 11th century, that is, at a time when the amanuenses still strictly adhered to the guiding rules of the technique.

The ever-growing popularity of this system from the very beginning of its use was first noticeable in codex titles, chapter headings, marginal notes, and postscripts by the scribes. Later, an increasing number of abbreviations by over-written letters modeled after Greek and Latin usage appeared in the texts proper. By the 11th and 12th centuries, original Slavic abbreviations were added to this

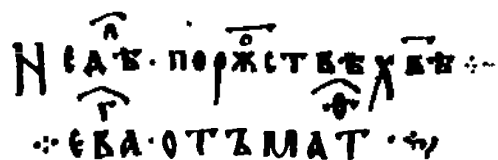


FIGURE 17. *Fragment of the Ostromir Gospels (p. 294<sup>v</sup>) illustrating abbreviations by over-written letters in their earliest form.*



category. They (just as the abbreviations by contraction) show a definite capability of Cyrillic writing to accommodate the new technique within the indigenous tongue.

Being one of the major labor-saving devices of Slavic scriptoria, the system of abbreviation by over-written letters was subjected to constant attempts aimed at its further simplification. The omission of *titlo* from above the over-written letter was one step in that direction.

The abbreviated form of the word  $\text{O T}$  appears to be the first case when *titlo* was intentionally abandoned or combined with the over-written  $\text{TT}$ .

Around the 14th century there are examples of a similar combination of *titlo* with over-written  $\Delta$ , and by the beginning of the 15th century, this practice became generally accepted in both *poluustav* and cursive scripts ( $\Delta$ ,  $\Delta$ ).

As time progressed, the pressure on scribes to speed up their writing increased. By the middle of the 15th century, in *ustav* and *poluustav* scripts the attempts to keep abreast with the new demands resulted in the combination of *titlo* with the over-written  $\mathcal{K}$ ,  $\mathcal{З}$ ,  $\mathcal{M}$ , and  $\mathcal{X}$ ; in the early 16th century, with the letters  $\mathcal{Б}$ ,  $\mathcal{Г}$ ,  $\mathcal{И}$ ,  $\mathcal{К}$ , and  $\mathcal{H}$ ; and later, with  $\mathcal{A}$  and  $\mathcal{P}$ .

The 15th-century northwestern, or Moscow, cursive script developed special signs for over-written  $\Delta$ ,  $\mathcal{K}$ ,  $\mathcal{З}$ ,  $\mathcal{M}$ ,  $\mathcal{X}$ , and  $\mathcal{T}$ ; and in the 16th century, signs for over-written  $\mathcal{Б}$ ,  $\mathcal{И}$ ,  $\mathcal{A}$ ,  $\mathcal{M}$ ,  $\mathcal{H}$ , and  $\mathcal{X}$  were added.

While *ustav* and *poluustav* versions of  $\mathcal{T}$  and  $\Delta$ —having common lines with *titlo*—readily lent themselves to combination with that sign ( $\mathcal{T}/\Delta$ ), a similar treatment of letters like  $\mathcal{Б}$ ,  $\mathcal{K}$ ,  $\mathcal{З}$ ,  $\mathcal{К}$ ,  $\mathcal{M}$ , and  $\mathcal{H}$  became possible only as a result of the exceptional adaptability of the 16th- and 17th-century cursive script and of the apparent inventiveness of scribes.

The style of over-written letters and the ways they are combined with *titlo* may be of some help in the dating of manuscripts and manuscript fragments.

There is great variety among Glagolitic manuscripts in the extent of their use of abbreviations by over-written letters. In the *Codex Assemani* and the *Codex Sinaiticus*, they occur both in chapter headings and in the text proper; whereas in the *Codex Zographiensis* they appear only in marginal notes. In the *Kiev Fragments* and the *Glagolita Clozianus* they are hardly used at all.

The curious absence or restricted application of the technique may be the result of a number of causes. Glagolitic letters—with the few exceptions of  $\text{†}$ ,  $\text{Ů}$ , and  $\text{Ш}$ —are not particularly suitable for the creation of abbreviations by over-written letters: their structure is involved and equally unsuitable for simplification and for reduction in size; for example,  $\text{Ѧ}$ ,  $\text{Ѧ}$ ,  $\text{Ѧ}$ ,  $\text{Ѧ}$ ,  $\text{Ѧ}$ ,  $\text{Ѧ}$ ,  $\text{Ѧ}$ , and  $\text{Ѧ}$ . This statement can be supported by the fact that within the small group of over-written letters, the characters  $\text{†}$ ,  $\text{Ů}$ , and  $\text{Ш}$  are the ones most frequently used.

Another reason for the relative scarcity of over-written letters in Glagolitic manuscripts could be the conservative influence of the Catholic Church. This is most vividly demonstrated in the execution of manuscripts of Croatian origin.

### *Sigla*

Single letter abbreviation, or *sigla*, never gained wide popularity and use in Slavic manuscripts. Chaev and Cherepnin noted that this relatively rare technique was mainly applied in scribes' notebooks and other noncanonical texts (493). *Sigla*, a typically Latin abbreviation system, was closely connected with the uncial script. The Slavic counterpart of uncial, however, shows clear indication of being based on a Greco-Byzantine script which never applied single letter abbreviations extensively. Thus, the few abbreviations of this type in Slavic manuscripts could be considered as original creations of Slavic scribes rather than parts of a system modeled after the Latin usage.

Certain single letter abbreviations—usually consisting of the first letter of the word they represent—are conventional signs rather than abbreviations in the generally accepted sense of the word. Slavic *sigla* is indicated by a circle. Its meaning is not strictly defined and can be determined only from the context. Some examples of this rare technique are: Ⓐ = АВОР , Ⓑ = БО АВОРЕ , Ⓐ = АΔΒΚΔ , and Ⓜ = МОНАСТЫРЬ .

The task of decoding Slavic *sigla* is made even more complicated by another, closely related practice. According to this, letters of the Glagolitic and Cyrillic alphabets are used to represent words which are described by the special names of the former. The letter Λ, for example, was called ΛЮΔИ(people), and there are instances when that letter stands for the word ΛЮΔИ in the text. The Austrian National Library has a 15th-century Glagolitic Codex which contains a considerable number of single letter abbreviations of this type (494): on page 23 of the codex, line 1, Ⓐ , denoting Ⓐ Ⓝ Ⓝ Ⓝ Ⓝ ; on page 3, line 7, Ⓐ denoting Ⓐ Ⓝ Ⓝ Ⓝ Ⓝ ; on page 32, line 20, and page 115, Ⓐ denoting Ⓐ Ⓝ Ⓝ Ⓝ Ⓝ on page 26, line 5, Ⓐ denoting Ⓐ Ⓝ Ⓝ Ⓝ Ⓝ ; on page 141, line 7, Ⓐ denoting Ⓐ Ⓝ Ⓝ Ⓝ Ⓝ , and others.

### *Abbreviation by Suspension*

Another relatively rare Slavic abbreviation system is abbreviation by suspension. In this a word is represented by its first letter or by several letters taken from its beginning. The letter symbol may be accompanied by one or more over-written characters. Although abbreviation by suspension was a typical Greco-Byzantine technique, it had very little impact on Slavic writing. This can be explained by the fact that the system of abbreviation by suspension had a relative decline during the early vellum period, that is, at a time when the Christian uncial script with its typical abbreviation system—abbreviation by contraction—was predominant.

There are many indications that Greco-Byzantine codices of the latter era served as models for the scribes of Slavic scriptoria.

Vajs pointed out that, although Gardthausen considered abbreviation by suspension a pre-Christian technique, Capelli in his dictionary succeeded in gathering a considerable number of abbreviations of this type used in the Christian era (495).

Some examples of Cyrillic and Glagolitic abbreviation by suspension are as follows:  $\overline{\text{TO}} = \text{ТОГО}$ ,  $\overline{\text{ПY}} = \text{ПУСТОШЬ}$ ,  $\overline{\text{P}} = \text{PЭНДЭНЭЕ}$ ,  $\overline{\text{QbA}} = \text{QbAЭЭЕ}$ ,  $\overline{\text{Q}} = \text{QЭЕЭЭЭЭ}$ ,  $\overline{\text{X}} = \text{X+W+WЭP+}$ ,  $\overline{\text{bA}} = \text{bAШPЭPЭ}$ ,  $\overline{\text{v}} = \text{vЭPЭvЭ}$ , and  $\overline{\text{G}} = \text{GЭЭЭPЭЭ}$ .

### Ligatura

This abbreviation by the superimposition of letters was scarcely used in pre-14th-century Slavic manuscripts. The rare examples of its occurrence are indicative of the ad hoc utilitarian creations of the scribes rather than of a well-established and developed technique. In the *Ostromir Gospels* (1056–1057), for example, the elements of the diphthong  $\text{OY}(\text{ou})$  are combined in a ligature  $\text{Y}$  at the end of certain lines, mostly because of lack of space.

The 14th century brought a considerable increase in the speed and amount of writing. Among the methods of accelerating writing in *poluustav*, *ligatura* occupies a relatively important position.

Some frequently used ligatures in 14th- and 15th-century hands are:  $\Delta + \text{K} = \text{K}$ ;  $\Delta + \text{B} = \text{B}$ ;  $\Delta + \text{P} = \text{P}$ ;  $\Delta + \text{N} = \text{N}$ ;  $\Delta + \Gamma = \text{N}$ ;  $\Lambda + \text{Y} = \text{Y}$ ;  $\text{H} + \text{b} = \text{Hb}$ ;  $\omega + \text{P} = \text{P}$ ;  $\text{C} + \text{E} = \text{C}$ ;  $\text{T} + \text{B} = \text{B}$ ;  $\text{T} + \text{P} = \text{P}$ .

The 17th century witnessed the introduction of a particular ligature, the use of which persisted for generations. It was the combination of the letters  $\omega$  and  $\Gamma$  in the bond of  $\text{C}$ .

In Glagolitic manuscripts, *ligatura* was a popular way of abbreviating words, and it was used much more widely than in the Cyrillic. It dates back to the oldest surviving monuments of Glagolitic writing. Ligatures of all types can be found in the *Codex Assemani*, the *Kiev Fragments*, the *Macedonian Fragments*, the *Vienna Fragments*, *St. Tekla's Fragment*, and in the *Lublin Book of Homilies*.

Ligatures are the typical and the most natural abbreviations in any cursive script. In 17th-century Cyrillic cursive writing, many of the combinations of over-written letters with the last letter of the word proper tend to develop into ligature-type characters, if not actual ligatures.

This technique flourished in Cyrillic *viáz'*, which has *ligatura* and *pseudo-ligatura* as two of its basic elements.

## VIAZ', OR INTERLACED WRITING

*Viaz'*, or interlaced writing, as it was practiced by medieval Slavic amanuenses and early Slavic printers, is essentially a concentration of abbreviations, mainly of ligatures and pseudo-ligatures, resulting in a decorative mode of writing.

*Byzantine Prototypes*

The artistic principles and basic techniques of interlaced writing (*viaz'*) were first developed in Byzantine scriptoria. Sometime during the late 13th century, the innovation was adopted by Slavic amanuenses of the Balkan Peninsula, who were subsequently responsible for the introduction of *viaz'* to their Russian counterparts in the years of the so-called Second South Slavic Influence.

Apart from serving as the model for Slavic *viaz'*, Byzantine interlaced ornamental writing may carry some potential clues as to the beginnings of Russian literacy and the intensity of Byzantine cultural impact on Russia during the most crucial centuries of that country's history.

In Byzantium, the intellectual renaissance which had begun in the second half of the ninth century brought about the advent of the Second Golden Age, with an unparalleled revival of book arts. This period was marked by the so-called neoclassical style in manuscript decoration and illumination.

Byzantine interlaced writing flourished in the 12th century. During the 13th century the technique began to display unmistakable signs of stagnation and corruption. This resulted in a gradual decrease in the frequency of its use during the 14th and 15th centuries. By the early decades of the 16th century, interlaced writing almost completely disappeared from the treasury of artistic devices of the Byzantine school.

*The Slavic Renaissance of Viaz'*

In spite of its relatively short-lived career in the repertoires of Byzantine and Italian scriptoria, interlaced writing strongly influenced the work of Southern Slavic and Moldavian illuminators. After its adoption in the late 13th century by the Slavs of the Balkan Peninsula, the rather unimaginative and drab prototypes underwent a remarkable change. Artistically inclined medieval Serbian, Bulgarian, and Moldavian calligraphers—whose creative talents for centuries had been frustrated by traditionalism and by the ossified form and content of contemporaneous church-centered literature—soon turned the rudimentary Greek techniques into an elaborate artistic endeavor (see Figure 18).

*Styles of Viaz'*

The popularity of interlaced writing among South Slavic and Moldavian scribes soon led to the crystallization of three clearly distinguishable styles: the geometrical, floral, and intermediate. The latter was a balanced combination of geometrical letter designs and delicately applied floral ornamental elements. Of the

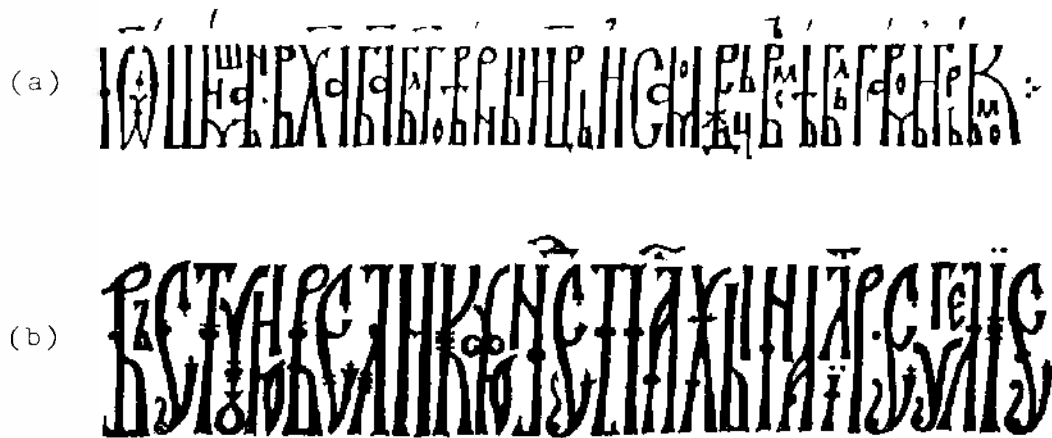


FIGURE 18. (a) *Viaz'* in the 14th-century Bulgarian charter issued by Tsar Ioann Shishman. The text in *viaz'* is the tsar's official title. (b) *Viaz'* headline in the 15th-century Russian Book of Gospels (Moscow State Historical Museum Collection). The codex was copied from a Serbian original.

three styles, the geometrical design was most closely related to the angular style developed by the Byzantine progenitors of the technique. These three styles were brought to Russian territories in the 14th century, during the intensification of cultural exchange between the Southern Slavs and the Russians.

In codices, charters, and on the title pages of printed books, *viaz'* is usually displayed in a single straight line, while on household articles and objects of art it is applied in the form of a waving band which follows the configuration of the particular object.

Within the space assigned to interlacing, the text usually reads from left to right or (in the case of "shelved" letters) from top to bottom. Though this statement is valid for the majority of cases, there are exceptions where the calligrapher displays such a tour de force in the use of artistic freedom offered by this technique that the text may be deciphered only by those who know its content in advance.

The height of *viaz'* in many cases is indicative of the approximate date of the writing or carving of the text. While in Byzantine codices the Shchepkin number hardly ever exceeded the value of 3, in the case of Russian *viaz'* it gradually grew from 3 to 4 in the 15th century, to 4 through 8 in the 16th, and to 10 through 12 in the 17th century (496).

Although certain late 14th-century Russian manuscripts undeniably reflect the impact of the "second Southern Slavic influence," including the application of elements of *viaz'*, it took 100 years for the innovation to be fully understood and assimilated by the Russian amanuenses. In the process of learning and adoption, a number of remarkable centers of this art developed (Pskov, Novgorod, Tver', and the Trinity-Saint Sergius Monastery in Zagorsk, near Moscow); and, in addition, a kind of regionalization of styles occurred. Though each of these styles was based on one of the prototypes inherited from the Slavs of the Balkan Peninsula, they displayed an ever-increasing number of new and original characteristics. During the 16th century the assimilation of these traits led to the establishment of at least three

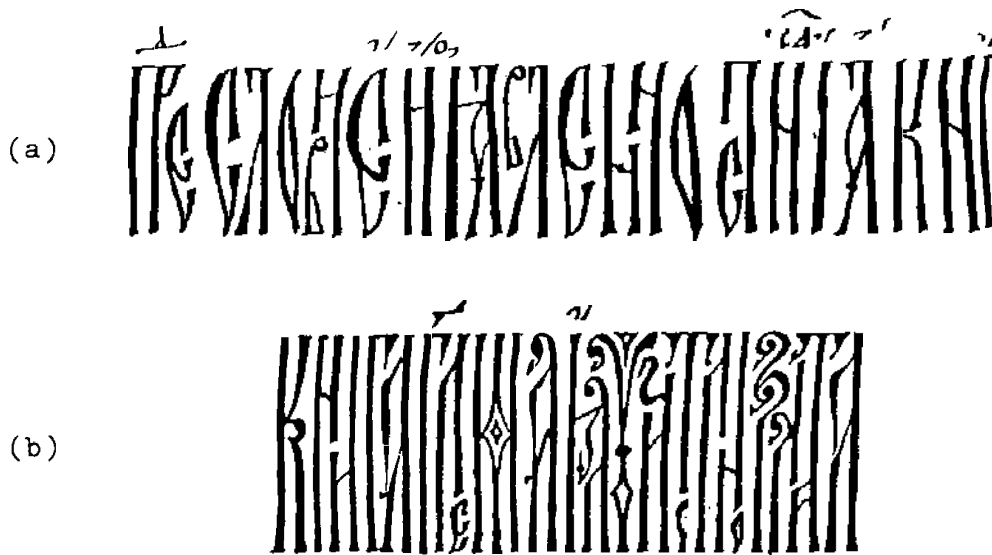


FIGURE 19. *Pskov viaz'*: (a) late 15-century, (b) mid-16th century. *Viaz'* (a) is indicative of the tendency to introduce restrained curves in the down strokes, while *viaz'* (b) demonstrates both the slight curves in the down strokes and the ornamental effect achieved through the application of fractured ligatures.

Russian schools which demonstrated notable inventiveness and independence for a period of nearly 80 years. Two of these schools, Pskov (see Figure 19) and Novgorod (see Figure 20), were situated in the northwestern part of the country, and one, Moscow (see Figure 21), in the center of the developing empire.



FIGURE 20. *The development of the Novgorod viaz'*: (a) 1436; (b) 1477; (c) 1537; (d) 1552.



FIGURE 21. Two examples of 16th-century Moscow *viaz'*.



FIGURE 22. *Viaz'* headline in the 19th-century copy of the Book of the Apocalypse illustrating the peculiarities of the *Pomorskaia viaz'*, or *viaz'* of the Pomor'e, of the Russian Old Believers.

By the last decade of the 16th century the Moscow school had absorbed almost all the peculiarities of the Pskov and Novgorod styles. In fact, this exchange of techniques was mutual. At the end of the reign of Fedor Ivanovich (1584–1598) and especially in the first quarter of the 17th century, there was a more or less uniform Russian style of *viaz'*, which in its further development successfully drew on the inventiveness and resources of all schools and individuals. Experts unanimously consider the 17th century as the golden age of Russian *viaz'*.

The middle of the 17th century was marked by the spread of the so-called rectilinear, or *fractura*, style, which transformed the curves and loops of various letters into straight, long “masts.” The blank spaces between the characters were usually filled with minute, grasslike ornamental designs.

The Shchepkin number of the late 17th-century *viaz'* often reached the high values of 10 through 11½.

The tradition of interlaced writing in the 18th and 19th centuries was carried on by the diligent scribes of the sect of Old Believers. Their *viaz'* stemmed from the late 17th-century Moscow rectilinear style and was generally called *Pomorskaia viaz'* (interlaced writing of the Pomor'e). The frequent application of “half-mast” ligatures, the changing of “half-masts” into “masts” in some letters, the introduction of peculiar decorative elements, the oblique cut in letters, and other features make the *viaz'* of the Pomor'e highly complicated and difficult to read (see

Figure 22). Shchepkin, and later Chaev and Cherepnin, distinguished between an 18th-century "old" and a 19th-century "new" *viaz'* of the Pomor'e (497).

Brief mention should be made here of the problem of the use of *viaz'* in Glagolitic manuscripts.

As far as the increase in the size of characters in titles and headlines is concerned, the earliest Glagolitic manuscripts—such as the *Assemani* and *Zograph Gospels* and the *Euchologium* of Mount Sinai—closely followed the pattern set by Byzantium. Furthermore, the use of abbreviations which could have served as components of *viaz'* was not infrequent in the body of Glagolitic texts. However, the very structure of Glagolitic letters prevented the development of a Glagolitic *viaz'*.

### Numeral Notations and Dates

#### NUMERAL NOTATIONS

Prior to the 9th–10th centuries A.D., the Slavs used notches as the means of recording quantities. As late as the 11th century, notches on various household articles, measuring instruments, and containers persisted, either alone or in addition to the fairly new numeral notations based on the Cyrillic alphabet.

The introduction of the new system of symbols representing numerals must have taken place between the 8th and 10th centuries and it coincides basically with the advent of literacy among various Slavic nations. Most extant early Slavic monuments of writing include numerals.

The recent successes of archaeologists at Tmutorokan and in Novgorod and Moscow have produced a vast number of objects with writing and, in particular, with numeral notations on them. This has given a new stimulus to the investigation of the topic by mathematicians and linguists.

#### *Glagolitic Numeral Notations*

In Glagolitic writing, numerals were represented by the first 27 letters of the alphabet. Thus,  $\text{Ш}$ ,  $\text{Ж}$ ,  $\text{А}$ , and  $\text{Р}$  were not used as numeral notations. The sequence of letters in the alphabet has been preserved (see Figure 23).

As in the Greek system, we have three groups of symbols, each with nine units. These represented numbers from 1 to 9, 10 to 90, and from 100 to 900, respectively. One thousand was represented by the notation  $\text{Ѡ}$ .

The scarcity of surviving Glagolitic monuments of writing prevents us from establishing the system of notations used in the case of numbers higher than 2,000. The most obvious place to look for the components of such a system would be the dates of early manuscripts. However, the oldest dated Glagolitic manuscripts are those written in the square Croatian hand and dated according to the Christian Era, as opposed to the so-called World Era used in Cyrillic manuscripts. Consequently, numerals higher than 2,000 were not used in the dates of Glagolitic manuscripts.

