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VOLUME 9

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Fore-Edge Painting

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FORE-EDGE PAINTING

A fore-edge painting may be defined as a painting or decoration on the fore-edge of the book, but it commonly refers to a water-color painting on the fore-edge which is visible when the leaves are fanned and disappears when the book is closed. The painting is most often concealed under the gilt or marbled edges of the leaves, although the leaves may be stained a color such as maroon or left untreated. Fore-edge paintings are single, double, or two-way. A single painting becomes visible when the leaves are fanned in one direction, most often to the right. In a double fore-edge painting one painting is visible when the leaves are fanned to the right, another when they are fanned to the left. In a two-way fore-edge painting one painting is visible when the leaves are fanned to the middle on the left, another when they are fanned to the middle on the right. This kind of painting is very unusual, only one being mentioned among the large number of fore-edge paintings examined by Carl Weber (*1*, p. 104). Although most paintings are horizontal on the leaves, some are vertical.

Since the art of fore-edge painting has been developed by book-binders and their artists, it is best described in books on bookbinding. J. A. Arnett's *Bibliopegia* (*2*) explains the technique but points out that the work is so time-consuming and expensive that it is not often done. Further information is found in J. B. Nicholson's *A Manual of the Art of Bookbinding* (*3*), J. W. Zaehnsdorf's *The Art of Bookbinding* (*4*), and H. L. A. Blanchon's *L'Art et la Pratique en Reliure* (*5*). More recent sources are Cyril Davenport's *The Book, Its History and Development* (*6*) and Edith Diehl's *Bookbinding, Its Background and Technique* (*7*). The basic steps are: scrape the leaves of the fore-edge with a plough (a wooden implement with a knife which cuts edges of a book when in a press) and smooth the surface; then fan the leaves and clamp them tightly into position between wooden boards or other satisfactory holder and paint the scene or design on the fore-edge, holding the brush at a right-angle and using paint thick enough not to run sideways on the leaves. Allow the painting to dry thoroughly before removing the clamps. The secret is to hold the pages so tight that paint doesn't get into the leaves, and not to paint the white areas, thereby avoiding crumbling white powder later. If the painting is to be concealed under gilt, care must be taken that there is sufficient gilt to hide the painting but not so much that it dulls it. Gilding is an art so different from that of painting that one person rarely does both. The fore-edge of the book is burnished while the book is held between gilding boards in the gilding press. The leaves must be tightly clamped to prevent the glair, (or sizing), from running onto the painting.

How to mix the sizing and how to apply the gilt successfully are described in books on bookbinding. Edith Diehl gives information on marbling and notes that Le Gascon introduced marbled edges under gilt (*7*). Most twentieth century artists use an old book which has already been gilded because of the superiority of the rag paper and of the gilding; today gold leaf is so expensive that it is often applied too

sparingly to cover the painting. The fore-edges of many old books are painted by twentieth century artists and sold as paintings contemporary with the book.

Vera Dutter in "The Ancient Art of Fore-edge Painting" suggests fanning out the gilt edge and holding it tightly in position with screws or clamps, then using a brush as dry as possible on the surface so exposed (*8*). When the painting is dry, remove the clamps and close the book; remove the paint which has run with a piece of damp cotton. The artist should be skilled in painting miniatures. In a double fore-edge painting the artist has to take advantage of some of the color in the first painting and work it into the second, a very delicate task. If the book has already been gilded, the artist must use a book with heavier paper and paint with a very dry brush; any color which comes through on the second painting must be camouflaged.

Book-edge decoration was used in the tenth century in Europe and developed from the practice of lettering the title of bulky manuscript folio volumes on the fore-edge, the horizontal shelving making such identification desirable. When books became smaller, the title was transferred to the spine, leaving the fore-edge available for the owner's name or coat of arms or geometric and floral designs. In England a fourteenth century psalter of Anne de Felbrigge, the earliest embroidered book known, has the Felbrigge arms on the edges. By the fifteenth and early sixteenth centuries book decoration was common and the early practice of decorating the top and lower as well as the fore-edge continued. Gauffering, a practice of crimping or fluting, was done in France in the fifteenth century, and in the middle of the sixteenth color was added to the gauffered edges; this was especially popular in Germany and England. Gauffered gilt edges were used at a later period to conceal fore-edge paintings.

Designs long in use on the Continent were introduced into England by Thomas Berthelet, printer to King Henry VIII; colored heraldic designs, for example, had been used on the Continent since the Crusades. Berthelet used decoration to denote royal ownership and often lettered such sentences on the bindings and the fore-edge as "Rex in Aeternum Vive." He is responsible for one of the most beautifully decorated books of the early sixteenth century, a Bible printed in Zurich in 1543 and owned by Henry VIII (the book is now in the British Museum). The top and bottom edges as well as the fore-edge are elaborately painted in gold and colors with figures, arabesques, flowers, and scrolls which are visible only when the book is closed.

There is disagreement among authorities on bookbinding about the inventor of the art of concealing a fore-edge painting on a book. The earliest signed and dated concealed painting is on a Bible printed in 1651 by the Stationers Company, London; beneath a painting of the Booth or Leigh family's coat of arms (with flowers and animals and the first owner's motto "Via Verbū. Patria Coelum") is the monogram "ST" followed by "Lewis Fecit. Anno Dom. 1653" (book in the New York Public Library's Spencer Collection) (see Figure 1).

Although many writers on fore-edge painting mention the 1651 Bible, they draw differing conclusions about the artist. Charles William Kellaway surmises that not

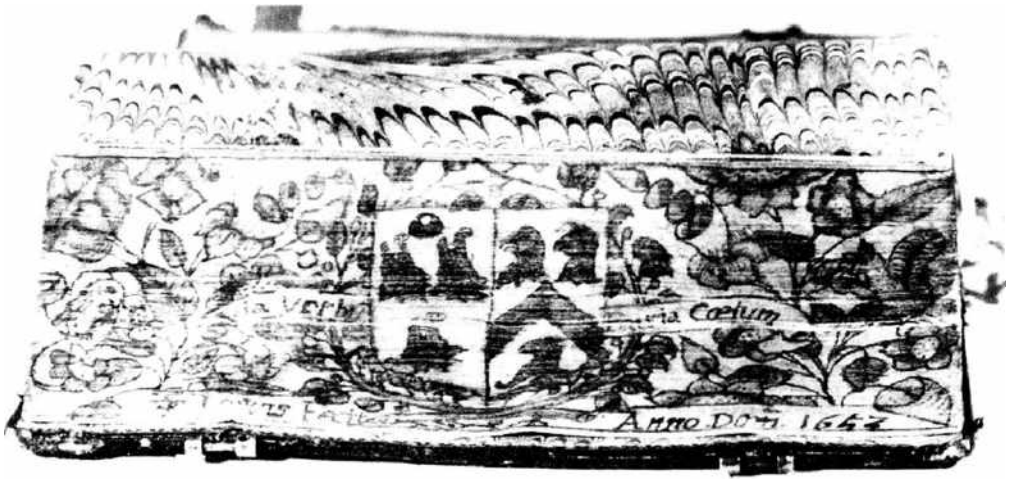

FIGURE 1. *From* The Holy Bible, *London, 1651, in the Spencer Collection, Astor, Lenox, and Tilden Foundations, New York Public Library.*

one man but two brothers, Stephen and Thomas Lewis, did the first concealed fore-edge painting and that the "S.T." is a monogram, since one letter is superimposed on the other (*9*). The brothers, who were bookbinders in London, evidently did fore-edge paintings individually also, for there is one in the Edinburgh University Library signed Thomas Lewis and another in the Guildhall Library signed Stephen Lewis. Of the nine examples of their work extant, six are signed and three are dated. Carl J. Weber agrees with Kellaway that Stephen and Thomas Lewis invented the art of the disappearing fore-edge painting (*1*) but Howard M. Nixon points out that the signature of the Lewis brothers is that of the bookbinders, not of the artist, and that other signatures like those of Fletcher and Mearne belong to binders or booksellers (*10*).

Vera Dutter credits the invention to Samuel Mearne, Royal Bookbinder to Charles II from 1660–1683, who was noted for his elaborate fore-edge decorations (*8*). Edith Diehl refers to the Mearne binder rather than specifying Samuel Mearne himself as the originator (*7*). The binding of the 1651 Bible is in Mearne's cottage style, but that does not mean that Lewis worked for Mearne.

Cyril Davenport thinks Samuel Mearne conceived the plan of concealing a painting on the fore-edge but an artist named Fletcher did the actual work (*6*). He bases the evidence on three volumes of John Fox's *Acts and Monuments*, London, 1641, which have the cipher and portraits of Charles II on the fore-edge with floral designs painted vertically in red, blue, green, and gold and signed "Fletcher compinxit." The portraits were probably painted in 1660 or later. The problem of assigning a date to the paintings and the name of the artist or bookbinder for whom he worked has left the debate on the inventor of concealed fore-edge paintings unsettled, although the Lewis brothers, on the basis of present evidence, seem the most likely originators.

The second half of the seventeenth century is noted for elaborate fore-edge paintings and is considered the golden age by Nixon (*10*). It is a period well-

documented by studies of famous binders and collectors. One of the famous paintings is on a Book of Common Prayer, printed in 1662, with five vertical pictures showing from bottom to top the agony, betrayal, crucifixion, resurrection, and ascension of Christ (painted for Charles II and now in the British Museum). For Weber the golden era is the period in which the firm of Edwards of Halifax was active, approximately 1774–1834 (*1*).

Not only is there disagreement about the inventor of the art of the concealed fore-edge painting, but there is also speculation about what happened after Mearne's death. Some writers maintain that the art died and was revived in the eighteenth century by William Edwards [according to Vera Dutter (*8*)], by James Edwards [according to Edith Diehl (*7*), Eugenia Raymond (*12*), and Cyril Davenport (*6*)], or by Charles Kalthoeber [according to H. P. Horne (*13*)]. The art was not lost; in fact, two of the most famous fore-edge paintings appear on John Pine's edition of *Horace* which was published in 1733, the date of the paintings being fairly certain because the arms of the Spanish Prince of the Asturias (with floral scrolls and different designs) were on each of the two volumes (now in Columbia University Library). In the first half of the eighteenth century armorial fore-edge paintings were done for John Brindley, bookbinder to Caroline of Ansbach, consort of George II.

The art of fore-edge painting was developed to its highest point in the eighteenth century by the Edwards of Halifax firm. William Edwards (1723–1808) founded a bookbindery in Halifax which was noted not only for its "Etruscan" calf and transparent vellum bindings but also for the beauty of its fore-edge paintings. The early paintings done for the firm were monochromes, often in gray or brown. The floral designs, scrolls, or Biblical scenes were concealed under marbled edges. Great interest in the picturesque had been aroused by William Gilpin's *An Essay upon Prints,* published in London in 1768, and William Edwards profited from this interest by having his artists paint landscapes, often with country seats or ruins, on the fore-edges of his books, thereby revolutionizing the subject matter of the art. The brightness of the colors and the skillful use of detail have never been surpassed.

Several of William Edwards's sons entered the book business but only Thomas Edwards (1762–1834) became a binder. To Thomas Edwards and to Bartholomew Frye, who worked for the Edwards firm and later became independent, belongs the credit for the production of most of the fore-edge paintings which were not done under the direction of William Edwards. The only clue to the artist who worked for them is a pencilled note on the flyleaf of Thomson's *Seasons* (London, 1821) stating that "the drawing on the edge (is) by I. Herbert" (a painting of King's College Chapel, Cambridge).

Did Thomas Edwards invent the double fore-edge painting as Carl J. Weber thinks (*1*), or was it first done about 1890 or even later as Howard M. Nixon maintains (*10*)? Mr. Nixon has examined famous private English libraries of 1800–1830, such as those of the Duke of Devonshire, Lord Spencer, George III, Thomas Grenville, and Francis Douce, and not found one book printed between 1800 and 1825 with a concealed fore-edge painting. Those with such paintings were bound

by Fletcher, Samuel Mearne, John Brindley, and Edwards of Halifax. Far fewer fore-edge paintings were done for William Edwards than has been supposed, and many attributed to him are twentieth century fakes. There were few rivals of the Edwards firm, although fore-edge paintings do appear on books bound by Charles Kalthoeber, R. & J. Faulder, John Whitaker, Taylor and Hessey, Walther, Staggemeier & Welcher, Charles Hering, and Dawson and Lewis. Probably few of the paintings are contemporary with the book.

The art of the concealed fore-edge painting certainly originated in England and reached its highest development there, but in the nineteenth century it was also practiced in the United States. American tourists and American writers living in England (such as Emerson, Longfellow, and Holmes) had bought books with fore-edge paintings and brought them back to the States. The English began to cater to American tourists by painting scenes of American cities, frequently copied from albums of views, on the fore-edges, and eventually this concentration on the tourist trade and on scenes likely to appeal to American tourists led to shoddy work and no relationship between the subject of the book and that of the painting. In spite of the declining quality of the fore-edge paintings so much interest was evidenced in the technique that in 1856 Nicholson gave directions on how to paint a fore-edge in his *A Manual of the Art of Bookbinding* (*3*). John T. Beer of England decorated many books in his own library, preferring the sixteenth century titles, but didn't conceal them under gilt or marbling, a task left to buyers of his books. He did not hesitate to give the source of the work he copied: on William Tyndall's *The Whole Workes of W. Tyndall,* London, 1573, he painted the picture of Tyndall's martyrdom from Fox's *Book of Martyrs* (now in the Folger Shakespeare Library). By the end of the nineteenth century the art of fore-edge painting was being marred by commercialism and careless work.

Disagreement about twentieth century fore-edge painting is as marked as that about its origin and its revival. Vera Dutter in "The Ancient Art of Fore-edge Painting" says that the art began to die in 1850 and that today few artists do it (*8*). Carl J. Weber thinks that artists are fairly active today but considers the greatest period of production the first 30 years of the nineteenth century (*1*). Howard Nixon, on the other hand, believes that about 90% of the fore-edge paintings under gold were done in the twentieth century, a great many of them by amateurs commissioned by London and American booksellers (*10*).

Unlike many twentieth century fore-edge painters who remain anonymous, Miss C. B. Currie signed and numbered her paintings. She was employed by Messrs. Henry Sotheran & Co. in London to paint miniatures for their Cosway bindings and to paint the edges of the books, mostly nineteenth century, with a wide variety of subjects in bright colors. She worked from the latter part of the nineteenth century until well into the twentieth and did about two hundred fore-edge paintings, the earliest being listed in Sotheran catalog no. 788 for 1923. Other artists doing fore-edge paintings in the twentieth century are Kenneth Hobson, Sydney Richmond Burleigh, Alfred De Sauty, Vera Dutter, Frederick R. Cross, and Sue Buckingham Moulton.

Amateur artists quite often sign their paintings; many artists copy from other artists or from illustrated books. Vera Dutter is a professional painter who does originals on the fore-edge and can do a simple fore-edge painting in one day. Many booksellers who specialize in fore-edge paintings have amateurs like housewives and clerks and some full-time artists adding paintings to the fore-edges of their older books. This is a legitimate practice if the books are not sold as having contemporary fore-edge paintings.

It is rather surprising to find fore-edge paintings done in China. Mr. Pettus, an American teacher at the University of Peiping, took a book with a fore-edge painting to China, confident that the Chinese could figure out how it was done. Between 1936 and 1942 many books so decorated were sold in the United States, usually depicting Biblical scenes or oriental landscapes. Many Chinese fore-edge paintings are vertical on the leaves and many are not gilded. Modern books, old English, Chinese, and Japanese books are frequently chosen for decoration, but most of the painting is inferior to that of the outstanding English artists.

Subjects used in fore-edge paintings have varied. The earliest were heraldic shields, coats of arms, monograms, family mottos, floral designs, and scrolls, some to denote ownership of the book, some purely decorative. In the middle of the sixteenth century German binders were fond of using color on gauffered edges. When the concealed fore-edge painting became popular many Biblical scenes were used, the Last Supper being a favorite. William Edwards of Halifax introduced the use of landscapes, especially those considered picturesque. Sporting scenes became popular. The style of painting with a portrait in the compartment on the left and a house or scene comprising the other three-fourths of the painting was thought typical of the Edwards of Halifax era but is now said to have been invented by an English woman who has painted well over a thousand fore-edges since 1927.

The best artists have attempted to relate the subject of the painting to the book, although they rarely created the painting but most often copied it from other artists. Certain types of books have appealed to painters of fore-edges far more than others: English poetry, the Bible, prayer-books and psalters, Greek and Latin classics, and travel books have been frequently decorated.

Forgeries are common and are hard to detect. The date of the view of a city can be checked or the portrait of a famous person compared with other portraits done during the same period to establish the approximate date of the painting. Bookseller's catalogs for a given period are most useful in listing the fore-edge paintings then available and in describing the subjects which were popular. There is much skepticism about the genuineness of many fore-edge paintings offered for sale today, especially those attributed to Edwards of Halifax—but when an Edwards of Halifax fore-edge painting is placed beside a forgery, it is clearly superior in the use of color and clarity of detail.

Fore-edge paintings are fragile and must be treated with care. Dr. Charles Olsen of Chicago, according to *Hobbies* for October 1948 (p. 132), kept two of his fore-edge paintings in his office for visitors to see: one was a nature scene on *Lays of the Scottish Cavaliers* by William Edmondstoune Aytoun; the other was a picture

of Abraham Lincoln painted on the fore-edge by a twentieth century artist (title of the book not mentioned but it was bound by Donnelly). If the story is true, it relates a most unusual situation of unusual generosity.

Many libraries do not list fore-edge paintings in the card catalog because they do not want to create a demand for them. The books should be treated as rare, with controlled temperature and humidity in the rooms where they are stored, and they should not be touched or exposed to light more than necessary. To view a fore-edge painting put the book on a hard surface, open it, and press the left board down firmly; leaves will fan to reveal the painting. The book may be held and the leaves fanned carefully, but the viewer must be careful not to touch the painting.

The largest collection of fore-edge paintings in the United States is the Doheny Collection, St. John's Seminary, Camarillo, California. There are examples in many other libraries, such as the Pierpont Morgan Library, the Thorne Collection at the Art Institute of Chicago, the New York Public Library, the Albert H. Wiggin Collection of Prints at the Boston Public Library, the Frazer Memorial Library at McNeese State College, the Huntington Library, the Folger Shakespeare Library, Cincinnati Art Museum, Grosse Pointe Public Library, University of Rochester Library, the British Museum, and other libraries in England. The British Museum has a good collection and is building a twentieth century section of signed fore-edge paintings, many of them on old books. The Library of Congress has a small collection and is not actively pursuing a policy of acquiring more. There are some good collections in private hands. Doubles are scarce; even the large collections do not have a great number. With continued activity of twentieth century artists these collections will surely grow.

Fore-edge paintings bring pleasure to the viewers and will be sought by the collector. But let the buyer and the reader beware of all they hear about this surprising art!

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The publications of Forest Press, Inc. consist solely of the *Dewey Decimal Classification* (DDC) (q.v.). The press is a New York State nonprofit corporation, governed by its own Board of Directors, who serve without compensation. It is a wholly owned subsidiary of the Lake Placid Club Education Foundation.

The name Forest Press first appeared in an imprint of the *Dewey Decimal Classification* in 1911 in Edition 7. The first edition of the classification, which was devised by Melvil Dewey (q.v.) while a student at Amherst College, was published at Amherst, Massachusetts, in 1876 with no publisher in the imprint. The second to sixth editions, 1885–1899, and the first abridged edition, 1894, were published in Boston by Library Bureau, which Dewey had created and which he controlled.

In 1906 Dewey resigned from his position as librarian of the New York State Library in Albany and moved to the Lake Placid Club at Lake Placid, New York, a private organization that he had been instrumental in forming. Since that time the principal office of the Dewey Decimal Classification has been at the Lake Placid Club.

The name "Forest Press" was adopted around 1910 when the club enlarged its print shop with a view to doing somewhat more ambitious printing than menus and leaflets. The name "Forest" has also been applied to the main building at the club, Forest Clubhouse, and to the library in that building, Forest Library.

For over 20 years the name was merely an imprint on various club publications, the DDC, and a few other publications, and the name in which the business of the DDC was conducted. Organization was formalized October 31, 1933, by incorporation, under the name Forest Press, Inc. An amendment to the certificate of incorporation filed July 27, 1951, limited the activities of the press to functions relating to the Dewey Decimal Classification.

The earlier editions of the classification, through 1921, were copyrighted in the names of Melvil Dewey, Library Bureau, and Forest Press, Forest Press being used for the second and third abridged editions, 1912 and 1921, respectively, and for the *Outline Decimal Classification* published in 1921. However, all copyrights from the very first edition had actually been owned by Melvil Dewey.

On January 31, 1922, Melvil Dewey assigned all copyrights in the Decimal Classification to the Lake Placid Club Education Foundation. This foundation had been chartered January 26, 1922, by the University of the State of New York, for the promotion and management of educational activities, including specifically "instituting, organizing or fostering . . . movements to advance public welfare through education by means of the Foundation press."

The nonprofit status of Forest Press, Inc. derives from Melvil Dewey's "deed of gift" of October 31, 1924. In a document of that date Dewey provided further aid to the Lake Placid Education Foundation for carrying out the purposes for which its charter was granted. The deed of gift included certain conditions which Dewey imposed to guard against having the foundation drift away from the purposes for which it was founded. By the following clause (in his simplified spelling) Dewey effectively and at one stroke both limited the use of the income from the Decimal Classification and insured the perpetuation of the system:

> All receits or royalties from the sales of the various editions of the Decimal Classification hereinabove referd to shal be spent under direction of the Foundation Executiv Board for editing, revising, bringing out needed special editions and making them known, thus making the sistem more widely useful without allowing it ever to be a source of *personal profit* beyond necessary expenses and reasonable salaries for actual work.

The purpose of incorporation after Dewey's death in 1931 was to segregate the active business and related affairs of the Decimal Classification and thus facilitate the carrying out of the injunctive provisions of Dewey's "deed of gift," and to put the authority for the operations of the Decimal Classification in the hands of a separate board of directors smaller in number and more directly interested in library affairs than the full board of foundation trustees. Forest Press, Inc. issued all its authorized stock to Lake Placid Club Education Foundation; the foundation transferred all assets and liabilities related to the Decimal Classification to the newly created Forest Press, Inc.

By an Internal Revenue Service ruling of July 3, 1953, Forest Press, Inc. became entitled to exemption from federal income tax under the provisions of Section 101(6) of the Code, beginning July 27, 1951. This tax-exempt status is based on the fact that the press is organized and operated exclusively for educational purposes and as a nonprofit corporation.

In the early years Melvil Dewey himself took the responsibility for the business of publishing the Decimal Classification. Later, the management was vested in a committee of the Lake Placid Club Education Foundation. Since the incorporation of Forest Press in 1933 there has been a separate Board of Directors, elected by the foundation. At first this board consisted entirely of men from the foundation. Gradually representation of the book and library world has been added until now the entire board is comprised of men representing various library interests, a majority of whom are also trustees of the foundation. The first of a series of distinguished librarians on the Board of Directors was Milton J. Ferguson, who served from 1945 until his death in 1954. Following is a list of the library-oriented members preceding the present board; a list of other members who have been closely associated with the press over a long period; and the current (1971) members with the dates of their complete terms:

Library-oriented

Milton J. Ferguson (1945–1954)
Brooklyn Public Library

Walter A. Hafner (1950-1965)
Stechert Hafner, Inc.

Howard Haycraft (1951–1968)
H. W. Wilson Co.

Verner W. Clapp (1954–)
Council on Library Resources, Inc.

Jack Dalton (1961–1967)
Columbia University School of Library Service

Others

Deo B. Colburn (1933–1947; 1951–)
Forest Press, Inc. (to 1969)

Godfrey Dewey (1950–1961)
Lake Placid Club, New York

Current Members

Verner W. Clapp (1954–1974)
Consultant, Council on Library Resources, Inc.

Deo B. Colburn (1933–1947; 1951–1972)
Lake Placid, New York

Emerson Greenaway (1968-1973)
Formerly Director, Free Library of Philadelphia

John A. Humphrey (1965–1975)
Assistant Commissioner for Libraries
New York State Library

Robert L. Talmadge (1969–1976)
Director of Technical Services
University of Illinois Libraries

The first presidents of Forest Press, Inc. were foundation men, Charles T. Newberry and T. Harvey Ferris, who served from 1933–1951, and Godfrey Dewey (1951–1961). Presidents since then are as follows:

Howard Haycraft (1961–1962)
Verner W. Clapp (1962–)

The day-to-day business of Forest Press was administered by Deo B. Colburn for an unusually long continuous period of time. Mr. Colburn was associated with the business affairs of Forest Press from 1925 until his retirement in 1969.