Numbers higher than 1,000 were usually described in words; and 10,000 was in-



†	= 1	Ⲡ	= 10	ⲃ	= 100
Ⲓ	= 2	ⲡ	= 20	Ⲅ	= 200
ⲓ	= 3	Ⲣ	= 30	ⲅ	= 300
Ⲕ	= 4	ⲣ	= 40	Ⲇ	= 400
ⲕ	= 5	Ⲥ	= 50	ⲇ	= 500
Ⲗ	= 6	ⲥ	= 60	Ⲉ	= 600
ⲗ	= 7	Ⲧ	= 70	ⲉ	= 700
Ⲙ	= 8	ⲧ	= 80	Ⲋ	= 800
ⲙ	= 9	Ⲩ	= 90	ⲋ	= 900

FIGURE 23. *Glagolitic numeral notations.*

licated as *t'ma*, or darkness—that is, a number or quantity beyond comprehension (cf., the Greek *myriad*,  $\mu\upsilon\rho\iota\omicron\iota$  or  $\mu\upsilon\rho\iota\alpha\varsigma$ ).

Sometimes the sign Ⲩ (and) was placed between the numeral notations, for example, ·ⲃ· Ⲩ ·ⲣ· Ⲩ ·Ⲕ· Ⲩ ⲠⲡⲢⲣⲤⲥⲦⲧ [sic] = 144,000.

Numeral notations consisting of two or more digits were formed by means of combining various signs (see Table 1)—that is, ·†Ⲡ· = 11, ·ⲒⲠ· = 12, ·Ⲩ†· = 21, ·ⲨⲒ· = 22, and ·ⲔⲒⲠ· = 1,012.

In the oldest Glagolitic manuscripts, in the case of notations from 11 to 19, the symbols representing the units precede those denoting tens. Thus, in the *Codex Marianus* (Luke 9:17) we find  $\overline{\text{ⲒⲠ}}$  denoting 12.

A clear demonstration of Greek (Byzantine) influence can be seen in the use of horizontal strokes (*titlo*) above the letters denoting numerals and in the application of one or several dots separating numeral notations from the rest of the text.

In Glagolitic manuscripts, one, two, or three dots are usually to be found on both sides of the letters denoting numerals. The use of these dividing dots is often combined with the use of *titlo* or several horizontal strokes above the notations. The so-called *Kiev Fragments* contained several good examples illustrating combinations of dots with *titlo*. On page 4<sup>v</sup> we find :Ⲕ̄: . , on page 3<sup>r</sup> . Ⲓ̄ . , on page 5<sup>v</sup> . Ⲩ̄ . , and on page 5<sup>r</sup> . ⲕ̄ . .

#### *Cyrillic Numeral Notations*

The system of Cyrillic numeral notations shows a strong direct or indirect Greek (Byzantine) influence.

From the very beginning of their literacy, most Slavic nations used an alphabetic system of numeral notations. This was based on the letters of the Cyrillic alphabet. However, only the symbols borrowed from the Greek were used. They strictly followed the order of the Greek alphabet (see Figure 24).

А = 1	І = 10	Р = 100
В = 2	К = 20	С = 200
Г = 3	Л = 30	Т = 300
Д = 4	М = 40	У = 400
Е = 5	Н = 50	Ф = 500
З = 6	Ѡ = 60	Х = 600
И = 7	О = 70	Ѳ = 700
Н = 8	П = 80	Ѡ = 800
Ѡ = 9	У = 90	Ѡ Ѡ = 900

FIGURE 24. Cyrillic numeral notations.

All the other numbers were combinations of the symbols shown in Figure 24, or their combinations with special signs, for example, dots, strokes, brackets, circles, circles of dots, crosses, and so on.

The numbers 11 through 19 were represented by the combination of the unit notations with the symbol for ten (І = *i desiatirichnoe*). In this case the sequence of symbols followed the oral usage, that is, the notations of units preceded the symbol of ten. It should be noted here that this same order was applied by Greeks in Asia Minor.

From 20 through 90, the combination of tens with units again was fashioned after the oral usage: the notations of tens preceded those of units.





The hundreds (100–999) were represented by further letters of the alphabet and by their combinations with the notations of units and tens:  $\overline{С}$  = 200,  $\overline{Ф}$  = 500,  $\overline{Р} \overline{К} \overline{Ѡ}$  = 129,  $\overline{Т} \overline{Ѡ} \overline{З}$  = 367,  $\overline{Х} \overline{П} \overline{Д}$  = 684,  $\overline{А} \overline{Ѡ} \overline{Г}$  = 963, and  $\overline{Ѡ} \overline{У} \overline{Ѡ}$  = 999.



The thousands (1,000–9,999), following the Greek (Byzantine) model, were denoted by the notations for 1–9. The leftward-sloping, little stroke of Greek notation was changed into a powerful, long stroke which in most cases was crossed by one, two, or, rather seldom, by three short strokes; thus:  $\overline{Х} \overline{Л} \overline{Н}$  = 638,000 and  $\overline{Х} \overline{Л} \overline{Н}$  = 600,038.

The Cyrillic numeral notations go further than the highest documented Glagolitic numeral signs. Here, tens of thousands, which previously had been called *t'ma* or *tma* (darkness), were used as regular notations. They were represented by the symbols for units from 1 through 9 placed in a circle; thus:  $\textcircled{А}$  = 10,000,  $\textcircled{В}$  = 20,000, and  $\textcircled{Ѡ}$  = 90,000.



The values of hundreds of thousands (previously called *nevedie* or *nes'vedie*, meaning a number beyond human comprehension) were represented by the same notations but now in a circle of dots:  $\textcircled{\cdot} \textcircled{А}$  = 100,000,  $\textcircled{\cdot} \textcircled{В}$  = 200,000, and

$\textcircled{\cdot} \textcircled{З}$  = 700,000. They were called *legion* or *legeon*.

The millions, called *legiondr* or *leodr'*, were expressed by placing the same notations of units in a circle of short strokes or commas. Thus:  or   
 = 1,000,000 and  or  = 6,000,000.

In the case of tens of millions, called *voron'* or *vran'*, the notation appeared in a circle of small crosses thus:  = 10,000,000 and  = 50,000,000.

These clever ways of denoting numbers larger than *t'ma* (1,000) originated sometime in the 12th century.





New notations and signs introduced at a later period of time (but definitely before the 17th century) extended the limit to the area of 100,000,000. A new concept, that of *koloda*, was introduced. This was indicated by placing the notations of the units in brackets (  and  ).

A number of references, dating back to the 14th–16th centuries, clearly indicate that *koloda* (just as *neveidie* or *t'ma* in the 10th through 13th centuries) was considered to be beyond human comprehension. Shchepkin quotes an unidentified source: “bezchislennaia lezhit koloda, ei zhe bol'she nest' chisla i chlovekom' ot Boga utaeno; nevozmozhno bo est' chloveku tainu Bozhiiu vedeti” [uncounted rests koloda, there is no larger number than it and it is hidden from men by God; it is impossible for men to learn the secret of God] (498).

Two paleographers, Jagić and Karskii, have reported about further mathematical manipulations with *koloda*. Karskii also mentions expressions like *t'ma tem* and *desiat' kolod*, which he found in various manuscripts in the library of the Novgorod Sofia Cathedral. These references, however, would be meaningless without the consideration of the new numeral system which was gradually introduced in Russia during the 16th century. The new system distinguished between two separate methods of reckoning: by small numbers and by large numbers. The reckoning by small numbers meant essentially the use of the old numeral system and the notations described earlier. The reckoning by large numbers used a system in which *t'ma* (10,000) was redefined as 1,000,000 and the meanings of the other members of the old system of notations were changed accordingly. Thus *legion* meant  $10^{12}$ , *leodr* denoted  $10^{24}$ , *vran'* took the reader to  $10^{48}$ , and *koloda* represented  $10^{49}$ .

These astronomical figures were used very seldom in manuscripts—and each of the few cases should be considered as a tour de force on the part of the author rather than the application of a widely spread system. However, one should always remember the existence of these two systems whenever a numeral notation in the area of 100,000 or 1,000,000 is being dealt with.

Neither the Glagolitic nor the Cyrillic system of numerals had a special notation for zero.

In order to distinguish the Cyrillic numeral notations from the rest of the text, a horizontal stroke (*titlo*) was placed above each notation. In addition to this, dots were used on each side of the notation, separating it from the rest of the text and from the next symbol. If in a number consisting of several digits (  ·  ·  ·  ).

.Ѡ.Ѡ.Ѡ.). The notations of tens and units usually had one common *titlo* above them, in which case no dot was used to separate the symbols (ѠѠ). Following the Byzantine example, and mainly in the later period, all members of the notation were placed under one common *titlo* and between two dots.

The relative uniformity of the ways of indicating Cyrillic numeral notations, the consistency in the use of *titlo* above the notation, and the single dividing dots between the digits are in sharp contrast to the freedom and variety of practices found in Glagolitic writing.

The *titlo* above and the dividing dots on both sides of the numeral notations have been considered by most paleographers as a certain indication of numerals in texts originating from the 10th through the 18th centuries. This belief was supported by almost all surviving manuscripts of South Slavic and Russian origin.

However, excavations conducted in 1951 and the following years produced a considerable number of private documents, business contracts, letters, and notes, that is, documents dealing with everyday life. They are “originals” in the sense that they were not copied from Greek or Southern Slav models, as was the case with the church-related monuments of writing. These documents, written by impressions on birch bark, shed some light on the 11th–16th-century usage of numeral notations in everyday life. They indicate a clear preference given by the man of the street of that era to writing out the names of numerals rather than using notations. Even when numeral notations were used, they tended to be restricted to the symbols for the units 1 to 9 and for the tens from 10 to 40. Larger numbers and those consisting of units and tens tended to be spelled out (see Figure 25).

The recently discovered documents also show that, although dots separating numeral notations from the text were regularly used, the *titlo* above them was not; in a number of documents it was completely omitted.

Cyrillic numeral notations were used as the elements of the numerous cryptogrammic systems which flourished in the 14th through 17th centuries.

Arabic numerals—the introduction of which in the West was connected with the

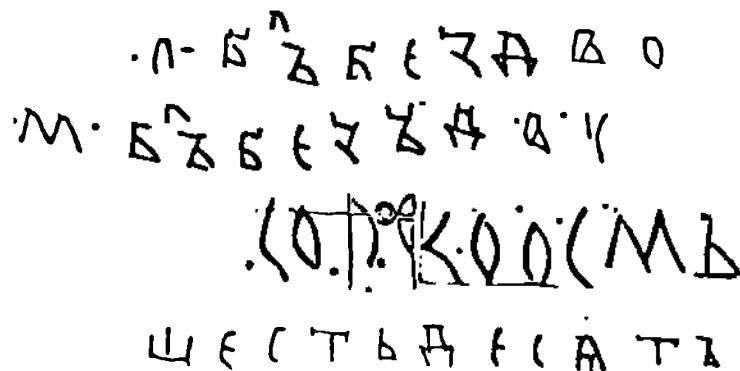


FIGURE 25. Numeral notations in 11th–16th-century birch bark documents.

bitter fight between the abacists and algorithmists of 12th-century Europe—made rather slow headway in Russia and in other countries of Eastern Orthodoxy. The Orthodox Church, in its resistance against the Polish Catholic influence, banned all Western manuscripts. In addition to ecclesiastical literature, manuscripts and manuscript books on astronomy, mathematics, “star counting,” and geodesy were also kept out of the country for several centuries. The ban on books seriously delayed the spread of the use of Arabic numerals.

## DATES

Most of the pre-15th-century Slavic documents were undated. In state documents from the middle of the 15th century, the date followed the text; while in deeds, *gramoty*, and other legal manuscripts, it was to be found on the first page, preceding the text proper. Codices might include various dates in their texts, but it was most unusual for a medieval Russian author or chronicler to give the exact time of the writing and the completion of the work of copying. Fortunately, scribes did not follow the same practice, and many Slavic codices have a more or less elaborate colophon in which the scribe painstakingly recorded the date on which he undertook the task of copying and also the date when the work was finished (see, for example, the colophon of a copy of Upyr' Likhyi's 11th-century *Prophets*, or that of the *Ostromir Gospels*).

Slavic dates usually began with the words *v' leto* (i.e., in the year or *anno*), a routine expression in use from the very beginning of Slavic literacy through the end of the 15th century. This introduction of a date was common in Russian as well as in Southern Slavic texts written in Cyrillic or Glagolitic characters. The close of the 15th century brought about a change: while *v' leto* invariably remained in use among the Southern Slavs, its occurrence in Russian manuscripts became a rather unusual phenomenon and was generally restricted to ecclesiastical and literary works. By the dawn of the 17th century, the presence of *v' leto* even in church manuscripts can be considered an archaism.

Figure 26 illustrates variants of dates in Slavic writings of the 10th through 15th centuries.

During the 16th century, in Russian manuscripts of Muscovite origin, the expression *v' leto* was gradually replaced by the word *leta*, which about the end of that century became a standard way of introducing dates by most Russian scribes. Neither the origin nor the exact time of the adoption of this usage is known to us.

The expression *v' leto* (*ou leto*, *pod' lety*, *leta*, or *roku*) was sometimes followed by a reference to the era. Thus, the Slavonic version of the Greek ἄπο κτίσεως κόσμου [from the creation of the world] appeared occasionally as part of a date, from the advent of Slavic literacy up to the early 18th century. For example, in Tsar Samuil's inscription (933 A.D.), which is one of the oldest known Slavic monuments of writing, we read “(v) leto ot' s'tvo (renia) miro (u)” [in the year . . . from the creation of the world; see Figure 26 (a)]. Other variants to be found in different Slavic manuscripts and incunabula are: “ot' sozdaniia



mira"; "v' leto sozdaniia miru"; "ot' sozdaniia Adamlia"; "v' leto mirosozdaniia"; "mirosozdaniia v' leto"; and "ot' nachala mira," or, as Patriarch Filaret used it in the closing sentence of his May 5, 1621, letter to King James I, "leta ot' sozdaniia miru."

A reference in each date to the Byzantine era (a calendrical system widely adopted and used) soon must have proved to be superfluous and was often omitted by the hard-pressed scribe.

When dates were given according to the Christian era, the year might be preceded by a brief reference to that effect. For example, in the document concerning Prince Fedor Rostislavich's judgment of 1284 in the case of the German bell, the date reads "si zhe gramota psana bys ishchlo bylo ot' rzhstva gna do sego leta . . ." [up to this year that this document was written . . . years have passed since the birth of the Lord].

This review of Slavic numeral notations and dates would not be complete without a brief consideration of medieval Slavic chronology.

### *Eras*

The main system of reckoning time (or era) used in ancient Russian texts was first established by the seventh-century Byzantine *Chronicon Paschale*, or *A Summary of the Ages from Adam the First Man to the 20th Year of the Reign of the Most August Heraclitus, and the 19th Consular Year of His Son Constantine, the Third Indiction*. The anonymous author of the *Chronicon* began his huge compilation of chronological data with March 21, 5507 B.C., which he regarded as the date of the creation of the world. The listing of events, based on the best sources then available (Sextus Julius Africanus, the Bible, Eusebius, Malalas, the *Fasti Consulares*, *Annales Consulares*, Epiphanius of Cyprus), ends with the year 629 A.D. This work is considered to be the first attempt at a chronology of the so-called Byzantine, or Roman, era—a system which was subsequently adopted by the Greek Church and, from the 10th century, by the Orthodox Church of Russia.

A second system of time reckoning was handed down to the Slavs through their religious and trade contacts with the West. This was based on the Christian, or Dionysian, era and gained ground first of all in Slavic territories that neighbored on Western Catholic states (e.g., Smolensk, Polotsk, and Galitsia) or that experienced the cultural impact of the centralizing tendencies of the medieval papacy and Venice (e.g., Croatia and its provinces, such as Bosnia and Dalmatia). We do not need to go far for examples to illustrate this statement. The earliest Slavic private document, a deed of purchase dated 1189 A.D., was issued by the Bosnian Ban Kulin, and its Russian counterpart, a 1351 deed of purchase, originated in Galitsia. The various trade agreements between the princes of Smolensk and the coastal town of Riga—among them the oldest Russian text of an international agreement between Russians and a foreign partner—were all dated by the A.D. system. Finally, there is the fact that all known Glagolitic manuscripts, that is, Slavic works written in an alphabet used mostly by the Southern Slavs, followed the Christian era in their dates.

The Dionysian era, or the era "ot' rozhdestva Khristova" (*ab incarnatione domini*), was officially adopted in Russia by Peter I's decree of December 20,

1699. According to the tsar's *ukaz*, the year 7208 of the Byzantine era was to be replaced by the year 1700 A.D.

*Styles*

The first problem the paleographer has to solve when confronted with a date given in the Byzantine era is to find the equivalent year of the Christian era. Since the starting point of the *Chronicon Paschale* is known to us (March 21, 5507), the computation itself would appear to be simple mathematics, that is, the subtraction of 5508 from the Byzantine year. However, soon one will encounter instances when this method produces some puzzling results. For example, in the Lavrent'ev version of the *Kiev Chronicle*, the annalist reported that in October 6634, Metropolita Nikita consecrated a bishop and in March "of the same year" he died. This seemingly contradictory chronological sequence of events indicates that the year in ancient Russia, just as in Rome and in the Byzantine Empire, did not begin with the first day of January.

As a matter of fact, before 1700 A.D. there were two different calendrical styles known to the Russians: the so-called March style and the September style. In Slavic manuscripts originating from the 11th through 15th centuries, both styles were used alternatively but with a clear preference shown toward the March style. From the close of the 15th century, however, in Russian manuscripts the latter was completely replaced by the September style.

Before taking a closer look at the March and September styles of the Byzantine era and at the methods of their conversion to the January style of the Christian era, one should note that the division of the Julian year into months, as revised by the Emperor Augustus, was invariably in force in the Byzantine Empire and in Russia and that it was far from being affected by the various calendrical styles. One could also add that the Julian method of counting the days within the 12 months of the year—of any style—has prevailed up to the present time.

According to the March style, the year begins with March 1 and ends with the last day of February. This means that if it were superimposed over two consecutive

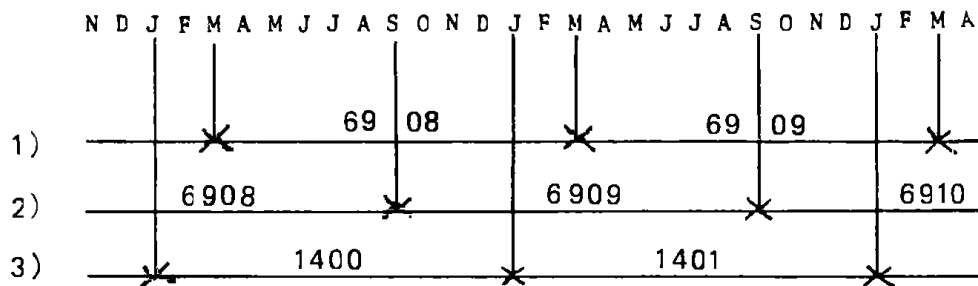


FIGURE 27. Superimposition of the months of the March style year (first line) and the September style year (second line) over the months of two consecutive years, January style (third line). This graphic presentation demonstrates the problem related to the making of concordances for dates expressed in these styles.



years of the January style (see Figure 27), ten of its months (i.e., March through December) would coincide with the same months of one year of the January style calendar. The last two months (i.e., January and February), however, would correspond with the January and February months of the following year, January style.

According to the September style, the year begins with September 1 and ends with August 31. By applying the principles discussed in the preceding paragraph we can easily write the rule for the conversion of a date given in September style, Byzantine era, into a date of January style, A.D. If the date includes any month from September through December, then 5509 should be subtracted from the Byzantine year. In the case of the months from January through August, 5508 is the subtrahend (see Figure 27).

While discussing styles, it seems opportune to mention briefly the so-called New Style—a name for the reformed calendar introduced by a bull of Pope Gregory XIII in 1582. In order to eliminate the 10-day discrepancy between the Julian calendar and the solar year, the new calendar removed 10 days from the year 1582, so that October 15 followed immediately upon October 4.

This desirable reform was proposed at an unfortunate time, when religious and political feuds were so bitter that even a measure so universally advantageous was not regarded objectively as a mere matter of chronological accuracy, and it was rejected by a number of states, including Russia. Thus, from the 16th century it became customary to call the dating of documents by the Julian calendar “Old Style” and by the Gregorian calendar “New Style.”

In addition to the new chronological concept of these styles, Pope Gregory's reform also introduced a 10-day difference between the two calendrical systems: in the 16th and 17th centuries the New Style was 10 days ahead of the Old Style which was used by the Russians, among others. This difference—as a result of the larger frequency of leap years in the Julian calendar—increased to 11 days in the 18th century, 12 days in the 19th, and to 13 days in the present century. When dates of the March or September style, Byzantine era, are converted to January style, A.D.—between 1582 and 1918—this difference in the number of days also has to be taken into consideration.

### *Indiction, or Indikt*

In the dates of early Slavic manuscripts the year is often followed by a brief reference to the so-called *indiction* (indication) year, or *indikt*. This addition makes the dates more precise and is often the only clue to the solution of problems resulting from the complicated system of calendrical styles.

The Slavs apparently borrowed their method of reckoning *indiction* from Constantinople. The Greek or Constantinopolitan system grouped the years of the Byzantine era into a series of 15-year cycles. The cycles—just as the Byzantine new year and the Roman civil year—began with September 1 and were unnumbered. The *indiction* (indication) year was a figure denoting the place occupied by the year in an unspecified cycle of 15 years.

For a year in the Byzantine era, the *indiction* is found by means of a simple com-

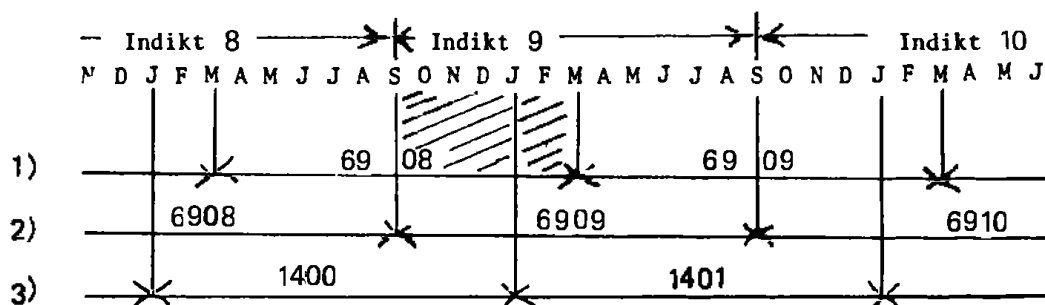


FIGURE 28. Graphic presentation of the relationship between the number of the year in the Byzantine era and the indikt number in a medieval Synaxarion. The first line denotes March style, Byzantine era; the second line indicates September style, Byzantine era; and the third line is January style, A.D.

putation: the number of the Byzantine year is divided by 15, and the remainder is the *indiction*. When the remainder is zero, the proposed year is the 15th in the cycle.

Since the cycle of *indiction* always began with September 1, the computation of the *indikt* for a September style date in the Byzantine era should not present any difficulties. If, however, there is a discrepancy between the actual *indikt* in a manuscript and the one computed by the paleographer, this might indicate that the scribe applied the March style.

Figure 28 shows that a year, March style, always began in the middle of the span of an *indikt* dividing the latter into two equal parts, or, in the words of the *Primary Chronicle*, “na poly.” Consequently, the first 6 months of the year, March style (i.e., March–August), fall in one *indikt*, and the others (i.e., September–February) coincide with the first half of the next, higher *indikt* (see the shaded part of the year 6908, March style).

Besides the era, calendrical style, and the cycle of *indiction*, or *indikt*, there were several other devices used by medieval Slavic authors and scribes for reckoning time. The most frequently occurring components of medieval dates were: the year (according to the Byzantine and Christian eras), the *indikt*, the *epact* (the 19-year lunar cycle), the solar cycle (covering periods of 28 years), and reference to the regnal year.

We make no attempt to describe here the other, more involved or less frequently used, chronological methods and tools (for instance, the large *indiction*; the golden number, or *numerus aureus*; the *vrutseleto*, or dominical letters; the Paschal tables) and the various ways of determining the exact days of past events. The discussion of these systems is the subject of specialized works on chronology.

### Materials Used to Receive Writing

One cannot establish with certainty whether the ancient Slavs made regular use of classical or “primitive” writing materials such as leaves, stone, metals, clay tablets, *ostraka*, or papyrus.

## WAX TABLETS

Excavations conducted in the 1950s by A. V. Artsikhovskii and others have brought to light a number of objects which suggest that a revived form of the ancient waxed tablet was used, probably for practicing writing, in the 12th through 14th centuries in medieval Russian cultural and economic centers such as Novgorod (204).

## BARK

There had been vague references to the use of birch bark as a writing surface by the people of ancient Russia, but the first material proof to support such information was not found until the Artsikhovskii excavations at Novgorod in 1951. From the time of the modest start at Dmitrievskaia Street, the number of birch bark documents unearthed has steadily grown, and similar finds have been reported from Pskov, Riazan', Smolensk, and other places.

Caches of medieval private documents discovered in different cultural strata indicate that the use of the bark of trees had been routine in the lives of Novgorod men of the street of the 11th through 14th centuries. The texts include "horn-book"-type alphabets on birch bark; lists of numbers from 1 to 40,000, apparently used as educational aids by schoolchildren; letters written by humble citizens, craftsmen, and merchants; "I owe you" notes and birthday greetings; and trade contracts, bills of sale, and invoices. The lighter side of medieval Novgorod life is represented by children's drawings (see Figure 29), puzzles, and word games.

On the average, Russian birch bark scrolls measure 8 to 10 inches in length and 2 to 3 inches in width. They accommodate three to six lines of text consisting of up to 200–250 characters (see Figure 10). The almost standard size of the scrolls was achieved by trimming the bark fragments on both ends.

The rather crudely shaped *ustav* letters were produced by scratching the smoothed inner surface of a birch bark fragment with a bone, wooden, or metallic implement, probably called a *pisalo*.

Known instances of writing with ink on birch bark are extremely rare. However, the use of birch bark as a writing surface was not restricted to ancient times. From the 16th to the late 18th centuries, a lack of means to purchase paper, or occasional shortages of that commodity in some remote parts of Siberia, resulted in sporadic revivals of the old practice of writing on birch bark. These texts, as a rule, were written with ink. Cases of relatively modern use of birch bark as a writing surface have been reported in the literature, and the Bibliothèque Nationale has an original report written on birch bark by the governor of Kamchatka in 1768.

## PARCHMENT

The standard writing surface used for medieval Slavic codices and official documents was parchment.

The fine quality of the pages in 11th-century Slavic codices suggests that the

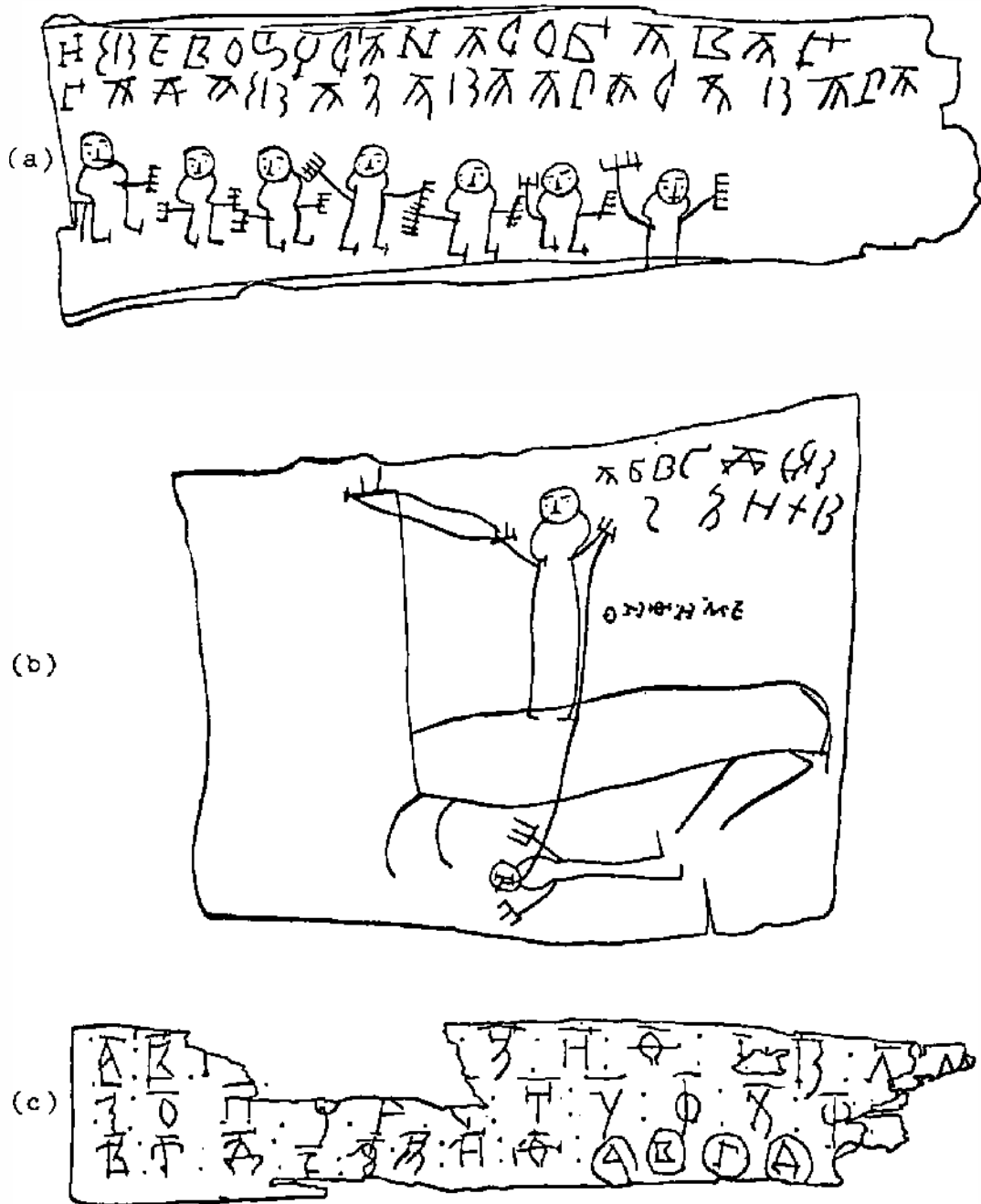


FIGURE 29. Alphabet, numeral notations, and children's drawings on birch bark, unearthed by A. V. Artsikhovskii in Novgorod: (a) is object No. 206, the "portraits" of little Onfim and his friends; (b) is object No. 200, the beginning of the alphabet and the self-portrait of little Onfim posing as a warrior; and (c) is object No. 342, a 14th-century list of numeral notations from 1 to 40,000. (Source: V. L. Ianin, *Ia poslal tebe berestu . . .* Izd-vo Moskovskogo universiteta, Moscow, 1965).

amanuenses used imported parchment. Some authors point to Greece and to the German Hansa merchants as possible sources of that scarce commodity. The almost forbidding price (often referred to in colophons and marginal notes of codices), the continuous use of birch bark for many centuries by private citizens, and the noticeable decline in the quality of parchment following the appearance of Russian-made sheets on the market—all seem to support this theory.

Russian parchment was prepared principally from the skins of calves. Hence, the ancient Russian name for documents written on parchment—*teliatina*. Other words denoting parchment were *kozha* (“skin”), *mekh* (“hide” or “fur”), and *khartiia* or *kharatia* (“charta”). The term *pergamen* or *pergament*, obviously derived from the classical *Περσδαμηνή*, or *charta Pergamena*, was introduced in Russia at a more recent time and is an apparent borrowing from West-Russian or Polish usage.

The Slavic parchment maker’s work of washing, liming, scraping, stretching, and rubbing with pumice and chalk seems to have been almost identical with the ancient process applied by the Greeks and Romans.

Well-made parchment was soft, thin, white, and smooth. Traces of pulverized chalk, an appearance of greasiness or opacity, and round or elliptical holes in the leaf were some of the typical shortcomings of poor quality parchment. The holes resulted from attacks by warbleflies on the animal and from nicks made in the skin prior to processing. Defective parchment was often used by Russian scribes, obviously for reasons of economy.

The finest sort of vellum—abortive, or “uterine,” vellum in particular—was virtually unknown in medieval Russia. So were the extravagant practices of producing sumptuous literary and liturgical codices written in gold or silver upon vellum stained with purple and other colors.

Finally, it might be interesting to note that, in contrast to South Slavic practices, methods of economy such as the use of palimpsest or the mixed application of paper and parchment leaves in codices never became part of the routines of Russian amanuenses.

## PAPER

The first documented instances of the use of writing paper in medieval Russia date from the mid-14th century. The oldest extant document on paper is the undated charter of Prince Vasilii Davidovich of Nizhnyi Novgorod (d. 1345), and the most ancient surviving Russian codex written on paper is a volume of the *Sermons of Isak Sirin* dating from 1381.

However, the transition from the use of parchment to the full adoption of paper was a long and gradual process, and it was not until the late 16th century that the use of parchment became restricted to ceremonial texts.

The Russians made several unsuccessful attempts to organize their own paper industry. Negotiations by Tsar Ivan IV to secure the services of the Saxon Hans Schlitte failed. Evidence concerning the manufacture of paper in a 16th-century paper mill on the River Ucha, near Moscow, should be interpreted in the light of

the report by the Italian Rafael Barberini, who visited Russia in 1565 and found that Russian-made paper was not usable for writing (499).

Thus, in spite of the documented existence of several 17th-century paper mills—such as the one in the Monastery of the Caves at Kiev, another near Moscow under the management of Vasiliï Burtsov, one on the River Pakhra (1655–1692?), and another on the River Iauza (1673–1682?)—for a considerable period of time, extending well into the 18th century, paper was imported in large quantities from abroad. The extracts listed in Table 3, from the records of the White Sea port of Arkhangel'sk, support this statement.

The main sources of imported paper can be established with certainty from watermarks in Russian medieval documents and codices. Early trade contacts with Central Asia and the etymology of certain words connected with the paper business have led to speculations by some authors concerning the import of that commodity from Central Asia and Persia. However, the results of a study conducted by N. P. Likhachev have proved that Russian paper import relied solely on the markets of West Europe (500). And indeed, watermarks show that paper came to Russia from Italy (14th century), from France (late 14th through 17th centuries), from Germany (15th century), and from Holland (17th and 18th centuries). England, though herself an importer of paper until the late 17th century, contributed to Russian paper import by reexporting foreign-made paper through Arkhangel'sk.

Organized and effective paper production was established in Russia by Peter I. In the late 17th and early 18th centuries Peter I built, at government expense, the Bogorodskoe (1705–1776), the Krasnoe Selo (1714–1844), and the Saint Petersburg (1723–1727) paper mills, and he promoted the establishment of other mills in Ugod'e (1718) and in Polotniannyi Zavod (1721–1872). During the years which followed the tsar's death, another five paper mills were put into operation. The history of these mills is told by the watermarks they created and used (see Figure 30).

Two clearly distinguishable kinds of paper were imported and used by the Russians: *bombitsina* and *bumaga*.

TABLE 3  
Examples of Paper Shipments Received at Arkhangel'sk, 1585–1673<sup>a</sup>

Year	Nationality of ship	Origin of paper	Quantity (reams)
1585	English	French	400
1588	English	French (?)	6,000
1621	English	?	1,990
1639	Dutch	Dutch	10,000
1671	various	various	28,472
1672	various	various	3,709
1673	various	various	8,033

<sup>a</sup> Source: N. P. Likhachev, *Paleograficheskoe znachenie bumazhnykh vodianykh znakov*, "V. S. Balashev i Ko," Saint Petersburg, 1899, Vol. 1, p. 17.

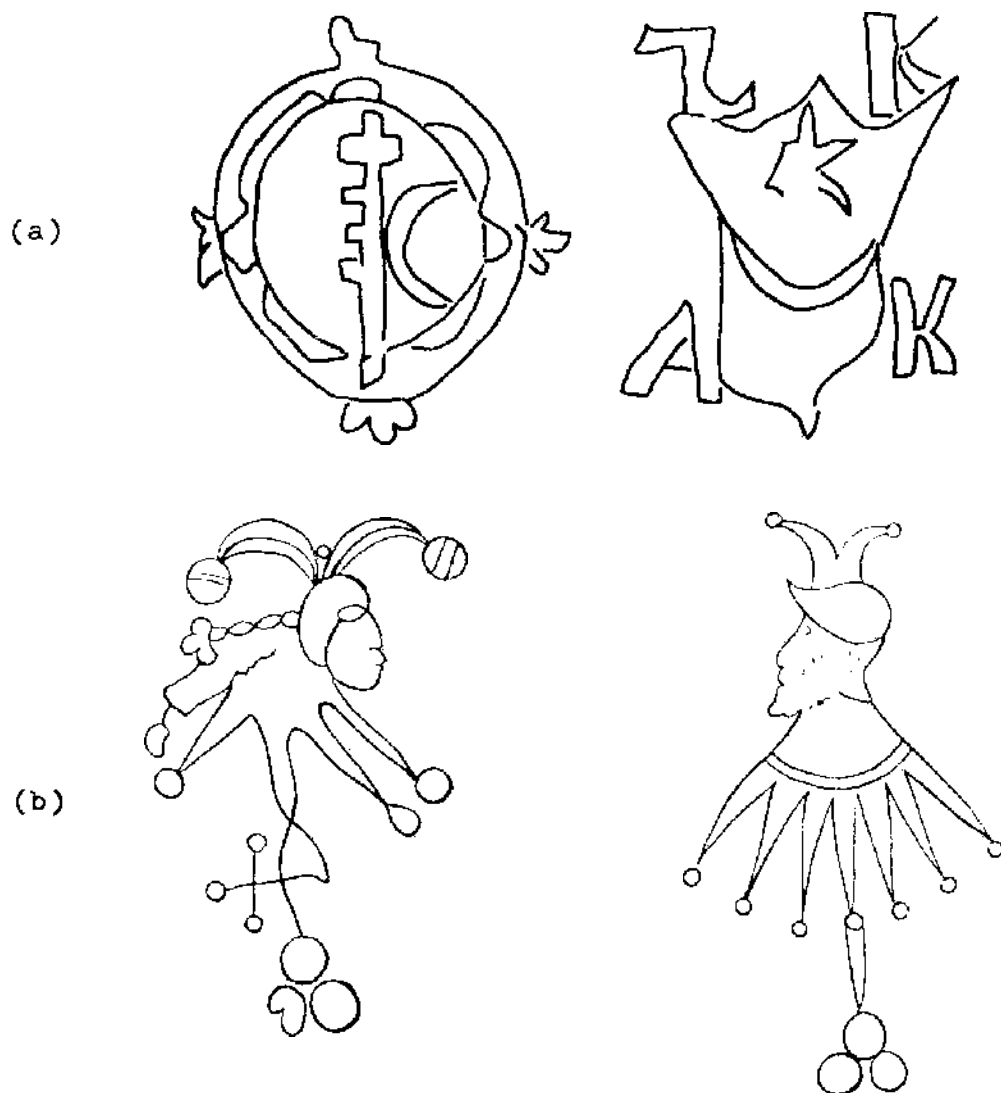


FIGURE 30. Typical watermarks in paper of Russian manufacture (17th and 18th centuries): (a) watermarks used by E. Pletenetskii (left) and Z. Kopystenskii (right) at the paper mill belonging to the Kiev Monastery of the Caves (early 17th century); (b) Russian watermarks modeled on Dutch designs (17th century).

*Bombitsina* was a coarse, thick, soft paper with spots, inadequately treated fibers, and marks of the glazing bone on its glossy surface, and it was for many years the center of heated controversy. Some believed that the word *bombitsina* originated from the name of the Syrian town Bambyce and that it stood for a certain kind of paper made from linen rag. However, microscopic analysis of the fibers of a 13th-century manuscript written on *bombitsina* has revealed that the leaves were produced from cotton fibers. Hence, the name *bombitsina* seems to have originated from  $\beta\omicron\mu\beta\upsilon\varsigma$ , the Greek word for cotton, rather than from the name of the town Bambyce.



FIGURE 30 (continued). (c) Russian watermarks (18th century).



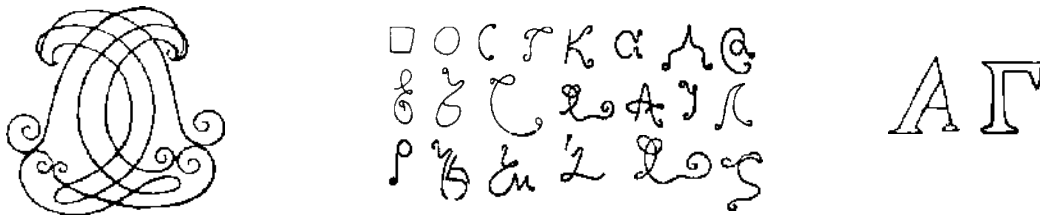


FIGURE 30 (continued) (d) *Vatman's marks in paper manufactured in the mill of Afanasii Goncharov.*

No Slavic manuscripts written on *bombitsina* are known to paleographers.

*Bumaga* is a general term for paper and has been used by the Russians from medieval times to date. This word presents a puzzle for linguists because it is the only term used by a Slavic nation to denote paper that has no relation to the ancient word "papyrus."

For details on Russian and Ukrainian papermaking and watermarks, the reader is referred to the excellent works by V. N. Shchepkin, N. P. Likhachev, S. A. Klepikov, Z. V. Uchastkina, M. V. Kukushkina, I. Kamanin, and O. Vitvit'ska (93–97, 216–220, 222–227); and, on imported European paper and its history, to C. M. Briquet and D. Hunter (501).

The problem of dating manuscripts by watermarks and by the position of the chain lines needs to be mentioned here briefly. Although many watermarks carry an indication of the year when the particular batch of paper was produced, this date might lead to errors. Errors may result from the time gap between the actual production of the paper and its use by the scribe or printer. The problem of such delay is especially acute in the case of medieval Russia, where paper imported from distant countries was regularly used.

A method of estimating dates by the position of the chain lines in imported paper has been offered by N. P. Likhachev (94, 95). As far as dating by watermarks is concerned, the approach developed by V. N. Shchepkin (and widely used by the State Historical Museum in Moscow) might be helpful. The system considers the marginal dates for the particular manuscript and allows a 10-year correction (i.e., 5 on each side of the mean); thus, for the period 1470–1510:  $1470 + 1510 = 2980$ ;  $2980/2 = 1490$ ;  $1490 - 5 = 1485$ , and  $1490 + 5 = 1495$ . The suggested dates are within the range 1485 and 1495.

### Format of Slavic Manuscript and Printed Materials

Medieval Russian manuscripts were executed in one of the following forms: a single oblong sheet of parchment or paper ("list"), with the text confined to the flesh side; a roll, or *rotulus*, with sheets of parchment or paper sewn or pasted together head-to-tail and rolled into a continuous cylinder (*svitok* or *stolbets*); a quire of 2, 4, 8, or 16 leaves (*tetrad'*); and the book form (*kniga*).

Quires of three sheets (folio in 6's) have occurred, but they are considered rare.

TABLE 4  
 Medieval Russian Book Formats, with Their Modern  
 Russian and Western Equivalent

Medieval format	Modern Russian format	Symbol	Western format
v destnyi list	list (raskryti)*	none	open leaf
v dest'	listovaty format	1°	in folio
v poldest'	v chetverku	4°	in quarto
v chetvert'	v vos'mushku	8°	in octavo

\*Note that a parchment leaf was only about one-half the size of a paper sheet.

The most popular was the 16-page (octavo) quire, which was subsequently handed down to early Russian printers and is the standard format to date.

The format of parchment codices was determined largely by the size of the available sheets, a circumstance resulting in an infinite variety of sizes.

With the advent of paper, a certain tendency toward standardization of formats occurred. The size of a sheet of handmade paper was basically limited by the measurements of the mold used. Since the size of the mold was, for practical reasons, determined by the average arm's length of the vatman, human engineering aspects had a standardizing influence on the end product.

Medieval Russian bookmen had their special terms for each of the more easily identifiable formats (see Table 4). It should be noted, however, that even within these categories there existed a considerable tolerance in the actual sizes of books. This soon resulted in attempts to define at least some of the most often occurring odd formats by terms such as "v malyi dest'," meaning small sheet, and so on.

Russian manuscript codices did not have pagination, and only the leaves were marked. This was done by means of special notations using certain characters of the alphabet. The system of foliation was subsequently borrowed by 16th- and 17th-century Russian printers.

As far as the positions of watermarks and the direction of chain lines are concerned, ancient Russian manuscript and printed quires seem to comply with the general principles described in standard Western sources such as Briquet and McKerrow (501, 502).