During much of this period Godfrey Dewey, Melvil's son, who has lived at Lake Placid Club for most of his life, provided a guiding hand in the affairs of the Decimal Classification and the press. He was a member of the Board of Directors of Forest Press, Inc. and its president for many years. He was instrumental in establishing the Decimal Classification Committee (composed of members appointed by Lake Placid Club Education Foundation and by the American Library Association) in 1937. He was a member of this committee and its continuation, Decimal Classification Editorial Policy Committee, from its beginning in 1937 to 1965. After the reorganization of the committee in 1955, with continuing members representing the American Library Association, Library of Congress, and Forest Press, Inc., his status on the committee was that of continuing member representing Forest Press, Inc. During the difficult period after publication of the fifteenth edition Godfrey Dewey assumed the editorship of the fifteenth revised and the seventh abridged edition.

With the ups and downs of user reaction to the various editions, the press has come to concern itself more and more with editorial matters. However, it has always sought and relied on professional guidance in these areas. Over the years various committees have had a hand in the Decimal Classification, with varying degrees of authority and varying degrees of success. The most important and the one with the greatest control was the Decimal Classification Committee established in 1937, which evolved into the present Decimal Classification Editorial Policy Committee, a joint committee of the American Library Association and the foundation. The committee originally had control over the management and editorial policies of the DDC. However, in 1967 these functions became the responsibility of the directors of Forest Press, Inc., with the committee designated as an advisory

body. The character of the composition of the committee underwent much the same type of change as that of the Board of Directors, so that since 1953 its members have all been librarians—administrators, teachers of library science, and practicing classifiers. This group, representing the users of the Dewey Decimal Classification, makes recommendations to Forest Press with respect to editorial policy for the Decimal Classification, and the press bases its decisions on these professional recommendations.

In order to meet the needs of an expanded, worldwide business and complex editorial developments, several changes have been made in Forest Press, Inc. in the past few years. The press now has an enlarged and professional staff. On October 1, 1968, Richard B. Sealock, for 19 years librarian of the Kansas City, Missouri, Public Library, became executive director. The newly created position of assistant executive director was filled on May 1, 1970, by Pauline A. Seely, who had just completed 22 years at the Denver Public Library, 1948–1956 as head of the Catalog Department and 1956–1970 as director of Technical Services. She served as a member of the Editorial Policy Committee from 1959 to 1970.

On August 5, 1970, Forest Press, Inc. opened a new office at 85 Watervliet Avenue, Albany, New York 12206. It still retains its corporate office at Lake Placid, New York, but business is now conducted at the Albany office. This new location facilitates publishing and professional contacts in the expanding activities of the press.

RICHARD B. SEALOCK

FORGERIES, FRAUDS, ETC.

Forgeries and frauds have been with us since remote antiquity. There are, of course, *pseudepigrapha*, works improperly attributed to a known author, but there are also forgeries with the purpose to deceive. There is the case of Lobon of Argos (ca. third century B.C.) who, according to Diogenes Laertes (I, 34, 112) wrote a book in which he assigned his own poetastry to the Seven Sages; Aristeas, Arion, Semonides, Pindar, and others. The gullibility of many ancient and mediaeval scholars, including the Suda, was challenged by this (now lost) compilation.

The *Ancreontea* and *Theognidea* are probably not real efforts to deceive; but the alleged Anacreontic material, referring to a living Bathyllus, really makes no claim to being the original Anacreon's composition (I, and 60 B, Τὸν *Ἀνακρέοντα μιμοῦ*!) On the other hand, there was willful and deliberate forgery in the case of many collections of supposedly genuine letters. The best known case is that of the "Letters of Phalaris" (historic tyrant of Agrigentum, sixth century B.C.), of which a text was issued by Charles Boyle in 1695, then exposed by Richard Bentley as totally spurious in a classic philological controversy.

Motives of the ancients were varied. Some wanted to perpetuate philosophical or literary fame. Thus the Orphics, neo-Pythogoreans, and Hellenistic Jews com-

mitted more than one act of pure forgery for this purpose. Others, not unlike Chatterton or Macpherson in another day, wrote in the style of admired ancients. Thus Aristoxenes claims that Heraclides Ponticus wrote tragedies which he ascribed to Thespis. In Diels' *Vorsokratiker* there are examples of *pseudo-Demokritea*. Dionysius Scytobrachion, an alleged Alexandrian grammarian of the last two centuries B.C. was probably a useful invention as a source, and Ptolemaeus Chennos (same place and date) may have been equally spurious. Even ancient music has been forged (e.g., that of Kircher to part of Pindar's first Pythian, 1648).

A couple of the earliest forgeries in Latin literature are some *elegi* and a letter to Maecenas, said to have been by Horace, seen by Suetonius and not accepted by him. Neither has survived. The poetess Sulpicia was the purported author of *Sulpicide satira*, some seventy hexameter lines denouncing Domitian and predicting his downfall. To Dares of Phrygia, a priest of Hephaestus at Troy, and Dictys of Crete, a comrade of Idomeneus at Troy, were ascribed contemporary accounts of the epic conflict, actually written about the third century A.D., but neither is of any importance other than as sources for medieval versions of the Trojan campaign.

Christian literature is replete with forgeries, false ascriptions, and interpolations deliberately intended to deceive. Only a couple of examples may be cited. The spurious Clementine literature, handed down under the name of the third bishop of Rome, St. Clement (fl. ca. 96) includes the Homilies (Ὁμιλίαι), a sort of a religious and philosophical romance, and the Recognitions (Ἀναγνώσεις), a similar work in which Clement's family is "recognized" by St. Peter. Clement never saw either piece. Dionysius the Areopagite, converted at Rome by St. Paul (Acts, 17:34), is alleged to have composed certain tracts which constitute a bold amalgamation of neo-Platonic and Christian thought and were influential up to the Reformation.

In modern times too many scholars learned too much about classical antiquity too early. The recognition of the importance of inscriptions in the Renaissance tempted forgers. Some of the early compilers such as Mazzochi and Muratori (but not Scipione Maffei or J. F. Séguier) were deceived. We know the names of some of the forgers, e.g., Luis Andrea de Resende (1498–1573), canon of Evora; Pirro Ligorio (1530–1586), architect and painter in Ferrara and Rome; Hieronymus Roman de la Higuera (1551–1624), a Spanish Jesuit; and J. J. Boissard (1528–1602) of Besançon. Some of these things were clever, others crude, a few simply illiterate. Of vernacular inscriptions there have also been forgeries from the Middle Ages on. Most notorious is the Kensington Stone, "found" in 1898 on a farm southwest of Alexandria, Minnesota. In linguistically impossible Old Norse and in runic characters, it long flattered the vanity of Minnesota Swedes to believe that Scandinavian explorers were in their state as early as 1362.

Forgery of parts of texts has continued into modern times. In 1693 Nodot published in Paris some parts of Petronius' *Satyricon* which were composed by Nodot himself or some other contemporary. C. Barth (1587–1658) issued Latin poems supposed to have been by Vestricius Spurvina. *De progenie Augusti Caesaris*, assigned to Valerius Messala, was written in the fifteenth century. In A.D. 1510 Fiocchi published *De magistratibus et sacerdotiis Romanorum* as a work of Fene-

stella. Guez de Balzac put out in his own works as "ficta pro antiquis" thirty verses entitled "Indignatio in poetas Neroniarum temporum." The book of forgeries related to classical antiquity and the Middle Ages is still to be written, but it will include few pieces after the eighteenth century, thanks to the great advances in classical scholarship.

From a political standpoint the most far-reaching of all forgeries was the so-called *Donatio Constantini*. In it Constantine the Great was pretended to have conferred on Pope Sylvester I the primacy over Antioch, Constantinople, Alexandria, and Jerusalem was well as temporal dominion over all Italy and other *civitates* of the West. Although actually composed somewhere in western Europe in the eighth or ninth centuries, and first used by Leo IX in 1054 to bolster papal claims, it was long accepted as a genuine document until effectively exposed in the fifteenth century by Lorenzo Valla, Nicholas of Cusa, and Bishop Reginald Pecock.

Closely related to the *Donatio Constantini* are the "False Decretals," assigned to St. Isidore of Seville in the seventh century but actually roughly contemporary in composition with the *Donatio* at least 100 years later. They consist of forged letters of ante-Nicene popes, some canons of councils which are genuine for the most part, and collections of letters from Sylvester I through Gregory II (d. 731), of which thirty-five are forgeries. The compiler used his sources with intellectual cunning and deceived many scholars, including St. Thomas More and St. John Fisher; but the Lutheran Centuriators of Magdeburg, led by Matthias Flacius (Illyricus), proved them to be forgeries in their *Historia Ecclesiae Christi* (1559–1574). Thus the claims for papal supremacy were effectively destroyed as far as the main supporting documents were concerned.

Not quite a forgery, but a document which has a place in this résumé, is the famous *Epistolae obscurorum virorum* (1515–1517), an outgrowth of the dispute between Johannes Reuchlin and Dominicans of Cologne. Addressed to Ortwin Gratius, the letters are in parodied monkish Latin skillfully composed by Crotus Rubianus and Ulrich von Hutten. It was a powerful weapon in the hands of the reformers and humanists, and it is still delightful reading for those who know the age and its conflicts.

The Christian Church, particularly the Roman branch, has been both the target and the beneficiary of frauds and forgeries even into our time; but some are actually ludicrous. One ridiculous example may be cited: In his *Bibliographie der Breviere 1501–1850* (2nd ed., 1963), Hanns Bohatta cites a *Breviarium sanctae Lugdunensis Ecclesiae, primae Galliarum sedis* (Lyon, 1815; Bohatta, no. 2392), which records in the Lyon copy an insertion between pp. 555–556 with the legend of a St. Napoleon! And there have been several fairly recent attempts at Biblical forgeries. Well known are the efforts of M. W. Shapiro (1830–1884), the forger of Jerusalem. In addition to supposedly ancient Moabite pottery offered in 1872, he produced a very early Hebrew manuscript of part of Deuteronomy. When it was proven that the document was written on treated sheepskin barely 3 centuries old, Shapiro took his own life.

The yearning to "prove" ancient origins and points of medieval history has

tempted more than one forger. At some time in the fourteenth or fifteenth centuries a much-too-clever character invented the Croyland (*vice*, Crowland) History, which he attributed to Abbot Ingulf of Croyland (d. 1109), said to have been secretary to William the Conqueror. It was generally accepted up to the day of Sir Francis Palgrave, who exposed it. A similar medieval forgery, of later date, came from the hand of Charles Bertram (1723–1765), who concocted a work he attributed to Richard of Cirenchester (d. ca. 1401) on Roman antiquities in Britain and a purportedly ancient itinerary of the island. Later he produced works of Gildas and Nennius and his own forged texts. He was finally exposed by B. B. Woodward in the *Gentleman's Magazine* in 1866 and 1867. The temptation to produce forgeries of sound works in the classical tradition endured into our age. William Lauder (d. 1771), recognized as a sound classicist, pulled from a Latin verse translation of *Paradise Lost* some lines which he inserted into the works of two seventeenth-century Latin poets, Staphorstius and Masenius.

It has been noted from such incidents as those of Lauder, Bertram, and others that the eighteenth century was to become the golden age of fraud, forgery, and fake. One need only cite the case of the Diamond Necklace to see how clever dishonesty reached into the highest echelons of society. There were rumblings of the new art of forgery in the seventeenth century. For example, the Paris lawyer, J. Raveneau published in 1666 his *Traicté des inscriptions en faux et reconnaissances d'escritures et signatures par comparaison et autrement*, a pioneer work in the scientific study of handwriting. Unfortunately, Raveneau succumbed to the temptation of his own skills, and in 1682 he was arrested, arraigned, tried, and convicted to life imprisonment.

Talleyrand is said to have commented that "He who has not lived before the Revolution knows naught of the joys of life." At least, he knew little of the pleasures of fraud and its rewards. One of the most amazing careers is that of George Psalmanazar (ca 1679–1763), a native of Provence and adventurer who issued his "Description" of Taiwan (Formosa in his day) and would speak fluently to London socialites and scholars in his invented language. He met at times with Dr. Johnson at the alehouse in Old Street, and the latter said he would no more contradict Psalmanazar than a bishop. Nevertheless, Psalmanazar recanted his literary sins in 1728, and his posthumous memoirs of 1764 tell the story of his imposture. A much more rascally character associated with Dr. Johnson was William Dodd (1729–1777), who forged a bond for £4,200 in the name of his pupil, the fifth Lord Chesterfield. He was executed despite petitions for him, among them one from Johnson.

One is hesitant to mention Bishop Percy, James Macpherson, or even Thomas Chatterton in this category. It is pleasant to think of them as "practising romanticism by proxy," as the late Fernand Baldensperger said in his Harvard lectures of 1935. William Ireland (1777–1835) is a character of different die. He knew well the Elizabethan documents preserved in legal archives, and he was able to forge a number of signatures and deeds which were supposed to relate to Shakespeare. But even Sheridan was not able to make a success of Ireland's *Henry II* (attributed to

Shakespeare!) at Drury Lane in 1796. Subsequently Ireland admitted that this play, as well as *Vortigern and Rowena*, were of his own composition. It is curious to note that George Steevens (1736–1800), friend and literary associate of Dr. Johnson, attacked Ireland and expressed in print his doubts about the authenticity of Chatterton's Rowley poems. Yet he himself forged a letter of George Peele about an interview with Shakespeare and the legend of the Upas, poisonous tree of Java, in the *London Magazine* of 1783. One is inclined to class Steevens' work with literary spoofery rather than with intent to deceive.

No literature or national tradition is without its frauds in the last 2 centuries, but France seems to have had more than its share during the last century. There is Henri Sanson (1767–1840), executioner of Marie Antoinette, who fabricated memoirs of the Capet family published after his death in 1862. The boldest French scoundrel in our area was Vrain-Lucas, born about 1818. He produced over 27,000 letters from such characters as Alexander the Great, Caesar, Cicero, Herod, Cleopatra, Pontius Pilate, Mary Magdalene, Judas Iscariot, Vercingetorix, Attila, Alcuin, Abélard, Galileo, and Pascal. Lucas was tried and convicted to 2 years in 1870 but, like the dog returning, he produced further forgeries and was rewarded with another 3-year sentence. An unusually imaginative French-speaking rascal was Louis de Rougemont (born in Switzerland under the name of Grin), who contributed imaginary articles on Australia to the *Wide World Magazine* in 1898, but betrayed himself by speaking of the "flight of the wombats."

The story of Guglielmus Brutus Icilius Timoleon, Count Libri-Carrucci dalla Somaja (1803–1869), and his successful raids on the manuscript treasures of French libraries is too well known for repetition. Less well known is the fact that Libri was perceptive enough to set up his own shop, with experienced workmen, to delete neatly library stamps and other indications of provenance, any of which would have been fatal to his operations. Far too few book thieves have realized the absolute necessity for such arrangements if their work is to be permanently successful.

When most people speak of forgeries in the twentieth century, the name of Thomas James Wise (1859–1937) comes immediately to mind. The well-known studies of John Carter and Graham Pollard, *An Enquiry into the Nature of Certain Nineteenth Century Pamphlets (1)* and of W. G. Partington, *Forging Ahead (2)*, tell most of the story of Wise's machinations in producing, or causing to be produced, nineteenth century pamphlets by well-known literary figures which were widely distributed (and, incidentally, objects of collection themselves in the latter twentieth century). The various commentaries on the Ashley Library and Wise's relations with the British Museum are too extensive to mention here in detail. For the student of forgery, and for those who are tempted to commit forgery, the great lesson of the Wise adventure is that competent bibliographical scholars, with the aid of technical devices, can detect most any forgery today (one hesitates to say all!).

An aspect of forgery which is important for bibliographical studies may be noted here only briefly, forged bookbindings. Hellmuth Helwig, *Einbandfälschungen, Imitatitionen, Fälschung und Verfälschung historischer Bucheinbände (3)*, provides

the best résumé. The most commonly applied technique is in the field of armorial bindings. Forgers imitate a well-known armorial device with a new die and simply stamp it on a contemporary binding. Comparison with an original can generally detect the forgery. The same applies to the few cases in which forgers have attempted to imitate the tools of the great binders of the Renaissance.

Just as of the writing and production of books, of the production of forgeries there seems to be no end. A single example will suffice: A conscientious genealogist, local historian, and student of American lettering had collected unclaimed gravestones from family cemeteries in areas condemned for flooding or other public use or in areas purchased by new owners who could find no record of relatives of the interred. In the early 1960s a truck loaded with crudely inscribed stones, some with early eighteenth-century dates from Kentucky and Tennessee, backed into his driveway. The stones were put to effective use as a walkway around his flower borders, at a minimal sale price. But the prices of T. J. Wise's vastly more sophisticated forgeries continue to rise in the antiquarian market.

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LAWRENCE S. THOMPSON

FORMAT, CATALOG

In the early days of applying computer technology to the problems of library and information science, it seemed that the catalog of a library, or whatever the information center called its record of holdings, was very like an inventory. Librarians regard this description as metaphorical and likely to obscure the real issues of library cataloging. Their descriptions of a catalog seemed to indicate some great bibliographic tool responsive to the most subtle needs of the user. In fact, the catalog is the principal tool of a library, much more complicated than an inventory, and never adequate to answer all the questions of patrons. Nothing can replace the information source itself for the ultimate answers that users might have.

Catalogs assumed certain formats as certain features were found to be desirable. *Random access,* the characteristic that enables the cataloger to increase the number of items recorded in the catalog within the existing structure without the need for any rearrangement, led to the card catalog as the most efficient means of achieving maximum random access with a minimum of effort. This efficiency, however, made the catalog very bulky and unwieldly and was in opposition to another desirable feature, multiplicity of copies and ease of distribution of the catalog. Only the book catalog, with its notorious lack of random access once the work was completed, could achieve this.

The card catalog grew up as a means of cataloging because of the need for maintaining a complete, up-to-date file of holdings while subsequent editions of the book catalog were printed. At least two copies of the book catalog were printed on one side of a sheet so that the items could be clipped, pasted onto cards, and filed in separate catalogs. As new items were obtained they were cataloged, following the rules in force, and added to the card file so that a new edition was always possible. One copy was kept in the library at all times, and the other could be sent to the printer whenever desired. The public could examine one copy, the public catalog, meant to be the copy that might contain inaccuracies, but it never left the library. The other, the official catalog, was ready for the printer as each new edition of the book catalog was required.

Modern methods of typesetting and printing would make such a procedure much speedier than it was in the past if the number of items recorded were not so much greater in number and in complexity. The main entry system was a natural outgrowth of the book catalog, because one entry for each item was as much as any library could readily afford. Further, by careful indexing, the net effect of random access could be realized without reprinting previous editions. Each entry was numbered and the indexing referred to this number for each of the different kinds of entries. Indexes, obviously, had to be reprinted, but the complete bibliographic description could be in the order of accession. This procedure added another apparently unnecessary step to the process of obtaining needed information.

The dictionary catalog began as a book catalog, offering authors, titles, and subjects in one alphabetic arrangement. That dictionary filing was as valid for card

catalogs as for book catalogs seemed apparent, and the book catalog fell victim to the rising costs of printing. No one thought to examine the main entry concept as unit entries became possible with the printing and distribution of Library of Congress cards. As libraries began to print more and more cards for the branches, it seemed that a book catalog would accomplish what the card catalog had theretofore done. The plans for vast savings of time and money were not realized at the outset of a changeover, and to many libraries it seemed that the book catalog was not the answer to any question, least of all a saving of expenses of cataloging.

The size and growth of the card catalog became a major problem. Furthermore, filing for reasons so predictable that they can be called "Iron Laws" made the cost of maintenance reach the point where the value of the card catalog was practically lost in the expense of creating it. Some libraries experimented with other methods of cataloging, so that a re-examination of sheaf catalogs accompanied an inquiry into the use of the computer for cataloging purposes. Sheaf catalogs use slips of papers bound together in some temporary arrangement, either in arrays or with one item following another. The computer was not designed to accomplish what bibliographers desire and the first book catalogs produced from computer printouts were the abomination and scorn of librarians as much for their appearance as for their lack of bibliographic detail.

The methods of arrangement available in catalogs, whatever their physical format, can be subsumed under three headings: the dictionary catalog, the divided catalog, and the classified catalog. One of the measures taken to simplify the dictionary catalog when it obtained a size that made filing very slow and expensive was to divide it into some grouping by type of entry. The first divided catalogs were by author, by title, and by subject, or by author-title and by subject, or by author and by subject-title. None of the possibilities is without disadvantages because of the characteristics of entries. Certain advantages of the dictionary catalog are most noticeable when missed. For instance, the grouping of subject headings with an author as the subject along with entries for the author's individual works is most convenient. Furthermore, the rules of the dictionary catalog prescribe that a subject entry is to be preferred to a title entry when both are the same. Any division of the catalog is likely to require considerable revision if the advantage of title entry is not to be lost. Various catalogers have wondered what entry was most easily foregone, and some settled upon the title entry, much to the dismay of searchers of the catalog. There is little excuse for an unnecessary entry when the problem of the card catalog is primarily its size and growth.

The divided catalog is the rule when the subjects are maintained in classified order. The dictionary catalog was popular in the United States partly because it was supposedly equivalent to the classified catalog but arranged so that it could be used more readily. In the beliefs of the time, the classified catalog required that a separate index of subjects be maintained, a kind of barrier between the user and the information he needed. In the views of many catalogers, the index of subjects was just the same as the subject headings employed in a dictionary arrangement.

Much of the writing on cataloging rules and catalog maintenance, or the many

problems involved in this area of librarianship, are in support of the dictionary catalog, almost as if it were beyond the reach of contention, the shibboleth of American librarianship. The "literary units" principle, which would provide that all the entries for a given person or corporate body are to be found together in the catalog, is badly affected when the catalog is divided. Recently it has been shown that the literary units principle is more an ideal than a realization. Abdul Huq's analysis of the problems of Bengali Muslim names shows just what is necessary to obtain uniformity of entry in a most confused pattern of naming (*1*). Sharify's earlier work on Persian names (*2*), the studies of Chinese names, and the author's own investigation into Burmese names leads to the idea that the literary units principle, while highly desirable, is not so easily achieved as may be imagined if the topic of discussion is only the arrangement of the catalog.

Burmese, for instance, are only given names along with an honorific that may vary from the author's usage. The U in U Nu or U Thant is equivalent to Mister although it means, literally, uncle. U Nu, however, always signs his work Maung Nu. This is a courtesy in Burmese, because Maung, literally younger brother, is more appropriate for the author who is modest and unassuming. U Nu might describe a fellow author with whom he is very friendly as, for instance, Ko Thant. Ko means older brother and is also very courteous, showing both affection and respect. U Thant, which means Mister Clean, literally, just as U Nu means Mister Tender, should be entered under the word Thant, despite the *Anglo-American Cataloging Rules* of 1967 which perpetuates the mistakes of the 1949 rules so far as Burmese names are concerned. A standardized means of identification of Burmese authors would seem to be essential for a library with any significant collection of works by authors of this nationality.

The literary units principle, further, is affected by the change in rules that made Clemens, Samuel Langhorne, the standard entry for Mark Twain. Even this rule was not always observed, possibly because of the ignorance of the cataloger. Ruben Dario is the pseudonym of a Nicaraguan poet who, like Mark Twain, never wrote under any other name. The entry is always Dario, Ruben, and quite properly so. Pseudonymous authors are fewer in number than entries for corporate bodies made at a time when Cutter's distinctions between institutions and societies were preserved. The whole problem of superimposition by the Library of Congress in its use of the 1967 rules arises from a change of entry.

Even supposing that some authority list could be maintained of entries, so that the no-conflict rule of cataloging could prevail without undue problems in libraries, the library with an overgrown dictionary catalog is faced with the problems of division. One method is to divide the catalog not by type of entry but by kind of entry, not by subject or title as opposed to author, but by names and by topics, with all titles filed with topical subject headings and all subject headings for individual persons filed with authors. This divides the subject approach in a way that does most to preserve both the literary units principle and also the close relationship between titles and subject headings, both linguistically and in cataloging procedure. A good working definition of subject headings is to describe a list of them as a list of

formalized titles of books. This is somewhat inaccurate but it does state the similarity of titles and subject headings in a way that other definitions bypass.

The problem of standardization of entry has become confused with the problem of linearity in the catalog. When only one entry could be made, and in a library where the scholar is the chief user, the main entry system under author where possible is advisable and at least as acceptable, as some dozen decades of practice have established. What has been omitted in consideration of the kind of entry to be made is the difference between a main entry system and a unit entry system, regardless of the physical format or arrangement of the catalog. A unit entry may be duplicated for each different kind of entry and include all the bibliographic detail under each of the entries. This is just what the main entry concept avoids, because of the expense of duplication of bibliographic detail. The standardized format of entry in a unit entry system has only come to light as a result of two independent developments in cataloging.

The need to establish a "Universal Bibliographic Control" in Kaltwasser's terminology, along with the desire of the International Federation of Library Associations to prescribe a uniform bibliographic description, has led to the reexamination of the Paris Principles of 1961. M. Gorman's study established Standard Bibliographic Description as the method by which uniformity of entry could be established using the title as the primary means of identification along with International Standard Book Numbers (*3*).

At the same time a prolonged investigation of the history of main entry, along with experimental work in the design of computer entries, led to the development of the "Title Unit Entry" as the standard method for use in computerized catalogs. The sequence of bibliographic data used in the two methods are so nearly the same as to make the differences seem even more trivial than they are. At present the only real difference is omission of certain detail, always a privilege of a given library. The title unit entry and Standard Bibliographic Description follow the same sequence of listing to the point where any preference of the latter is acceptable in the former.

Title unit entry began as a method for establishing the entry when a computer will be used for storage and retrieval purposes. Although some of this work is contained in the various MARC projects, and certainly computer storage and retrieval is now an accomplishment in several places, most notably the Ohio College Library Center, an investigation to test certain hypotheses of cataloging was undertaken. It was found, first of all, that the computer very effectively escapes the problems of linearity that have been the cause of much difficulty in manual systems. By efficient tagging of the fields of bibliographic description, the need for elaborate rules of entry is avoided. The tagging of the MARC tapes is more elaborate than necessary in the ordinary library doing less experimental work. A further development was that established entries are necessary as access points, but that the unit entry must be under title because of the fallibility of human beings as searchers and recorders of information. There is no possibility of using authors as main entries without including all the problems of inaccurate entry along with others

discerned above. The computerized catalog can most effectively demonstrate the literary units principle, but only if the unit entry is under title and if that is made the primary means of search. Smythe, as entry, may not be searched under Smith or Smithe or Smyth, but smith, as a title entry, may be searched on a percentage of recall basis so that the variants of sm-th- will not cause excessive readout problems. The Ohio College Library Center, for instance, permits searching under the first word of the title and the initial letters of the next three words.

As other studies are made, it seems that the problems of universal bibliographic control are not so enormous as to make success an irrational dream. E. Pope, for instance, established that cataloging-in-publication is not only reasonable and feasible, but also that publishers can readily list material in their catalogs so that the bulk of bibliographic detail is available from the point of order onward (*4*). In fact, the Standard Bibliographic Description might be established at the point of publication by the publisher rather than later by a bibliographic center whether national or international. The requirement is not for elaborate acquisitions programs for certain libraries, although that is desirable for other reasons, but for the standardization of format of bibliographic description and precise wording of entry. R. Pierrot, S. Honore, and others have made important contributions in the area of standardizing entry, as reported by Kaltwasser (*3*).

We are now able to say that the format of the catalog begins first with the characteristics of bibliographic description. The Standard Bibliographic Description, if established along present lines of research, will be sufficient for the title unit entry system that eliminates most of the problems of arrangement before they arise. Then the use of the particular body of matter must be considered. If relatively small, the dictionary catalog will suffice. If relatively large, the divided catalog is necessary. With the new developments of subject analysis in mind, whether the subject headings are classified in the catalog or in a list accompanying the alphabetic array is inconsequential, both an alphabetic list and a classified list are essential if anything approaching subject analysis at a level of usefulness is to be attempted.

It can be shown that the dictionary catalog will begin to form internal divisions very like the divided catalog if it is not separated into its component parts when its size reaches the point where filing is difficult. The dictionary catalog is a great service to users of small general libraries. The divided catalog seems to be the only way of resolving problems of arrangement for very large catalogs, but even these are limited. At a certain point, the maintenance of computerized records is essential, not only as a means of providing quick random access to the material listed but as a means of conserving space and time, always the best means of slowing the rise in expenses.

Beyond the possibilities listed above, it seems that the form of material to be cataloged can be much less a problem if one is freed from a main entry under author as the only standard of approach. Beginning with title unit entry as the standard, the recording of cataloging detail, whether in a computerized or manual system, is vastly simplified. The unit entry of the computer storage of cataloging

data and the multiple cards that achieve the same purpose as the computer require only a standard bibliographic description independent of the problems of entry. Then the format of the catalog can depend upon the convenience of the users of a library, not on the formulations of theory to support one format over another.

The computer has acted as a kind of stern critic demanding that a reinvestigation of our perceptions of catalog format precede any aspirations toward universal bibliographic control. It now seems clear that no single format is desirable in all places at all times, but to the characteristics of random access and multiple copies can be added the possibility of tailoring the format to the individual user's or the library's needs.

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JAY E. DAILY

FORTRAN

Introduction

A stored program digital computer is an electronic device that can perform complex tasks as a sequence of elementary operations made available to it. Each elementary operation is called an instruction and the entire set of instructions for performing a given task is called a program. Those individuals who are responsible for writing the set of instructions to perform a task, such as computing a payroll, are called programmers. The finite set of instructions available to a programmer and the rules governing their use constitute a programming language. There are a number of programming languages available for generating the sequence of instructions necessary for a computer to solve a problem. Each programming language has both syntactic and semantic rules that govern its use. FORTRAN is a high-level programming language that can be used to instruct a computer to perform very complex computing tasks. It is the most widely used of all programming languages.

Development of High-Level Languages

In order to utilize a computer for solving problems, it is necessary to provide it with a set of instructions which define the sequence of steps through which the computer must pass. This set of instructions, a program, must be in a language that the computer can understand. The only language that a computer understands is machine language. Each machine-language instruction is represented in the memory of the computer as a series of 0's and 1's. A computer's memory is composed of a finite number of storage locations frequently known as words, and each storage location consists of a fixed number of elements representing the 0's and 1's. Therefore, an instruction must have a fixed length to be stored at one word of memory. Figure 1 represents a word in memory made up of 0's and 1's and containing 20 elements, known as bits. This series of 0's and 1's represents a machine-language instruction.

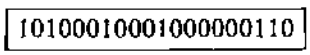


FIGURE 1. *Machine language instruction.*

An instruction consists mainly of such operations as (1) add, subtract, multiply, divide, and branch; (2) an address of a memory location which holds the information on which the operation is to be performed; and (3) an index register for address modification (see *Computers and Computing*). For example, if the first 5 bits of the memory word in Figure 2 represented the operation, the next 2 bits the

index registers, then the last 13 bits are left to represent the address of the data to be operated upon (operand).

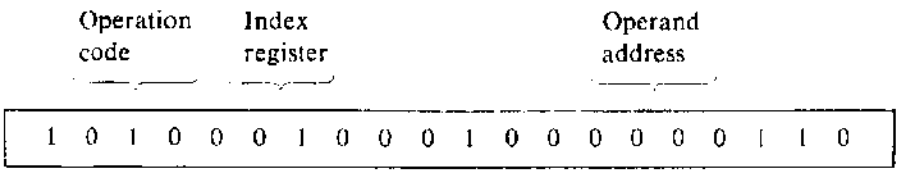


FIGURE 2. *Format of a machine-language instruction.*

The 5 bits used for the operation code can specify 32 different operations, the 2 bits for index registers can specify 4 combinations, and the 13 bits for the operand address can access up to 4096 memory locations. If a larger number is required either for a larger number of operations, more index registers, or a larger memory, the probability is high that the computer would be designed with a memory word larger than 20 bits to accommodate such requirements or a different method would be used to determine a memory address. Just as each word of memory can hold one machine instruction, it can also hold up to 20 bits of a data value. A datum can be a numerical value or one or more alphanumeric characters.

It should be obvious from the instruction represented in Figure 2, that writing a sequence of machine instructions, i.e., programming, in machine language is rather clumsy. A programmer would have to memorize binary equivalents for each operation the computer could perform, and he would have to assign memory addresses in binary notation and then use them in writing instructions. To overcome these difficulties, computer scientists have developed programs which translate instructions written in a symbolic language, which is easier for humans to understand, to machine language. Such translators are called assemblers or assembly languages. Their development was a significant step in the direction of automatic programming. The programmer, for example, could write an instruction "ADD 0518" which would be translated into a machine-language instruction such as that in Figure 2. This was not only significant because of the direct translation ability, but because it started a trend toward simplifying the task of programming.

Computers are very good at performing clerical functions, and direct translation falls in that category. Assigning memory locations is also a clerical activity, and assemblers were extended to allocate memory and to assign addresses to data values as well as to perform more and more of the clerical tasks associated with programming.

At the same time that assembly languages were being developed, programmers were gaining experience with subroutines. Subroutines are short programs that perform functions of a general nature that can occur in various types of computation. Obtaining square roots of numbers is a typical function for which a subroutine exists. In programming, when the square root of a number is required, a branch instruction is executed which jumps the program to the subroutine. The set of

instructions in the subroutine is executed using the specified number and then, at completion, the computer moves back to the problem program for its continuation.

The experience with assemblers and subroutines helped to generate the ideas for the next step, that of a higher level language that would require the programmer to understand the problem he wishes to solve and not the machine which will be used. Many models for higher level languages were conceived. The complexity of these models was several levels more difficult and much larger in scope and size than the experience of the time provided for.

One of the first automatic programming groups associated with a commercial computer effort was set up in 1951 by Dr. Grace Hopper in the Eckert-Mauchly Computer Corporation, which later became the UNIVAC division of Sperry Rand. This group guided efforts to produce several automatic programming language systems that greatly reduced the effort needed to produce computer programs.

The underlying concepts of automatic programming systems are:

1. To allow the programmer to write source program instructions in a form similar to a subset of his natural language.
2. To provide a translator to convert the source program instructions into a machine-language program called an object program.
3. To provide a library of subroutines already in machine language to perform common computational procedures such as square roots, trigonometric functions, and logarithms.

In 1954 IBM embarked on a project to reduce the task of preparing programs of a scientific nature for their then next large computer, the 704. This effort was undertaken because it was known that two-thirds of the cost of solving most scientific problems on large computers was for program preparation. This effort was headed by J. W. Backus of IBM and the project was named FORTRAN, an acronym for FORmula TRANslator. The goal was to enable a programmer to specify a numerical procedure using a language like that of mathematics and to obtain automatically an efficient machine-language program. Two and one-half years and 18 man years later, FORTRAN I appeared. Although FORTRAN I was far from perfect and criticized by many, the FORTRAN language has developed to the extent that it is taken for granted today, almost as if it were a built-in part of every computer system. FORTRAN has undergone a series of improvements and modifications to make it applicable to a wide range of programming tasks. Thus we have had FORTRAN II, FORTRAN III, and FORTRAN IV.

A computer can not execute source statements as written by a programmer in a problem-oriented language such as FORTRAN and therefore a translation must be made of the FORTRAN statements to machine language. During the compilation of a FORTRAN program, a single FORTRAN statement may produce many machine-language instructions. For instance, the FORTRAN statement

$$A = B + C + D$$

may result in the machine-language instructions which would do the following:

1. Place the contents of location B into the accumulator.*
2. Add the contents of location C to the accumulator.
3. Add the contents of location D to the accumulator.
4. Store the contents of the accumulator at location A.

Four machine-language instructions would be generated for one FORTRAN statement in the previous example. Prior to generating machine-language instructions, memory would be allocated to each of the variables A, B, C, and D. Although the previous example is a much simplified explanation of the process of compilation, it serves to illustrate the primary goal of the translation procedure—to produce an executable machine-language program from the source-language statements.

FORTRAN: The Language

The syntax of FORTRAN follows very closely that of a mathematical language. This is quite reasonable because FORTRAN was designed to solve problems of a mathematical nature. But FORTRAN can be used to solve problems of a non-mathematical nature as well.

The most fundamental program statement in FORTRAN is the assignment statement. The following are examples of the assignment statement:

```
A = 25.5
N = 1500
PRICE = 175.50
I = N
```

The assignment statement simply assigns to the variable on the left of the equal sign the value on the right. Since each variable (A, N, PRICE, I) given above is the name of a memory location location, any previous contents of these memory locations is replaced by the values on the right of the "=" sign. The entity on the right may be a constant such as 1500 or another variable name such as N in the statement I = N. The importance of the sequence in which statements occur is demonstrated by the fact that the last statement in the example has no meaning if the statement N = 1500 does not precede it. When the statement I = N is encountered, N has already been assigned the value 1500 and as a result I will be assigned the value 1500. Another very common FORTRAN statement is the arithmetic statement. The format of the arithmetic statement is illustrated by the following:

```
A = B + C - 1.5
```

The variable A on the left of the "=" will be assigned the value of the arithmetic expression on the right of the "=" sign. Thus the arithmetic expression on the right

* An accumulator is an electronic device used for performing arithmetic and the temporary storage of data from memory.

of the "=," B + C − 1.5, is evaluated and the results of the evaluation replaces any previous value assigned to A. As an example, an evaluation of the statements:

```
B = 3.0
C = 4.0
A = B + C − 5.0
```

would result in A receiving the value 2.0 after execution of the arithmetic statement A = B + C − 5.0. It is important to understand the sequence in which the arithmetic operations are performed in an arithmetic expression. The "rules of precedence," as they are called, are listed in Table 1.

TABLE 1

Rules of Precedence

Level	Operation	Symbol
1	Exponentiation	**
2	Multiplication and Division	*,/
3	Addition and Subtraction	+,−

All operations are performed from left to right in an arithmetic expression, following the "rules of precedence". Thus the FORTRAN statement:

```
A = D * B + C/5.0 ** 2
```

would be executed in the following order:

1. 5.0 is raised to the power of two (exponentiation).
2. D is multiplied by B (multiplication).
3. C is divided by the result of Step 1 (division).
4. The results of Step 2 are added to that of Step 3 (addition).
5. A is assigned the final value from Step 4.

There is a facility available to pre-empt the rules of precedence. This facility is the use of parentheses. If, in the preceding example, it was desired to multiply D * B and add the result to C before dividing by 5.0 squared, parentheses could be used to specify that this be accomplished as in the following statement:

```
A = (D * B + C) /5.0 ** 2
```

Any expression within parentheses is evaluated before all others. The rules of precedence still hold true for the arithmetic expression within the parentheses. Very complex arithmetic expressions can be structured that represent mathematical formulas.

FORTRAN distinguishes between two types of numerical quantities, integer and real. The integer values in FORTRAN are called fixed point values. They are

whole numbers and are characterized by the absence of a decimal point. Thus 10, 20, or 1001 are fixed point FORTRAN values. Real numbers are characterized by the presence of a decimal point: 12.5, 100.. or 1001.1001. Real numbers have a decimal point that is not in a fixed position but floats from position to position depending on the value of the number, designated by an exponent of 10, and thus are commonly called floating point numbers. Variables that are names of storage locations for integer values must begin with the alphabetical characters I, J, K, L, M, or N, while names of floating point variables begin with any other alphabetical character. FORTRAN does have a facility for overriding this implied rule. In any case, a variable name always begins with an alphabetical character and cannot normally be more than six characters in length.

If a programmer desired to assign an integer value to a variable name, he would follow the rules for variable names and select a name that begins with the alphabetical characters I through N and make sure it does not exceed six characters. He might select a name such as NUMBER or any other name that followed the rules and has some meaning to him. If a programmer wanted to refer to a variable that meant AMOUNT to him but wanted it to be in integer value, he could place an I, J, etc. in front of the name and drop the last few characters; thus a variable name such as IAMT or ITOTAL is created. The statement IAMT = 55 would cause the integer value 55 to be stored at memory location IAMT. Thus any reference to IAMT is a reference to a memory location containing the integer value 55. In the same manner, a programmer desiring to assign the value 5.55 to a variable name would follow the rules for naming real variables since the value 5.55 contains a decimal point. The variable name can begin with any alphabetic characters other than I through N. Thus a variable name such as "AMOUNT or "XNUM" could be assigned the value 5.55. If it is necessary to convert a real number to an integer, this can be done using the assignment statement. The following program statements demonstrate this:

```
AMOUNT = 5.55
IAMT = AMOUNT
```

The value of IAMT is equal to 5 because when an integer variable is assigned a floating point value the fractional part is cut off (truncated), leaving only the integer part. Mixing of arithmetic modes can cause some unexpected results if extreme care is not taken. Thus the arithmetic statement A = 6.4/2 may result in A being assigned the value 3.0 instead of 3.2 because 6.4 is a real number and 2 is an integer. The division may result in the fractional part being truncated. Some FORTRAN languages allow mixed modes in arithmetic statements; others do not. FORTRAN has the capability of handling alphanumeric as well as numeric data. Alphanumeric refers to data that is not to be used for computational purposes and may include numbers, alphabetic, and/or special characters. Depending on the computer on which a FORTRAN program is being executed, one or more alphanumeric characters can be referenced by a single variable name. It is possible to store the word "CATS" in a memory location. The word CATS is composed of a string

of four alphabetic characters. If a FORTRAN program causes the characters CATS to be read into and stored at a memory cell called STRING, then a reference to the variable STRING is a reference to the characters CATS. Therefore, variables can be used to reference both numerical data as well as alphanumeric data. A memory location can contain less then the maximum number of alphanumeric characters but never more than the specified maximum for a given computer. The restriction of not being able to store more than a specified number of alphanumeric characters at a variable name can be cumbersome when dealing with strings of characters. A title of a book such as *The Cat in the Hat* contains 18 characters (counting blanks or spaces as characters). To store this title in a computer's memory that can only store four alphanumeric characters per variable name would require five variable names. The following diagram illustrates this fact (the - indicates a blank):

Storage location contents:	THE-	CAT-	IN-T	HE-H	AT- -
FORTRAN variable name:	TITLE1	TITLE2	TITLE3	TITLE4	TITLE5

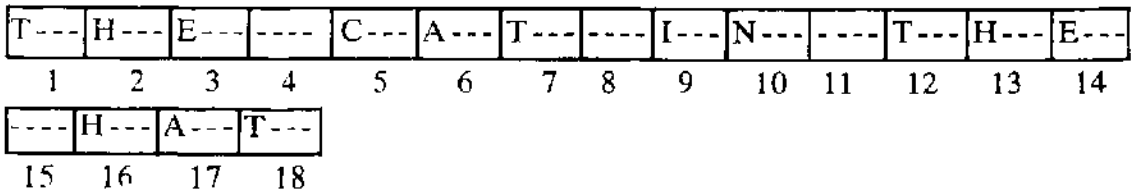
The characters THE are stored at TITLE1, CAT at TITLE2, IN T at TITLE3, HE H at TITLE4, and AT at TITLE5. A reference to the variable TITLE3 in a FORTRAN program would refer to the characters IN T stored at that memory location. If the computer were instructed to print the contents of TITLE1, TITLE2, TITLE3, TITLE4, and TITLE5, it would print THE CAT IN THE HAT.

To avoid having to write many variable names to refer to strings of alphanumeric data, FORTRAN has the facility to refer to a series of consecutive storage locations by a single variable name. The series of consecutive storage locations is called an array. The rules regarding an array name are the same as the rules for single location variable names. If an array is to be used, it must first be named in a FORTRAN DIMENSION statement. The DIMENSION statement causes the computer to allocate the desired number of memory locations to the named array. The dimension statement DIMENSION TITLE(5) reserves five memory words for the array named TITLE. Thus the title used as an example above could be read into and printed from the memory of the computer by referring to the variable TITLE. Any location of an array can be referenced by use of subscripts. A subscript is a pointer to a location in the series of storage locations in an array. The subscript is placed in parenthesis to the right of the array name. Therefore TITLE(3) refers to the third cell or storage word in the array named TITLE:

Title	THE-	CAT-	IN-T	HE-H	AT- -
	1	2	3	4	5

In the above example this would reference the storage location whose contents is IN T. Arrays are most important in handling alphameric data in the FORTRAN language. Quite frequently it is important to be able to examine each character of a string of data. Therefore, a single character is stored at each cell or location of an

array. The eighteen-character title above would require an array eighteen cells in length. This is an inefficient use of memory, since only 25% of each storage cell's maximum capacity is utilized. An example of an array to store the eighteen characters in the string THE CAT IN THE HAT is:



A reference to TITLE(5) refers to the character C. Using this arrangement to store alphameric data gives the programmer access to each character in the string whereas the previous arrangement gave access to groups of four characters. An instruction to print all eighteen elements of this array could still result in printing THE CAT IN THE HAT.

For any programming language to be effective it must possess the capability to read data into memory and to write data that is stored in memory. Any instruction to cause data to be read into memory must specify the device on which the data resides because most computer systems have card readers, magnetic tapes, magnetic disks, etc., on which the data can be stored. In addition to specifying the device, the location and type of data on the input medium must also be specified. The read instruction must also indicate the memory location(s) where the data is to be stored. For reading data into memory the FORTRAN READ statement is used. Its exact format is

```
READ(5,1) LIST
```

where the 5 refers to a device such as a card reader for reading a punched card and the 1 is the number of a FORMAT statement which specifies the type of data and its location on the input medium. LIST refers to the variable names of memory locations where the data is to be stored in memory. The format statement informs the computer where the data is recorded on the input media as well as the type of data. The FORTRAN statements:

```
READ(5,1) I, J
1 FORMAT (I5, I4)
```

causes a punched card to be read from the card reader and the 5-digit integer number recorded in positions (columns) 1–5 of the punched card to be stored in memory at the variable named location I and the 4-digit number recorded in positions (columns) 6–9 of the card to be stored at the variable named location J. The format statement indicates by the first I that the first value being read is an integer and it is in the first five positions on the card and that the second value being read is also an integer value and occupies the next four positions on the card. FORTRAN allows a wide range of input devices to be used including punched cards, magnetic tape and

magnetic disk. Each input device is identified by a given number, e.g., 1, 2, 3, 4, 5, ... Several systems have adopted the code 5 to represent the card reader and 6 the printer, but generally the choice is dependent on the computer system used.

Another example of the READ and FORMAT statements to demonstrate the reading of alphabetical data is:

```
READ (5,1) STRING
1 FORMAT (A3)
```

The READ and FORMAT statements in the example would cause three alphanumeric characters to be read from the first three columns of a punched card and stored in a memory location called STRING. If the characters CAT were punched into the first three columns of the card read by the above statement, then the word CAT would be stored at the memory location called STRING.

Having discussed the FORTRAN statement that allows us to read data into the computer's memory, we can now talk about the statement that permits us to print or write the data stored in memory onto a sheet of paper by using a high-speed printer. The paper can normally contain up to 132 characters on one line. The FORTRAN statement that commands the computer to write a line of stored data is called the WRITE statement. This statement has a form similar to that of the READ statement. Its form might be:

```
WRITE (6, 12) J
12 FORMAT (' ',4X,I3)
```

where the "6" is the number referring to the printer device and the "12" refers to a format statement labeled "12." In the memory of the computer an area called a buffer (see Figure 3) is utilized to hold all data before it is transmitted to the printer. This area in memory may be 133 positions in length. Each position can store one character. This character can be a digit, letter, or special symbol such as ., 1, ;, and $.