#### NOTES AND REFERENCES

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2. I. I. Sreznevskii, *Slaviano-russkaia paleografia XI-XIV vv.: Lektsii chitannye v imperatorskom S.-Peterburgskom universitete v 1865-1880 gg.*, Tip. V. S. Balasheva, St. Petersburg, 1885, p. 6.
3. In this case the analysis of the hand of a slanderous anonymous letter was used as evidence against Nikita Maslov; see I. F. Kolesnikov, "Ekspertiza 'podmetnogo pis'ma,'"

- Trudy Moskovskogo gosudarstvennogo istoriko-arkhivnogo instituta*, 7, 209–222 (1954).
4. One of the Ivanovskaia Ploshchad' street scribes acted as an expert when the 17th-century court tried the case of two feudal landlords both claiming the right of ownership of two serf girls. The "writing expert" established a number of forgeries in the documents submitted by one of the parties; see A. I. Iakovlev, *Kholopstvo i khology v Moskovskom gosudarstve XVII v.*, n.p., Moscow, 1943, Vol. 1, pp. 349–350.
  5. The Russian original is known as *Pomorskie otvety* (1723) or, in its earlier version, as *Diakonovskie otvety* (1719).
  6. The title of the Russian original reads *Sobornoe deianie na eretika armenina na mnikha Martina*. The document is now part of the manuscript collection of the Moscow State Historical Museum.
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83. N. A. Marks and I. F. Kolesnikov, eds., *Sbornik snimkov s russkogo pis'ma XIII–XVIII vv: Izdanie Moskovskago Arkheologicheskago instituta: Pod. red. N. A. Marksa i I. F. Kolesnikova* [A Collection of Facsimiles of 13th- Through 18th-Century Russian Writing], n.p., Moscow, 1908.

84. I. F. Kolesnikov and V. K. Klein, eds., *Sbornik snimkov s russkogo pis'ma XI–XVIII vv: Izdanie 2: Pod red. I. F. Kolesnikova i V. K. Kleina* [A Collection of Facsimiles of 11th–18th-Century Russian Writing], 2 parts; Part 1 edited by I. F. Kolesnikov and Part 2 by I. F. Kolesnikov and V. K. Klein.  
This was in fact the second, enlarged edition of the *Sbornik* published in 1908.
85. E. F. Karskii, . . . *Obraztsy slavianskago kirillovskago pis'ma s X po XVIII vek: Izd. 2*, Tip. Varshavskago uchebnago okruga, Warsaw, 1902.  
First edition published in 1901 in Warsaw; the third edition, in 1912, also in Warsaw.
86. P. A. Lavrov, ed., *Paleograficheskie snimki s iugo-slavianskikh rukopisei bolgarskago i serbskago pis'ma: Vyp. 1, XI–XIV v.*, Izd. S. Peterburgskago arkheologicheskago in-ta, [St. Petersburg, 1905].
87. P. A. Lavrov, *Paleograficheskoe obozrenie kirillovskago pis'ma* [A Paleographical Review of Cyrillic Writing], Vol. 4, Pt. 1 of *Entsiklopediia slavianskoi filologii* (I. V. Iagich, ed.), Tip. Imperatorskoi Akademii nauk, Petrograd, 1914.  
Supplement: *Prilozhenie k Vyp. 4.1–4.2: Al'bom snimkov s iugoslavianskikh rukopisei bolgarskago i serbskago pis'ma*, Tip. Imperatorskoi Akademii nauk, Petrograd, 1916.
88. Leningrad, Publichnaia biblioteka, *Paleograficheskie snimki s nekotorykh grecheskikh, latinskikh i slavianskikh rukopisei Imperatorskoi publichnoi biblioteki*, [Tip. V. O. Kirshbauma], St. Petersburg, 1914.  
Explanatory text on Slavic manuscripts by N. M. Karinskii, "Izdanie Imperatorskoi publichnoi biblioteki."
89. N. M. Karinskii, ed., *Obraztsy pis'ma drevneishego perioda istorii russkoi knigi . . . K pechatii prigotovil i vvodniu stat'iu snabdil prof. N. M. Karinskii*, [Izdat. Akademii nauk SSSR], Leningrad, 1925.
90. N. M. Karinskii, ed., *Obraztsy glagolitsy: 25 avtotipicheskikh snimkov s rukopis'nykh i pechatnykh pamiatnikov i transkriptsiiia tekstov kirillovskimi bukvami: Izdanie Imperatorskago Arkheologicheskago instituta pod redaksiei N. Karinskago*, Sinodal'naia tip., St. Petersburg, 1908.
91. *Viaz'* is a combination of decorative writing and abbreviations based on the extensive application of ligatures. Shchepkin, in the German translation of his definitive study about *viaz'* called it "Ligaturschrift," i.e., ligature writing. Considering the decorative aspects of this style, the names "decorative ligature" or "interlaced writing" appear to be more descriptive and exact.
92. I. P. Laptev, *Opyt v starinnoi russkoi diplomatike, ili sposob uznavat' na bumage vremia, v kotoroe pisany starinnyia rukopisi, s prilozheniem risunkov Vologodskago kuptsa Ivana Lapteva*, v Tip. Departamenta narodnago prosveshcheniia, St. Petersburg, 1824.  
Plates printed on both sides; 28 plates are included.
93. S. A. Klepikov, *Filigrani i shtempeli na bumage russkogo i inostrannogo proizvodstva XVII–XX veka*, Izd-vo Vsesoiuznoi knizhnoi palaty, Moscow, 1959, p. 118.
94. N. P. Likhachev, . . . *Bumaga i drevneishiia bumazhnyia mel'nitsy v Moskovskom gosudarstve: Istoriko-arkheograficheskii ocherk . . .*, Tip. Imperatorskoi Akademii nauk, St. Petersburg, 1891.  
Includes 116 plates. It is a reprint of Vol. 5 of the *Zapiski Imperatorskago russkago arkheologicheskago obshchestva*.
95. N. P. Likhachev, *Paleograficheskoe znachenie bumazhnykh vodianykh znakov*, "V. S. Balashev i K°," St. Petersburg, 1899.  
This folio-size publication consists of three volumes bound in four. It was printed as No. 116 of the series *Obshchestvo liubiteli drevnei pis'mennosti*, Leningrad: Numernyia izdaniia.
96. V. N. Shchepkin and M. V. Shchepkina, "Paleograficheskoe znachenie vodianykh znakov," *Problemy istochnikovedeniia*, 6, 325–346 (1958).
97. I. Kamanin and O. Vitvits'ka, "Vodiani znaki na paperi ukrains'kikh dokumentiv XVI i



- XVII v.v. (1566–1651).” *Akademiia nauk USSR, Kiev: Istorychno-filologichnyi viddil: Zbirnik*, No. 11, 1923.
98. A. F. Griaznov, *Iaroslavskaiia Bol'shaia Manufaktura s 1722 po 1856*, n.p., Moscow, 1910.
99. P. A. Kartavov, *Istoricheskiia svedeniia o gerbovoi bumage v Rossii: Vypusk I: 1697–1801*, n.p., St. Petersburg, 1900.
100. N. A. Reztsov, “Bumaga v Rossii 100 let nazad,” *Pishebumazhnoe delo*, Nos. 1, 2, 3, and 5, 1912.
101. . . . *Obraztsy pis'ma i ukrashenii iz Psaltyri s vozsledovaniem po rukopisi XV veka, khraniashcheisia v biblioteke Troitskoi Sergievoi Lavry pod No. 308 (481): So vvedeniem F. Buslaeva*, Tip. Dobrodeeva, St. Petersburg, 1881.  
Published as Nos. 52 and 74 in the series *Obshchestvo liubitelei drevnei pis'mennosti, Leningrad: Numernyia izdaniia*.
102. F. I. Buslaev, *Istoricheskie ocherki F. I. Buslaeva po russkomu ornamentu v rukopisiakh: Izdanie Otdeleniia russkago iazyka i slovesnosti Akademii nauk*, Tip. Akademii nauk, Petrograd, 1917.  
The volume was edited by N. Kondakov.
103. V. I. Butovskii, ed., *Histoire de l'ornement russe du X<sup>e</sup> au XVI<sup>e</sup> siècle d'après les manuscrits*, with an introduction by V. I. Butovskii, n.p., Paris, 1870, 2 vols.  
The publication was sponsored by the Moscow Industrial Art Museum [Moskovskii Khudozhestvenno-promyshlennyi muzeum].
104. . . . *Sbornik ornamentnykh ukrashenii, pocherpnytykh iz grecheskikh i drevne russkikh rukopisnykh knig s X po XVI vek vkluchitel'no: Material dlia promyshlennago risoval'shchika*, Izd. Khudozhestvenno-promyshlennago muzeuma, Moscow, 1874–1877, 3 vols.
105. G. G. Gagarin, *Sbornik vizantiiskikh i drevne-russkikh ornamentov, sobrannykh i risovannykh kniazem Gr. Gr. Gagarinym . . .* Khromo-lit. Shtadler i Pattinot, St. Petersburg, 1887.
106. V. V. Stasov, *L'ornement slave et oriental . . . Slavianskii i vostochnyi ornament: Po rukopisiam drevniago i novago vremeni sobral i izsledoval Vladimir Stasov: Izdano s Vysochaishago soizvoleniia imperatora Aleksandra II . . .*, Kartograficheskoe zavedenie A. Il'ina, St. Petersburg, 1887.
107. A. I. Nekrasov, . . . *Ocherki iz istorii slavianskago ornamenta: Chelovecheskaia figura v russkom teratologicheskom rukopisnom ornamente XIV veka*, n.p., St. Petersburg, 1914.  
Printed in the series *Pamiatniki drevnei pis'mennosti i iskusstva*, as [Part] 183.
108. L. P. Zhukovskaia, Ref. 57, p. 87.
109. V. N. Shchepkin, “Cyrillische Ligaturschrift,” *Archiv für slavische Philologie*, 25(1), 109–129 (1903).
110. V. N. Shchepkin, “Viaz,” *Drevnosti: Trudy Moskovskago arkheologicheskago obshchestva*, 20, 57–80 (1904).
111. I. A. Shliapkin, *Obraztsy viazi, Vyp. 1: Izd. Petrogradskago arkheologicheskago instituta*, n.p., Petrograd, 1916.
112. P. K. Simoni, ed., . . . *K istorii obikhoda knigopistsa, perepletchika i ikonnago pistsa pri knizhnom i ikonnom stroenii: Materialy dlia istorii tekhniki knizhnago dela i ikonopisi, izvlechennye iz russkikh i serbskikh rukopisei i drugikh istochnikov XV–XVIII stoletii: Sobral i snabdil vvodnoiui stat'eiu i ob'iasnitel'nymi primechaniiami Pavel Simoni; Vypusk pervyi: Teksty i primechaniiia 1–XXI: S prilozheniem XIV–ti tablits snimkov i risunkami v tekste*, n.p., [St. Petersburg, 1906].  
Published as Part 161 in the series *Pamiatniki drevnei pis'mennosti i iskusstva*. No more published.
113. P. K. Simoni, ed., *Opyt sbornika svedenii po istorii i tekhnike knigoperepletnago khudozhestva na Rusi preimushchestvenno v do-Petrovskoe vremia, s XI-go po XVIII-oe stc letie vkluchitel'no: Teksty-materialy-snimki: Sobral i primechaniiami snabdil Pavel Simoni*, n.p., St. Petersburg, 1903.

Published as No. 122 in the series *Obshchestvo liubitelei drevnei pis'mennosti, Leningrad: Numernyia izdaniia*.

114. A. N. Pynin, "Materialy dlia slavianskoi paleografii iz 'Opisanii Rumiantsevskogo muzeia,'" *Uchenye zapiski vtorogo otdeleniia Akademii nauk*, 2(2), Otd. III, 53–58 (1856).
115. I. I. Sreznevskii, "Zamechaniia o russkom tainopisanii," offprint from the *Imperatorskaia Akademiia nauk: Otdelenie russkago iazyka i slovesnosti. Sbornik*, Vol. 8, 1871.
116. P. A. Lavrovskii, "Staro-russkoe tainopisanie," *Drevnosti: Trudy Moskovskago arkheologicheskago obshchestva*, Vol. 3, 1873.
117. I. S. Nekrasov, *Permskie pis'mena v rukopisiakh XV v.*, n.p., Odessa, 1890.
118. A. I. Popov, "Diplomaticheskaia tainopis' vremen tsaria Alekseia Mikhailovicha," *Sanktpeterburgskoe arkheologicheskoe obshchestvo: Zapiski*, 5, 156–162 (1853), as cited by Karskii.
119. I. I. Sreznevskii, *Slaviano-russkaia paleografiia . . .*, Ref. 2, pp. 5–37.
120. E. F. Karskii, Ref. 69, pp. 9–88.
121. N. S. Chaev and L. V. Cherepnin, *Russkaia paleografiia*, Glavnoe arkhivnoe upravlenie MVD SSSR, Moscow, 1946, pp. 205–[213].
122. L. V. Cherepnin, *Russkaia paleografiia*, Gos. izdat-vo polit. lit-ry, Moscow, 1956.
123. [V. V. Vinogradov], ed., *Bibliograficheskii ukazatel' literatury po russkomu iazykoznaniiu s 1825 po 1880 god: Vypusk 5: Pamiatniki russkogo iazyka*, Izd-vo Akademii nauk SSSR, Moscow, 1957.
124. [Ia. S. Lur'e], ed., *Bibliografiia russkogo letopisaniia*, Izd-vo Akademii nauk SSSR, Moscow, 1962.
125. [*Arkhangel'skoe Evangelie 1092 goda: Izdanie Rumiantsovskago muzeia*], [Moscow, 1912].
- The volume is a perfect replica of manuscript No. 1,666 in the Rumiantsev collection (V. I. Lenin State Library). The text, illumination, paper, binding, finger marks, ink blotches, and even the worm holes of the original were reproduced to an astonishing exactness.
126. *Russische Annalen in ihrer slavonischen Grundsprache verglichen übersetzt und erklärt von August Ludwig Schlözer*, H. Dieterich, Göttingen, 1802–1805.
127. J. Dobrovsky, *Dobrowsky's Slavin: Botschaft aus Böhmen an alle slawischen Völker, oder Beiträge zu ihrer Charakteristik, zur Kenntniss ihrer Mythologie, ihrer Geschichte und Alterthümer, ihrer Literatur und ihrer Sprachkunde nach allen Mundarten . . .*, 2, verb., berichtigte und verm. Aufl. von Wenceslaw Hanka . . ., von Mayregg, Prague, 1834, pp. 53–54, locus as cited by Karskii.
128. I. P. Sakharov, *Obozrenie slaviano-russkoi bibliografii: Tom pervoi: kniga vtoraiia*, v Tip. Imperatorskoi Akademii nauk, St. Petersburg, 1849.
129. According to A. E. Burtsev (*Bibliograficheskoe opisanie*, Vol. 4, No. 1098) Vol. 1, Pt. 1 of Sakharov's work is a rarity, and only one printed copy of that part is known to bibliographers. The New York Public Library *Catalog of the Slavonic Collection* (2nd ed., Vol. 34) indicates that no more volumes or parts were published after Vol. 1, Pt. 2. However, Zhukovskaia (Ref. 57, p. 47) mentions that several incompletely printed copies of Vol. 2 are known. Karskii (Ref. 69, p. 70) reports on copies of Vol. 2 to be found at the University of Leningrad library and also at the Library of the Akademiia nauk SSSR. The V. I. Lenin State library does not have copies of that volume.
- Since Vol. 2 does not have a printed title page, we shall refer to it by the title suggested by Zhukovskaia (Ref. 57, p. 47), i.e., [I. P. Sakharov, *Obozrenie slaviano-russkoi bibliografii: T. II: Paleografiia slaviano-russkaia. Kn. 1: Pis'mo knizhnoe*].
- I. I. Sreznevskii lists only the title of Vol. 1, without indicating its parts or the contents. Chaev ignores the work and so does Cherepnin. Karskii mentions Sakharov's *Slavo-Russian Paleography I. Book Hand*, without realizing that it is part of a larger work.
130. I. P. Sakharov, *Chteniia iz russkoi paleografii*, n.p., Moscow, 1854 (lithographed edition).

1131. This assumption is based on the fact that an autographed copy of the published lecture notes at the Lenin library carries the date June 20, 1854; L. P. Zhukovskaia, Ref. 57, p. 51.
1132. I. I. Sreznevskii, "Opisanie rukopisei Patriarskoi, nyne Sinodal'noi biblioteki. 1. Zapiska akademika I. I. Sreznevskago," *Imperatorskaia Akademiia nauk: Zapiski*, Vol. 13, pp. 214–215.
1133. N. S. Tikhonarov, *Russkaia paleografiia: Kurs chitan v. 1887–1888 godakh*, n.p., Moscow, 1889 (lithographed edition).
1134. During the 14th century, when the Turks occupied most of the Balkans, South Slavic men of letters sought refuge in Russia. Their presence started a puristic ferment, the so-called Second South Slavic Influence, aimed at the reestablishment of the authority of a "pure"—and by then archaic and alien for the Russians—Church-Slavonic spelling and grammar. It was not until the end of the 16th century that the Second South Slavic Influence, which affected almost every area of Russian culture, began to lose its impact.
1135. A. I. Sobolevskii, ed., *Exempla codicum graecorum litteris uncialibus scriptorum: Ediderunt A. Sobolevskij et Gr. Cereteli: Obraztsy grecheskago ustavnago pis'ma po preimushchestvu IX–XI vekov: Sostavili A. I. Sobolevskii . . . i G. F. Tsereteli . . . Izdanie Otdeleniia russkago iazyka i slovennosti Imperatorskoi akademii nauk*, [Tip. Imperatorskoi akademii Nauk], St. Petersburg, 1913.  
The letters are described in Latin.
1136. That is, *Russkii filologicheskii vestnik* (1879–1917), a scientific journal published semi-annually at Warsaw University. Karskii's lectures were printed in Volumes 35–37.
1137. E. F. Karskii, *Ocherk slavianskoi kirillovskoi paleografii: Iz lektcii, chitannykh v Imperatorskom Varsh. universitete prof. E. F. Karskim*, Tip. Varshavskago uchebnago kruga, Warsaw, 1901.
1138. E. F. Karskii, ed., . . . *Russkaia pravda po drevnieshemu spisku; Vvedenie, tekst, snimki, ob'iasneniia, ukazateli avtorov i slovarnogo sostava*, Izdatel'stvo Akademii nauk, Leningrad, 1930.
1139. E. F. Karskii, ed., *Listki Undol'skago, otryvok kirillovskago evangeliia XI-go veka: Fototipicheskoe vosproizvedenie teksta i izsledovanie pis'ma i iazyka, sostavlennoe E. F. Karskim . . . Izdanie Otdeleniia russkago iazyka i slovesnosti Imperatorskoi Akademii nauk*, [Tip. Imperatorskoi Akademii nauk], St. Petersburg, 1904 (Pamiatniki staroslavianskago iazyka: Tom I, Vyp 3).
1140. E. F. Karskii, ed., *Lavrent'evskaia letopis': Part 1: Povest' vremennykh let. Polnoe sobranie russkikh letopisei, izdavaemoe Istoriko-arkheograficheskoi kommissiei Akademii nauk SSSR: T. I. Izd 2–e*, Izd. Akademii nauk SSSR, Leningrad, 1926.
1141. E. F. Karskii, ed., *Lavrent'evskaia letopis': Part 2: Suzdal'skaia letopis' po Lavrent'evskomu spisku*, Izd. Akademii nauk SSSR, Leningrad, 1927.
1142. E. F. Karskii, ed., *Lavrent'evskaia letopis': Part 3: Prilozheniia: Prilozhenie Suzdal'skoi letopisi po Akademicheskomu spisku: Ukazateli*, Akademii nauk SSSR, Leningrad, 1928.
1143. E. F. Karskii, . . . *Belorussy: Vvedenie k izucheniiu iazyka i narodnoi slovesnosti: S prilozheniem dvukh kart*, [Izdanie Vilenskago general-gubernatorskago upravleniia], Vilnius, 1904.  
The second edition of Vol. 2 of this work was published in three volumes by the Academy of Sciences of the BSSR in 1955–1956: E. F. Karskii, *Belorussy: Iazyk belorusskogo naroda*, Izd-vo Akademii nauk SSSR, Moscow, 1955–1956 (at head of title: Akademiia nauk BSSR, Institut iazykoznaniiia).
1144. R. F. Brandt, *Lekticii po slaviano-russkoi paleografii, chitannye v Moskovskom arkheologicheskom institute v 1908, 1909 i 1910 gg.*, n.p., Moscow, 1910.
1145. I. A. Shliapkin, *Russkaia paleografiia: Po lektciiam, chitannym v imperatorskom S.-Peterburgskom arkheologicheskom institute: Perepechatano s izdaniia slushatelei 1905–1907 gg. s razresheniia, no bez prosmotra avtora*, n.p., St. Petersburg, 1913.
1146. M. I. Mikhailov, *Pamiatniki russkoi veshchevoi paleografii*, n.p., St. Petersburg, 1913.