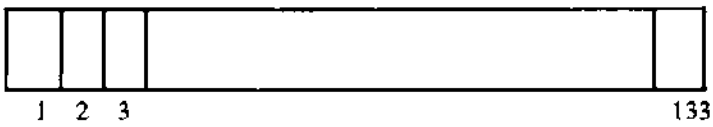


FIGURE 3. *Print buffer*

The very first position of this buffer is used to control the carriage of the printer. This governs the vertical movement of paper for spacing between lines of print. The first character in the format statement that will be transferred to the print buffer must be a legitimate carriage control character or the results of printing are unpredictable. The easiest way of getting a control character into the print format statement is to enclose it in single quotation marks because whatever is enclosed between quote marks is transferred directly to the print buffer. When the statement WRITE (6, 12) J is executed, the format statement labeled "12" is scanned from left to right similar to the READ format statement discussed above. Whatever is

found between single quotes is transferred to the print buffer. In the case of format statement "12," a blank will be transferred from the format statement into the carriage control position of the print buffer. This will cause single spacing between lines of print. The scanner will then interpret the "4X" in the format statement to ignore the next 4 positions in the print buffer. The scanner then encounters the "I3" element of the format statement. This causes the variable "J" in the WRITE (6, 12) J statement to be selected for conversion and transferred from its memory location to the print buffer in Positions 6, 7, and 8. Assume that the variable J has the value 055 stored at its memory location. Thus the print buffer now contains blanks in the first 6 positions and the characters "55" in Positions 7 and 8. The reason Position 6 does not contain a zero is that all nonsignificant zeros in integer values are replaced by blanks in FORTRAN. The scanner of the format statement will now encounter the right parenthesis which indicates the end of the format statement. In the same manner there are no more variables in the WRITE statement and the WRITE operation has been completed. When the contents of the buffer are transferred to the printer, "55" will be printed in Positions 6 and 7 on the print lines.

The power of a programming language is exhibited by the capability it gives the programmer to test data values and machine conditions. FORTRAN has a statement that can test data values and make logical decisions. This is the FORTRAN IF statement. The following example will serve to illustrate the use of the IF statement:

```
    A = 0.0
1 A = A + 1.5
    IF(A - 22.5)1,2,3
2 B = 23.5
3 C = 36.8
```

First A is set to 0.0, then 1.5 is added to A, giving A the value 1.5 (0.0 + 1.5). Next the expression inside the parentheses of the IF statement is evaluated. If the result of this evaluation is less than zero, the next statement to be executed will be the one with the statement number that comes immediately after the parenthetical expression. In the above example this would be the statement numbered "1" because the result of subtracting 22.5 from 1.5 is -21.0, which is less than 0.0. After the second execution of the statement labeled "1," A will have the value 3.0 (1.5 + 1.5) and the IF statement will be executed again because it is the next sequential statement in the program. This loop will be executed until the result of adding 1.5 to A in Statement 1 is equal to 22.5. At this point the result of evaluating the parenthetical expression is zero, and the next statement to be executed will be the one numbered "2." If the result of evaluating the parenthetical expression were greater than zero, the next instruction to be executed will be the statement labeled "3." This type of skipping around to various instructions in a program is called branching. The instructions in a program are normally executed sequentially in the order in which they are written. A branch such as the one caused by the IF statement is called a conditional branch. The statement to which it will branch is dependent upon the condition resulting from evaluation of the parenthetical expression of the IF statement, i.e., less than zero, zero, or greater than zero. There also exists

another form of branch instruction. This is the unconditional branch which in FORTRAN is the GO TO statement. The form of the GO TO is

```
GO TO 10
```

where "10" is the label of another FORTRAN statement in the program. The logical IF statement in the following example tests the value of A:

```
IF(A .EQ. 20.5)D = A + 5.5
B = 21.6
C = 32.8
```

If A is equal to 20.5, the next instruction to be executed will be the statement D = A + 5.5 and then the statement B = 21.6 will be executed. If A is not equal to 20.5, then the statement that follows the IF statement, B = 21.6, is executed next. Other logical conditions can also be tested such as .GT., greater than; and .LT., less than. The IF statement can be used for testing alphanumeric as well as numeric data values. In either case the IF statement is the facility for making logical decisions within a FORTRAN program. A series of logical conditions can be tested by one logical IF statement. The following example shows two conditions being tested:

```
IF(A .LT. 25.5 .AND. C .GT. 10.0) B = B - 7.5
D = D + 14.8
```

If A is less than 25.5 and C is greater than 10.0, then the statement B = B − 7.5 is executed next; otherwise the statement D = D + 14.8 is executed next. Other logical connectors such as .OR. and .NOT., are also available in FORTRAN.

FORTRAN also has a statement that can control the number of times a group of instructions is executed. The following is an example of the DO statement that is used to control an iterative process which is sometimes called looping:

```
      DO 15 I = 1,20,1
      A = A + 1.0
15    B = B + A ** 2
      C = A
```

The DO statement has a statement label, "15", in the example, i.e., the label of the last statement in the group of instructions that are to be executed repeatedly. The last statement, C = A, is not within the range of the DO loop. In the above example the statement labeled "15" is the last statement in the DO loop. Next in the DO statement, a variable, I, is used as a counter to control the number of times the instructions in the range of the DO are executed. This is initialized to a beginning value. In the above example, I is initialized to "1." The number "20" is the limit for the variable I and the final "1" in the DO statement is the amount by which I is incremented each time the statements from the DO statement down to and including statement "15" are executed. Each time statement "15" is encountered, a branch is made back to the DO statement where I is first incremented by "1" and then checked to see if it is greater than the limit "20." As long as I is not greater than

the limit, the group of instructions between the DO statement and the last statement in the range of the DO are executed again. In the above example the group of statements from the DO statement through the statement labeled "15" will be executed 20 times. The DO statement is frequently used to perform operations on arrays where it is necessary to scan an array for certain alphanumeric characters or numerical values.

The sample of FORTRAN statements that have been presented can be utilized to solve problems and perform tasks of both a numerical and textual nature. The power of a programming language is harnessed by the programmer using the correct FORTRAN statements in the correct sequence. FORTRAN has other statements that have not been discussed that increase its power and flexibility as a programming language.

Subprograms; Subroutines

A large and complex programming task can seldom be completed in one sitting or even by one person. It is therefore advantageous to be able to break a complex problem into subtasks that must be performed in order to achieve a desired goal. This modular approach to programming has many advantages as discussed later. Each subtask can be programmed at separate times by the same individual or by different individuals. Each person need only know what the inputs are to his program, the operations to be performed, and the outputs desired. Each program can be written as a subroutine with the exception of one program that can be called the main program. The main program can call on a subprogram when it is needed, and the subprogram can perform its function or task and return control back to the main program again. The main program is referred to as the calling program and the subroutine as the called program. The calling program can specify the inputs to the subroutine by a list of arguments. For example, the following call on a subroutine specifies the variables A and TEXT as values or arguments being sent to the subprogram FIND.

```
CALL FIND (A, TEXT)
ISW == 1
```

The subroutine named FIND is called upon to perform its specified function. The subroutine FIND might be as follows:

```
SUBROUTINE FIND (B, STRING)
- - - -
- - - -
- - - -          } Other Program Statements
- - - -
- - - -
RETURN
END
```

The dummy arguments B and STRING in the subprogram are replaced at execution time by the actual arguments in the calling program supplied in the CALL statement. The dummy arguments must correspond in order, number, type, and length with the actual arguments. If an actual argument is a floating point variable, then the corresponding dummy argument must be the same. If an actual argument is an array, the corresponding dummy argument must also be an array. The return statement is necessary in any subprogram and causes control to be returned to the calling program. In the example, the value of A in the calling program replaces the dummy argument, B, in the subprogram, and the value of TEXT replaces the dummy argument STRING in the subprogram. The subprogram statements are then executed to perform some specified task and, when the return statement is encountered, control is returned to the statement "ISW = 1" which follows the call on the subroutine.

Subroutines allow for a modular approach to programming, easier error correction, easier testing of a large program, and efficient use of memory if the same group of instructions must be written at several places in a program.

FORTRAN is the most widely used language in existence. The reasons for this are (1) its simplicity to learn, (2) its universal availability on a wide range of computers, and (3) its versatility in solving a wide range of problems. Although FORTRAN has its primary use in solving scientific problems of a mathematical nature, it has the capability of being used in business applications and for handling textual data. For libraries, FORTRAN is applicable to fund accounting and other phases of technical services such as acquisitions and circulation control. It can be used for procedures that handle textual data such as cataloging and reference services, but it is inefficient and cumbersome for such procedures. Entire programming packages for all phases of library automation written in the FORTRAN language are in existence. There are also a number of information retrieval programs written in FORTRAN.

The major disadvantages of using FORTRAN for handling large files of textual data are (1) the inefficient machine language code that is generated by the compiler, (2) the inefficient utilization of memory, and (3) the lack of providing a programmer control over a variety of data structures with any efficiency. These factors all lead to the inefficient use of a computer's two most valuable resources, time and memory space. One other factor that can not be overlooked is the difficulty of determining errors that occur during execution of a compiled FORTRAN program. It is extremely difficult to locate the FORTRAN statement causing an execution time error, even when the machine-langauge instruction causing the error is known, because there is not a one-to-one correspondence between machine-language instructions and FORTRAN statements.

FORTRAN will continue to be used in library and information science because its advantages outweigh its disadvantages. As more modifications and improvements are made to the language, its usefulness in textual processing will increase.

JAMES G. WILLIAMS

FRANCE, LIBRARIES IN

For many years the foreign visitor interested in French libraries first noticed their exceptional richness and especially the many very old collections. These collections are held not only by the Bibliothèque Nationale but also by those municipal libraries known as "bibliothèques classées." The rarest materials have been cataloged with great care (*1*) and these "precious collections" have earned a justifiable reknown (*2*).

Today it has come to pass that the legitimate importance accorded to these riches (which, it must be admitted, interest only the bibliophile, the researcher, and the scholar, and which the man in the street cares about only when there is an exhibition) masks the truth about the real growth of libraries. This growth was nearly halted in the nineteenth century and up to the beginning of the twentieth, but now France is in the process of remedying this regrettable delay.

One should retrace the historical circumstances that explain the slowness of this development before trying to make a statement on current efforts. Without this background, one can hardly grasp the contrast that exists between the past glory of French libraries and the difficulties experienced in trying to integrate them with the complex and ever-changing conditions of the present day.

In the Middle Ages in France as in other countries of western Europe, there were monastic libraries that were devoted to gathering and conserving the testimony of ancient civilization.

Related to libraries, *scriptoria*—copyists' workshops—played a key role, and in this regard the activity of Saint-Martin de Tours and of Saint-Denis has been compared with that of a publishing house. At the time of the Carolingian renaissance, Alucuin came from England, increased the decoration of manuscripts, and organized, near the monastery, the library of Saint-Martin de Tours. Among the best known monastic libraries were those of Saint-Requier, Corbie, and Saint-Bertin.

From the ninth to the eleventh centuries these manuscript holdings were numerically unimportant (about 300 at Saint-Riquier) and the library was hardly more than a small-sized room opening on a cloister. That of Thoronet (Var), which measured about 9.2 square meters, was a typical model. Sometimes the library was contained, as at Silvanès (Aveyron), in an *armarium* (closed niche with doors), and the monk who ran the scriptoria, the *armarius*, was often, at the same time, charged with the keeping and circulation of manuscripts.

Beginning in the thirteenth century, the development of universities was accompanied by a renewal of activity in copyists' workshops as well as the creation of academic libraries. Around the library of the Sorbonne, which possessed more than 1,000 books at the end of the century, clerks and needy students reproduced in their scriptoria original "copies," which were filed with the "stationaire" who rented them in notebooks *(peciae)*. At the university library, the books, laid flat on a consultation desk or stored on a shelf above a desk, were chained. In 1321

the charter of the Sorbonne stated that the best books on each subject must be chained, which led to a special lateral lighting arrangement in the reading room, completed on the other side by a stack where duplicates and infrequently consulted works were stored. This academic layout, which became general about the fifteenth century, did not exclude wall decoration. Parisian libraries of this type have disappeared, unfortunately, but one can find a fascinating example in Auvergne, at the library of the Chapitre du Puy, where the famous medieval *quadrivium* of the liberal arts appeared.

In the meantime, lay private libraries multiplied. The rulers set the example: Charlemagne, Louis le Pieux, and Charles le Chauve collected beautiful manuscripts. These private royal libraries were scattered, like that of Saint-Louis. The library of Charles V, lovingly organized and cataloged by the monarch himself, was installed, in 1368, at the Louvre, where it was arranged luxuriously on three floors. This precious collection seems to have disappeared; acquired in 1425 by the Duke of Bedford, it was transferred to England. Its ephemeral reconstruction was the main feature of one of the most famous exhibitions of the Bibliothèque Nationale (*3*).

During pre-Renaissance and Renaissance times, the lay libraries—princely, aristocratic, or bourgeois—enjoyed a period of brilliance, while the monastic libraries declined, and were often devastated, like that of Fleury sur Loire, at the time of the religious wars. At Château de Blois, Louis VII rebuilt a royal library, the treasures of which were enriched principally by the collections of the dukes of Milan, brought from Italy. They included manuscripts that had belonged to Petrarch and Greek and oriental manuscripts acquired for the king by Jean Lascaris.

The cult of the illuminated manuscript, that jewel of royal collections, survived the first productions of printing workshops. To these precious works, which were later to enrich the national library and some of the great provincial libraries, the collectors had the habit of affixing an ex-libris, which denoted their title of ownership.

The growth of printing necessarily involved, over a period of time, the growth of public and private collections. The royal library itself ceased to be uniquely the private treasure of the sovereigns to become the guardian of the national patrimony. François I, by establishing legal deposit in 1537, assured a regular source of growth for his library which he moved, in 1544, from Blois to Fontainebleau, and which he entrusted to the scholar Guillaume Budé, first "master of the bookshop." Sumptuously arranged and welcoming French and foreign scholars, the royal library then possessed 1,890 volumes of which 109 were printed. Searches for Greek and oriental manuscripts were made in order to enrich it.

Considered a means of diffusing knowledge, printing in the meantime gained ground, and its products contributed to the development of the libraries of the nobility and of the affluent middle class. From 1550 on, the magistrates often had private libraries of about 500 volumes, and this pattern increased in the following period.

For French libraries, the seventeenth century was the beginning of a brilliant period when immense resources, patiently accumulated, were organized with a view to their utilization by collectors, the learned, and scholars.

The name of Gabriel Naudé is connected with this period, and it was the Mazarine Library, not the royal library, which was the innovator in this area. In 1627 Naudé, librarian to Cardinal Mazarin, stated in his *Advis pour dresser une bibliothèque* a profession of faith, the liberality of which is well known: the "lights of the library must not be hidden under a bushel" and "fruitlessly he strives . . . to make some notable expenditure for books who does not have as a purpose to dedicate and consecrate the usage to the public and never to prohibit access to the least of men who could have need of them. . ." (*4*).

Conscious of the responsibilities incumbent upon the librarian, Naudé did not fail to face the problems of organization which make a library an ordered and carefully classified collection. He believed that a "heap of books, be it 50,000 volumes, will not merit the name of library" without pre-established order. This order should be "the most natural"; that is, Theology, Medicine, Law, History, Philosophy, Mathematics, and Humanities, with appropriate subdivisions. The preceding is one variant of a classification corresponding to the library of an educated person—a "honnête homme," as was said in the seventeenth century—and which, reduced to five main classes, culminated in the "system of the merchants of Paris," illustrated in the nineteenth century by the famous Brunet classification.

Open since 1643 on Thursdays, the first Bibliothèque Mazarine, located in the old Hôtel Tubeuf, between Richelieu and Vivienne Streets, was, after 1647, accessible to "everyone, without excepting a living soul, from 8:00 A.M. to 11:00 A.M. and from 2:00 P.M. to 5:00 P.M." After the wars of the Fronde, on the banks of the Seine, the library was moved to the College of Four Nations and again put at the disposition of the public in 1688.

The royal library, transferred from Fontainebleau to Paris, assumed its national destiny little by little. Thanks to acquisitions of quality through the devotion of Colbert, himself a well-known collector, it was developed and enriched by princely collections. In the eighteenth century it filled in its resources by annexing the Cabinet du Roi, the private collection of the kings of France and the source of the Cabinet of Coins as well as the Cabinet of Prints. Managed by a dynasty of great librarians, the Bignons, it was installed in the old Mazarin palace and opened in 1720 to "scholars of all nations." It then contained 80,000 printed works and more than 16,000 manuscripts.

Parisian scholars and learned men had access in addition to the Bibliothèque Sainte-Geneviève and to the rich Bibliothèque de Saint-Victor, the Victorine, now gone, which was until the Revolution the great public library of Paris.

The cultivated man in quest of quality reading or the bibliophile enamoured of books as objects were not the only ones who could benefit from these enticing resources. In the second half of the century, criticism of texts and study of sources expanded. From this time on, one could speak of scientific research, magnificently

illustrated by the Benedictines of Saint-Maur who took pains to create, at Saint-Germain-des-Prés, an important library. In addition, it is relevant to recall that in 1665 the *Journal des Sçavans* was considered a counterpart to the *Philosophical Transactions* of London.

In the provinces too, private collections were opening up to the inquiries of scholars. Some well-known supporters of art, science, and literature, such as prelates and councillors to Parliament, willingly bequeathed their private collections to colleges, to convents, or to academies on condition that they be put at the disposition of scholars. This was the case at Bordeaux in 1736, at Carpentras in 1745, and at Aix-en-Provence in 1786, and we are well aware of the treasures that were included in the Inguimbertine of Carpentras or the Méjanes of Aix-en-Provence. As for the library at Grenoble, it owes its origin to a public subscription begun in 1772.

The revolutionary period of 1789, despite its chaos, devastation, and pillaging, did not cause a halt in the liberal evolution. On the contrary, it had the effect of putting books in greater number at ready reach. The men who were charged with this large task, set by the old regime, had in mind the organization of resources, and the bibliographic care of the man of the Constituent Assembly, the Legislature, and the Convention was strongly underlined by historians of this period. Notable in this respect was Hubert Ameilhon (*5*).

On November 14, 1789, a decree of the National Assembly ordered the monasteries and the chapter houses to deposit at the record offices of the royal seats or the nearest municipalities catalogs of their book holdings, henceforth to be put at the disposition of the nation. These collections, declared "national property," were stored in warehouses. Some of them were stolen or sold, or subjected to the revolutionary vandalism aimed at erasing the printed testimony of a hated epoch. But most of the time those designated responsible had the courage to safeguard and keep an inventory of these precious collections. Their concern was expressed in a famous report of the Abbé Grégoire (1794) that ordered a general inventory of the property belonging to the nation, pointing out the delay in the making of catalogs set up on centralized cards by the bibliographic bureau (*6*). More than 8 million books were deposited in literary depots created to receive them (*7*). In Paris alone one could count no less than nine depots, of which the collections for the most part belonged to the Bibliothèque Nationale (100,000 volumes), the Bibliothèque Sainte-Geneviève, and the Bibliothèque de l'Arsenal. The provincial collections in literary depots were entrusted in 1803 to municipal libraries or to central schools, and placed under the responsibility of local authorities who were charged with keeping them and paying the librarians. Thus certain municipal libraries became depositories of state holdings and, therefore, became dedicated to the conservation of precious works.

Looking back, the nineteenth century was a critical period for French libraries. At the Bibliothèque Nationale, which was extended topographically into the quadrangle it now occupies, the influx of holdings coming from the literary depots posed

complex classification and cataloging problems for which a satisfactory solution could not be found. The provincial libraries, lacking competent personnel, were even more disabled in the face of these formidable riches which poorly paid amateur librarians often jealously tried to keep. As for the illustrious writers who had the privilege of managing the great libraries—Charles Nodier at l'Arsenal, Sainte-Beuve at the Mazarine, Leconte de Lisle at the Senate, to cite only the most well known—one could not expect them to have the necessary technical competence. In 1821 the creation of the École des Chartes permitted eminent historians to manage certain libraries. However, it was conservation, not free access, which figured in the instructions given to libraries, and the fact that no one had searched for an original classification, as had been done in Anglo-Saxon countries, underlined clearly the indifference in regard to book circulation and the interests of the average reader.

However, we should recognize as an asset the legitimate concept held by certain political men of what libraries should be. For example, the deeds of Guizot and of Salvandy testified to a sense of public service in advance of the ideas of the time, and these ministers of the Second Restoration can be considered authentic heirs of the great revolutionaries.

Connected in 1832 to the Ministry of Public Instruction, libraries were objects of concern to Minister Guizot. He averred that their holdings did not correspond in any way to the needs and tastes of the inhabitants and ordered by circular the construction of lists of duplicates and works for exchange, but this circular met with general indifference. To Guizot's successor, Salvandy, we owe the creation in 1838 of a "great book of libraries of France," a collection of library catalogs, planned to effect a better division of works. The order of February 22, 1839 (*8*) anticipated the reorganization of public libraries with the institution of "committees of inspection and purchases" and control by the "Inspection générale" which had been functioning since 1822. Finally, in 1841, the preparation of the *Catalogue général des manuscrits des bibliothèques de France* began, which was to be a census of the most valuable documents for researchers.

The Second Empire did not introduce any major innovations in the functioning of great libraries. Directed by the administrator Taschereau, the Bibliothèque Nationale undertook a systematic catalog of which the History of France section was published from 1855 to 1865. This catalog tended to be overshadowed when, toward the end of the century, Léopold Delisle undertook the *Catalogue général des imprimés de la Bibliothèque Nationale*. The first volume was published in 1897 and it was an admirable instrument of identification which unfortunately excluded anonymous works.

The last third of the nineteenth century saw the development of university libraries; from 1878 to 1886 they received instructions and regulations which remained important until recently. Jules Ferry, Minister of Public Instruction, emphasized in his plans what has become a sort of slogan of the importance of the library: "One can do everything for the school and the college; if one does not organize libraries, one will have done nothing. . . ."

In the meantime, what was becoming of public libraries? Various efforts are

worthy of note. In 1864 in the third arrondissement of Paris the typographic worker Girard created a library financed by the members of the Society of Friends of Education. Toward the end of the Second Empire, under the guidance of V. Duruy, then Minister of Public Instruction, some valuable collections appeared, and in 1865 in the eleventh arrondissement the first public library of Paris opened. The Prefect Ferdinand Hérold started new libraries in Paris which were in 1879 attached to the Service central des bibliothèques. At this time, too, we should render homage to the Franklin Society, which encouraged the development of so-called popular libraries. These libraries multiplied even in the very poorest villages.

The society also tried to develop school libraries, which in 1862–1863 received more than 100,000 works. Jean Macé, founder in 1865 of the Ligue de l'enseignement, which is still very active today, led an energetic campaign in favor of school libraries.

Unfortunately, government efforts and certain private efforts very often were sullied by an obvious paternalism and concern for moralization and a noted tendency to promote official history, which led in a direction denounced by politicians such as Jules Simon: "From the moment the State makes itself the purveyor of libraries, it is suspect. . . ."

Another serious fault of this system was that the traditional municipal libraries were eager to leave to the "popular" libraries literature considered facile. Thus the distinction between service to the scholarly reader and book circulation in the popular milieu was accentuated, a distinction the consequences of which are still felt in our day.

During the first half of the twentieth century the professional world, if not the public, took note of the conspicuous slowness of French libraries compared with their neighbors in Great Britain and some of the Scandinavian countries. A well-documented current study made a case of this imbalance and emphasized, with figures for support, the insufficiency of public libraries and their lack of brilliance (*9*).

Founded in 1906, the Association des bibliothécaires français, which will never have the authority enjoyed by professional associations elsewhere, makes a special effort to promote liberal ideas. Its *Bulletin d'information* serves to bind together the librarians who use it to bring out their individual difficulties. Eugène Morel, who devoted himself with the passion of an apostle to the cause of libraries, strove to create a climate favorable to the development of the public library as it was known in the United States, England, and elsewhere (*10*). The *Revue des bibliothèques*, which began publication in 1891, contributed to a better knowledge of collections and of professional activity.

But it was left to the period between the wars to record decisive progress with regard to public libraries. Encouraged by Carnegie gifts, aided by the American Committee for Destroyed Areas, certain libraries came alive and various experiments, such as the circulating library of Aisne, gave evidence of a new spirit. The

creation of children's libraries, of which the Heure Joyeuse of Paris constitutes the prototype, belongs to this period.

In 1929 a Commission on Public Reading was formed and conducted a survey, the results of which were examined at the Congress on Public Reading of Algiers in 1931. Despite official encouragement, progress was slow. However, the *politique des loisirs* put into operation after 1936 helped to create a favorable atmosphere for reading by people in rural areas. The efforts of pioneers became greater. In 1938 the Association pour le développement de la lecture publique was created, and an interesting although ephemeral *Revue du livre* stated examples of foreign experiences. A private effort, valuable for instruction, was pointed out: the creation, at Châlons-sur-Marne, by Henry Vendel of a bibliobus service which functioned even during World War II.

Private efforts and the actions of pioneers, as devoted as they were, could not in France provide the necessary methods to develop sufficiently equipped public services, and the indifference of most local authorities with regard to the municipal library hardly encouraged lasting progress. In a centralized country such as France, one waits for decisive efforts from the state. To this hope the response was finally, after the Liberation, the creation by the provisional government of General de Gaulle (*11*) of a Direction des bibliothèques de France, which included, besides an administrative service, a very active technical service and the body of inspectors general (*12*). The action of the Direction began immediately in the most neglected sector: rural public reading. Beginning in 1945, central lending libraries were established in the départements (*13*). Equipped with bookmobiles, they help to attract the rural population to reading (*14*).

At the same time an expansive effort allowed the development of university libraries which, while remaining under the authority of the rectors, depend on the Direction des bibliothèques which accords them a regular budget, obtains considerable equipment for them, and releases technical instructions for their well-being.

While discussing the activity of the young Direction, it is fitting to write of the rebuilding of damaged libraries, notably at Caen, at Strasbourg, and at Tours; an enormous endeavor of building all over the land (*15,16*); the introduction in 1962 of open access in new university libraries with general application of the Universal Decimal Classification; and, finally, the creation of common services permitting the improvement of interlibrary loan. Since 1956 the *Bulletin des bibliothèques de France* has disseminated information on various activities and included a selective analytic bibliography of international professional literature which is currently very much appreciated.

Following the example of the rebuilt library at Tours (*17*), several public libraries succeeded in conquering unfavorable local circumstances. But public opinion and the press were uneasy at witnessing the increased imbalance so evident when compared with the neighboring countries of Great Britain, Germany, and Denmark. An important statement made by a work group at the request of an interministerial

committee, presided over by the prime minister, drew up in 1968 a very gloomy balance sheet *(18)*. This conscience pricking was the basis of increased activity that tended from then on to endow France with services corresponding to its resources and to the responsibilities that are incumbent upon it in the European community.

The Direction des bibliothèques de France, which became the Direction des Bibliothèques et de la Lecture Publique, constitutes one of the departments of the Ministry of National Education. Its current director, Mr. Dennery, is also Director of the Bibliothèque Nationale. The Direction assumes actually authority over the libraries that depend on it, either directly (Bibliothèque Nationale, central lending libraries) or jointly in other administrative arrangements (municipal libraries, university libraries, libraries of large businesses). The administrative offices manage personnel and budget. The technical services exert a stimulating and coordinating effect on numerous libraries and information centers that do not report to the Direction but are willing to collaborate with it. Contributing to new buildings, encouraging public and private initiatives to develop reading, centralizing information provided by the inspectors general, and disseminating directives and advice, the Direction has had to expand its structure and create a Public Reading Service (which did not exist originally) in order to cope with these many tasks (see Figure 1).

Before measuring the size of the effort being made in the contemporary period, it is useful to remember that the population explosion has been felt in France with particular force in the last few years.

A recent British study *(19)* opportunely recalled that France is in the process of becoming one of the youngest nations of Europe, as 32% of the French people are under 20 years of age, and the population in 1970, over 50 million, is increasing regularly.

For this young public it is urgent that current books in sufficient number be furnished. As is the case everywhere, adolescents, particularly in the large urban centers, are deprived of reading material. The encyclopedic public library with its possibilities for extension services is at the center of the problem and it alone can offer efficacious solutions.

It is interesting to note that in France the term "public" library tends to become a substitute for the term "municipal" library. This is one way of emphasizing that the library is to be from now on for the service of all and that the contingent work of conservation of old collections is only one of the aspects of its activities.

At present fifty municipal libraries, called "classées," are for the most part the depositories of these collections which belong to the state. The law of 1897 restated emphatically this right of the state and forbade any transfer of the national heritage *(20)*. In 1931 the law of nationalization *(21)* recognized this particular responsibility which involved putting at the service of the municipality a qualified official, often a paleographic archivist, whose salary was paid by the state in a proportion of 40–60% according to the importance of the city.

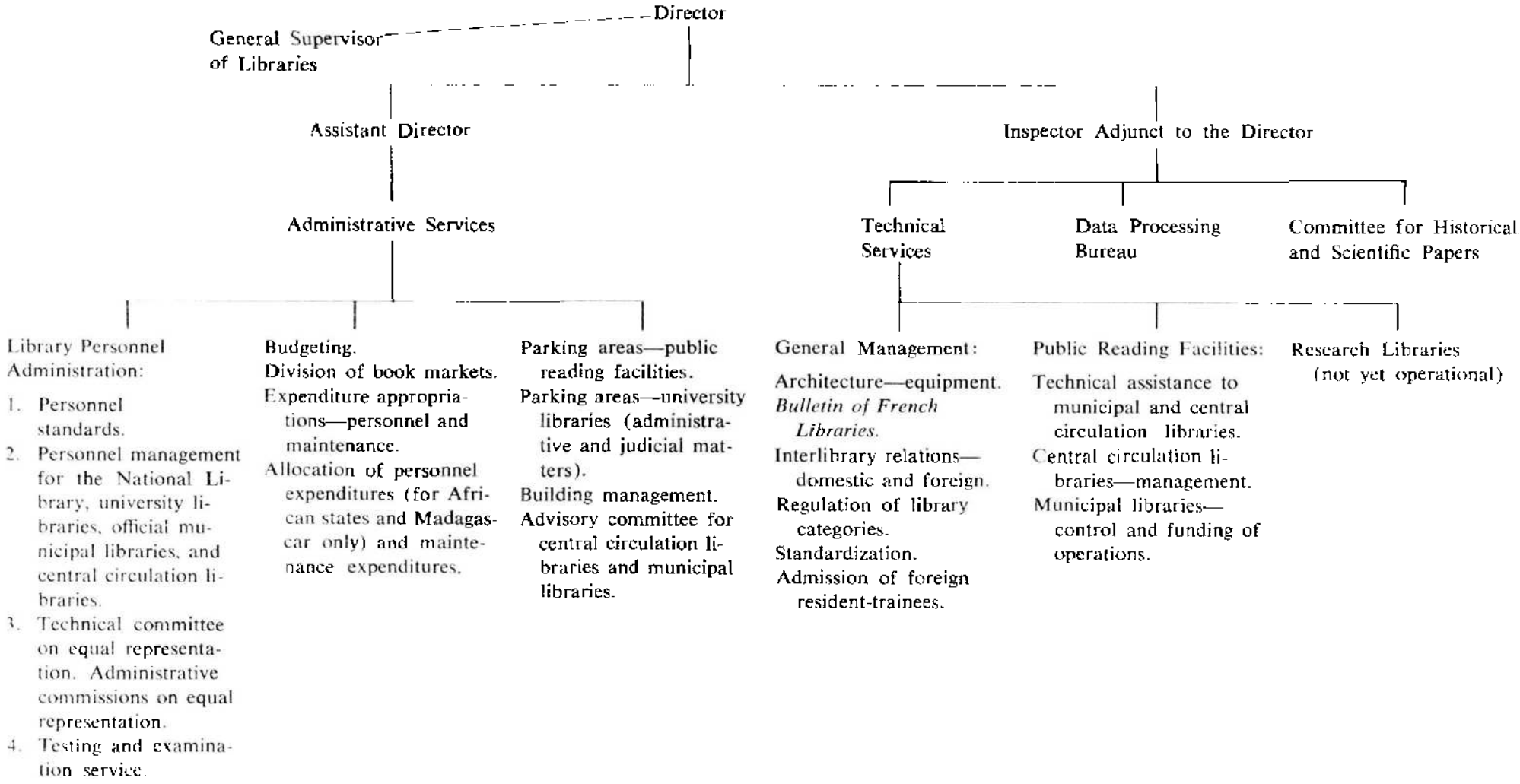


FIGURE 1. *Organization chart of the management of libraries and public reading facilities.*

Cities with a municipal library "classée:"

Aix-en-Provence
Albi
Amiens
Angers
Avignon
Besançon
Bordeaux
Boulogne-sur-Mer
Bourges
Brest
Caen
Cambrai
Carpentras
Châlons-sur-Marne
Clermont-Ferrand
Colmar
Compiègne
Dijon
Dôle
Douai
Grenoble
La Rochelle
Le Hâvre
Le Mans
Lille
Limoges
Lyon
Marseilles
Metz
Montpellier
Moulins
Mulhouse
Nancy
Nantes
Nice
Nîmes
Orléans
Pau
Périgueux
Poitiers
Reims
Rennes
Rouen
Saint-Étienne
Toulouse
Tours
Troyes
Valence
Valenciennes
Versailles

Departments with a central lending library:

Ain
Aisne
Alpes-Maritimes
Ariège
Aube
Aveyron
Bas-Rhin
Bouches-du-Rhône
Cantal
Charente
Charente-Maritime
Cher
Corrèze
Corse
Côte d'Or
Deux-Sèvres
Dordogne
Doubs et Territoire de Belfort
Drôme
Essonne
Eure
Girondë
Guadeloupe
Haut-Rhin
Haute-Garonne
Haute-Marne
Hautes-Pyrénées
Hérault
Ille et Villaine
Indre et Loire
Isère
La Réunion
Loir et Cher
Martinique
Mayenne
Meurthe et Moselle
Meuse
Morbihan
Moselle
Pas de Calais
Puy de Dôme
Pyrénées Atlantique
Rhône
Sarthe
Seine Maritime
Seine-et-Marne
Somme
Tarn
Val d'Oise
Yonne
Yvelines

FIGURE 2. *Bibliothèque municipale, Le Havre.*

The idea of "classification" has evolved considerably in the last several years. Recently "classified" libraries, like those of Nice or Dôle, are not responsible for especially precious holdings, but the importance of the city, justifying the intervention of the state, is henceforth to be taken into consideration. There are even those people who want the state to take complete charge of the personnel of these libraries.

As to the "non-classées" municipal libraries—now numbering more than 600—they too can benefit from state aid; they are regularly inspected and advised on technical matters. However, their expansion depends more strictly on the goodwill of their mayors.

It should be added that the libraries of the arrondissements of Paris, which celebrated their centenary in 1966 (*22*), do not depend on the Direction des bibliothèques and on public reading, but as in the past on the Préfecture de la Seine which administers them.

Since the creation of the Direction des bibliothèques a particular effort has been made in the scope of municipal libraries. Presently the state contributes 50% to buildings or furnishings. The 6th Plan anticipated a great endowment of 110 million francs for construction aid. The beautiful old buildings, which often have little attraction for the general public and which tend to prolong the improper conception of the "library-museum," have been undergoing changes meant to humanize them and adapt them to new needs: this is the case at the municipal library of Colmar, installed in the former Dominican convent.

Many libraries have been relocated in more functional modern buildings. There are large libraries like those of Havre (see Figure 2), Chartres, and Lille, but also some modestly charming buildings like the libraries of Saint-Dié, Mantes-la-Jolie (see Figure 3), and Grasse.

FIGURE 3. *Bibliothèque municipale, Mantes-la-Jolie.*

The actions of the Direction des bibliothèques and of the inspectors general, assisted by the initiative of librarians who are more attentive then they were formerly to the new needs of a democratic society, tend to endow these establishments with a complete range of public services: study section, loan service, sections for children and adolescents, record section, and urban bookmobile. When the effort of local authorities supports that of the state, a fundamental condition for construction aid, the public library fully plays its role at the heart of the community.

The development of libraries in the Paris area poses complex problems. Let us note here two libraries of a new type, which can well serve as examples.

In November 1970 a library which truly portrays experimental formulas opened; it is the public library of Massy, located in a bedroom suburb of the Paris area (60,000 inhabitants of which 13,000 are children). Providing a complete range of services (adult, children, adolescent, recordings) and equipped with a highly automated lending system, it acts in addition as an information and probationary center for the École nationale supérieure des bibliothécaires to which it is administratively connected. A living library oriented toward cultural awareness and the service of youth, it is dedicated to the practical initiation of future librarians. Three months after it opened it counted about 4,000 registered borrowers of whom nearly 2,000 were children.

In Paris itself the problems of space and the difficulties of the old libraries in serving the public have hastened research to an interesting resolution. Paris lacked a large central public library which would decongest the Bibliothèque Nationale and offer current information to potential readers. The opportunity was presented in

the framework of the 5th Plan to utilize part of the space freed on the Beaubourg plateau by the transfer to Rungis of some of the markets (les Halles) of Paris (*23*). The new library will be open in 1975 from 10:00 A.M. to 10:00 P.M. and will have room for 1 million documents—books, periodicals, and various French and foreign works. Serving as a large reference library of encyclopedic scope, and as an information and orientation center, it will have a noncirculating collection which will be continually at the disposition of the public. It will also be a meeting center and should provide halls, a large exhibition room, and a conference room. Under study is the automation of a group of services by means of a time-sharing system.

As for the provincial libraries, at present they are trying to develop their activity, often with very mediocre resources. The old collections, the conservation of which in the past slowed the development of the large municipal "classées" libraries, now constitute an additional attraction. Certain particularly important libraries are in reality complexes of very varied services. This is the case at the municipal library of Lyon, which owns a wonderful old collection: manuscripts, incunabula, prints, and special holdings—documents on freemasonry and the occult sciences. It controls the Musée de l'Imprimerie, and under consideration is the construction of a new central library on 5,000 square meters of ground. The municipal library of the city of Bordeaux now includes four lending branches and three urban bookmobiles.

At present one can count some fifty urban bookmobiles in France. In other words the public library now goes to the reader in addition to drawing him in with specially developed live programs, for example at Saint-Dié. For several years exhibitions have been increasing, even in small libraries, and librarians often play an important role at the heart of the cultural community. A public library like that of Mulhouse can create a real city system, completed by bookmobile service.

It is significant to note the increase of questionnaires and inquiries planned to inform librarians of the progress of reading in large cities such as Lyon (*24*) or Paris (*25*). Public reading in the Paris area was recently the subject of a report done in March–April 1970 by the Public Reading Service of the Direction des bibliothèques on the occasion of the preparation of the 6th Plan for economic and social development (1971–1975) (*26*).

As was mentioned previously, the purpose of the creation of central lending libraries in 1945 was to provide book service to the rural population which had been treated poorly until then.

The demographic move to urbanization has altered considerably the composition of cities and villages, and therefore changed the conditions under which reader service is given.

By means of rural bookmobiles, central lending libraries serve the population of a département. More than half of the départements (fifty-two) are served currently, and the Direction des bibliothèques has established four new services per year. A considerable effort has been made, and the numbers are significant: twelve central lending libraries were financed from 1966 to 1968 at a sum of 6,450,000 francs.

At the beginning the central lending library arranged for the deposit of cases, and those responsible locally (most often the schoolmasters) handled direct loans to readers. This system still exists in several départements; in other places it has been replaced by open access to material on the shelves. The older techniques are becoming outdated quickly. If they are satisfactory in certain regions still untouched by urbanization, in other areas they need to be replaced by more efficient methods. Certain pilot experiences of direct loans to the reader are underway in the north (Pas de Calais) and in Alsace (Bas-Rhin). The service at Bas-Rhin uses four bookmobiles stationed at fixed points and reaches population groups that previously had little service (*27*). Recent statistics made a good case for these activities (*28*).

One day, however, it will be necessary to remedy a major fault of the system: the absence of a truly coordinated network connecting public reading libraries and research libraries.

Certain private efforts have been made to develop services for the purposes of groups little or poorly served by local libraries. Certain associations of a religious nature, for example, have developed their own networks. This is the case with the Action Catholique Féminine which established, beginning 1934, "libraries for all." At present there are about 18,000 libraries and 1,200 deposit stations.

The Centre laïque de lecture publique of the *Ligue française de l'enseignement* has organized circulating libraries—now numbering more than 4,000—that serve certain localities that have youth clubs or student houses. The organization publishes books reviews in *Lectures culturelles*.

Certain associations elsewhere have encouraged the development of libraries for the ill. Begun in 1959, "Reading in the Sanatorium" has exerted efficacious action. The invalid students in certain regions benefit from well-equipped libraries. The richest is that of the sanatarium of Saint-Hilaire du Touvet.

In cooperation with the Foundation santé des étudiants de France, the Direction des bibliothèques took charge in 1955 of a loan service attached to the University of Paris: the central university library for invalid students (Bibliothèque universitaire centrale des étudiants malades). Recently installed in new quarters, this service sends parcels of books to students hospitalized in fifty institutions. More than 28,000 works are stored on compact shelving (*29*).

The "Service Social à l'Hôpital" has been functioning for the public assistance hospitals of Paris since 1934. A service by book cart is provided in the older hospitals, and libraries have been established in newer hospitals.

Dedicated to the blind, the Valentin-Hauy has a good collection of books in Braille.

However, the underdevelopment of these services must be recognized. The extension of public libraries serving certain deprived sections by bookmobile should, bit by bit, contribute to the amelioration of this situation.

Company committees created in 1943 and representing several thousand workers are still in existence. These committees have established libraries for the benefit

of personnel. The holdings include literary, artistic, historical, scientific, and technical works for employee self-improvement and entertainment.

On the subject "Libraries on work premises," the study conference sponsored by UNESCO in 1961 allowed some interesting exchanges of views (*30*) on the formation and operation of these libraries and on the services they render to workers, including foreign workers, who are very numerous in France.

Company libraries are developing in a very unequal manner in terms of methods and local initiatives, and proportionally to the effort made by employers. Management is represented on the library committee in the same manner as the workers delegated by workers' committees. The development of these libraries is strongly encouraged by the "Association Travail et Culture." Some of them include very modern furnishings, provide open access, and adapt their hours to working conditions. Numbering 372, the libraries of the "Société nationale des chemins de fer français" are very useful. That of the Régie Renault à Boulogne-Billancourt counts among the most active.

The most preoccupying problem for these organizations is that of finding responsible people. In 1961 it was estimated that only 6% of all company libraries were managed by a qualified person.

One of the most regrettable shortages in the French structure involves the school library: libraries of the primary school, of the school "normale," and of the "lycée." Rarely settled in an adequate location (despite instructions that direct the regrouping of books scattered in classrooms), often put in the charge of people without professional qualifications, these libraries function, in fact, without coordination with those of the Direction des bibliothèques.

An effort is underway currently by the administration of the second degree to recruit documentalists and librarians, but there remains a great deal to do in order to organize the holdings. The new student who begins to use a university library often lacks any experience in a rationally conceived school library.

On the other hand, the development of children's sections in public libraries is proceeding well. The Heure Joyeuse of Paris was presented in 1924 by the Committee on Libraries for Children of New York and set an example. It is connected to the public library of the 5th arrondissement and has offered valuable works with free access to young readers of the Latin Quarter. A pilot experiment due to private initiative (Association de la Joie par les livres) has allowed the endowment in Clamart (located on the outskirts of Paris) of an originally designed building where modern methods are used. Like the library at Massy, which is mentioned later, the Clamart library is attached to the École nationale Supérieure des bibliothèques. At present, children's sections are multiplying in public libraries. The city of Tours, in its turn, has tried a school bookmobile, the services of which are very much appreciated.

Between 1960 and 1970, French university libraries entered a critical phase. If the Instructions of 1962 (*31*), distributed by the Direction des bibliothèques, have permitted them to better organize their resources in view of freer circulation,

if working conditions for students have been improved, if the professors and researchers have found better material put at their disposition, if there are some newly built buildings, if there are some specialists' sections with open access, nevertheless the majority of beginning students flooding the schools are far from finding sufficiently spacious working rooms or from finding quick reference works in sufficient number. This is an international problem, but it is felt with particular acuity in France.

The influx of students after the Liberation, the transformation in programs and teaching methods called for by the disputants in 1968, and the major changes in the structure of universities prescribed by the "loi d'orientation de l'enseignement supérieur" (*32*) led to genuine changes in university libraries which accompanied the development of the universities in Paris and in the provinces.

In 1945, in addition to the venerable Sorbonne which served the faculties of arts and sciences, and the nearby libraries of Medicine, Pharmacy, and Law, there were three establishments attached to the University of Paris. In 1930, in order to increase the facilities available to students, the St. Geneviève library was placed under the authority of the Paris Academy (academic region) while still remaining a public library. Two specialized libraries, the Library of International Contemporary Documentation and the Library of Art and Archeology, were also made part of this grouping. Two other libraries were then installed in the new science faculties of the Halle aux Vins and l'Orsay. The evolution that began after 1962 and was hastened by the events of May 1968 led to other creations. The increase of universities in the Parisian agglomeration (a total of thirteen) profoundly changed the basic principles and the vocation of libraries. The Sorbonne, with its richly venerable and prestigious academic collections (1,500,000 works, 12,500 current periodicals), remains an irreplaceable research collection in the area of human knowledge. But other literary libraries have appeared: at Nanterre, at the experimental Center of Vincennes, for example, while the university hospital centers (C.H.U.) have their own collections.

The same sort of change is occurring in the provinces. While in 1945 there were only sixteen university libraries (with an average of two sections each), open-access libraries have since been built at Reims and at Nice, for example. The national and university library of Strasbourg, which enjoys a special status because of its historic origin, is particularly important and remains a regional library of indisputable prestige. As for the most important provincial academic regions (Lyon, Aix-Marseille, Montpellier, Toulouse, Bordeaux), they include, like the Paris academic region, several universities which the existing libraries must serve.

The application of the Loi d'orientation de l'Enseignement supérieur to university libraries has led to a major change in their administrative structure. University libraries must have "common services." Their personnel are represented on a library council. The decree of December 23, 1970 (*33*), which defined their structure, distinguishes between "university libraries" and "interuniversity libraries." The latter are constituted of the areas where several universities exist, and they

must, of course, have especially good collections in order to serve a group of establishments. These new structures are not inaugurated without difficulty. The interuniversity libraries of Paris consist of groups of establishments, each one of which forms an administrative unit.

- Interuniversity and university libraries in Paris and its environs (provisional):
  - Interuniversity libraries A:
    - Bibliothèque de la Sorbonne
    - Bibliothèque de l'ancienne Faculté de droit
    - Bibliothèque Sainte Geneviève
    - Bibliothèque universitaire centrale des étudiants malades
  - Interuniversity libraries B:
    - Bibliothèque d'Art et d'Archéologie
    - Bibliothèque du Centre universitaire Censier
    - Bibliothèque du Centre universitaire Montgolfier
    - Bibliothèque du Centre universitaire du Grand Palais
    - Bibliothèque du Centre universitaire de Clignancourt
    - Bibliothèque du Centre universitaire d' Asnières
    - Bibliothèque de Documentation internationale contemporaine
  - Interuniversity libraries C:
    - Bibliothèque de l'ancienne Faculté de Medecine
    - Bibliothèque de la Faculté des science (Halles aux Vins-St. Bernard)
    - Bibliothèque de l'ancienne Faculté de Pharmacie
    - Bibliothèque des centres hospitaliers universitaires
  - Interuniversity libraries D:
    - Bibliothèque du Centre universitaire Saint-Denis
    - Bibliothèque du Centre universitaire de Villetaneuse
    - Bibliothèque du Centre universitaire de Saint-Maur
    - Bibliothèque du Centre universitaire de Créteil
    - Bibliothèque du Centre hospitalier universitaire de Créteil
  - Library of the University of Paris VIII (Vincennes)
  - Library of the University of Paris IX (Dauphine)
  - Library of the University of Paris X:
    - Bibliothèque de Nanterre
    - Bibliothèque du Centre universitaire de Clichy
  - Library of the University of Paris XI:
    - Bibliothèque de la Faculté des sciences d'Orsay
    - Bibliothèque du Centre universitaire de Sceaux
    - Bibliothèque de Chatenay-Malabry
    - Bibliothèque du Centre hospitalier universitaire de Kremlin-Bicêtre
  - Interuniversity annd university libraries in the provinces:
    - Interuniversity libraries:
      - Aix-en-Provence
      - Bordeaux
      - Grenoble
      - Lille
      - Lyon
      - Montpellier

Nancy
Toulouse

University libraries associated with schools in:
Aix-Marseille: Bibliothèque universitaire de St. Denis de la Réunion
Amiens: Bibliothèque universitaire d'Amiens
Besancon: Bibliothèque universitaire de Besançon
Bordeaux: Bibliothèque universitaire de Pau
Caen: Bibliothèque universitaire de Caen
Dijon: Bibliothèque universitaire de Dijon
Grenoble: Bibliothèque universitaire de Chambéry
Lille: Bibliothèque universitaire de Valenciennes
Limoges: Bibliothèque universitaire de Limoges
Lyon: Bibliothèque universitaire de Saint-Étienne
Nancy: Bibliothèques universitaires de Nancy et de Metz
Nantes: Bibliothèque universitaires de Nantes, d'Angers et du Mans
Nice: Bibliothèques universitaires de Nice et de Toulouse-Lagarde
Orléans: Bibliothèques universitaires d'Orléans et de Tours
Poitiers: Bibliothèque universitaire de Poitiers
Reims: Bibliothèque universitaire de Reims
Rennes: Bibliothèque universitaires de Rennes et de Brest
Rouen: Bibliothèque universitaire de Rouen

Library with a special status:
Bibliothèque nationale et universitaire de Strasbourg

The organizational difficulties are felt in the Paris area particularly, where universities are multiplying. In 1945 there were eight university libraries. They were the libraries corresponding to the faculties of letters, sciences, law, medicine, and pharmacy, the Sainte-Geneviève library, connected to the university as a whole, two specialized libraries of art and archaeology, and the Library of International Contemporary Documentation. The changes begun after 1962 and accelerated by the events of May 1968 have led to the creation of new libraries including those of the university medical centers, that of the faculty of Nanterre (see Figure 4), and that of the experimental center of Vincennes, for example. One can now count eleven universities in the Parisian agglomeration.