147. Portions of Karinskii's lectures dealing with the origin of Slavic alphabets were published in the work: N. M. Karinskii, *Slavianskaia paleografia. II: Vopros o proiskhozhdenii slavianskikh alfavitov: Lektsii chitannye na I kurse v Imperatorskom Arkheologicheskom institute v 1904–1905 uchebnom godu, izdannye g.g. slushatelei instituta, 1906–1907 uchebn. g.*, n.p., St. Petersburg, [1907?].
148. N. M. Karinskii, *Slavianskaia paleografia: Lektsii, chitannye v imp. Arkheologicheskom in-te*, n.p., Petrograd, 1915.
149. P. A. Lavrov, *Iugoslavianskaia paleografia: Kurs, chitannyi v S.-Peterburgskom arkheologicheskom institute v. 1903–1904 godu: Izdanie slushatelii SPb. arkh. insti. inzhenera A. F. Papengut*, n.p., St. Petersburg, 1904.  
The work was poorly edited and contains several mistakes.
150. P. A. Lavrov, *Materialy po istorii vozniknoveniia drevneishei slavianskoi pis'mennosti*, Izd-vo Akademii nauk SSSR, Leningrad, 1930.  
Published as Vol. 1 of the series *Trudy Slavianskoi komissii*.
151. P. A. Lavrov, *Kirilo ta Metodii v davn'oslov'ians'komu pis'menstvi: Rozvidka*, n.p., Kiev, 1928.  
Published in the series *Ukrains'ka Akademiia nauk: Zbirnik ist.-fil. viddilu*, as No. 78. Translated into Ukrainian by P. G. Ivantsev.
152. Speranskii's main contributions to the literature of forged manuscripts are two excellent papers (the first dealing with the A. I. Sulakadzev and the second with both the A. I. Sulakadzev and the A. I. Bardin cases): "K istorii russkikh rukopis'nykh poddelok," *Akademiia nauk SSSR: Doklady*, Ser. B, No. 9, 1928, pp. 181–184; and "Russkie poddelki rukopisei nachala XIX v.," *Problemy istochnikovedeniia*, 5, 44–101 (1956).
153. M. N. Speranskii's main contribution to the study of Slavic cryptography was published as one of the volumes of the *Entsiklopediia slavianskoi filologii* of I. V. Jagić: *Tainopis' v iugo-slavianskikh i russkikh pamiatnikakh pis'ma*, Vol. 4, Part 3 of *Entsiklopediia slavianskoi filologii* (I. V. Jagić, ed.), n.p., Leningrad, 1929.
154. M. N. Speranskii, "Zametki o rukopisiakh Belgradskikh i Sofiskoi bibliotek," *Istoriko-filologicheskii institut kn. Bezborodko v Nezhine: Izvestiia*, 16, 1–87 (1898).
155. M. N. Speranskii, "Iz slavianskoi epigrafiki," *Akademiia nauk SSSR: Doklady*, Ser. B, 1930, pp. 51–57.
156. Manuscript book containing the Gospels. It was copied in the 11th century by the Bulgarian priest Savva, from a Glagolitic original. Some time during the 14th century *Savva's Book* was brought to Russia.
157. V. N. Shchepkin, ed., *Savvina kniga: Trud V. N. Shchepkina . . .*, Izd-vo Imperatorskoi Akademii nauk, St. Petersburg, 1903.  
The work was published as Vol. 1, Part 2 in the series *Imperatorskaia Akademiia nauk: Otdelenie russkogo iazyka i slovesnosti: Pamiatniki staroslavianskogo iazyka*. This first edition of Shchepkin's book was reproduced and printed in 1959 by the Institut für Slavistik der Universitat Graz (Austria): V. N. Shchepkin, ed., *Savvina kniga*, Akademische Druck u. Verlagsanstalt, Graz, 1959 (added title page: *Editiones monumentorum slavivorum veteris dialecti*, hrsg. vom Institut für Slavistik der Universitat Graz: V. Ščepkin: *Savvina kniga: "Photomechanischer Nachdruck der 1903 . . . Ausgabe"*).
158. V. N. Shchepkin, "Rassuzhdenie o iazyke Savvinoi knigi: S prilozheniem dvukh fototipicheskikh snimkov," *Imperatorskaia Akademiia nauk: Otdelenie russkogo iazyka i slovesnosti: Izvestiia*, 3, 157–227 (1899).  
Another edition is: V. N. Shchepkin, "Rassuzhdenie o iazyka Savvinoi knigi," *Imperatorskaia Akademiia nauk: Otdelenie russkogo iazyka i slovesnosti: Sbornik*, Vol. 67, No. 9, 1901.
159. V. N. Shchepkin, "Bolonskaia psal'tyr'," *Issledovaniia po russkomu iazyku*, Vol. 2, Part 4, 1906.
160. V. N. Shchepkin, "Novgorodskie nadpisi Graffiti, s 9 fototipicheskimi tablitsami," *Drevnosti: Trudy Moskovskogo arkheologicheskogo obshchestva*, Vol. 19, Part 3, 1902, pp. 26–46.

161. For Shchepkin's brilliant study on the paleographical significance of watermarks, see Ref. 96.

Papers were published by this prolific author in the magazines *Drevnosti* and *Russkii filologicheskii vestnik*, and also in the *Proceedings of the Moscow Historical Museum*.

162. V. N. Shchepkin. *Uchebnik russkoi paleografii. 6 tablits i 42 ris. v. tekste*, Obshchestvo istorii i drevnosti rossiiskikh pri Moskovskom universitete, Moscow, 1918 [i.e., 1920]. Reprinted as: V. N. Shchepkin. *Russkaia paleografiia*, Izd-vo "Nauka," Moscow, 1967.
163. That is, *Slovo o polku Igoreve*; also known by the English titles *The Lay of Igor's Campaign* and *The Lay of Igor's Expedition*. The epic poem is believed to be a 12th-century work.

The controversial text is now available in a modern English version: V. Nabokov, *The Song of Igor's Campaign*, Vintage Books, New York, 1960.

164. That is, *Gimn Boiana Letislavu* [Boian's Hymn of Letislav].
165. V. F. Pokrovskaiia, "Eshche ob odnoi rukopisi A. I. Sulakadzeva (K voprosu o popravkakh v rukopisnykh tekstakh)," *Akademiia nauk SSSR: Otdel drevnerusskoi literatury: Trudy*, **14**, 634-636 (1958).
166. A. I. Sulakadzev changed several words in an old manuscript and turned it into a contemporaneous account of the first Russian hot-air balloon flight, allegedly executed by a certain Krakutnoi in 1731.
167. The editors of the *Large Soviet Encyclopedia* [Bol'shaia sovetskaia entsiklopediia] devoted a separate entry to Sulakadzev's brainchild (Krakutnoi) and his deeds: Vol. 8, p. 503; and Vol. 23, p. 567, in the second edition.
168. For A. N. Olenin's bitter remarks about the work of Russian forgers see: Ia. F. Priima, "Nabliudenija A. N. Olenina nad 'Slovom o polku Igoreve'" [A. N. Olenin's Observations Concerning the "Tale of Igor's Campaign"], *Akademiia Nauk SSSR: Izvestiia russkoi literatury: Otdel drevnerusskoi literatury: Trudy*, **9**, 43 (1953).
169. A. N. Pynin, "Poddelki rukopisei i narodnykh pesen'" [The Forging of Manuscripts and Folk Songs], *Pamiatniki drevnei pis'mennosti*, **127**, 1-22 (1898).
170. V. N. Korablev, "Viacheslav Ganka i ego 'Kraledvorskaia rukopis'" [Václav Hanka and His "Manuscript of Králové Dvůr"], *Akademiia nauk SSSR: Izvestiia: Seriia VII: Otdelenie obshchestvennykh nauk*, No. 6, 1932, pp. 521-543.
171. N. S. Chaev, "K voprosu o poddelkakh istoricheskikh dokumentov v XIX veke" [More about the Question of Forging Historical Documents in the 19th Century], *Akademiia nauk SSSR: Izvestiia: Seriia VII: Otdelenie obshchestvennykh nauk*, No. 6/7, 1933, pp. 485-502.

The paper deals with the forgeries of N. G. Golovin. References to the same case were made by I. A. Golubtsov in the following work: *Akty sotsial'no-ekonomicheskoi istorii Severo-vostochnoi Rusi kontsa XIV- nachalo XVI v.*, Izd-vo Akademii nauk SSSR, Moscow, 1952-1964; Vol. 1, 1952, pp. 153 and 381.

172. D. S. Likhachev, "K voprosu o poddelkakh literaturnykh pamiatnikov i istoricheskikh istochnikov" [More about the Problem of Forging of Literary Monuments and Historical Sources], *Istoricheskii arkhiv*, No. 6, 1961, p. 149.
173. L. P. Zhukovskaia, "Poddel'naia dokirillicheskaia rukopis': K voprosu o metode opredeleniia poddelok" [Forged Pre-Cyrillic Manuscript: More about the Method of Identifying Forgeries], *Voprosy iazykoznaniiia*, No. 2, 1960, pp. 142-144.
174. L. P. Zhukovskaia. Ref. 57, pp. 93-95.
175. For a good summary of the Stalin-Marr philological controversy in the U.S.S.R., the reader is referred to a paper by D.B.Y. in the magazine *The World Today*, Vol. 6, 1950, pp. 355-364.
176. G. G. Pavlutskii, *Istoriia ukrains'kogo ornamentu*, n.p., Kiev, 1927.
177. The illuminations of the manuscript were the subject of a number of studies: by V. I. Sizov, "Miniatiury Kenigsbergskoi letopisi" [Illuminations in the *Königsberg Chronicle*], *Imperatorskaia Akademiia nauk: Otdelenie russkogo iazyka i slovesnosti*, Vol. 10, Book 1, 1905; by N. P. Kondakov, "Zametki o miniaturakh Kenigsbergskogo spiska Nachal'noi

letopisi"; in *Radzivilovskaia ili Kenigsbergskaia letopis'. II: Stat'i o tekste i miniaturakh rukopisi* [Notes on the Illumination of the Königsberg Copy of the Primary Chronicle]; in *The Radziwill or Königsberg Chronicle. II: Papers About the Text and the Illumination of the Manuscript*], Obshchestvo liubitelei drevnei pis'mennosti, St. Petersburg, 1902; and subsequently by a number of Soviet experts (see infra; Refs. 178–180).

178. M. I. Artamonov, "Miniatiury Kenigsbergskogo spiska letopisi," *Gosudarstvennaia Akademiia istorii material'noi kul'tury: Izvestiia*, Vol. 10, Part 1, 1931.

179. A. V. Artsikhovskii, "Miniatiury Kenigsbergskoi letopisi," *Gosudarstvennaia Akademiia istorii material'noi kul'tury: Izvestiia*, Vol. 14, Part 2, 1932.

180. A. V. Artsikhovskii, *Drevnerusskie miniatiury kak istoricheskii istochnik*, n.p., [Moscow], 1944 (at head of title: Moskovskogo ordena Lenina Gosudarstvennyi universitet im. M. V. Lomonosova).

Another Artsikhovskii contribution was published earlier, in 1934: A. V. Artsikhovskii, "Miniatiury Sinodal'nogo spiska Nikonovskoi letopisi" [Miniatures in the Synod Version of the Nikon Chronicle], in *Sbornik statei k 40-letiiu deiatel'nosti A. S. Orlova* [A Collection of Papers Commemorating the Fortieth Anniversary of the Work of A. S. Orlov], Izd-vo Akademii nauk SSSR, Moscow, 1934.

181. M. Vladimirov and G. P. Georgievskii, eds., *Drevne-russkaia miniatiura . . .*, n.p., Moscow, 1933.

182. V. A. Shchavinskii, *Ocherki po istorii tekhniki zhivopisi i tekhnologii krasok v Drevnei Rusi*, n.p., Moscow and Leningrad, 1935.

183. A. I. Nekrasov, *Drevnerusskoe izobrazitel'noe iskusstvo* [Ancient Russian Graphic Arts], Izogiz, [Moscow], 1937, pp. 60–65.

184. A. A. Geraklitov, "Odin iz bumazhnykh vodianykh znakov XVII v.," in *Sbornik statei po russkoi istorii, posviashchennykh S. F. Platonovu* [One of the 17th-Century Watermarks in Paper, in A Collection of Papers about Russian History Dedicated to S. F. Platonov], n.p., Petrograd, 1922, pp. 305–313.

Another Geraklitov paper dealing with some problems of watermarks in paper was published later in Saratov: A. A. Geraklitov, "Tri izdaniia XVI v. bezvykhodnykh listov iz biblioteki Saratovskogo Universiteta: K voprosu o nachale knigopechataniia v Moskve" [Three Editions of 16th-Century Undated Pages in the Library of the Saratov University: More about the Problem of the Beginning of Printing in Moscow], in *Saratovskii Gosudarstvennyi universitet: Uchenye zapiski*, Vol. 5, Part 2, Pedagogicheskii fakul'tet, 1926, pp. 1–20 (as cited by L. V. Cherepnin, Ref. 122, p. 65).

185. V. I. Borkovskii, "O iazyke Suzdal'skoi letopisi po Lavrent'evskomu spisku" [About the Language of the Lavrent'ev Version of the Suzdal' Chronicle], *Kommissiia po russkomu iazyku: Trudy*, 1, 1–91 (1931).

186. N. N. Durnovo, "Miunkhenskii abetsedarii" [The Munich Primer], *Akademiia nauk SSSR: Izvestiia, Ser. VII: Otdelenie gumanitarnykh nauk*, No. 3, 1930, pp. 211–221.

187. M. A. Sokolova, "K istorii russkogo iazyka v XI veke" [More about the History of the Ninth-Century Russian Language], *Izvestiia po russkomu iazyku i slovesnosti*, 3(1), 75–135 (1930).

188. S. P. Obnorskii and S. G. Barkhudarov, *Khrestomatiia po istorii russkogo iazyka* [A Chrestomathy of the History of the Russian Language], Gosudarstvennoe uchebno-pedagogicheskoe izd-vo, Moscow, 1938–1949, 2 vols.

189. A. S. Orlov, ed., *Vspomogatel'nye istoricheskie distsipliny*, Sponsored by the Akademiia nauk SSSR, Institut istorii [Academy of Sciences of the SSSR, Historical Institute], Izd-vo Akademii nauk SSSR, Moscow and Leningrad, 1937.

190. M. D. Priselkov, *Kurs russkoi paleografii*, Sektor zaocnogo otdeleniia LGU, Leningrad, 1938.

The brief booklet (38 pages) was printed in 430 copies.

191. N. V. Ustiugov, "Chaev N. S. i Cherepnin L. V., Russkaia paleografia" [N. S. Chaev

and L. V. Cherepnin, Russian Paleography], *Voprosy istorii*, No. 12, 1947, pp. 110–112 (book review).

192. L. V. Cherepnin, Ref. 122, p. 70: according to L. V. Cherepnin, the following pages of the Chaev–Cherepnin work have been used in a somewhat altered and enlarged version in the new book: pp. 84–92, 99–101, 104–105, 107, 138–140, 145–146, 158–160, 215–224, 239–243, and 246–247.
193. A. T. Nikolaeva, *Russkaia paleografiia; konspekt kursa: Uchebnoe posobie dlia studentov zaocnogo fakul'teta Moskovskogo gos. istoriko-arkhivnogo instituta* [Russian Paleography; a Course Outline: Instructional Aid for Students of the Correspondence Department of the Moscow State Institute of History and Archives], *Otvetstvennyi redaktor A. A. Zimin*, Moscow, 1956.
194. A. M. Selishchev, *Obraztsy drevnerusskogo pis'ma XI–XVII vv.*, n.p., Moscow, 1939.
195. N. V. Stepanov, ed., *Uchebnyi paleograficheskii al'bom: Snimki s russkikh rukopisei XI–XVIII vv.: Vvodnaia stat'ia i transkriptsiiia N. V. Stepanova*, [Voenno-politicheskaia] akademiia [Krasnoi armii] im. V. I. Lenina, Moscow, 1940.
196. N. V. Stepanov, *Transkriptsiiia tekstov k Uchebnomu paleograficheskomu al'bomu N. V. Stepanova* [Transcribed Texts of N. V. Stepanov's Instructional Paleographical Atlas], [Voenno-politicheskaia] akademiia [Krasnoi armii] im. V. I. Lenina, Moscow, 1941.
197. S. S. Gadziatskii and N. V. Ustiugova, eds., *Uchebnoe posobie dlia prakticheskikh zaniatii po paleografii*, Moskovskii Gosudarstvennyi istoriko-arkhivnyi institut, Moscow, 1940.  
The work consists of 20 facsimile reproductions and their transcribed versions. The supplement is entitled *Azbuka skoropisi XV–XVIII stoletii* [The Alphabet of the 15th–18th-Century Cursive Hand]. These tables are borrowings from Beliaev's work, Ref. 75.
198. For information concerning collections of facsimile reproductions edited by I. F. Kolesnikov, see Refs. 83 and 84.

Among other significant Kolesnikov contributions, mention should be made here of the two editions of his textbook of paleography: I. F. Kolesnikov, *Konspekt lektsii po paleografii (1 i 2 kursy) v Moskovskom arkheologicheskom institute* [An Outline of Lectures in Paleography (Courses 1 and 2) at the Moscow Archaeological Institute], n.p., Moscow, 1910–1911. The second edition of this work was published in 1913–1914.

A complete list of I. F. Kolesnikov's writings was published by the Moscow State Institute of History and Archives: "Spisok nauchnykh trudov professora I. F. Kolesnikova" [A List of the Scientific Works of Professor I. F. Kolesnikov], *Moskovskii Gosudarstvennyi istoriko-arkhivnyi institut: Trudy*, 7, 237 (1954).

199. I. F. Kolesnikov, "Paleografiia dokumental'noi (arkhivnoi) pis'mennosti," *Arkhivnoe delo*, No. 4/52, 1939, pp. 15–35.
200. N. G. Koroleva and A. K. Panfilova, "Iz istorii grafiki XVIII v." [From the History of 18th-Century Graphics], *Moskovskii Gosudarstvennyi istoriko-arkhivnyi institut: Trudy*, 10, 408–411 (1957); subtitle of issue: *Sbornik studencheskikh nauchnykh rabot*.
201. In Rus' the most commonly used bark was that of the birch tree. The text was recorded by impression or by scratching lines with a blunt instrument on the inner side of the specially prepared bark. This technique encouraged the use of epigraphic-type *majuscule* (*ustav*).
202. S. N. Valk, "Nachal'naiia istoriia drevnerusskogo chastnogo akta" [The Primary History of the Ancient Russian Private Deed], in *Vspomogatel'nye . . .* (A. S. Orlov, ed.), Ref. 189, pp. 258–317.
203. M. N. Tikhomirov, "O chastnykh aktakh Drevnei Rusi" [Ancient Russian Private Deeds], *Istoricheskie zapiski*, No. 17, 1945, pp. 225–244.
204. A. V. Artsikhovskii, "Arkheologicheskie otkrytiia v Novgorode" [Archaeological Discoveries in Novgorod], *Akademiia nauk SSSR: Vestnik*, No. 12, 1951, pp. 60–69; A. V. Artsikhovskii, "Novye otkrytiia v Novgorode" [New Discoveries in Novgorod], *Voprosy istorii*, No. 12, 1951, pp. 77–87; and A. V. Artsikhovskii and M. N. Tikhomirov,

*Novgorodskie gramoty na bereste (iz raskopok 1951 g.)* [The Novgorod Birch Bark Documents (from the 1951 Excavations)], Izd-vo Akademii nauk SSSR, Moscow, 1953.

The results of the Novgorod excavations of subsequent years have been reported continuously by A. V. Artsikhovskii and his colleagues in the magazine *Voprosy istorii* and in monographs sponsored by the Academy of Sciences of the U.S.S.R. In 1978 a folio volume was published with reproductions of some of the recently discovered birch bark documents: A. V. Artsikhovskii and V. L. Ianin, *Novgorodskie gramoty na bereste: Iz raskopok 1962–1976 godov*, Izd-vo "Nauka," Moscow, 1978.

205. M. N. Tikhomirov and M. V. Shchepkina, "Dva pamiatnika novgorodskoi pis'mennosti" [Two Monuments of the Novgorod Writing], *Gosudarstvennyi istoricheskii muzei: Trudy: Pamiatniki kul'tury*, Part 7, 1952.
206. L. P. Zhukovskaia, *Novgorodskie berestiane gramoty* [The Novgorod Birch Bark Documents], Gosudarstvennoe uchebno-pedagogicheskoe izdatel'stvo, Moscow, 1959.
- Also, in V. L. Borkovskii's work (*Paleograficheskii i lingvisticheskii . . .*, Ref. 209), the chapters "Paleografiia" [Paleography], pp. 13–78, and "Teksty gramot i perevody s raznochteniiami" [The Texts of the Documents and Translations with Variants of Interpretation], pp. 189–204.
207. B. A. Rybakov, a specialist in epigraphy, acted as the editor of A. V. Artsikhovskii's work which reported the Novgorod bark inscriptions found during the years 1952–1955. His papers concerning the chronology of these inscriptions are additional contributions of high value to the literature of the topic.
208. S. N. Orlov, a specialist in the topography of ancient Novgorod contributed: S. N. Orlov and B. V. Khrychkov, "Novyi dokument drevnerusskoi pis'mennosti" [A New Document of Ancient Russian Writing], *Novgorodskii gosudarstvennyi politekhnicheskii institut: Istoriko-filologicheskii fakultet: Uchenye zapiski*, Part 2, 1957, pp. 241–243; and S. N. Orlov, "Topografiia deviaty berestianykh gramot iz Novgoroda" [The Topography of Nine Novgorod Birch Bark Documents], *Vestnik Leningradskogo Universiteta*, 20(14), (1965), *Ser. istorii, iazyka i literatury*, Part 3, pp. 156–158.
209. V. I. Borkovskii, a linguist, whose interest in certain aspects of Slavic paleography began as far back as in 1931 ("O iazyke Suzdal'skoi letopisi po Lavrent'evskomu spisku" [The Language of the Suzdal' Chronicle According to the Lavrent'ev Version], *Komissiiia po russkomu iazyku: Trudy*, 1, 1–91 [1931]), paid considerable attention to problems related to the study of ancient Novgorod documents.
- His main contribution to the literature of the topic, however, was the work published by the Linguistic Institute of the USSR Academy of Sciences [Akademiiia nauk SSSR: Institut iazykoznaniiia] in 1955: V. I. Borkovskii, ed., *Paleograficheskii i lingvisticheskii analiz novgorodskikh berestianykh gramot* [Paleographical and Linguistic Analysis of the Novgorod Birch Bark Documents], Izd-vo Akademii nauk SSSR, Moscow, 1955. Later, in 1958, V. I. Borkovskii was the coauthor of A. V. Artsikhovskii's books on the results of the 1953/1954–1955 Novgorod excavations.
210. L. A. Bulakhovskii, the linguist (*Kurs russkogo literaturnogo iazyka* [A Course of the Russian Literary Language]), reviewed V. I. Borkovskii's book; L. A. Bulakhovskii, "Paleograficheskii i lingvisticheskii analiz novgorodskikh berestianykh gramot' M., Izd-vo AN SSSR, 1955" ["Paleographical and Linguistic Analysis of the Novgorod Birch Bark Documents" M., Izd-vo AN SSSR, 1955], *Akademiia nauk SSSR: Izvestiia: Otdelenie literatury i iazyka*, 15, Part 1, 76 (1956), book review.
211. V. P. Kurashkevich, a linguist, published a review of the Borkovskii book: V. P. Kurashkevich, "Paleograficheskii i lingvisticheskii analiz novgorodskikh berestianykh gramot, ' M., Izd-vo AN SSSR, 1955" ["Paleographical and Linguistic Analysis of the Novgorod Birch Bark Documents," M., Izd-vo AN SSSR, 1955], *Voprosy iazykoznaniiia*, No. 2, 1957, p. 123, book review.
212. R. I. Avanesov, a linguist and frequent contributor to the magazine *Voprosy iazykoznaniiia*, was the coauthor of the "Introduction" and the contributor of the chapter "Fonetika" in V. I. Borkovskii's work on the Novgorod birch bark inscriptions.