In the provinces, where in 1945 there were only six university libraries, each having two sections on the average, numerous activities have brought about modern libraries at new universities (Rouen, Amiens, Reims, Nice; see Figures 5 and 6), while in some older universities, such as Aix-Marseille, several scientific sections have appeared.

A strong financial effort has been necessary so that the operating budget rose in 1969 to 18 million francs for Paris, and items of equipment obtained in 1968 cost 6,255,275 F. But Paris has 200,000 students, and the budget is still insufficient.

The application of the "Loi d'orientation" (1968), which has changed markedly the administrative structure of universities (*32*), and the activities of thousands of professionals and of organizational committees have led to a change in libraries set up for "common services." The decree of December 23, 1970 (*33*) distin-

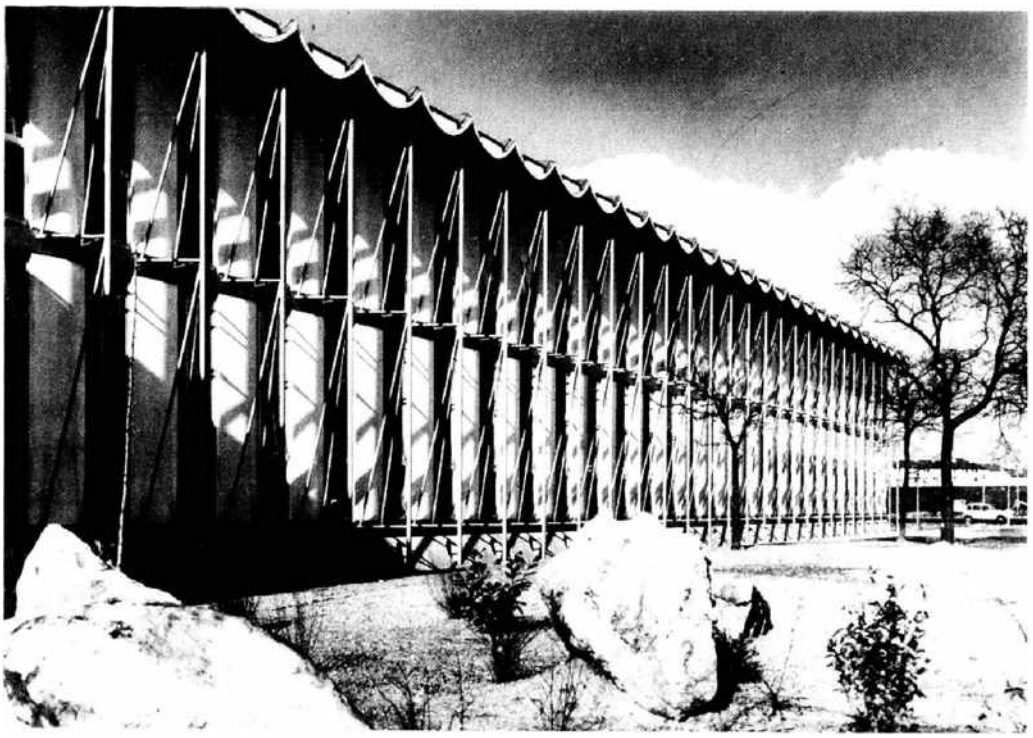


FIGURE 4. *Bibliothèque universitaire, Nanterre.*

guishes between "university" libraries and "interuniversity" libraries. The latter are established in agglomerations where there are several universities, and they must have especially strong collections in order to serve the group. They must have, in addition, a degree of autonomy in administration.

There is reason to hope that this change will improve the presently poor coordination and allow the university libraries to emerge from their isolation. It is true that for a long time they have helped each other successfully through an interlibrary loan circuit, but it is still imperfect because of the lack of union catalogs. They collaborate with other areas thanks to the University Exchange Service which functions at the Sorbonne Library and provides for national and international exchanges of theses. However, much remains to be done in order to create a real information network between French university libraries, and the absence of a real acquisitions policy on the national level is felt deeply.

Beginning in the nineteenth century, special libraries were developed in France as in other European countries. There existed and still exist rich special collections of which the resources are little known and poorly utilized. Sometimes a public library, accepting a gift or legacy of particular value, applies itself to developing it, especially if it coincides with local activity. It is thus that the municipal library of Limoges, located in an area specializing in the china industry, has collected a great deal of information on this subject and also specializes in the study of coral.

The Paris area has a large number of special libraries and information centers.

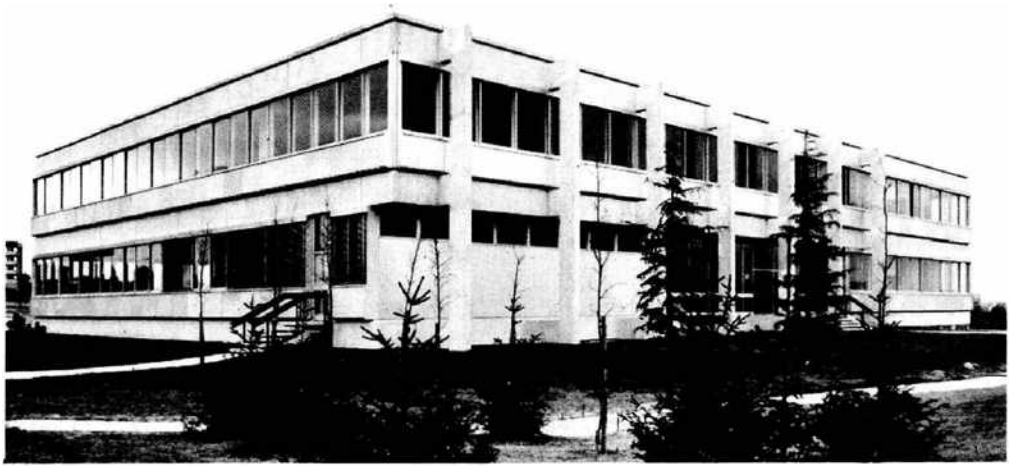


FIGURE 5. *Bibliothèque universitaire, Reims.*

Many institutions maintain libraries where old collections are conserved with care and kept up to date. This is true at the library of the Paris Observatory, at the National Museum of Natural History, whose vellums are well known, at the Collège of France, which has a unique collection of Egyptology and Assyriology, and at the Institute of France, which has been developing since the eighteenth century and currently contains 1,500,000 books and 22,000 periodicals. One can also cite the library of the Musée de l'homme, the ethnography and anthropology museum located in the Palace of Chaillot, which is freely open to researchers, providing open access to collections classified according to an adaptation of the Library of Congress classification.

A very new idea of a research library inspired the founders of the Maison des sciences de l'homme, installed in a very modern building on the Left Bank.

The city of Paris administers directly certain special libraries, such as the administrative library of the Préfecture de la Seine, the Forney Library, located in the charming Hôtel de Sens and dedicated principally to decorative arts and techniques, or the history library of the city of Paris, the holdings of which are indispensable for the historians of the capital.

The development, properly speaking within the scope of university libraries, of "institute libraries" that are not attached to the Direction des bibliothèques has increased, in France as in Germany, the number of sometimes very valuable collections entrusted to nonprofessionals. These specialized libraries, administered by the directors of the institutes, are often exclusively reserved for a limited group of university people and researchers. For example, l'Institut de musicologie, l'Institut des hautes études d'Amérique latine, and l'Institut Henri Poincaré have very important collections.

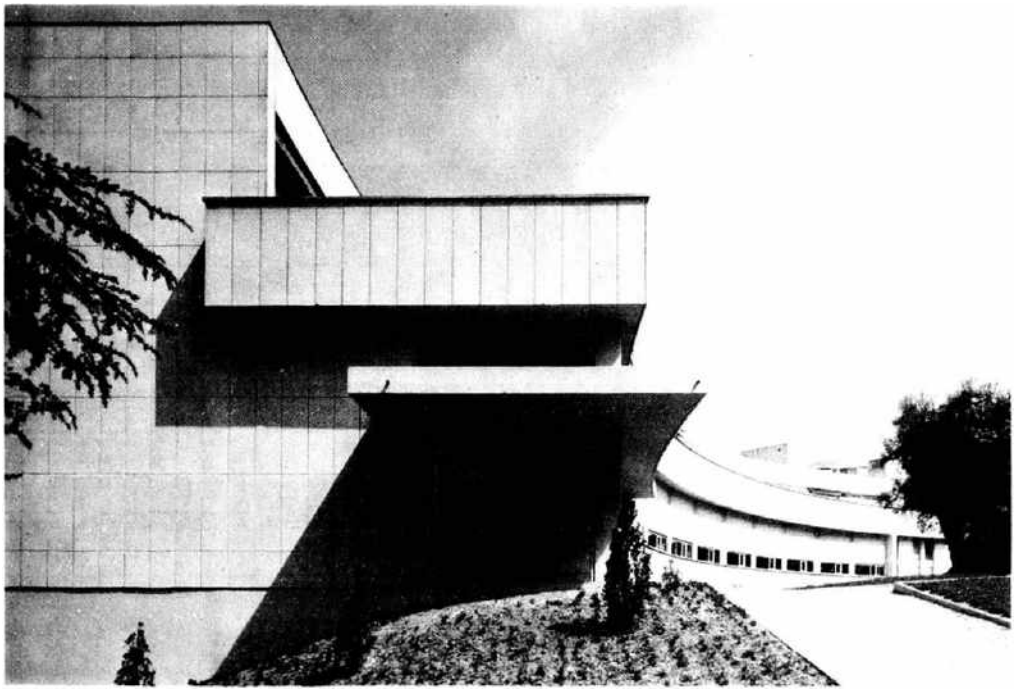


FIGURE 6. *Bibliothèque universitaire, Nice.*

Other institutes or public bodies, independent of universities, have important specialized libraries. They are connected to ministries such as the Institut national de la Statistique et des Etudes économiques (INSEE) or the Service de documentation du Commissariat à l'Energie atomique of Saclay, or to large schools such as l'Ecole des mines or l'Ecole polytechnique. Separate mention must be made of the Centre de documentation national de la recherce scientifique, which is directly connected to the Ministry of National Education.

As is also true in Germany, but at a reduced level, France has witnessed the organization of industrial libraries and the increase of information centers indifferent to traditional library science methods and less concerned with the conservation of documents than with their utilization. This movement is continuing currently, leading to a proliferation of organizations of which some have acquired a fully justified fame for their efficiency. In this area, one can cite the Institut de pétrole de Rueil-Malmaison, the Centre de documentation sidérurgique de Paris, and Rhône-Paulenc à Saint-Fons.

The national library is actually at the head of a group of establishments which constitute the Réunion des bibliothèques nationales. The composition of this group has varied over the course of the twentieth century. The Réunion includes (with the library l'Arsenal which constitutes one department) the library of the Opera and the Conservatory (attached to the Music Department), the national Phonothèque, which receives sound recordings through legal deposit, and the Fondation Smith-Lesouêf at Fontainebleau. Special attention must be paid to the library of

l'Arsenal, former library of the Marquis de Paulmy d'Argenson, and enriched, at the time of the Revolution, by confiscated collections. It possesses no less than 1,500,000 volumes and 15,000 manuscripts, including 200 miniatures. Its literary collection is particularly rich and forms a center of theatrical documentation greatly valued by researchers.

The role of the Bibliothèque Nationale is vital to library development in France. The establishment of a national network is tightly tied to the efficient functioning of a national library, whose coordinating role can not be underestimated in any country.

France is no exception to this rule. After having been royal and imperial, this library which became "national" finds itself at the center of an information system that is developing despite difficulties. It is, in fact, an essential wheel in the French structure.

Officially designated under the title Réunion des bibliothèques nationales, directed by an administrator (currently Etienne Dennery), assisted by a council of administration (*34*), it actually includes in addition to the traditional departments (books, prints, manuscripts, coins, music) some outside libraries: the venerable Bibliothèque de l'Arsenal, rich in old holdings, and two special libraries connected to the Département de la musique—the library of the conservatory and that of the opera.

The insufficiency of the premises it occupies has forced the Bibliothèque Nationale to deposit some of its collection of infrequently used periodicals in an annex at Versailles. It has managed as well as possible over the course of successive changes (*35*) to meet its obligations in the face of an increasing influx of readers. To illustrate: in 1953, 189,183 readers and 689,270 letters were counted; in 1969, 380,000 readers and 1,700,000 letters. Ultimately the library at Halles should siphon off a part of these users who could be content with a well-equipped public library.

Using a large budget, aided considerably by a large subsidy from the Direction des bibliothèques (8,492,810 francs in 1969), the Bibliothèque Nationale can supplement the material brought in by legal deposit and received in the acquisitions department with quality foreign acquisitions.

Its information resources are considerable: about 6 million printed books; 18,000 French periodicals; 5,500 current foreign periodicals; 150,000 volumes of manuscripts; 800,000 maps and charts; 6 million prints, placards, engravings, and photographs; and 400,000 coins kept in the Cabinet des médailles, the old royal collection. The catalogs, particularly the old general catalog of printed works and the new quinquennial catalog, play the role of a retrospective national bibliography.

A national library, whatever its size, can serve only a limited public. What counts most is its role at the center of a network. National services operating for the whole country have long been connected with the Bibliothèque Nationale. Traditional legal deposit (*36*), the basis for the official part of the "Bibliographie de la France," requires the publishers of current publications to deposit four copies of

every publication, the printer being required to deposit two copies (one of which goes to the Bibliothèque Nationale). Part of the material received is divided among the big Parisian libraries. Aural productions are deposited at the national "Phonothèque."

Attached to the national library, the ministerial International Exchange Service collects, for the group of participating libraries, the receipts of exchanges from abroad. Finally, the central loan service of prints and manuscripts (*37*) is also administered by the Bibliothèque Nationale, which loans its own duplicates and, within the limits of the information methods at its disposal, directs loans between municipal libraries and controls loans of precious documents to foreign countries through diplomatic channels.

Aside from those services which have functioned for many years, recent efforts have been made by the Direction des bibliothèques to promote further knowledge of the resources which exist currently when the means of information are insufficient. Among these postwar undertakings, we should note the union catalog of foreign works, set up on cards beginning in 1952, for works published outside of France. This organization, attached to the Bibliothèque Nationale, has gathered more than 1½ million cards from 550 public and private institutions. This service permits the direction of loan requests, especially for university and research libraries.

Another equally useful tool provides information on periodicals, the Inventaire permanent des périodiques étrangers en cours. The fourth edition lists about 43,000 foreign titles, with a code indicating which libraries have each journal, from which one can judge the possibility of making a loan request, at least for issues of recently acquired foreign periodicals, since the length of a library's run does not show in this list.

Certainly the marked improvements in recent years are encouraging, but they seem to have been accomplished at a very slow pace, and France even more than other countries is still waiting for definite progress in new techniques.

In this area the MARC project has evoked avid interest. The university libraries are most interested, especially the new scientific sections which thus far have only a limited number of documents and can try electronic experiments. Besides, they can count on the aid of the university for machines and research. One project, inspired by the MARC project and called MONOCLE, is in the experimental stage in the Science Section at the University of Grenoble (*38*).

Another effort is being tried at the library at Luminy, not far from Marseille, a library which was originally scientific but which now is multidisciplinary. Breaking with tradition, this library has taken to automation. Renouncing traditional catalogs, it publishes a machine-produced author-subject catalog. It is the first step in a movement which will grow, little by little, in other university libraries (*39*).

The special libraries and information centers are also very concerned with new techniques (*40*). Since 1966 the Institut français du pétrole, for example, has used automatic printing for its lists and indexes (*41*). An experiment with telecataloging has given the library of the École des mines excellent results (*42*).

If the introduction of automation is effected easily enough in new libraries or information centers devoted primarily to current materials, it runs into certain difficulties when it is a matter of establishments whose mission is to conserve a huge collection of documents.

In this area the Bibliothèque Nationale must resolve some problems which have been under study for several years. A study group is trying to prepare a program suitable for the "Bibliographie de la France." For one of the services attached to it, the Inventaire permanent des périodiques étrangers en cours, a solution has been found and used since the fourth edition of this list, which henceforth can be updated automatically by addition and deletion of entries (*43*).

If the first attempts at automation have been applied to the documentation of the exact sciences, which enjoy an obvious priority, their extension to the social sciences cannot be delayed much longer, and treatment of the old collections in French libraries can be considerably hastened and improved by the use of new techniques. Therefore, in cooperation with the Institut de recherche et d'étude de textes, an ambitious project is underway. It is a census of old books in French libraries, a survey of more than 10 million bibliographic units prior to 1800. Mechanical studies are being undertaken in order to realize the retrieval of information by means of the elaboration of cataloging information; to find a system of identification of duplicate copies; and to establish a method of classification, indexing, and topical research (*44*).

A particularly active French group, the Groupe informatiste des bibliothèques universitaires et spécialisées (G.I.B.U.S.), currently is studying computer applications with the collaboration of directly interested libraries, in particular the library of the École nationale supérieure des mines, the Halles library, the municipal library of Lyon, the Centre de documentation sur les sciences humaines of the Centre national de récherche scientifique, the Récherché coopérative sur programme 207 of the Centre nationale de la récherche scientifique (cataloging of old books), the university library of Luminy, the science library of the University of Grenoble, and the Service de documentation of the Fondation nationale des sciences politiques.

The initiation of new techniques obviously requires standardized methods. In this area France can claim definite progress. For many years the Direction des bibliothèques has worked in cooperation with the Association française de normalisation which is associated with the work of the International Standards Organization, and if older French standards already need revision, for example regarding cataloging procedure applicable to automation, it is believed that the necessary accomplishment will be hastened by the willing cooperation of thousands of professionals.

The rapid technical progress that is changing information methods involves major revisions in the instruction of librarians and documentalists, and in the same manner, the "recycling" of personnel on the job. This problem is also of current primary concern to thousands of librarians.

In the nineteenth century the problems of professional training were neglected. Very often the French were content to let libraries be managed by scholarly book-lovers who had not received any professional training.

In France as in other countries it became necessary, over time, to recognize that one can not improvise oneself into being a librarian, and that this profession, which requires rigorous techniques, also requires simultaneous instruction in practice and theory.

At the beginning of the twentieth century some very sketchy lessons were arranged for the staff of certain libraries. But the personnel, represented by the Association des bibliothècaires français, struggled to obtain at the same time an organization of professional staff (*45*).

In 1932 a school was begun, attached to the École nationale des Chartes, approving graduates with a technical diploma of librarianship. Its program was meager and, as the diploma indicates, emphasized the acquisition of professional techniques. Open to the students of the École Nationale des Chartes or to holders of a certificate of licence (bachelor's degree, more or less), the course included a compulsory practice phase.

One of the important tasks of the then young Direction des bibliothèques involved the organization of the profession. In the application of the "statut du fonctionnaire," several laws pertaining to library personnel were enacted: in 1952 the statute concerning scientific personnel (librarians), which was recently revised, was passed (*46*); the statute regarding technical personnel (subprofessionals) had been in effect since 1950 (*47*). This necessitated a re-evaluation of the qualifications of personnel.

In 1950 the Diplôme supérieur de bibliothécaire was created, which included an expansion of former programs. Bibliography and classification were emphasized. After 1952, in line with the law that had been passed, the holders of the "Diplôme" in order to become librarians in the libraries dependent on the Direction des bibliothèques had to pass a competitive examination. For the paleographic archivists, a special course was organized. This parallel recruitment is in effect up to the present time.

These actions satisfied the wishes of personnel in the sense that they opened to librarians of the state the possibility of moving from one type of library to another. For example, the head of a university library could move to a "classée" municipal library or vice versa. This led to a group of workers, still quite small, who could receive the same training and benefit from identical working conditions and salaries, a positive advantage to which French librarians still are very much attached.

However, recruiting remained insufficient and the programs were unsatisfactory with regard to the development of professional techniques. The idea of a school gained ground, and the efforts of the Direction culminated in 1963 in the creation of an École nationale supérieure de bibliothécaires (later becoming the École nationale supérieure des bibliothèques, E.N.S.B.) (*48*) which opened the fol-

lowing year (*49*). Unfortunately the 2-year course of study anticipated at the beginning could not be put into practice (*50*). The result of this is that the École today can provide only a general course in 1 year, completed, however, by options and stages of specialization that guide candidates toward particular types of libraries (*51*). Recruiting of heads of state libraries is henceforth assured; the young licentiates who contract to serve 10 years in a library connected to the Direction des bibliothèques and who successfully pass the entrance examination of the École receive a stipend and later are directed to the large libraries, such as the Bibliothèque Nationale, university libraries, municipal "classées," or central lending libraries. Other candidates, French or foreign, for the higher diploma of librarian can also pursue the course of study with the rank of student-associate, and at the end of the year receive the "Diplôme" and then find posts in public or private libraries.

The École has also organized the formation of a new lower level of librarians, open to holders of a baccalaureate degree and certified by the "Certificat d'aptitude" to the functions of a librarian. These librarians are earmarked for particular institutions ("nonclassées" municipal libraries, Institute libraries, school libraries, etc.). Finally, the École also assures the preparation of state sublibrarians.

A reform project of the École nationale supérieure des bibliothécaires currently under study recommends a 2-year course, the organization of probationary stages, and the granting, in 1 year, of a "mastery of library science," and in 2 years, of a "diploma of thorough study." Thus the theoretical and scientific preparation of heads of large libraries could be assured under favorable conditions.

Elsewhere, other forms of preparation exist. The Institut national des techniques de la documentation, attached to the Conservatoire national des arts et métiers, prepares in 2 years professional documentalists certified by a state diploma, called upon to serve chiefly in the private sector.

The École de bibliothécaires et de documentalists of the Institut catholique de Paris grants a private diploma and provides an appreciable number of people. Finally, the Association des bibliothécaires français controls an accelerated program granting a practical diploma.

Despite the accomplishments of recent years, librarians in France as abroad have much to do in order to realize many of the projects now underway.

On the other hand, one can reproach them for having lived slightly isolated lives. A large outward move is desirable by currently working personnel as well as by the students of library science and documentation, and the new spirit appearing in the reform projects is in this respect a good sign. There is room to hope that at the heart of the cities and university campuses the young librarian will be put in a position to exercise fully his professional and civic responsibilities.

The preparation of the 6th Quinquennial Plan currently has given rise to great hopes in the library world. A wide-ranging financial effort should permit the realization of anticipated goals, particularly the modernization of buildings and augmentation of operating budgets and staff salaries. The number of "classées" munic-

ipal libraries should be increased from fifty to 125. The development of common services and the introduction of a national acquisitions policy should allow the establishment of a coordinated network which currently is only in the embryo stage.

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FRANCE, LIBRARY AND INFORMATION SCIENCE, CURRENT ISSUES IN

Reappraisal of the Past

During the last ten years some research activity in France has been directed toward a reappraisal of the history of libraries and related subjects, using archival material and the methods of the new historical school of the "Annales."

Roughly speaking, it can be said that French librarianship was probably the most progressive of any during three different periods. The first one was what Maurice de Gandillac (*1*) called the "Renaissance of the 12th century." Then, after this period of progress, there was a regression, during which the leadership passed to Italy and Spain. It is well known that the first public libraries in Europe in modern times were established in the northern part of Italy, much earlier than in France. Indeed, France was behind Germany, the Netherlands, and Spain during the fourteenth, fifteenth, and sixteenth centuries in its efforts to establish new libraries.