213. N. B. Bakhilina, a linguist, was the contributor of the chapter entitled "Leksika" [Lexicology] in V. I. Borkovskii's work on the Novgorod bark inscriptions.
214. In 1973 T. V. Rozhdestvenskaia published her paper "Ob osobennostiakh paleografii novgorodskikh nadpisei—graffiti XI–XIV vv." [About the Peculiarities of the Paleography of 11th–14th-Century Novgorod Graffiti], in *Linguisticheskie issledovaniia 1972 g.*, n.p., Moscow, 1973, pp. 90–105.
215. S. I. Maslov, "Iz istorii russkoi filigranografii (Neizdannaia chast' raboty K. Tromonina 'Iz'iasnenie znakov, vidimykh v pischei bumage,' M., 1848)," *Akademiia nauk SSSR: Izvestiia: Otdelenie gumanitarnykh nauk*, Ser. 7, No. 3, 1934, pp. 225–235.
216. S. A. Klepikov, "Filigrani i shtempeli bumag russkogo proizvodstva XVIII–XX vv.," *Gosudarstvennaia biblioteka SSSR im. V. I. Lenina: Otdel rukopisei: Zapiski*, Part 13, 1952, pp. 57–122.
217. S. A. Klepikov, "Bumaga s filigran'iu 'Gerb goroda Amsterdama' (materialy dlia datirovki rukopisnykh i pechatnykh tekstov)," *Gosudarstvennaia biblioteka SSSR im. V. I. Lenina: Otdel rukopisei: Zapiski*, Part 20, 1958, pp. 315–352.
218. S. A. Klepikov, *Filigrani i shtempeli na bumage russkogo i inostrannogo proizvodstva XVII–XX v.*, Izd-vo Vsesoiuznoi knizhnoi palaty, Moscow, 1959.
219. S. A. Klepikov, "Novye raboty v oblasti filigranologii," *Problemy istochnikovedeniia*, 9, 433–438 (1961).
220. S. A. Klepikov and M. V. Kukushkina, "Filigran' 'Pro Patria' na bumage russkogo i inostrannogo proiskhozhdeniia (Materialy dlia datirovki rukopisnykh i pechatnykh dokumentov)," in *Sbornik statei i materialov Biblioteki Akademii nauk SSSR po knigovedeniiu*, n.p., Leningrad, 1965, pp. 83–192; *ibid.*, Part 3, pp. 319–383, 1973.
221. E. L. Keenan, "Paper for the Tsar 'Letter of Ivan IV of 1570,'" *Oxford Slavonic Papers*, n.s., 6, 21–29 (1971).
222. S. A. Klepikov, "O dopetrovskoi bumage i 'Bumage dlia tsaria (pis'me Ivana IV),' E. Kinana," in *Kniga, issledovaniia i materialy: Sbornik*, 28, 157–161 (1974).
223. Z. V. Uchastkina, "Vodiane znaki russkoi bumagi," *Akademiia nauk SSSR: Institut istorii estestvoznaniia i tekhniki: Trudy*, 12, 312–337 (1956).
224. S. A. Klepikov, *Watermarks and Stamps in Seventeenth . . .*, Ref. 218, p. [125].
225. Z. V. Uchastkina, *A History of Russian Hand Paper-mills and Their Water-marks, Edited and Adapted for Publication in English by J. S. G. Simmons*, Monumenta chartae papyraceae historium illustrantia, No. 9, Paper Publications Society, Hilversum, 1962; Bibliography, pp. 135–146.
226. Z. V. Uchastkina, "Characteristics of Watermarks in Russian Handmade Paper," *Paper-maker*, 142(3), 61–65 (September 1961).
227. M. V. Kukushkina, "Filigrani na bumage russkikh fabrik XVIII–nachala XIX vv. (Obzor sobraniia P. A. Kartavova)," in *Istoricheskii ocherk i obzor fondov Rukopisnogo otdela Biblioteki Akademii nauk SSSR*, Izd-vo Akademii nauk SSSR, Moscow and Leningrad, 1958, Part 2, pp. 285–371.
228. A. S. Zernova, *Nachalo knigopechataniia v Moskve i na Ukraine* [The Beginning of Printing in Moscow and in the Ukraine], n.p., Moscow, 1947, pp. 21–25; and Supplement 1, pp. 80–91 (at head of title: Gosudarstvennaia ordena Lenina biblioteka SSSR imeni V. I. Lenina).
229. T. N. Protas'eva, *Pervye izdaniia moskovskoi pechati v sobranii Gosudarstvennogo Istoricheskogo muzeia* [First Editions of the Moscow Press in the Collection of the State Historical Museum], n.p., Moscow, 1955, pp. 7ff.
230. A. N. Svirin, *Drevnerusskaia miniatura*, n.p., Moscow, 1950.  
Another Svirin work dealing with illumination was published in 1958: A. N. Svirin, "Ostromirovo evangelie kak pamiatnik iskusstva" [The Ostromir Gospels as a Monument of Art], *Publichnaia biblioteka im. M. E. Saltykova-Shchedrina: Trudy*, 5(8), 47–55 (1958).

231. A. S. Zernova, *Ornamentika knig moskovskoi pečati XVI–XVII vekov* [The Decoration of Books Printed by the 16th–17th-Century Moscow Press], Izdanie Gosudarstvennoi ordena Lenina Biblioteki SSSR imeni V. I. Lenina, Moscow, 1952.

Another paleographer who showed considerable interest in the study of manuscript miniatures was M. V. Shchepkina. Her unpublished dissertation "Litsevye tsarskie rukopisi vremeni Fedora Ioannovicha i Borisa Godunova" [Illustrated Manuscripts of the Tsars Originating from the Times of Fedor Ioannovich and Boris Godunov], dated 1945, and her studies about individual manuscript books (see L. P. Zhukovskaia, Ref. 57, p. 111) show deep understanding of and interest in miniature techniques and styles.

232. N. E. Mneva, "Izografy Oruzheinoi palaty i ikh iskusstvo ukrasheniia knigi," in *Gosudarstvennaia Oruzheinaia palata Kremliia*, n.p., Moscow, 1954, pp. 216–246.
233. Ia. P. Zapasko, *Ornamental'noe oformlenie ukrainskoi rukopisnoi knigi* [The Decorative Design of the Ukrainian Manuscript Book], Akademiia nauk USSR, Kiev, 1960.
234. A. N. Svirin, *Iskusstvo knigi drevni Rusi XI–XVII vv.*, Izd-vo Iskusstvo, Moscow, 1964.
235. O. I. Podobedova, *Miniatiury russkikh istoricheskikh rukopisei: K istorii russkogo litsevoogo letopisaniia*, Izd-vo "Nauka," Moscow, 1965.
236. L. A. Dmitriev, "Miniatiury 'Skazaniia o Mamaevom poboishche'" [Illuminations in the 'Legend of the Rout of Mamai'], *Akademiia nauk SSSR: Institut russkoi literatury: Otdel drevnerusskoi literatury: Trudy*, Part 22, 1966, pp. 239–263.
237. Iu. Begunov, "Miniatiury pomorskogo mesiatseslova," *Iskusstvo*, No. 7, 1965, p. 64.
238. G. I. Vzdornov, "Knigopisanie i khudozhestvennoe oformlenie rukopisei v moskovskikh i podmoskovskikh monastyriakh do kontsa pervoi treti XV v.," *Akademiia nauk SSSR: Institut russkoi literatury: Otdelenie drevnerusskoi literatury: Trudy*, 22, 119–143 (1966).
239. T. N. Kopreva, "Khudozhestvennye traditsii Ostromirova Evangeliiia v knizhnoi ornamentike XVI v.," in *Kniga i grafika*, Izd-vo "Nauka," Moscow, 1972, pp. 115–119.
240. V. D. Likhacheva, "Miniatiury Kievskoi Psaltiri i ikh vizantiiskie istochniki," in *Kniga i grafika*, Izd-vo "Nauka," Moscow, 1972, pp. 38–47.
241. N. V. Rozanova, "Pamatniki miniatiury moskovskogo kruga pervoi poloviny XVI veka," in *Drevnerusskoe iskusstvo: Khudozhestvennaia kul'tura Moskvy i prilozhashchikh k nei kniazhestv XIV–XVI vv.*, Izd-vo "Nauka," Moscow, 1970, pp. 258–274.
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  315. I. I. Gumnitskii, "Litsevoe Evangelie XVI veka iz sobraniia V. N. Peretsa" [Sixteenth-Century Illuminated Gospel from the Collection of V. N. Perets], in *Istoriiia zhanrov v russkoi literature X-XVII vv.*, Akademiia nauk SSSR, Institut russkoi literatury, Otd.

- drevnerusskoi literatury, Trudy, No. 27, Izd-vo "Nauka," Leningradskoe otделение, Leningrad, 1972, pp. 450–453.
316. T. O. Izmailova, "O chetveroevangelii 1071/1078 goda" [About the Book of Gospels of the Year 1071/1078], in *Istoriko-filologicheskii zhurnal*, No. 1, 1972, pp. 277–283.
317. G. M. Prokhorov, "Kodikologicheskii analiz Lavrent'evskoi letopisi" [A Codicological Analysis of the Lavrent'ev Annals], in *Vspomogatel'nye istoricheskie distsipliny*, Part 4, 1972, pp. 77–104.
318. M. N. Tikhomirov, "Doklad M. N. Tikhomirova 1960 g. o sostavlenii svodnogo kataloga drevnikh rukopisei: Publikatsiia I. P. Staroverovoi" [A 1960 Lecture by M. N. Tikhomirov about the Creation of a Union Catalog of Ancient Manuscripts], in *Arkheograficheskii ezhegodnik za 1971 god*, Izd-vo "Nauka," Moscow, 1972, pp. 368–372.
319. O. P. Likhacheva, "Podgotovka Svodnogo kataloga slaviano-russkikh rukopisei XI–XIV vv.," *Izvestiia Akademii nauk SSSR: Ser. literatury i iazyka*, 31(1), 97–101 (1972).
320. "O rabote nad predvaritel'nym spiskom slaviano-russkikh rukopisei XV v. khраниashchikh-sia v SSSR," in *Arkheograficheskii ezhegodnik za 1971 god*, Izd-vo "Nauka," Moscow, 1972, p. 392.
321. The magazine *Bibliotekno-bibliograficheskaiia informatsiia bibliotek Akademii nauk SSSR i Akademii nauk soiuznykh respublik* (Vol. 2, pp. 126–131) reported about the proceedings of a meeting held in February 1971 in Leningrad concerning the subject of the creation of a union catalog of 11th–14th-Century Slavic and Russian manuscripts.
322. B. V. Sapunov, "Proizvodstvo russkoi rukopisnoi knigi, ee tsena i stoimost' v XI–XIII vv.," in *Kniga, issledovaniia i materialy*, 30, 92–[112] (1975).
323. G. I. Vzdornov, "Knigopisanie i khudozhestvennoe oformlenie rukopisei v moskovskikh i podmoskovskikh monastyriakh do kontsa pervoi treti XV v." [The Copying of Codices and the Artistic Execution of Manuscripts in the Monasteries of Moscow and the Moscow Area Up to the First Third of the 15th Century], in *Akademiia nauk SSSR: Institut russkoi literatury: Otdelenie drevnerusskoi literatury: Trudy*, 22, 119–143 (1966).
324. N. N. Pokrovskii, "O drevnerusskoi rukopisnoi traditsii u staroverov Sibiri" [The Ancient Russian Manuscript Tradition Among the Old Believers of Siberia], in *Akademiia nauk SSSR: Institut russkoi literatury: Otdelenie drevnerusskoi literatury: Trudy*, 24, 394–403 (1969).
325. N. N. Rozov, "Kto, chto i kak pisal v Drevnei Rusi" [Who Wrote, What and How in Ancient Rus'], *Voprosy istorii*, No. 2, 1969, pp. 208–214.
326. M. V. Kukushkina, "Knigopisnaia shkola Afanasiia arkhiepiskopa Kholmogorskogo i Vazheskogo" [The Training Scriptorium of Afanasii, Archbishop of Kholmogorsk and Vazhesk], in *Vspomogatel'nye istoricheskie distsipliny*, Part 3, 1970, pp. 108–130.
327. V. G. Dem'ianov, "O perepisyvanii knig v Drevnei Rusi" [About the Copying of Books in Ancient Rus'], *Russkaia Rech'*, No. 5, 1973, pp. 157–160.
328. I. M. Kudriavtsev, "'Izdatel'skaia' deiatel'nost' Posol'skogo prikaza (K istorii russkoi rukopisnoi knigi vo vtoroi polovine XVII veka)," *Kniga: Issledovaniia i materialy*, 8, 179–[244] (1963).
329. M. N. Speranskii, *Rukopisnye sborniki XVIII veka: Materialy dlia istorii russkoi literatury XVIII veka: Predislovie, podgotovka k pechati, redaktsiia i primechaniia V. D. Kuz'minovi*, Izd-vo Akademii nauk SSSR, Moscow, 1963.
- An earlier attempt to gather data for a census of 11th–14th-century codices was made in 1897 by N. V. Volkov: cf., his *Statisticheskie svedeniia o sokhranivshikhsia drevnerusskikh knigakh XI–XIV vekov*, St. Petersburg, 1897.
330. In October 1962, for example, an "expedition" to the small town of Kirillov resulted in the discovery of the 46 manuscript books and 56 17th-century printed books. About 50 of the early printed books had been absent from the collection of the Saltykov-Shchedrin State Public Library. See, *Kniga: Issledovaniia i materialy*, 8, 482–483 (1963).
331. Expeditions to the Arkhangel'sk area, the White Sea regions, to the Pselets and Kargopol' regions and the areas of the North Dvina and the Vag, to the Kirov and



Vologda regions, and many areas of Siberia have been described by several authors. Reports about the results of these expeditions can be found in the publications of the Academy of Sciences (cf., *Materialy i soobshcheniia po fondam otdela rukopisnoi i redkoi knigi Biblioteki Akademii nauk SSSR; Sbornik statei i materialov Biblioteki Akademii nauk SSSR po knigovedeniu; Istoriia zhanrov v russkoi literature X–XVII vv.; Nauchnye biblioteki Sibiri i Dal'nego Vostoka*).

In 1970 the Archaeological Commission of the History Division of the Academy of Sciences published the proceedings of a conference on the methodology of archaeological expeditions in RSFSR (cf., *Tikhomirovskie chteniia 1970 goda: Materialy . . .*, Izd-vo "Nauka," Moscow, 1970).

332. T. N. Kopreeva, "Rukopisnye sborniki entsiklopedicheskogo sostava XV–XVI vekov i slaviano-russkoe vozrozhdenie" [Manuscript Compilations of Encyclopedic Nature of the 15th and 16th Centuries and the Slavo-Russian Renaissance], in *Kniga: Issledovaniia i materialy*, 32, 76–[92] (1976).
333. T. V. Rozhdestvenskaia, "Ob osobennostiakh paleografii novgorodskikh nadpisei-graffiti XI–XIV vv." [About the Peculiarities of the Paleography of the 11th– Through 14th-Century Novgorod Inscriptions—Graffiti], in *Lingvisticheskie issledovaniia 1972 goda*, n.p., Moscow, 1973, Part 1, pp. 90–105.
334. B. O. Bulgakov, "O datirovke otdel'nykh rukopisei TsGADA" [About the Dating of the Individual Manuscripts at the TsGADA], *Sovetskie arkhivy*, No. 4, 1972, pp. 59–64.
- Two somewhat related papers were published in 1973 by R. A. Simonov concerning the Byzantine number system used in the inscriptions of the First Bulgarian Kingdom and its relation to the beginning of Slavic literacy, and the so-called numeric alphabets (cf., *Sovetskaia archeologiya*, No. 1, 1973, pp. 71–82; and *Russkaia rech'*, No. 1, 1973, pp. 134–140).
335. O. V. Zverintseva, "Fototipicheskie vosproizvedeniia vizantiiskikh i drevnerusskikh litsevnykh rukopisei" [Photo-typographical Reproduction of Byzantine and Ancient Russian Illuminated Manuscripts], in *Knigi: Arkhivy: Avtografy: Obzory, soobshcheniia, publikatsii*, Izd-vo "Kniga," Moscow, 1973, pp. 210–218.
336. A. K. Pole, "K voprosu o razvitiu russkoi paleografii v pervoi chetverti XIX veka" [More about the Development of Russian Paleography During the First Quarter of the 19th Century], in *Nekotorye problemy otechestvennoi istoriografii i istochnikovedeniia: Sbornik nauchnykh statei*, Dnepropetrovsk, 1972, pp. 97–106.
337. N. Lebedeva, "Russko-slavianskie knizhnye sviazi XI–XIII vekov" [Russian and Slavic Ties in the Field of Books During the 11th Through 13th Centuries], in *Leningradskii gosudarstvennyi institut kul'tury im. N. K. Krupskoi: XXIII studencheskaia nauchnaia konferentsiia, posviashchennaia, 50-letiiu obrazovaniia SSSR: 19–20 Apr. 1972 g.*, Leningrad, 1972, pp. 7–8.
338. A. S. Orlov, *Bibliografiia russkikh nadpisei XI–XV vv.* [A Bibliography of 11th–15th-Century Russian Inscriptions], Izd-vo Akademii nauk SSSR, Moscow and Leningrad, 1936; a second edition was published in 1952.
339. A. S. Orlov, "Materialy dlia bibliografii russkikh pechatei XI–XV vv. do 1425 g" [Materials for a Bibliography of Russian Seals of the 11th–15th Centuries, to the Year 1425], in *Vspomogatel'nye istoricheskie distsipliny* [Ancillary Historical Disciplines] (A. S. Orlov, ed.), Izd-vo Akademii nauk SSSR, Moscow and Leningrad 1937, pp. 245–283.
340. D. A. Avdusin and M. N. Tikhomirov, "Drevneishaia russkaia nadpis'" [The Most Ancient Russian Inscription], *Akademiia nauk SSSR: Vestnik*, No. 4, 1950, pp. 71–79.
341. B. A. Rybakov, "K bibliografii russkikh nadpisei XI–XV vv." [Addenda to the Bibliography of 11th–15th-Century Russian Inscriptions], *Sovetskaia arkheologiya*, No. 4, 1938, pp. 250–257.
342. B. A. Rybakov, "Nadpis' kievskogo gonchara XI v." [The Inscription of the 11th-Century Kiev Potter], in *Akademiia nauk SSSR: Institut istorii material'noi kul'tury: Kratkie Soobshcheniia o dokladakh i polevykh issledovaniiaakh*, 12, 134–138 (1946).

343. B. A. Rybakov, "Imenni nadpisi XII st. v Kiivs'komu Sofiis'komu sobori" [Twelfth-Century Inscriptions of Names in the Kiev Sophia Cathedral], *Arkheologiya*, 1, 53–64 (1947).
344. B. A. Rybakov, "Zapis' o smerti Iaroslava Mudrogo" [Inscription about the Death of Iaroslav the Wise], *Sovetskaia arkheologiya*, No. 4, 1959, pp. 245–249.  
See also Refs. 207 and 356.
345. V. Girshberg, "Materialy dlia svoda nadpisei na kamennykh plitakh Moskvy i Podmoskov'ia XIV–XVII vv." [Materials for the List of 14th–17th-Century Inscriptions on Stone Plates in Moscow and in Its Surrounding], Ch. 1, Nadpisi XIV–XVI vv., *Numizmatika i epigrafika*, 1, 3–77 (1960); Ch. 2, Nadpisi pervoi poloviny XVII v., *Numizmatika i epigrafika*, 3, 212–287 (1962).
346. S. A. Vysotskii, "Drevnerusskie graffiti Sofii Kievskoi [The Ancient Russian Graffiti of the Kiev Sophia Cathedral], *Numizmatika i epigrafika*, 3, 147–182 (1962).
347. That is, *Numizmatika i epigrafika*, a serial publication put out since 1960 by the Akademia nauk SSSR, Institute Arkheologii [Archaeological Institute of the Academy of Sciences of the U.S.S.R.].
348. V. V. Vinogradov, ed., *Bibliograficheskii ukazatel' literatury po russkomu iazykoznaniiu s 1825 po 1880 god*, Izd-vo Akademii nauk SSSR, Moscow, 1954–1958, Parts 1–8.
349. R. P. Dmitrieva, *Bibliografiia russkogo letopisaniia*, Izd-vo Akademii nauk SSSR, Moscow and Leningrad, 1962.
350. D. S. Likhachev, ed., *Bibliografiia sovetskikh rabot po dreverusskoi literature za 1945–1955 gg.: Sostavili V. A. Kolobanov, O. F. Kolobanova i M. A. Salmina: Pod redaktsiei i vstupitel'noi sta'ei D. S. Likhacheva*, Izd-vo Akademii nauk SSSR, Moscow and Leningrad, 1956.
351. V. P. Adrianova-Perets, ed., *Bibliografiia sovetskikh russkikh rabot po literature XI–XVII vv. za 1917–1957 gg.: Sostavila N. F. Droblenkova: Pod redaktsiei i so vstupitel'noi sta'ei V. P. Adrianovoi-Perets*, Izd-vo Akademii nauk SSSR, Moscow and Leningrad, 1961.
352. N. F. Bel'chikov, Iu. K. Begunov, and N. P. Rozhdestvenskii, *Spravochnik-ukazatel' pechatnykh opisaniĭ slaviano-russkikh rukopisei* [A Guide-Index to Printed Descriptions of Slavic-Russian Manuscripts], Izd-vo Akademii nauk SSSR, Moscow and Leningrad, 1963.
353. A. S. L'vov, *Ocherki po leksike pamiatnikov staroslavianskoi pis'mennosti* [Studies on the Lexicology of the Monuments of Ancient Slavic Literacy], Izd-vo "Nauka," Moscow, 1966.
354. M. V. Shchepkina, *Bolgarskaia miniatura XIV veka: Issledovanie Psaltyri Tomicha*, Izd-vo "Iskusstvo," Moscow, 1963.
355. A. S. Myl'nikov, *Cheshskaia kniga: Ocherki istorii (Kniga: Kul'tura: Obshchestvo)*, Izd-vo "Kniga," Moscow, 1971.
356. B. A. Rybakov and V. L. Ianin, "Po povodu tak nazyvaemykh 'otkrytii' N. V. Engovatova" [Concerning the So-called Discoveries by N. V. Engovatov], *Sovetskaia arkheologiya*, No. 4, 1960, pp. 239–240.
357. The following passage from a letter written in Karlsbad on July 8, 1838, by Pavel Josef Šafařík should give a taste of this strong feeling. The Czech scholar wrote to his brother in Prague: "There are a lot of young Russian ignoramuses hunting through the libraries and archives of Europe. All these people are thoroughly ungifted and none of them is worth a penny. . . . It would be good if you warned the staff of the Royal and Imperial Archives that they should not have anything to do with these empty-headed idiots and should not allow them to copy anything, for they would only mess it all up. The honor of publishing [the early manuscripts] must belong to an Austrian."
358. Abū-al-Hassan 'Alī al-Mas'ūdī, Arabic historian whose chief work, a chronological sketch of general history called *Annals* (in 30 vols.), contains references to inscriptions seen in Slavic temples. Although the *Annals* are not considered a reliable source by Arabic

scholars, parts of the work were published in abridged form in English translation (1841):

كتاب مروج الذهب المسعدي *El-Mas'udi's Historical Encyclopaedia Entitled "Meadows of Gold and Mines of Gems," Translated of the Arabic, by Alois Sprenger . . .*, Vol. 1, The Oriental Translation Fund [of Great Britain and Ireland], London, 1841.