The second period of progress began with the activities of Gabriel Naudé. When the Mazarin Library was opened in 1643 it was probably the most important and most valuable collection of books in the Western world. Later on, the Royal Library was developed under the able direction of excellent librarians like Abbé Bignon, and from the last quarter of the seventeenth century up to the 1780s took the leadership. It was in the same period that the so-called "système des libraires de Paris" took shape. This standardized classification, evolved by successive generations of librarians and booksellers, was recognized as a standard system, not only in Europe but in America as well. The story of the progress made at that time in the field of cataloging and classification has not yet been written, but much material is available in Gabriel Ledos' book on *The History of the Catalogs of the Bibliothèque nationale* (at that time Bibliothèque royale) (*2*), and the big volumes of the eighteenth-century catalog of the Bibliothèque royale remain as a testimony to the work of its great librarians.

The turmoil of the Revolution did not destroy the organization which had evolved in the decades before 1789, but accomplished, or tried to accomplish, the dreams of the most progressive librarians and "amateurs de livres" of the Ancien Régime. A remarkable plan for a comprehensive library network and what could be called a national system were put before the legislative assembly by no lesser a figure of the revolutionary period than the Bishop de Talleyrand. The report which Talleyrand presented (*3*) is probably the first attempt to delineate a comprehensive information policy in modern times, and indeed it certainly did not remain a dead letter, as there was a tremendous effort made to realize this plan in fact. Even now, the fully documented history of what Hélène Dufresne has called the "national book policy" of the great revolution has not been subjected to truly scientific re-

search. That policy, during more than 150 years, has been deprecated as mere utopianism, or even worse, as revolutionary vandalism. This is not true. The vandals were not the revolutionary leaders and the librarians who, in very difficult conditions, tried to seize the opportunity which was offered by the "confiscations" of the biens du clergé and of the émigrés for building up new public libraries, open not only to the elite of scholars, but to the common people; and for strengthening the existing system of scholarly libraries like the Bibliothèque nationale and the libraries attached to higher education institutions. The book by Artz (*4*) has shown that at the end of the seventeenth century the French system of technical education was probably the most progressive in Europe and that these schools of higher learning like the Ecole des ponts et chaussées, had very good libraries for the time.

The first period of the Révolution française, up to the 18th Brumaire, saw the creation of numerous new libraries which are even now among the most important in France.

The collections of the Marquis de Paulmy, who tried with all the money he had (and he had a lot) to collect *all* the books ever published, formed the nucleus of the new Bibliothèque de l'Arsenal. The various "dépôts littéraires" were used for forming the new collections of the Ecole polytechnique, the Conseil d'Etat, etc. Moreover, the first national cataloging code was published (*5*) and a very serious attempt was made to create a National Union Catalog on quite modern lines.

Finally, a whole system of libraries open to the public was established in the "Ecoles centrales."

Unfortunately, the advent of Napoleon Bonaparte brought about a reaction which had already begun after the fall of Robespierre (19th Thermidor). The libraries of the "Ecoles centrales" were, in fact, abandoned by the state to municipalities which had neither the means nor the will to convert them into real public libraries. The interesting attempts for devising new classification systems were forgotten and the old system, with theology at the head of the five main classes, was revised by Brunet.

It was after Bonaparte signed the momentous decree leaving the libraries of the Ecoles centrales to the good will of the towns that the most deplorable dilapidations of public property were committed by ignorant or greedy pseudo-librarians. Incidentally, it is also during the same period (and after) that the historical monuments—churches, abbeys, etc.—suffered the most.

Another feature which has to be noted, and with which the French revolutionary period is credited, is the first "library school" in Europe and probably the world. A circular from the Minister of the Interior, François de Neufchateau, dated 20th Brumaire an VII (November 10, 1798), asked that the librarians of the Ecoles Centrales establish a course in bibliography. This circular was received with enthusiasm by Abbé Laire, who was at that time "bibliothécaire général du département de l'Yonne" (general librarian of the Yonne district), who opened the first class on April 20, 1799. His teaching continued until his death on March 27, 1801. Courses of the same type were probably given in other towns but, with research in the

archives incomplete, we do not know who the other teachers were. It is at least quite probable that Achard gave such a course in Marseilles, the results of which were published in his *Cours de bibliographie*. These first attempts at professional education in librarianship were coupled with the training of users, as the courses were opened to the students of the Ecoles centrales as well as to other persons interested in bibliography and librarianship. The founding of the Ecole des Chartes in 1821 is to be viewed as a consequence of this first initiative.

After the "Trois glorieuses" (the revolution that dethroned Charles IX and put the Roi Bourgeois Louis Philippe in his place), France enjoyed what has been called by some historians its "été de la Saint Martin" (Indian summer), the last period when science and technology were ahead of those of other countries. This was also a good period for French libraries, but the efforts of the ministers of public education were mostly directed toward exploiting the treasures stored after the revolutionary confiscations and putting them at the disposal of historians. These ministers were themselves historians.

A rather hot controversy raged on the problem of the reorganization of the Bibliothèque nationale and its catalogs. There were also attempts to devise new classification systems, and two of these, Albert's and Merlin's, are especially interesting as they were among the most progressive schemes evolved in Europe during the century. The system of Merlin was explained by its author in a report he submitted to the New York Convention of Librarians in 1853, and it was applied during 2 years to the "Table Systématique" of the "Bibliographie de la France."

There were also some quite interesting library buildings constructed during the period—especially that of the Bibliothèque Sainte-Geneviève in Paris, which was the first iron structured library and a model for the renowned reading room at the British Museum.

The Second Empire of Napoleon III expanded the Bibliothèque nationale, for which a new reading room was constructed in 1864–1868, and at which the work for completing the printed classified catalogs, begun in the eighteenth century, was pursued with the publication of two big catalogs—one for French history and one for medicine—which are still useful today.

The Third Republic was less profitable for French libraries. The action of the "Chartiste" Léopold Delisle at the Bibliothèque nationale has been diversely judged. The strong criticism put against his initiatives by Eugène Morel (6) appear as probably quite justified. A progressive minister of education, Louis Liard, took several measures for developing the French university libraries on the model of the German universities, and courses of bibliography were opened at the Ecole des Chartes. There was also a notable initiative in the creation of the Musée pédagogique in 1876, which was to serve as a center for developing school libraries which were supposed to serve the adult public as well as children. Some circulating libraries were also organized. This movement has been praised by Pellisson (7) but, generally speaking, the French public libraries lagged far behind those of the Anglo-Saxon, Germanic, and Scandinavian countries until their revival under

the influence of a few progressive librarians like Ernest Coyecque and Eugène Morel, whose book *La librairie publique* (*8*) marked the turning point in French librarianship, and who organized courses of bibliography and librarianship at the Ecole des hautes études sociales a few years before World War I.

The American influence was quite important after 1919, and the first true library school (Ecole de bibliothécaires) was created under the auspices of ALA in 1925. Unfortunately this school closed during the Great Depression, but it trained a number of librarians inspired by the democratic ideology of American librarianship.

The first county library was organized, also on the American model, at Soissons in the Aisne department. One of the alumni of the Ecole de bibliothecaires, Yvonne Oddon, reorganized the library of the Musée de l'Homme, introducing open stacks and applying the Library of Congress classification. Another alumnus of the same school, Georgette de Grolier, modernized the municipal library of Boulogne-Billancourt (a popular suburb of Paris), in 1933 founded the *Revue du Livre* which propagated the ideas of modern librarianship up to the first months of World War II, and served as secretary-general of the newly organized Association pour le développement de la lecture publique (ADLP) (1936). The socialist government which resulted from the "Front populaire" aided the ADLP with small grants and helped it in the creation of a second county library with a bookmobile in the département de la Marne. Special libraries were also developing, notably in the fields of chemistry and technology. Jean Gérard organized the library and documentation center of the Maison de la Chimie, which he conceived of as a center for an international information network in the field of chemistry, and in 1932 he founded the UFOD (Union française des organismes de documentation) which had only institutional members: documentation centers—which we would call information analysis centers today—and some libraries having information services. In 1937 he convened the Congrès mondial de la documentation universelle, the proceedings of which are still interesting today. He propagandized the idea of microfilming and micropublishing, and the Maison de la Chimie developed, on his initiative, a model microcard. The ADLP organized three symposia—regional libraries, psychology and sociology of reading, and training of librarians and documentalists, the latter in collaboration with the UFOD. Also, with the cooperation of UFOD, there was organized in 1939 a "Cycle de conférences sur la documentation et la lecture publique," during which the first courses in documentation in France were given (and also courses on psychology and sociology of reading). The year 1939 was marked by the creation of the documentation center at the National Center for Scientific Research (Centre national de la recherche scientifique, CNRS).

The military collapse of the French armies in 1940 served in a certain way as a shock treatment. French industrialists were made conscious of the fact that industrial research in their country was lagging behind that of the other developed countries. With a quarter of a century's delay, relative to Britain, research associa-

tions were organized during the 1940s and developed new documentation and information analysis centers. At the Liberation the law creating these research associations was validated and the Gouvernement provisoire created a number of other industrial research centers, which were later grouped in the Association nationale de la recherche technique (ANRT). ANRT soon organized a committee for documentation and information services, and was influential in developing new techniques for information work.

In 1945 UFOD organized technical courses for documentalists, which 5 years later were given official status with the creation of the INTD (Institut national de techniques de la documentation) at the Conservatoire national des arts et métiers. The INTD introduced a graduate course in 1970. After a short-lived attempt at creating a "licence de documentation," seven provincial universities organized documentation courses in the newly created Instituts universitaires de technologie (University Institutes of Technology). During the last decade four new associations have been formed in the field of library and documentation: the ADBS (Association des documentalistes et bibliothécaires spécialisés) in 1962; the Association des bibliothécaires municipuax; the Association pour le développement des bibliothéques publiques; and the Comité des sciences de l'information et de la communication (1972).

Present Development of French Librarianship

Statistical material for evaluating the development of French libraries is rather scarce. It was only quite recently that statistics were made available by the Direction des bibliothèques et de la lecture publique for municipal libraries (*9*). This scarcity of statistical material is in itself probably a proof of the under-development of French librarianship, despite the fact that France was, at the beginning of the nineteenth century, one of the first countries to publish library statistics (*10*).

The relative development of French public libraries can be evaluated by comparison with some other countries for which comparative figures have been compiled by UNESCO (*11*). It appears that there is still a considerable gap between France and the most developed country in this respect (see Tables 1–4) (*12*).

School libraries are less developed than public libraries. At the elementary school level they are almost nonexistent. At the high school level ("lycées") a recent document (*13*) gives a rather sad picture of their present status, despite the progress which has been made, especially since 1968.

University libraries are in a better position and really important efforts have been made to modernize and strengthen them. But the most developed sector is that of specialized libraries and information centers, some of which have taken a role as international centers (like those for textiles and welding) and/or are active members of international networks, like the French Petroleum Institute (Institut français du pétrole) and the ELDO–ESRO Documentation Center. The situation

TABLE 1

Number of Public Library Loans per Year per Unit of Population

Western countries		Eastern countries	
United Kingdom	11.6	USSR	20.0 (?)
Denmark	9.1	Belorussia	17.0 (?)
Finland	6.3	Ukraine	7.2
Sweden	6.1	Hungary	5.3
United States	4.2	Bulgaria	4.8
Canada	4.0	Poland	3.6
Netherlands	3.0	Czechoslovakia	3.3
Norway	2.6	Romania	2.1
Federal Republic of Germany	1.8	Yugoslavia	1.0
France	0.6[a]		
Spain	0.5		

[a]Without the loans of the "bibliothèques centrales de prêt" (county libraries) which, in fact, have a majority of pupils in their readership and serve, more or less, as substitutes for (nonexistant) primary school libraries. The most recent statistics of the B.C.P. [*Bull. bibl. France*, 17(7), 322–323 (July 1972) give 706,189 direct loans "to adults and young people" for metropolitan France. Adding this figure yields about 0.7 loans per year per unit of population.

is not healthy because it results in an "inverted pyramid" of French documentation. Table 5 gives some information on the distortion of the normal distribution of librarians among the various types of libraries. The relative under-development of what could be called the "public consumption" of books and other documents through reading in the public libraries and other state-supported libraries is indeed partly compensated for by the relatively favorable level of private consumption of books and periodicals. However, even in this respect France lags behind the Scandinavian countries as seen by the figures given in Table 6 (*14*).

TABLE 2

Public Library Expenditures (in FF)/per Year per Unit of Population

Denmark	45.69
Sweden	21.84
United States	17.35
United Kingdom	13.89
Canada	10.15
Norway	6.91
Federal Republic of Germany	6.08
France	2.26

TABLE 3

Percentage of the Expenditures of Public Libraries (per Year per Unit of Population) versus the National Income*

Western countries		Eastern countries	
Denmark	4.41	Hungary	1.25
Finland	2.13	USSR	1.18
Sweden	1.44	Poland	0.86
Netherlands	0.85	Yugoslavia	0.66
Norway	0.71	Czechoslovakia	0.50
United Kingdom	0.71		
Federal Republic of Germany	0.55		
Austria	0.32		
France	0.24		

*For the Eastern countries, against the gross national product ("mass of *material* wealth").

Signs of Renewal

The presence of good information analysis centers for specialized scientists and technicians does not compensate for the absence of a strong network of school and public libraries, the under-development of which is creating many difficulties for the special libraries themselves, as their public is (as a result) not trained in

TABLE 4

Number of Volumes per Unit of Population in Public Libraries

Western countries		Eastern countries	
Iceland	3.4	Ukraine	4.6
Denmark	3.3	Bulgaria	3.4
Sweden	2.8	Romania	2.1
Norway	2.0	Czechoslovakia	2.0
Belgium	1.5	Democratic Republic of Germany	1.5
United Kingdom	1.4	Poland	1.5
Ireland	1.1	Hungary	1.4
Switzerland	1.1	Yugoslavia	0.6
Canada	1.0	USSR	0.5
Federal Republic of Germany	0.8	Albania	0.2
Italy	0.8		
France	0.7		
Netherlands	0.6		
Portugal	0.6		
Spain	0.1		
Greece	0.1		

TABLE 5

Approximate Number of Professional Librarians and Information Scientists in France

Type of library	Number of professional librarians and information scientists		Ratio (1)/(2)
	(1) At present	(2) "Desirable" target	
School libraries (secondary)	1,200	23,000	1/20
Public libraries	810	8,300	1/10
University libraries	900	6,000	1/7
Special libraries and information analysis centers	1,000 (?)	5,000	1/5

the use of information sources and reference materials. In addition, such a situation is undemocratic and does not conform with the ideals proclaimed by the French government and French society, as only a small elite is adequately served by good libraries, the great majority of the population remaining with unsatisfactory services. However, there are some signs that the dangers involved in the present situation are being noticed by a growing number of professional librarians, educators, and by numerous representatives of the political and economic elites. The fact that libraries and documentation services have for the first time found a special place in the documents concerning the preparation of the Sixth Plan is one of these symptoms.

The elements of a national policy for libraries and information services are slowly emerging. In the early 1960s a committee for scientific and technical informa-

TABLE 6

Private Consumption of Books and Periodicals: Expenditures per Year and Population (in FF)

Date	Country	Books	Periodicals	Total
1966	Denmark	108	163	271
1966	Sweden	47	127	174
1969	Norway	52	85	137
1968	France	42	94	136
1969	West Germany	51	66	117
1969	United Kingdom	16	78	94
1969	Belgium	—	—	62
1966	Finland	18	32	50
1968	Spain	—	—	5

tion was formed under the chairmanship of Prof. Boutry, but its final report was somewhat disappointing and did not at that time result in major innovations.

A prize of FF 10.000 was offered anonymously by a donor through the Centre national de la recherche scientifique. Three essays were awarded prizes and subsequently published under the title of *The Organization of Scientific and Technical Information in France* (*15*) and to the prize essays was added a report by an ad hoc association, Association nationale pour l'étude de la documentation automatique (ANEDA), formed to study the possibilities of automation in libraries and information services, but again no concrete measures resulted. The Délégation générale à la recherche scientifique et technique supported, however, certain projects, especially those directed by Jean-Claude Gardin, which were very interesting and even achieved international recognition, but which were probably too advanced and too theoretical to be converted into practical applications.

A second committee for studying the questions relating to scientific and technical information was formed in 1969, and its deliberations resulted in a proposal for the creation of a Bureau national de l'information scientifique et technique—somewhat similar to the Office of Scientific and Technical Information of the National Science Foundation—which, however, is not yet officially established and probably will not be functioning before 1973. In the meantime an Institute for Research in Computer Science and Automation (IRIA, Institut de recherche d'informatique et d'automatique) was formed. It did some research in the application of computer science in the field of scientific and technical information.

There are two fields in which recent developments have been rather interesting: law and medicine. In law there have been half a dozen or so research centers in Paris, Montpellier, and Lyon which have investigated the possibilities of applying automation to law. In the field of medicine a French center cooperating with the MEDLARS system has been created at the INSERM (Institut National de la santé et de la recherche médicale) and has been operational for 3 years. Rather sophisticated medical information systems have been established, or are being established, at the Institut du cancer in Villejuif, in various public hospitals in Paris, and in a few provincial towns.

SDI services are rapidly expanding, one of the first of them having been established at the IBM Research Center in La Gaude on the Côte d'Azur in 1965. Other SDIs were operational in 1966 at the CSF (a firm in the telecommunication and electronic fields) at the Cedocar for defense documentation, and at the Centre national d'étude des télécommunications (CNET, National Center for Research on Telecommunications) in 1969.

Much attention is being paid to the development of data banks. Experiments in this field have been made in the areas of thermochemistry in Grenoble, enzymology at INSERM, and economic data at INSEE (Institut national de la statistique et des études économiques; National Institute for Statistics and Economic Studies). An operational data bank exists for urban studies at APUR (Atelier parisien d'urbanisme; Parisian Office for Urban Studies). Another one was in operation

at the Datar (Délégation à l'aménagement du territoire et à l'action régionale; General Delegation for Regional Development), but the experiment was stopped in 1972.

The use of computers for the treatment of linguistic, and specifically lexicological data as well as of historical and archeological data has been rapidly expanding during the past few years. One of the pioneering institutions in these applications of computer science and information science to the humanities was the Centre d'études lexicologiques at Besançon. Another much more extensive application is in progress at the Trésor de la langue française in Nancy. Interesting experiments are also being conducted at the Institut de recherche et d'histoire des textes (IRHT) on medieval documents and at the Inventaire national des monuments historiques (National survey of archeological monuments), the last one being directed by Jean-Claude Gardin.

The problem of library and information networks has drawn much attention during recent years. French institutions as partners in international information networks were mentioned above. The Commissariat à l'énergie atomique (CEA, Commissariat for Atomic Energy) has been involved recently in cooperative ventures with the United States Atomic Energy Commission, EURATOM, and the International Agency for Atomic Research in Vienna (Austria). A national information network for archaeology is being implemented; another one is planned for economics (with a pilot project already operational in the subfield of economy of energy).

Automation in libraries, properly speaking, is less advanced; but a Bureau for Automation in Libraries has been formed (BAB, Bureau pour l'automatisation des bibliothèques), and some new experiments are planned in various places.

A computerized information service for the new Bibliothèque des Halles (a million volume public library which is to open in 1975) is envisaged, but curiously enough, using UDC; this decision is somewhat open to discussion. The ONISEP (Office national d'information sur les enseignements et les professions; National Office for Information on Teaching Institutions and Professions) is organizing an on-line information system with terminals in each of its regional information centers.

The use of audiovisual materials in libraries is increasing, especially in school libraries, and recently a semi-public corporation has been formed for their development between the ORTF (Office de Radiodiffusion et de télévision françaises) and the Hachette group, which is one of most advanced European corporations in the field of book and newspaper publishing; this agreement, however, has been widely opposed on political grounds.

During the last decade French librarians have followed the developments in England with great interest. The National Lending Library for Science and Technology (NLLSP) has been considered as a model which it would be useful to imitate in France. Regional schemes, introduced in England since the first Sheffield experiment before World War II, have attracted the attention of French public librarians. Yet up to now no concrete measures have been taken for modernizing the rather

antiquated plans for cooperation among libraries in France. The system of county libraries (bibliothèques centrales de prêt), which was put into operation just after World War II, is still far from covering the totality of France; moreover, it is based on the principle of separate urban and rural services, which is now considered as a relic of the past in Anglo-Saxon countries. However, its replacement has not yet been envisaged.

Finally, some renewal efforts are also discernible in the fields of bibliography and union catalogs. Even if no large-scale attempts at automation of union catalogs can be cited apart from the preparation by computer of IPPEC (Inventaire permanent de périodiques étrangers en cours), it is quite certain that as more attention is paid to the creation of library networks, the question of computerizing their union catalogs will call for new solutions. Plans are under way in the field of bibliography for computerizing the *Bibliographie de la France* after its merger with the private bibliography *Biblio*. Paris was chosen by UNISIST as the site of an international data bank on serials, with a grant from the French government and under the auspices of UNESCO.

Information Science

Information Science (science de l'information) has had up to now a different meaning in France than in the United States. Generally, it has been conceived as covering only the study of mass media. It is in this sense that it is used, for instance, at the Institut de science de la presse (Institute for Science of Journalism) attached to the Fondation nationale des sciences politiques (National Foundation for Political Science) by its director, Prof. F. Terrou. However, a broader concept is slowly emerging.

At present there is no organized, comprehensive research program for information sciences. Perhaps such a program will result from the work of the Comité des sciences de l'information et de la communication, alluded to above. However, there are many centers where research in the field of information sciences is pursued. Probably the most active is the Ecole pratique des hautes études (EPHE) where a number of seminars, conducted since 1958, relate more or less closely to the information science domain. The studies in the history of information media, pursued under the direction of François Furet, seem especially important and have resulted in the publication of two volume (*16*). There is also research coming from the EPHE seminar of Prof. Serge Moscovici on the diffusion of innovations.

At the University of Bordeaux, Robert Escarpit is conducting studies on the sociology of reading, and Robert Estivals is now teaching at the same university (*17*). (Estivals is one of the few people now studying bibliometrics in France following the death of Zoltowski, who was the initiator in this field in France.)

The Centre national de la recherche scientifique (CNRS) is mainly concerned with information science through the work of the various teams which have been directed by Jean-Claude Gardin, and to which reference has already been

made (*18*). Unfortunately, the Groupe d'études sur l'information scientifique, which was formed in 1963, was dissolved in 1970 due to a lack of permanent funding. A survey of readers' needs and interests was conducted under INTD (Institut national des techniques de la documentation) auspices in 1957, but was never published. More recently, some of the 'mémoires" which are necessary for obtaining the "diplôme supérieur des sciences et techniques de l'information et de la documentation" (postgraduate diploma, introduced in 1970) could be qualified as bits of research more or less intermediary between American Masters papers and Ph.D. dissertations.

Research on information science in the universities is rather infrequent. At the IUT (Institut universitaire de technologie) in Tours a study on the geography of documentation in the Central region has begun. It is conceived of as the follow-up to a study of the same kind made in the early 1940s and published in 1947 (*19*), but the geography of documentation and information services is still undeveloped.

Historical studies, apart from those conducted at the EPHE, have recently been increasing in number, especially the books by Prof. Martin (now at the Ecole des Chartes) and Dr. Labarre (*20*). There is also the research by Jean Hassenforder and Pierre Riberette, cited in the General Bibliography of the article *France, Libraries in*.

The psychology and social psychology of information are relatively neglected. Madame Vallet-Gardelle recently studied a small team of scientists at the Laboratoire de psychologie sociale at the Sorbonne in depth. Some earlier studies from this laboratory are still valuable (*21*).

In the past 5 years much work has being done on the construction of various thesauri, but there is a question of whether this is to be considered as information science or as just information technology. Some theoretical work on information retrieval languages has been pursued at the Institut du cancer (Cancer Research Institute) in Villejuif by Madame Wolff-Terroine (*22*), who has also begun some studies in the evaluation of information retrieval systems.

Automatic classification has been the subject of various research projects, especially at the Institut Blaise Pascal in Paris, since 1965 (*23*).

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ERIC DE GROLIER

FRANKFURT BOOK FAIR

The invention of the art of printing, Johannes Gutenberg's great achievement, spread in the course of a few decades to many European countries. It changed the intellectual climate of the old world. Books became a feature of public life and began to make their enormous contribution to man's development.