359. Ahmad ibn-Fadlān ibn Hammād, Arabic traveler who described the funeral rites of early Volga Bulgars. He referred to a poplar pole erected on the grave. The pole carried the name of the deceased together with the name of the tsar.

360. ibn-abī Ya'qūb al Nadīm, also cited as ibn-abī Ya'qūb al Nadīm al Warrāq al-Baghdādī (d. 995). The author of the *Index to Sciences*, or *Fihrist al-ullām* (987–988) reports secondhand information concerning the use by Russians of some kind of letters or signs representing words, which were carved in wood.

According to G. Sarton (*Introduction to the History of Science*, Williams and Wilkins, Baltimore, 1927, Vol. 1, p. 662), the text of the original work with commentaries was published in Leipzig in 1871–1872 by Johann Rödiger and August Müller. It was edited by Gustav Flügel, Sarton also states that no English translation of the work is available.

361. A detailed account of Arabic references about early Slavs, and especially Russians, is to be found in the works of A. Ia. Harkavi: A. Ia. Harkavi, *Skazaniia musul'manskikh pisatelei o slavianakh i russkikh (s poloviny VII veka do kontsa X veka po R. Kh.)* [Relations of Muhammadan Authors Concerning Slavs and Russians (from the mid-7th Century to the End of the 10th Century A.D.)], Sobral, perevel i ob'siasnil A. Ia. Harkavi, Tip. imp. Akademii nauk, St. Petersburg, 1870, and A. Ia. Harkavi, *Dopolneniia*, v Tip. A. O. Tsederbauma, St. Petersburg, 1871.

The original Russian text of the 1870 edition was reprinted in 1969; it was published by Mouton as No. 96 in their Slavistic Printings and Reprintings series.

362. There are many theories as to the identity of the author. The word *khraabr*, meaning "brave," does not offer any leads. Individual scholars think that it was a pseudonym used by one of the following: the Bulgarian tsar Simeon (V. N. Zlatarskii); Bishop Cyril (J. Hanuš); Bishop Clement (F. Snopka); Ioann the Bulgarian Exarch (G. A. Il'inskii); or by Naum (A. Mazon and M. Weingart). What is believed to be a ninth-century (A.D.) Glagolitic original has come down to us only in copies written in Cyrillic characters. Although the earliest extant copy originates from the 14th century, it refers to the year 855 A.D. as the time of the creation of the Slavic alphabet and of the translation of the Scriptures into Slavic. Furthermore, these references state that "there are still people alive who have seen them" (i.e., the Bishops Cyril and Methodius), which would suggest that the original copy of *O pis'menekh* [About Letters] was written some time during the late 9th or early 10th century.

Two interesting contributions to the literature of this problem were made by J. Hanuš: *Sv. Kyril nepsal kyrilsky než hlaholsky, vypravuje Ignac Jan Hanuš*, Pro pojednání král. české učené společnosti v. Praze, část V, svazek 10, G. Haas, Prague, [1857]; and "Der bulgarische 'Mönch Chrabru' (IX.–X. Jahrhundert): Ein Zeuge der Verbreitung glagolitischer Schriftwesens unter den Slawen bei deren Bekehrung durch die heiligen Kyril und Method," in *Archiv für Kunde österreichischer Geschichts-Quellen*, Vol. 23, 1859.

363. G. Postel, *Linguarum duodecim characteribus differentium alphabetum introductio ac legendi modus longe facilimus . . . Gillelmi Postelli . . . diligentia . . .*, Apud D. Lescuier, Paris, 1538.

The belief that Saint Jerome (ca. 347–ca. 420) was the creator of the Glagolitic alphabet and the translator of the Scriptures into Old Church-Slavonic still persists among Catholic South Slavs.

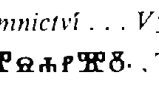
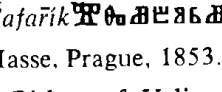
364. The Jeromian theory was used by many who fought for the Vatican's decision allowing Slavic liturgy in the South Slavic territories. See S. Rittig, *Provijest i pravo*

*slovenštine u crkv. bogoslužju*, n.p., Zagreb, 1910; and F. Bulić, *Stridon (Grahovo polje u Bosni) rodno mesto sv. Jeronima*, n.p., Sarajevo, 1920).

Further references are to be found in J. A. Theiner's *Vetera monumenta Slavorum meridionalium historiam illustrantia . . .*, Typis vaticanis, Rome, 1863, Vol. 1, p. 78; in A. Potthast's *Regesta Pontificum Romanorum inde ab a. post Christum natum 1198 ad a. 1304*, n.p., Berlin, 1783–1785, Vol. 2, Item 12877; and also in the following: P. Solarić (1812), K. Segvić (1931), L. Jelić (1906), I. Prodan (1904), and others.

365. A. Banduri, *Imperium orientale, sive Antiquitates Constantinopolitanae, in quatuor partes distributae: Quae ex variis scriptorum graecorum operibus & praesertim ineditis adornatae, commentariis, & geographicis, topographicis, aliisque . . . tabellis illustrantur . . . Opera & studio Domni A. Bandurii*, n.p., Paris, 1711.
366. J. L. Frisch, *Origo characteris Sclavonici vulgo dicti Cirulici paucis generatim monstrata, ortus vero et progressus characteris vulgo dicti Glagolitici pluribus sigillatim descriptus*, [An academic invitation], n.p., Berlin, 1727.
367. G. S. Assemani, *Kalendaria ecclesiae universae, in quibus . . . sanctorum nomina, imagines et festi per annum, dies ecclesiarum orientes et occidentes . . . recensentur . . . studio . . . Josephi Simonii Assemani . . . Tomus IV: Kalendaria ecclesiae slavicae sive graeco-moschae . . .*, Sumptibus F. Amidei, Rome, 1755, ♀. 408.
368. C. Grubissichius, *In originem et historiam alphabeti sclavonici glagolitici vulgo hieronymiani, disquisitio . . . a Clemente Grubissichio*, J. B. Pasquali, Venice, 1766, p. 73.
369. A. Linhart, *Versuch einer Geschichte von Krain und der übrigen südlichen Slaven Oesterreichs*, n.p., Nuremberg, 1796, 2 vols.
370. That is, C. A. F. Pertz, *De Cosmographia Ethici libri tres, scripsit Karolus Augustus Fridericus Pertz . . .*, Sumptibus F. C. Nicolai, Berlin, 1853, pp. 150–153.
371. Fergal (Latinized Virgilius) supported Bede's doctrine of the antipodes and was involved in bitter controversy with Boniface, organizer of the Frankish church. Under the assumed name of Aethicus, or "the Danube Philosopher," he produced the controversial *Cosmographia* and used it to support his hypothesis against Boniface.
372. Printed in *Böhmische Gesellschaft der Wissenschaften: Abhandlungen*, 1783, pp. 300–322.
373. Printed in *Böhmische Gesellschaft der Wissenschaften: Abhandlungen*, No. 2, 1785, pp. 101–139.
374. J. Dobrovský, "In welche Zeit fällt mutmasslich die Erfindung der glagolitischen Buchstaben," in *Glagolitica: Ueber die glagolitische Literatur: Das Alter der Bukwitzza . . . ihr Muster, nach welchem sie gebildet worden: Den Ursprung der römisch-slavischen Liturgie: Die Beschaffenheit der dalmatischen Uebersetzung, . . . Ein Anhang zum Slavin*, n.p., Prague, 1807, pp. 17ff.
- Another edition was published in 1845, under the editorship of V. Hanka, *Dobrowsky's Glagolitica: Ueber die glagolitische Literatur . . . Zweite . . . Ausgabe von Wenzeslaw Hanka: Mit drei lithographierten Tafeln*, C. von Meyeregg, Prague, 1845.
375. J. Dobrovský, *Josephii Dobrowsky Institutiones linguae slavicae dialecti veteris, quae quum apud Russos, Serbos aliosque ritus graeci, tum apud Dalmatas Glagolitas ritus latini Slavos in libris sacris obtinet*, A. Schmid, Vienna, 1822.
376. F. C. Alter, *Beitrag zur praktischen Diplomantik für Slaven, vorzüglich für Böhmen, von Franz Carl Alter . . .*, I. G. Binz, Vienna, 1801.
377. C. Wessely, ed., "Glagolitisch-lateinische Studien," in *Studien zur Palaeographie und Papyruskunde*, Vol. 13, E. Avenarius, Leipzig, 1913.
378. M. Hocij, "Die westlichen Grundlagen des glagolitischen Alphabets," *Süddeutsche Forschungen*, Vol. 4, 1939.
379. F. Durich, *Bibliotheca Slavica antiquissimae dialecti communis et ecclesiasticae universalis Slavorum gentis, studio et opera Fortunati Durich . . . primum emittitur . . .*, Sumptibus S. Novakovitsch, Vienna, 1795, Vol. 1.
380. J. Hanuš, "Zur slavischen Runen-Frage mit besonderer Rücksicht auf die obotritischen

Runen-Alterthümer sowie auf die Glagolica und Kyrillica: Als ein Beitrag zur comparativen germanisch-slavisches Archäologie entworfen von Dr. I. J. Hanuš," *Archiv für Kunde österreichischer Geschichts-Quellen*, **18**, 1–117 (1857).

381. J. Hanuš, "Zur Glagolica Frage," *Slavische Bibliothek*, Vol. 2, 1858.
382. B. Kopitar, ed., *Glagolita Clozianus, id est Codicis glagolitici inter suos facile antiquissimi . . . ΛΕΙΨΑΝΟΝ foliarum XII membraneorum . . . litteris totidem cyrillicis transcriptum, amplissimis de alphabeti glagolitici remotiori antiquitate et liturgia slavica A.D. 870 primum coepta in Pannonia prolegomenis historicis et philologicis, monumentis item tribus dialecti carantianae seculi X. Monachii repertis, itemque speciminibus slavicarum cis Danubium dialectorum ab a. 1057 as 1385, calendario slavico a. 1057 aliisque ineditis, addito graeco glagolitae interpretis ἸΩΑΝΝΕΣ ΜΕΛΩ, latinaque slavica omnium interpretatione, linguae demum Slavorum utriusque ritus ecclesiasticae brevi grammatica et lexico illustratum edidit . . . Bartholomeus Kopitar . . .*, Apud C. Gerold, Vienna, 1836.
383. [Dom C. F. Toustain and Dom R. P. Tassin], *Nouveau traité de diplomatique où l'on examine les fondemens de cet art, on établit des règles sur le discernement des titres et l'on expose historiquement les caractères des bulles pontificales et des diplômes données en chaque siècle . . . par deux religieux bénédictins de la congrégation de S. Maur*, G. Deprez, Paris, 1750–1765, 6 vols.
384. J. C. Adelung, trans., *Neues Lehrgebäude der Diplomatie, welches in Frankreich von einigen Benedictinern von der Congregation des heil. Mauri ausgefertigt worden . . .*, n.p., Erfurt, 1759–1769, 9 vols.
- Another, more complete list of the letters of the Glagolitic alphabet (see Fig. 2) was discovered in a 10th-century Latin codex (Cod. Lat. 14.485) in the Library of Munich. The *Munich Abecedarium* is in fact a parallel listing of Cyrillic and Glagolitic characters. Some letters have been omitted by the compiler (see *Byzantinoslavica*, Vol. 2, p. 32).
385. B. Kopitar, *Hesychii glossographi discipulus et ἑπιγραμματιστὴς russus in ipsa Constantinopoli sec. XII–XIII, e codice vindobonensi graecorussica omnia, additis aliis pure graecis, et trium aliorum cyrillicani lexici codicum speciminibus, aliisque miscellaneis philologici maxime et slavistici argumenti nunc primum edidit . . . Bartholomeus Kopitar . . .*, C. Gerold, Vienna, 1839.
386. P. J. Šafařík, *Památky dřevního písemnictví Jihoslovanův*, n.p., Prague, 1851.
- A second edition of the work was also published: P. J. Šafařík, *Památky dřevního písemnictví Jihoslovanův: Díl předchozí: Sebral i vydal Pavel Josef Šafařík: Vydání druhé, doplňky pozůstalosti Šafaříkovy rozmnožené, upravil Josef Jireček, Nákladem F. Tempského*, Prague, 1873.
387. P. J. Šafařík, *Památky hlaholského písemnictví . . . Vydal Pavel Josef Šafařík*  . Tiskem synův B. Hasse, Prague, 1853.
- For the shorter version of the Greek legend about Saint Clemens, Bishop of Velica, the reader is referred to pp. 57–59 of the work.
388. Two leaves of parchment with Glagolitic writing. They were discovered in 1855 in the collection of Prague Archives by Prof. K. Höfler. One of the leaves is a palimpsest. Authorities cannot agree on the place or date of origin of the fragments (P. J. Šafařík, F. Pastrnek, V. Oblak, L. Geitler, V. Jagić, V. Vondrák, V. Lamanskii). The text of the leaves was published by P. J. Šafařík and K. Höfler (1857).
389. P. J. Šafařík, *Über den Ursprung und die Heimath des Glagolitismus . . . Mit einer Schrifttafel*, Verlag von F. Tempsky, Prague, 1858.
390. F. Rački, *Pismo slovjensko: Napisa dr. Franjo Rački: Troškom K. Stojšica*, Brzotiskom D. Albrechta, Zagreb, 1861, pp. 113ff.

391. I. Taylor, "Über den Ursprung des glagolitischen Alphabets," *Archiv für slavische Philologie*, 5, 191–192 (1881).
392. I. Taylor, *The Alphabet: An Account of the Origin and Development of Letters*, K. Paul, Trench & Co., London, 1883, Vol. 2, pp. 201–207.
393. Archimandrate Amfilokhii (i.e., Pavel Ivanovich Sergievskii), *O podlozhnosti otryvkov glagolitskikh t.n. Reimskogo evangeliia, odnosimo arkheologami slavianskimi k XII v. i o kliuche k glagolitskomu pis'mu: Dopolnenie k Galichskomu slichitel'nomu chetveroevangeliu* [The Spuriousness of the Glagolitic Fragments in the So-called Reims Gospel Attributed by Slavic Archaeologists to the 12th Century and about the Key to Glagolitic Writing], n.p., Moscow, 1883, pp. 145–178.
394. F. Miklošič, "Glagolitisch," in *Allgemeine Encyclopädie der Wissenschaften und Künste*, 1(68), 403ff (1858).
395. V. Jagić, "Chetyre kritiko-paleograficheskie stat'i," in *Otchet o prisuzhdenii Lomonosovskoi premii za 1883 god, s prilozheniem . . .*, Tip. Imperatorskoi Akademii nauk, St. Petersburg, 1884.  
Published as *Imperatorskaia Akademiia nauk: Otdelenie russkago iazyka i slovesnosti: Sbornik*, Vol. 33, No. 2.
396. V. Jagić, *Glagolicheskoe pis'mo*, Part 3 of *Entsiklopediia slavianskoi filologii* (I. V. Jagić, ed.), Tip. Imperatorskoi Akademii nauk, Petrograd, 1911.  
The same volume contains the following papers: "Vopros o runakh u Slavian," by V. Jagić (Pt. 1); "Grecheskoe pis'mo IX–X stoletii," by V. Gardthausen (Pt. 2); and "Glagolicheskoe pis'mo," by V. Jagić (Pt. 3).
397. V. Jagić, comp., *Razsuzhdeniia iuzhnoslavianskoi i russkoi stariny o tserkovnoslavianskom iazyke: Sobral i ob'iasnil . . . I. V. Iagich*, *Izsledovaniia po russkomu iazyku*, Vol. 1, Izdanie Otdeleniia russkago iazyka i slovesnosti Imperatorskoi Akademii nauk, St. Petersburg, 1885–1895, pp. 289–1070, Bibliography, pp. 950–1023.  
Another edition is: V. Jagić, comp., *Razsuzhdenie iuzhnoslavianskoi i russkoi stariny o tserkovno-slavianskom iazyke: Sobral i ob'iasnil . . . I. V. Iagich*, *Codex Slovenicus rerum grammaticarum*, n.p., St. Petersburg, 1896.
398. V. Jagić, *Istoriia slavianskoi filologii: Trud ordinarnago akademika I. V. Iagicha*, Part 1 of *Entsiklopediia slavianskoi filologii* (I. V. Jagić, ed.), Tip. Imperatorskoi Akademii nauk, St. Petersburg, 1910.
399. A. Leskien, "Zur glagolitischen Schrift," *Archiv für slavische Philologie*, 27, 161–168 (1905).
400. Even an expert on Greek paleography such as Gardthausen gave recognition to the Leskien theory: V. Gardthausen, *Grecheskoe pis'mo IX–X stoletii* [Ninth–Tenth-Century Greek Writing], in Part 3 of *Entsiklopediia slavianskoi filologii* (I. V. Jagić, ed.), p. 43; as cited by J. Vajs, *Rukovět hlaholské paleografie: Uvedení do knižního písma hlaholského*, Nákladem Slovanského Ústavu, Prague, 1932, p. 23.  
At head of the French half-title: *Manuels publiés par l'Institut slave de Praha*, Vol. 2.
401. L. Geitler, *Die albanischen und slavischen Schriften: Von dr. Leopold Geitler . . . Mit Unterstützung der Kaiserlichen Akademie der Wissenschaften in Wien*, A. Hölder, Vienna, 1883.  
Contents: Pt. 1: Analyse der albanischen Schriften; Pt. 2: Analyse der beiden slavischen Schriften.
402. R. Nachtigal, "Doneski k vprašanju o postanku glagolice I.," *Znanstveno društvo za humanistične vede v. Ljubljani: Razprave*, 1, 135–178 (1923); as cited by Georgiev, *Kiril i Metodii, osnovopolozhnitsi . . .*, Ref. 414, p. 116.
403. E. Minns, "Saint Cyril Really Knew Hebrew," in *Mélanges publiées en l'honneur de P. Boyer*, *Travaux publiés par l'Institut d'études slaves*, Paris, Vol. 2, 1925, pp. 94–97.
404. M. Gaster, *Ilchester Lectures on Greeko-Slavonic Literature and Its Relation to the Folk-Lore of Europe During the Middle Ages*, Trübner & Co., London, 1887, pp. 209–229.

405. R. Abicht, *Ist die Aehnlichkeit des glagolitischen mit dem grusinischen Alphabet Zufall?* Von Dr. A. Abicht . . . , R. Gerhard, Leipzig, 1895.  
A paper by the same author about the Khabr problem was printed in *Archiv für slavische Philologie* ("Das Alphabet Chrabrs"), Vol. 31, pp. 210ff.
406. V. Vondrák, "Zur Frage nach der Herkunft des glagolitischen Alphabets," *Archiv für slavische Philologie*, **18**, 541–556; **19**, 167–188 (1896).
407. A. Rahlfs, "Zur Frage nach der Herkunft des glagolitischen Alphabets," *Zeitschrift für vergleichende Sprachforschung*, Vol. 45, pp. 285–287.
408. J. Grimm's review of the Kopitar edition of the text of the Glozian Glagolitic Codex: *Göttingische Anzeiger*, **1**, 325ff (1836); as cited by Vajs, Ref. 400, p. 26.
409. In Yugoslavia, research in this field has been focused on Glagolitic writing, its history, development, and local peculiarities (I. Prodan, L. Jelić, F. Bučar, S. Rittig, S. N. Ivančić, I. Milčetić, B. Vodnik, R. Strohal, S. Ivšić, M. Tentor, V. Štefanić, J. Hamm, and V. Stefanović).
410. Bulgarian scholars, and first of all Prof. Emil Georgiev, devoted much attention to a broader aspect of the problem, i.e., to the possibility of the existence of a pre-Cyrillic writing and its links with the two extant Slavic alphabets, the Cyrillic and Glagolitic.
411. E. Georgiev, "Proizhod't na kirilitsata," *Prosveta*, **1**, 1182–1187 (1936).
412. E. Georgiev, *Nachaloto na slavianskata pismenost v B'lgariia: Starob'lgarskite azbuki*, *Studia historico-philologica Serdicensia*, Vol. 3, No. 1, n.p., Sofia, 1942.
413. E. Georgiev, *Slavianskaia pis'mennost' do Kirilla i Mefodiia*, *Izdanie Bolgarskoi Akademii nauk*, Sofia, 1952.
414. E. Georgiev, *Kiril i Metodii osnovopolozhnitsi na slavianskite literaturi*, *Izdanie na B'lgarskata Akademiia na naukite*, Sofia, 1956.
415. Some of the supporters of the "Greek theory" were Arkhimandrate Amfilokhii, D. F. Beliaev, and F. Müller. Those who opposed this theory, or had an alternative idea to promote, were A. S. Budilovich, V. Miller, F. Fortunatov, L. Lamanskii, M. Grun'skii, M. A. Obolenskii, A. I. Sobolevskii, and others.
416. F. F. Fortunatov, "O proiskhozhdenii glagolitsi," *Imperatorskaia Akademiia nauk: Otdelenie russkogo iazyka i slovesnosti: Izvestiia*, **18**(4), 221–256 (1913).
417. Vajs, Ref. 400, p. 31.
418. I. Ogienko, "Slov'ians'ke pis'mo pered Konstantinom," in *Iuvileinii zbirnik na poshanu M. S. Grushevs'kogo*, Vol. 2, n.p., Kiev, 1928.
419. I. K. Nikol'skii, "K voprosu o russkikh pis'menakh, upominaemykh v Zhitii Konstantina Filosofa," *Akademiia nauk SSSR: Otdelenie russkogo iazyka i slovesnosti: Izvestiia*, **1**, 1–37 (1928).
420. D. S. Likhachev, *Vozniknovenie russkoi literatury*, *Izd-vo Akademii nauk SSSR*, Moscow and Leningrad, 1952, pp. 14–15.
421. J. Dobrovský, "Cyril und Method der Slaven-Apostel: Ein historisch-kritischer Versuch," *Abhandlungen der böhmischen Gesellschaft der Wissenschaften*, 3rd ser., B. Vol. 8, *Histor.*, Part 2, 1823.
422. V. Jagić, *Vopros o Kirille i Mefodii v' slavianskoi filologii: Rech I. V. Jagicha*, *Imperatorskaia Akademiia nauk: Otdelenie russkogo iazyka i slovesnosti: Sbornik*, Vol. 38, Pt. 1, *Tip. Imp. Akademii nauk*, St. Petersburg, 1885; and *Vnov' naidennoe svidetel'stvo o deiatel'nosti Konstantina filosofa, pervouchitelia Slavian sv. Kirilla*, *Imperatorskaia Akademiia nauk: Otdelenie russkogo iazyka i slovesnosti: Sbornik*, Vol. 54, Pt. 3, *Tip. Imp. Akademii nauk*, St. Petersburg, 1893.  
Also: a letter from Anastasius Bibliothecarius to Gaudericus, Bishop of Velletri, with the text in Latin and Russian. There are references to the role of Cyril and Methodius in other Jagić publications: e.g., *Historija knjizevnosti naroda hrvatskoga i srpskoga . . . Kniga prva. Staro doba . . .* (1868); *Zur Entstehungsgeschichte der kirschenoslavischen Sprache . . .* (1900); and *Einige Streitfragen . . .* (1901).
423. A. B. Balan (i.e., A. Teodorov-Balan). *Kiril i Metodii*. D'rzhavna Pechatnitsa. Sofia. 1920, 2 vols.

424. J. Friedrich, "Ein Brief des Anastasius Bibliothecarius," *Bayerische Akademie der Wissenschaften: Sitzungsberichte: Hist. Klasse: Sitzung von 2 Juli, 1892*, n.p., Munich, 1892.
425. F. Dvorník, *Les legendes de Constantin et de Methode, vues de Byzance*, Byzantinoslavica, Prague, 1933; published as Supplement 1 of the magazine *Byzantinoslavica*.  
Also: F. Dvorník, "La carrière universitaire de Constantin le Philosophe." *Byzantinoslavica*, 3, 59–67 (1931).
426. M. Rešetar, "Zur Übersetzungstätigkeit Methods," *Archiv für slavische Philologie*, 34, 234ff (1913).
427. F. Pastrnek, *Dějiny slovanských apoštolů Cyrilla a Methoda, s rozbořem a otiskem hlavních pramenů: Sepsal Dr. František Pastrnek . . .*, Spisě postěny jubilejní cenou Král. české společnosti nauk v Praze, Vol. 14, Nakladem jubilejního fondu, Prague, 1902.
428. L. K. Goetz, *Geschichte der Slavenapostel Konstantinus (Kyryllus) und Methodius: Quellenmassig untersucht und dargestellt von Lic. Leopold Karl Goetz, F. A. Perthes*, Gotha, 1897.
429. G. A. Il'inskii, *Opyt sistematičeskoj kirillo-mefod'evskoj bibliografii: Pod redaktsiei i s dopolneniiami M. G. Popruženko i St. M. Romanskogo*, Izd. B'lgarskata Akademiia na naukite, Sofia, 1934.
430. M. Popruženko and S. Romanski, *Kirilometodievaska bibliografija za 1934–1940 god*, D'ržavna pečatnitsa, Sofia, 1942.
431. I. Milčetić, "Hrvatska glagolska bibliografija . . . Sa dva priloga dr. K. pl. Horvata, s jednim prilogom J. Vajsa i s dodatkom: Šibenska molitva (XIV vjeka) pisana latincom (sa dva fotografska snimka): Priopćili I. i o. J. Milošević," *Starine*, Vol. 33, 1911.
432. F. Pastrnek, *Bibliographische Übersicht über die slavische Philologie 1876–1891, verlasst von Dr. Fr. Pastrnek: Zugleich Generalregister zu Archiv*, Vols. 1–13, *Archiv für slavische Philologie*, Weidman, Berlin, 1892.  
Another work containing information about source material was published in 1877: A. Voronov, *Glavneishie istochniki dlja istorii svv. Kirilla i Mefodiia*, n.p., Kiev, 1877.
433. E. F. Karskii, *Slavianskaia kirillovskaia paleografija*, Ref. 69, pp. 32–62, 80–84; L. V. Cherepnin, *Russkaia paleografija . . .*, Ref. 122, Notes; and J. Vajs, *Rukovět . . .*, Ref. 400, Notes.
434. B. Kopitar, *Evangelia slavice, quibus olim in regnum Francorum oleo sacro inungendorum solemnibus uti solebat ecclesia remensis vulgo Texte du sacre ad exemplaris similitudinem descripsit et edidit J. B. Silvestre . . . Evangelia latine vertit eandemque interpretationem latinam e regione adjecit B. Kopitar . . .*, Lutetiae, Paris, 1843.  
Facsimile in color.
435. V. Jagić, ed., . . . *Quattuor evangeliorum Codex glagoliticus olim Zographensis nunc Petropolitanus: Characteribus cyrillicis transcriptum notis criticis prolegomenis appendicibus auctum . . . edidit V. Jagić . . .*, Apud Weidmannos, Berlin, 1879.  
Title in Church-Slavonic with Glagolitic characters and in Russian with Cyrillic characters, at head of main title. Introductory note in Latin.
436. V. Jagić, ed., *Mariinskoe četveroevangelie s primečaniiami i prilozheniiami. Trud I. V. Jagiča*, Izd. Otdeleniia russkago iazyka i slovesnosti Imperatorskoi Akademii nauk, St. Petersburg, 1883.  
Added title page in Latin: *Quattuor Evangeliorum versionis palaeoslovenicae Codex Marianus glagoliticus: Characteribus cyrillicis transcriptum edidit V. Jagić*. Introduction in Latin.
437. V. Jagić, ed., . . . *Psalterium Bononiense; interpretationem veterem Slavicam cum aliis codicibus collatam, adnotationibus ornatam, appendicibus auctam adiutus Academiae Scientiarum Vindobonensis liberalitate editit V. Jagić: Accedunt XIX specimina codicum*, Gerold & Soc., Vienna, 1907.
438. V. Jagić, *Sluzhebnye minei za sentiabr', aktiabr', i noiabr', v tserkovnoslavianskom perevode po russkim rukopis'iam 1095–1097 godov*, Imperatorskaia Akademiia nauk, St. Petersburg, 1886.



439. Other significant Jagić contributions were the description, with illustrations, of the *Kiev Fragments*, the *Grškovic Fragment*, and the *Vienna Fragments*—all Glagolitic: "Glagolitica: Würdigung neuentdeckter Fragmente." *Denkschriften der kaiserlichen Akademie der Wissenschaften: Philosophisch-Historische Klasse*, **32**, 44–56 (1890); "Glagolitica II: Würdigung neuentdeckter Fragmente." *Denkschriften der kaiserlichen Akademie der Wissenschaften: Philosophisch-Historische Klasse*, **38(2)**, (1890); and "Grškovičev odlomak glagolskog apostola." *Starine*, Vol. 26, 1893.
440. F. Rački, ed., *Assemanov ili Vatikanski Evangelistar: Iznese ga na svjetlo dr. F. Rački*, n.p., Zagreb, 1865.  
With an introduction on the language and Glagolitic characters and with a facsimile plate.
441. L. Geitler, ed., *Psalterium: Glagolsi spomenik monasteri Sinai brda . . .*, Opera Academiae scientiarum et artium Slavorum meridionalium, Vol. 3, n.p., Zagreb, 1883.
442. L. Geitler, ed., *Eucologium: Glagolski spomenik monastira Sinai brda . . .*, Opera Academiae scientiarum et artium Slavorum meridionalium, Vol. 2, n.p., Zagreb, 1882.
443. F. Miklošič, ed., *Monumenta linguae palaeoslovenicae e Codice Suprasliensi edidit F. Miklosich*, n.p., Vienna, 1851.  
Printed from the manuscript copy of the 285 leaves of the Codex containing the Menologion for March, 20 homilies by St. John Chrysostom, etc.
444. F. Miklošič, ed., *Apostolus, e codice Monasterii Sišatovac palaeo-slovenice editit F. Miklosich*, Apud G. Braümüller, Vienna, 1853.  
Also known as *Apostolus Sisatovacensis or Damiani 1324*.
445. I. Goshev, ed., *Rilski glagolicheski listove*, Izd. na B'lgarskata Akademiia na naukite, Sofia, 1956.
446. F. A. C. Höfler and P. J. Šafařík, *Glagolitische Fragmente, herausgegeben von Dr. Kari Adolph Constantin Höfler . . . und Dr. Paul Joseph Šafařík . . .*, Königliche Böhmische Gesellschaft der Wissenschaften: Abhandlungen, Ser. 10, Vol. 5, Druck von G. Haase Söhne, Prague, 1857.
447. V. Vondrák, *Glagolita Clozův*, Nákladem České akademie věd a umění, Prague, 1893.
448. J. Vajs and J. Kurz, eds., *Evangelium Assemani: Codex Vaticanus 3. slavicus glag. Editio phototypica cum prolegomenis, texti litteris cyrillis transcriptio, analysis, annotationibus palaeographicis, variis lectionibus, glossario . . . Ediderunt Dr. Jos. Vajs . . . Dr. Jos. Kurz. Evangelium Assemanův, etc. . . .*, Codices e Vaticanis selecti phototypice expressi, Vol. 20, n.p., Prague, 1929.
449. J. Vajs., ed., *Ukázky textů z vatikánského kodexu (sign. Illir. IV)*, n.p., Prague, 1913.
450. J. Vajs, "Charvatsko-hlaholské kodexy v Bodlejaně v Oxfordě," *Časopis katol. duchovenstva*, 1915, pp. 561–574.
451. J. Vajs, "Charvatskohlaholský kodex a hlaholský zlomek v Britském museu v Londýně," *Sborník filologický*, Vol. 5, 1914.  
*Sborník filologický* was a publication of the Česká Akademie věd a umění, Prague.
452. J. Vajs, ed., *Nejstarší Breviář Chrvatsko-Hlaholský (Prvy breviář Vrbnický): Úvodem a bibliografickými popisy hlaholských breviářů starší doby opatřil J. Vajs: Se sedmi autotypickými snímky a mapkou*, Královská Česká Společnost Nauk, Prague, 1910.
453. J. Vajs., ed., *Najstariji hrvatskoglagolski misal, s bibliografskim opisima svih hrvatskog-lakolskih misala: Napisao dr. Josip Vajs*, Jugoslavenska Akademija znanosti i umjetnosti: Djela, No. 38, n.p., Zagreb, 1948.
454. J. Vajs, *Staroslavenski Psalter hrvatskoglagolski*, n.p., Krk, 1916; and also another edition: J. Vajs, *Psalterium Palaeoslovenicum croatico-glagoliticum*, n.p., Prague, 1916.
455. L. Leger, *L'Évangélique slave de Reims, dit: Texte du Sacre: Edition fac-similé en héliogravure . . .*, n.p., Reims and Prague, 1899; *Notice sur l'évangélique slave de Reims, dit Texte du Sacre, par Louis Leger . . .*, F. Michaud, Reims, 1901; and *Notes complémentaires sur le Texte du sacre (évangélique slave), communication de M. Louis Leger . . .*, F. Michaud, Reims, 1901.

456. For example, the Academies of Sciences of Poland, Czechoslovakia, Yugoslavia, Bulgaria, and Hungary publish various series covering mainly Slavic history and linguistics. These series occasionally include publications relevant to Slavic paleography.
457. The Bavarian Academy of Sciences recently published a work on the paleography of ancient Russian musical notations by Johann von Gardner: *Ein handschriftliches Lehrbuch der altrussischen Naumenschrift: Herausgegeben von Johann von Gardner und Erwin Koschmieder*, Verlag der Bayerischen Akademie der Wissenschaften; in Kommission bei Beck, Munich, 1963–.
458. The works of Prof. E. Georgiev were published mostly under the sponsorship of the Bulgarian Academy of Sciences.
459. The Polish Jagellon University of Kraków has a very active publishing program in this field. The series entitled Biblioteka Studium Słowianskeigo contains several volumes which are of paramount interest to Slavic linguists and paleographers. The only non-Russian paleography of Cyrillic writing is one of the titles published in the Biblioteka series. See Ref. 473.
460. The University of Graz recently printed V. I. Petrov's work about Russian coins—a field closely related to paleography: V. I. Petrov, *Catalogue des monnais russes de tous les princes, tsars et empereurs depuis 980 jusqu'à 1899*, Akademische Druck- und Verlagsanstalt, Graz, 1964.
461. V. Beshevliev, ed., *Die protobulgarische Inschriften* [Proto-Bulgarian Inscriptions], Akademie-Verlag, Berlin, 1963.  
This was published in the scholarly series Berliner byzantinische Arbeiten.
462. The proceedings and transactions of various academies and universities have always printed, though only occasionally, papers relevant to Slavic paleography.
463. A facsimile edition of a 14th-century Church-Slavonic "Leitourgikon" was published in 1960, in New York, apparently with the support of individuals: *Molitovnik-sluzhebnik: pamiatka XIV stolittia*, n.p., New York, 1960.
464. The Apophoreta Slavica series, the first volume of which is a photomechanical reproduction of A. A. Shakhmatov and P. A. Lavrov's *Sbornik XII veka moskovskogo Uspenskogo Sobora* (Vypusk pervyi, 1899), is a publication of Mouton & Co. Publishers, who seem to specialize in Slavica:  
A. A. Shakhmatov and P. A. Lavrov, *Sbornik XII veka Moskovskogo Uspenskogo Sobora: Vypusk Pervyi . . . Photomechanischer Nachdruck mit einer Einführung von Dmitrij Čiževskij . . .*, Mouton & Co., The Hague, 1957.
465. The *Slavistic Printings and Reprintings*, which is published by Mouton & Co., is another indication of the vivid interest this publishing company displays toward Slavic linguistics, literature, history, and (though indirectly) also paleography.
466. The Harrasowitz Publishing House in Wiesbaden puts out the Bibliotheca Slavica series. It includes, among other works, a facsimile edition of the *Missale Illyricum Lipsiense*: J. Schütz, *Das handschriftliche Missale Illyricum Cyrillicum Lipsiense. I: Philologisch-linguistische Monographie*, Vol. 16, 318; and II: *Phototechnische Reproduktion des Kodex*, Vol. 10, 550, Harrasowitz, Wiesbaden, 1963.
467. Russian Jesuit who resided in France and was a prolific author. His work listing Slavic manuscripts to be found in the French national library is: Le P. I. M. Martynov, S.J., *Les manuscrits slaves de la Bibliothèque Impériale de Paris par Le P. Martinof . . . A veque un calque*, Julien, Lanier, Cosnard et cie. Paris, 1858.
468. V. Vondrák, *Kirschenoslavische Chrestomathie von dr. W. Vondrák*, Vandenhoeck & Ruprecht, Göttingen, 1910; and *Čírkevněslovanska chrestomatie: Uspořádal Dr. V. Vondrák (Druhé vydání)*, n.p., Brno, 1925.
469. F. Miklošič, ed., *Chrestomathia palaeoslovenica: Edidit Fr. Miklosich*, G. Braumüller, Vienna, 1854; and *Chrestomathia palaeoslovenica, cum specimenibus reliquarum linguarum slavicarum: Edidit F. Miklosich . . .*, G. Braumüller, Vienna, 1861.

470. M. Weingart, *Texty ke studiu jazyka a pisemnictví staroslověnského*, n.p., Prague, 1938. See also, Refs. 386 and 387.
471. J. Vajs, *Abecedarium palaeoslovenicum in usum Glagolitarum: Accedunt paradigmata morphologica, specimina lectionum e Missali Romano idiomato selecta, specimina cantus, glossarium: Composuit Dr. Joseph Vias . . . Editio altera, aucta et emendata*, Sumptibus Academiae Palaeoslavicae Veglensis, Prague, 1917.
472. S. Lesnoi (i.e., S. Paramonov) reported several times (in his book about Russian history and in the San Francisco Russian-language magazine *Zhar-ptitsa*) that a set of wood tablets had been brought out of Russia in 1917 by a certain A. Izenbek. These allegedly ninth-century tablets were lost after Izenbek's death in 1941. The text of what Lesnoi calls "Vlesovaia kniga" was copied by Iu. P. Miroljubov and survived in the form of photographed facsimiles of his transcripts. L. P. Zhukovskaia (*Voprosy iazykoznanii*, No. 2, 1960, pp. 142–144) recently analyzed these photographs and expressed doubt as to the authenticity of the original tablets.
- There have been other, though less publicized, cases of "discoveries" of Glagolitic inscriptions of fabulous antiquity: Ota Ritz "Štupavské hlaholské padělky," *Byzantinoslavica*, 5, 376–415 (1933–1934); and also F. Adamek, *Důkaz pravosti metodějských náleží z "Hrobů" u Ostvětínám*, n.p., Brno, 1934.
473. B. Horodyski, *Podręcznik paleografii ruskiej*, Wydawnictwo Studium slowainskiego uniwersytetu Jagiell., Krakow, 1951.
- At head of title: *Biblioteka Studium slowianskiego uniwersytetu Jagiellonskiego*, Ser. C, No. 6.
474. I. L. Káldor, *Slavic Paleography and Early Russian Printing: The Genesis of the Russian Book*, University of Chicago, Chicago, 1967 (doctoral dissertation).
475. I. L. Káldor, "The Genesis of the Russian *Grazhdanskii Shrift* or Civil Type," Parts 1 and 2, *J. Typographic Research* [now *Visible Language*], 3(4), 315–344 (October 1969); and 4(2), 111–138 (Spring 1970).
476. Some papers relevant to the topic of this study were published in the *Revue des études slaves*: M. Dolobko, "La langue des feuillets du Zograph," Vol. 6, 1926; P. Lavrov, "Les feuillets du Zograph," Vol. 6, 1926; A. Vaillant and M. Lascaris, "La date de la conversion des Bulgares," Vol. 8, 1933, pp. 5–15; A. Vaillant, "Les 'lettres russes' de la Vie de Constantine," Vol. 15, 1935, pp. 75–77; and M. Tadin, "Recueil glagolitique croate de 1375," Vol. 31, 1954, pp. 21–32.
- The journal also offers a systematic survey of the most significant publications in the field of Slavic linguistics and history as well as individual reviews of new works. It is a quarterly publication of the Institut d'Études Slaves de l'Université de Paris.
477. For example, the *Oxford Slavonic Papers* printed two installments of an interesting paleographical study by M. Tadin about Glagolitic manuscripts in the Bodleian Library at Oxford: M. Tadin, "Glagolitic Manuscripts in the Bodleian Library, Oxford," *Oxford Slavonic Papers*, 4, 151–158 and plates (1953); and 5, 134–144 and plates (1954).
478. *Slavia*, *Linguistica slovacica*, *Byzantion*, *Byzantinoslavica*, *Starine*, *Slovo i slovesnost*, and *Časopis moderní filologii*.
- As a curiosity one could mention *The Newberry Library Bulletin* (Chicago), which published a brief paper by A. J. Swan about the *Newberry Obikhod* (Liber Usualis), a Russian musical manuscript with naumic signs above the text: A. J. Swan, "The Newberry Obikhod," *Newberry Lib. Bull.*, 4(3), 67–69 (1956).
479. See Ref. 361, pp. 240–244.
480. The essay has come down to us in several versions and under a number of titles ("O pis'menekh Chernoriztsa Khrabra," "Skazaniia o pis'menekh," etc.). The cited paragraphs have been printed by P. A. Lavrov, in his *Materialy . . .*, Ref. 150.
481. As cited in P. A. Lavrov's *Materialy . . .*, Ref. 150, p. 12.
482. See Ref. 150, p. 72.

483. A. A. Formozov, "Sosudy srubnoi kul'tury s zagadochnymi znakami," *Vestnik drevnei istorii*, No. 1, 1953, pp. 193ff.
484. A. S. L'vov, "K voposu proiskhozhdeniia russkogo pis'ma" [More about the Origin of Russian Writing], *Russkii iazyk v shkole*, No. 6, 1951.
485. See Ref. 122, pp. 82–83. Also, a review article by A. I. Kamentseva in *Voprosy istorii*, No. 8, 1952, pp. 114–117.
486. P. Ia. Chernykh, *Proiskhozhdenie russkogo literaturnogo iazyka i pis'ma*, *Voprosy iazykoznaniiia dlia uchitelei*, Vol. 3, Gos. Uchebno-pedagogicheskoe izd-vo, 1950, p. 18.
487. A. L. Mongait, *Archeology in the USSR*, translated and adapted by M. W. Thompson, Penguin, Baltimore, 1961, p. 268. Also, A. Mongait, *Archeology in the U.S.S.R.*, Foreign Languages Publishing House, Moscow, 1959, p. 318.
488. Procopius of Caesarea. Numerous references in the works of the author contain concrete information concerning the life-style, housing, behavior, etc., of the early Slavic tribes with which ancient Byzantium had frequent contacts. None of these references allows us to conclude the presence of writing and reading skills among the Slavic groups in question. For further references and details, the reader should consult I. L. Káldor, *Slavic Paleography . . .*, Ref. 474.
489. See Ref. 413, pp. 27–75.
490. P. Ia. Chernykh, "Iazyk i pis'mo" [Language and Writing], in N. N. Voronin and M. K. Karger, eds., *Istoriia kul'tury drevnei Rusi. Domongol'skii period: II. Obshchestvennyi stroi i dukhovnaia kul'tura*, Izdatel'stvo Akademii nauk, Moscow and Leningrad, 1951, pp. 114–138, and pp. 135–138 in particular.
491. See Ref. 162, p. 107, or p. 119 in the 1967 reprint.
492. See Ref. 247, pp. 430–431.
493. See Ref. 121, p. 144.
494. As described by J. Vajs in *Slavia* 2, pp. 269ff.
495. A. Cappelli, *Lexicon Abbreviaturarum: Dizionario di Abbreviature Latine ed Italiane . . .*, 6th ed., Hoepli, Milan, 1961, pp. xxii–xxiii.
496. In his paper "Viaz'" (see Ref. 110, pp. 66–67), V. N. Shchepkin recommends that the number indicating the ratio of height to width of an average or be used as the standard measure of the size of *viaz'*.
497. V. N. Shchepkin, *Uchebnik . . .* (Ref. 162), pp. 40–41; and N. S. Chaev and L. V. Cherepnin, *Russkaia paleografii* (Ref. 121), p. 196.
498. V. N. Shchepkin, *Uchebnik . . .* (Ref. 162), p. 151 in the 1967 edition.
499. Rafaello Barberini. Barberini visited Moscow in 1564. He described his impressions of Russia in a brief statement which has been published numerous times and in many languages. It is included on pp. [191]–222 of A. Olearius, *Viaggi di Moscovia de gli anni 1633, 1634, 1635 e 1636, libri tre . . .*, n.p., Viterbo, 1658. The text was printed for the first time in Russian translation by Liubich-Romanovich in the periodical *Syn otechestva*, Nos. 6 and 7, 1842.
500. Cf., N. P. Likhachev, *Paleograficheskoe znachenie . . .* (Ref. 95) Vol. 1, p. 17.
501. C. M. Briquet, *Les Filigranes . . .*, 2nd ed., Hacker Art Books, New York, 1966, 3 vols.; and D. Hunter, *Papermaking: The History and Technique of an Ancient Craft*, 2nd ed., Knopf, New York, 1947, reprinted in 1952 in London by Cresset Press. Another useful source, mainly for the identification of watermarks in paper, is: W. A. Churchill, *Watermarks in Paper . . . in the XVII and XVIII Centuries*, M. Hertzberger, Amsterdam, 1935.
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