As one of the major trade fairs of the time, Frankfurt am Main could already boast a lengthy and lively past. The importance of this old city, situated as it was at the crossways of many water and land trade routes, the proximity of Mainz the cradle of occidental printing, and the historical circumstances which contributed to its spread in Germany and neighboring countries had had the result that books, too, had been exhibited at the Frankfurt Fair during the last decades of the fifteenth century. Printers, publishers, and booksellers had their traditional stands near St. Leonard's Church during the Frankfurt Fair, as indicated by a Frankfurt street name, the "Buchgasse."

Guarantees of safe passage to the fairs and conditions of security at them were the basis for an influence which very soon went far beyond the borders of Germany. Thanks to the medium of Latin, the printed language of most European books produced up to the end of the seventeenth century (it was still the *lingua franca* of the educated classes at this time), Frankfurt am Main, through its trade fairs, made a very significant contribution to the European book trade and to the intellectual life of the time.

There are many records of the role played by the old Frankfurt Book Fair; of how important Frankfurt meetings were for the book trade and what significance it had for scholars who here had an opportunity of meeting printers and publishers, and who, through looking around and experiencing all the varied and manifold happenings at the fair, gained new inspiration. We know that during the fifteenth and sixteenth centuries these book fairs were attended by many from European countries. During its most important period, from about 1550–1630, this book fair attracted most of the great names in the book trade.

Perhaps nobody has better expressed what the Frankfurt Fair meant for the Europe of this time than Henri Estienne, printer, publisher, bookseller, and scholar. His description in *Francofordiense emporium* (*1*) was based on intimate knowledge of existing conditions. He was a frequent visitor to the fairs in Frankfurt am Main. For him they represented the place which decided the fate of his books and their sale in Germany and in other European countries.

The Thirty Years' War (1618–1648) had catastrophic consequences for the German book trade. Even if Frankfurt am Main was at first less affected by the war and its terrible side effects than some other German cities, nevertheless the fundamental changes which occurred in social, political, cultural, and economic life in the second half of the seventeenth century had such serious results for the traditional book trade in the city of Frankfurt that for a time it lost much of its

importance and influence. Between 1680–1690 publishing in Frankfurt am Main collapsed, thus ending a tradition which, through content and extent of production, had made the Frankfurt Book Fair powerful, permanent, and influential in its own special way. The classical proportion of two-thirds production in the south to one-third in the north of Germany was reversed. The attractiveness of central and north German publishing towns became progressively stronger in the course of a development which was not to be halted. Furthermore business methods within the book trade also changed. The wind bringing in these changes seemed to blow more strongly in the north than in the south. These and other influences favored the establishment of the book trade in Leipzig which, in the volume of its book production, had already caught up with Frankfurt am Main by the second decade of the seventeenth century. After this there had been a slight relapse, but on the decline of publishing in Frankfurt, Leipzig had quickly moved to the forefront of the German book world. Even its book fair outstripped the one in Frankfurt am Main. Leipzig took over the traditional role of the south German area, and in the eighteenth and nineteenth centuries the Leipzig Fairs became the most important meeting-places for members of the German and foreign book trade.

The result of the political situation and decisions after World War II was the re-creation of the Frankfurt Book Fair, a fair that was started under completely different conditions in an age of undreamed of international means of communication, thus making it an event of new worldwide significance.

The retention of the traditional name should not mislead one to see in the present Frankfurt Book Fair a continuation of the earlier one. The names may be identical, but the contents are quite different. When the first modern Frankfurt Book Fair was planned and held in 1949, thanks to the initiative of some Hessian booksellers and publishers, it was thought of as a purely internal German affair.

The idea behind it was to re-establish and encourage communication between German publishers and booksellers at a very difficult time. The country, suffering from the effects of a lost war and very widespread destruction, needed new initiatives. One of the first steps in this direction was the Frankfurt Book Fair, although the initiators could not possibly foresee that within a few years it would attract the praise and active participation of foreign countries. Some 200 West German publishers and booksellers exhibited their books at the 1949 Frankfurt Book Fair.

A year later there were the first signs that this fair not only answered German needs. Austrian, British, Dutch, French, North American, Swedish, and Swiss publishers came to Frankfurt am Main. After these first few signs of the internationalization of the fair, foreign participation increased year by year. From this postwar German initiative has developed a large, indeed the largest, event of its kind in the world. In the Frankfurt Book Fair 1970, 3,384 publishing houses from sixty-five countries participated.

The reasons for this remarkable development, which has no parallels in the recent or ancient history of the book trade, are various. The most important contributory factor may be seen in the tremendous upswing in the sphere of education which

has occurred in all parts of the world since the end of World War II. Through this the book world has received encouragement and opportunities for expansion which in this form had never existed before. This process was further aided by new means of communication and travel which have brought countries and continents closer together and which, as far as the Frankfurt Book Fair is concerned, have made it possible for publishers, booksellers, librarians, and booklovers from all parts of the world to reach Frankfurt am Main within 24 hours at the most. In addition, the constantly increasing tendency and obvious need for the change of books and ideas at the international level should be considered as being active promoters of the Frankfurt Book Fair. At no time in the history of the book trade has there been such a strong desire for durable international contacts as at the present. This, too, has benefited and continues to benefit the Frankfurt Book Fair.

The Book Fair has encouraged this development to the best of its ability by keeping its relationship with exhibitors and friends, and its decisions, completely free of political, religious, or economic groupings in the world. It has offered a welcome to all, regardless of race or political inclination. It has often been confirmed that the Frankfurt Book Fair has remained true to this principle, and there can be no finer acknowledgment of its performance than such opinions. But there are many other factors which have contributed to the worldwide importance of the Frankfurt

FIGURE 1. *General view of the central part of an exhibition hall at the Frankfurt Book Fair.*

Book Fair: for example, the geographical position of Germany at one of the east–west crossroads.

In the years since the creation of the modern Frankfurt Book Fair, the expectations which have been entertained for it have become greater and in some ways different from what the founders of the fair imagined in 1949. From meetings between publishers and booksellers, from direct inspection of new publications at the stands, and from discussions which develop there, have come many new things in themselves essential to and characteristic of the Frankfurt Book Fair. We are thinking here of coproductions which in specific fields of international publishing become more and more indispensable. We would mention the negotiation of translation rights and that in the course of the days and nights of the Frankfurt Book Fair, the foundation for many a book is laid which otherwise would never have come into being. Then, of course, there are the many indirect impulses which are given to the book world through viewings at such a huge annual fair. This is, after all, the first time in the history of books that booklovers have had an opportunity of appreciating at first-hand the incalculable wealth of books which they can see and judge according to content, typography, and artistic presentation, or according to the country of origin (see Figures 1 and 2).

FIGURE 2. *More than sixty countries representing all continents participate at the Frankfurt Book Fair to show their new publications and to discuss problems of cooperation, coproduction, translation rights, and other activities of international publishing.*

Finally, this situation helps to build a bridge for those developing countries attending the Frankfurt Book Fair which thus have a chance of gaining experience and material for easing the way toward book production in their own countries.

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SIGFRED TAUBERT

FRANKLIN, BENJAMIN

Benjamin Franklin was born in Boston on January 17, 1706. His father, Josiah Franklin, was a tallow-chandler and a soap boiler, and had little money to care for a big family of thirteen. His home was almost devoid of books other than some on polemic divinity as his father was a devoted member of the Old South Church in Boston (*1*).

Being the tenth son, and the youngest, Franklin's father intended to devote him to the service of the church as a tithe of his children. Accordingly, at the age of eight he went to the free grammar school in Boston where he learned to read (*2*). In less than a year his father moved him to George Brownell's school for writing and arithmetic, where he learned how to write but failed in arithmetic. At ten years of age, young Franklin had to be taken out of school to help in his father's business (*3*). It is interesting to note that Benjamin Franklin, who was known later to be one of the most learned men, had only two years of formal education.

Yet young Franklin was fond of reading and he bought as many books to read as his little money would allow. He also sold what he had read to be able to buy new books. After a short time Benjamin became so disenchanted with helping to make candles that his father was forced to find his son another occupation. After trying several jobs, Benjamin finally was apprenticed to his brother James, a printer, at

the age of twelve and was to serve, with journeyman's wages, until the age of twenty-one (*4*).

Franklin made friends with some apprentices of booksellers, who allowed him to borrow small books, one at a time, providing he returned them early the following day, lest it be missed or wanted (*5*). Later, he met a bookish tradesman, Matthew Adams, who took a liking to Franklin and invited him to use his private library. There he "took a Fancy to Poetry and made some little Pieces"(*5*). His brother encouraged him to compose poetry but his father discouraged him, so Franklin practiced prose writing. While practicing, he continued to read every book he could lay his hands on. He was also able to have access to the reference collection maintained by the *New England Courant* for the benefit of its subscribers and contributors (*6*). Later he became a contributor under the pseudonym of "Silence Dogood" (*7*).

The Dogood papers, which satirized the "establishment" in Boston, were a success but Franklin, only seventeen, had to run away to New York to avoid a legal action which was instigated because his brother James had used Benjamin's name falsely to assure the continuation of his business as a printer. In New York he was advised to go to Philadelphia where the chances of employment might be better. While in Philadelphia he worked as a printer in different workshops and later met Sir William Keith, governor of Pennsylvania, who heard of the young printer and "proposed to help him get started in business in Philadelphia" (*8*).

In April 1724 Franklin returned to Boston with a letter of recommendation from the governor to seek financial help from his father. This did not prove successful in convincing his father to support him, and he had to return to Philadelphia where Governor Keith suggested that he go to England to establish contacts with book-traders and merchants of stationery. In November 1724 Franklin sailed to England with nothing but his youth and knowledge of printing to sustain him (*9*). There he worked with several printers for a year and a half, after which he decided to return to Philadelphia to work first as a clerk and then as a printer at Keimer's printing house. At Keimer's he met and made many friends, among them Hugh Meredith, an avid reader, who later became his business partner. Once again, Franklin's love of books and reading opened doors for him, particularly when he went to New Jersey with Keimer to print paper money. There he made friends with people in high positions who became very useful to Franklin when he went into business with Meredith (*10*).

Franklin noted that there were in Philadelphia, as in Boston, no good booksellers, and that those who loved to read had to import their books from England. This was one of the reasons why Franklin sought out friends who enjoyed reading and discussing books. He began to rally around him similar young men and by 1727 he formed, with Hugh Meredith, Stephen Potts, George Webb, and others, a club which he called the Junto (*11*). He also set the rules of the club which was based on interest in reading, discussions, and self-improvement. The club met every Friday evening, where every member, in his turn, brought up a subject for discus-

sion by the company and each, every three months, produced and read a paper on any subject which subsequently was opened for debate.

In 1728 Franklin started the third printing house in Philadelphia. He was, however, handicapped by his partner Meredith who was "seldom sober" and had to work hard by himself to compensate for that situation (*12*). His business began to thrive and expand, particularly after Meredith withdrew from the partnership and the Keimer printing house closed, especially with his new venture in 1729 printing *The Pennsylvania Gazette* and then in 1732 the *Poor Richard Almanac*.

The Junto began to depend on books to stimulate discussions and by May 1731 Franklin proposed that since their books were often referred to and consulted in their discussions, they should be put together where the members met, "thus clubbing their books to a common library" (*13*). Later, he proposed the extension of the benefit of reading by starting a public subscription library, and on July 1, 1731, the Association of the Library Company of Philadelphia, the first subscription library in America, was born. The company started with fifty persons, mostly the Junto members, who paid 40 shillings each for membership and 10 shillings subscription per annum (*14*). The company had more subscribers along the years and its business went on as usual, but one major change was made during the short term that Franklin served as librarian (1733–1734) when the library was opened to nonsubscribers "upon deposit equal to the value of the book and a rental fee" (*15*).

By 1748 his business prospered to the point that he decided, at the age of 42, to retire and put his printing interests into partnership with David Hall to be able to enjoy "the leisure to read, study and . . . to produce something for the common benefit of mankind, uninterrupted by the little cares and fatigues of business" (*16*).

Franklin had become a national figure as a member of the Pennsylvania Assembly, and in 1757 he left for England as a representative of the assembly.

The Library Company, accordingly, had to appoint another director to replace Franklin who had served as director of the company since its inception in 1731. In England, however, he acted on behalf of the company and made many purchases and subscriptions of magazines. This led to a radical change in the relationship between Franklin and the company as the latter accused him of using funds for buying items for his own book store and packaging personal items in the Library Company's trunks. Nevertheless, when he returned to Philadelphia in 1764, Franklin served again, for two years, as director of the Library Company (*17*). Under his directorship, the Library Company flourished and established contacts with many learned societies in America and abroad.

Other subscription libraries were established in America (e.g., in Trenton and Burlington, New Jersey; Charleston, South Carolina; New York; and Newport, Rhode Island); however, they can definitely be traced to the example of the Library Company of Philadelphia and its concepts of expanding each of the members' resources far beyond his own financial means.

In addition to the Library Company, Franklin helped establish the American Philosophical Society in 1743. He also designed practical plans for cleaning,

paving, lighting, and economical night watching of the streets in Philadelphia, and was instrumental in establishing its fire company.

Franklin also influenced the establishment and improvement of several library and educational institutes. He is remembered, for example, as the founder of the University of Pennsylvania (*18*) and Rhode Island College (now Brown University), to name two. He helped solicit funds and develop the College of New Jersey (now Princeton University), the University of the State of New York, Washington Academy (now Washington and Jefferson College), and urged American colleges to seek support from the people they served.

Franklin later became the clerk of the Pennsylvania Assembly and Postmaster of Pennsylvania. In his last years he became special patron of Pennsylvania Colleges and served as president of the State of Pennsylvania from 1785–1788, and went to the extent of giving away a large part of his salary to frontier colleges that were just getting started. One of those colleges, in appreciation of his advice, knowledge, and contribution was called after him, Franklin College in Lancaster, Pennsylvania (*19*).

He also helped in founding the first medical library in America in the Pennsylvania Hospital in Philadelphia. He developed the library of the Pennsylvania Assembly and personally collected useful information from Europe for the U.S. Congress. He also helped establish free schools among the German immigrants in Pennsylvania and among the blacks in all America.

Franklin was also given, in recognition of his scholarly knowledge and experiments, honorary Master's degrees from Harvard, Yale, and the College of William and Mary. His election to England's Royal Society in 1756, and to the French Academy of Sciences in 1772, acknowledge his fame also as a leading eighteenth-century scientist.

Though a bookman and a man of letters, Franklin indulged in many scientific experimentations. In 1749 he formulated his theories on the relationship between lightning and electricity. He invented the bifocal spectacles around 1770, oil lamps with three wicks which gave light equal to six candles (through a pipe that supplied cool fresh air to the lights), a "long arm" for retrieving books from high shelves, a ladder chair which had a seat that could be tipped up to form a stepladder, the lightning rod, Franklin's electrical machine (which is an electrostatic generator), a printing press, the arm chair with a writing surface attached to one arm, and many others.

In 1770 Massachusetts appointed him as its agent and spokesman in England. Franklin's tenure in England, however, came to an unhappy ending as some of his friends, against his instructions, published certain controversial letters which he had previously received from the governor of Massachusetts. As a result, he left England in 1775 after being insulted, treated as a dishonest schemer, and was in fear of being imprisoned as a traitor (*20*). At home he helped draft a new Constitution for Pennsylvania and later helped draft the Declaration of Independence, and was among those who promptly signed it (*21*).

In October 1776 Franklin accepted appointment as one of three commissioners to France. As a result of his successful efforts, the French Alliance was signed to help America in its struggle for independence from England. It is virtually true to state that all the outside aid for the American rebels came through Franklin's help.

When he was twenty-six years old, Franklin jestfully wrote his epitaph and circulated copies of it among his friends in America and abroad. It read as follows:

The Body of
B. Franklin
Printer
Like a Cover of an old Book,
Its Contents torn out,
And stript of its Lettering and Gilding,
Lies here, Food for Worms,
But the Work shall not be wholly lost
For it will, as he believ'd, appear once more
In a new and more perfect Edition
Corrected and Amended
By the Author . . ."

When he died of old age on April 17, 1790, Franklin, however, left instructions for a simple epitaph to be placed on the grave of himself and his wife Deborah (*22*).

The author believes that Margaret Korty's analysis of Franklin gives a true picture of him as a learned man, a national and international figure, and a civic leader. She wrote:

> Franklin used books and his books used him in service to his century. He began as a printer but tried his hand at other occupations which reflected the variety and complexity of his interests: publisher, shopkeeper, writer, cartoonist, editor, librarian, scientist, inventor, investor, postmaster, soldier, realtor, Masonic leader, school and hospital administrator, fireman, musician, politician, diplomat, economist, sociologist, philanthropist, etc. Many of these interests were nutured by his love of reading, and his accumulation of a large private library testified to the value that he placed upon books.
>
> He was a promoter of useful knowledge and valued a book more for its contents than for its cover, more for information than for entertainment. Books to him were tools of a trade chosen carefully to fit a notch of need. They were read and remembered, retained or sent forth to accomplish a purpose. His aid to American libraries is by itself a long and involved story (*23*).
>
> His most significant contributions to eighteenth-century libraries were his promotion of public enterprises of an educational nature, and his emphasis upon modern language (*24*).

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WILLIAM Z. NASRI

FRANKLIN BOOK PROGRAMS

As one of the few organizations that aid the book industry in developing countries, Franklin Publications, as it was named in 1952 when it was founded, is the result of a combination of idealism and practicality with a complete lack of condescension identified in its first president, Datus C. Smith, by R. Hemphill (*1*). The method begun in 1952 and continuing to date is to provide a local Franklin office with rights secured from the publishers in the United States and, on this basis, have a translation made into the language of the country. The publishing industry, in its formative years, then has something to publish, and the royalties collected for the translation in printed form help to defray the costs of maintaining the local office and paying the translator. This apparently simple method is remarkably effective

for several reasons, both practical and idealistic, but it depends ultimately on the lack of condescension that has marred aid offered by other sources, notably the United States Agency for International Development.

The local offices do not include a resident American. Any that are in a local office at a given time are on a visit, usually of brief duration. There is no implied assumption that the local office cannot be adequately managed by a citizen of the country. Experience has shown that the local managers are capable of a productivity that no American could match; this arises both from a belief in the Franklin program and from a knowledge of the country. The local managers are men of great respect in the community, speak its language at the level of the college-educated man, and have an understanding that is far beyond what any visitor could achieve in less than the time the local manager has spent in acquiring his expertise. Visitors are as old in the country as their cumulated time, so that a man who spends 2 or 4 years in a developing country is, practically, only 2 to 4 years old.

The books to be translated are chosen by the local community, not the New York office. This has occasioned some heartache and negotiation with both the local office and with the leaders of American foreign policy. The New York office recommends books for examination and may decide that Franklin cannot support a translation because the original work is faulty in some respects, but a wide latitude is provided for the local office to make the decisions that best suit the locality. Doubtless the local office manager tends to lend weight to his preferences, but in general the selections have been of both popular and substantial books.

Providing the local office with the technical assistance and with the rights to works printed in the United States has a kind of doubled effectiveness. A respect for literary property is engendered in areas where piracy has occurred, and technical advice is given as the need is felt. There is no attempt to force methods and advances on a country before its infrastructure can accept them. The respect for literary property has resulted in the maintenance of international agreements and services in order to obtain rights, and the value of this respect is soon learned when the local country produces works that have a market value in English. The technical advances are not simply a matter of machinery but also of marketing and distribution.

Datus C. Smith, who was president until 1967, and his associates, Donald Cameron and Harold N. Munger, were the creators of Franklin in the days when each title selected for translation had to be cleared through governmental bodies that had first asked for and then demanded the right. The change of policy that altered the approach of the United States Information Service to something very like the propaganda office of an authoritarian regime had its worst effect in limiting the number of children's books that were judged valuable for translation, just as children's libraries were closing down as being an unnecessary expense.

Franklin, however, has always favored the publication of translations of children's books because they have the longest and most enduring influence on the reading habits of the people in a developing country. In its programs of providing technical expertise to other organizations, Franklin has greatly assisted in the development not

only of general reading but also of textbook production and publication. Franklin has provided seminars and institutes for local personnel, calling upon the services of highly informed but otherwise unavailable experts, so that the influence has been very great, even though it passes quite unnoticed.

The proof of the Franklin method is ultimately in the results, and its significant progress is not to be judged by the number of the local offices, for when a particular project ends, the local office may go out of existence, its ties to Franklin not so much broken as no longer needing expression in an administrative arrangement. The office in Iran has published fantastic numbers of textbooks and has been instrumental in assisting that country from its previous underdeveloped status to its present significance in the middle east, above the perils of warfare and well beyond the level of underdevelopment seen in all of Iran's neighbors. Literacy, libraries, and a thriving publication industry are all either direct results of Franklin's influences or the end result of the interaction of forces that would be impossible to trace. Quite significantly, Franklin offices have weathered every kind of political trouble without having to leave a country. Franklin survived the problems of war and revolution in Pakistan, Indonesia, Bangladesh, and Egypt. The Kabul office is really the result of Franklin Iran's influence, an unusual expansion of its initial investment.

Probably no dollar spent on foreign aid gets as much mileage as the money that has sustained Franklin through the years. Grants from the Ford Foundation, from private individuals and corporations, and the contract funds from the United States government have had a kind of multiplier effect not often seen in the area of foreign aid where a heavy investment of funds has little effect. Franklin is not in the business of making friends for the United States but rather in the wider area of proving that where knowledge reigns, friendship among nations is inevitable. In helping to dispell ignorance without seeming to be condescending and all-wise, Franklin has done more to promote international understanding than any propaganda effort could hope for.

Franklin does not directly support libraries, and early in its existence, direct subsidy of publishers was seen to be a very poor method of achieving the development of a book industry that was sought. By subsidizing the user, however, Franklin encourages not only the development of the publishing industry but assures that the most effective organization will gain the greatest reward. Support of libraries is achieved by providing materials that an interested public would want to find by offering assistance when practical and by encouraging other organizations that do support library development to make what use of Franklin's resources and knowledge as may be feasible.

International travelers in the book world do well to call upon the offices of Franklin in New York where a friendly welcome and a knowledgeable staff can do much to make a trip more productive. Directors of international programs in the book industry should be certain to investigate Franklin's experiences, for the benefits of a continuing and well-reasoned program can serve as a model. All who have been a part of Franklin, and this is rather a large number of librarians,

publishers, and other book men, gain a deep respect for the basic tenets that account for its success to date. The only problem at Franklin is financing that will keep it both independent and solvent. It would be a major catastrophe if Franklin should have to lose its free-wheeling advocacy of good books, just because they are good, and turn to promoting one or another kind of book because it serves some goal other than development of a book industry.

A knowledge of Franklin can be gained from its annual reports, where the numerous organizations and affiliates are fully reported, and the changes in organization are accounted for. Michael Harris, Carroll Bowen, and John Kyle have served as presidents. The author of this article was its library consultant for a time, and Esther Walls succeeded him in a somewhat different capacity until the position was taken by Byron Buck who has long been associated with Franklin. Its Board of Directors has included some of the most important men in the book world and the communication industry as well as industrialists of all kinds. A list of its publications shows the diversity of titles, and the several articles written about Franklin give an accurate picture of its history. Few organizations have been so open in their demonstration of methods and beliefs, and so far as the author here is concerned, none have been nearly so successful.

The influence spread beyond the book world into theoretical considerations of comparative and international librarianship and equally into the purposes and goals of foreign aid. Among the many things that Franklin has shown by its very existence is that foreign aid can have a very significant effect if it does not have strings attached. The results may seem minimal, but in a long-run sense, they have been titanic, as seen in Iran where a paperback book industry is spurring literacy along as almost nothing else has done elsewhere. From this author's own observations in a recent trip to Iran, the Franklin office in Tehran shows how completely acclimated the work has become. The New York office is not at all the identity of Franklin in Tehran, but rather the local office so that New York seems to have a subsidiary office of Franklin rather than the reverse.

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JAY E. DAILY

THE FRANKLIN D. ROOSEVELT LIBRARY

The Franklin D. Roosevelt Library in Hyde Park, New York, is the oldest of the presidential libraries. An agency of the United States government, it is administered by the National Archives and Records Service of the General Services Administration.

On December 10, 1938, President Roosevelt announced at a White House luncheon and later at a press conference his long-cherished plan to present to the nation his papers. He said that he had come to the realization that his presidential papers would, when added to his pre-presidential papers, his family papers, and his historical manuscript collections, bulk so large that conventional ways of handling them as a private collection would be totally inadequate. Moreover, he wished to keep this material intact and in a place where he could use it after leaving the White House. He also wanted to accommodate associates in his administration who might wish to place their papers with his. Finally he wanted this material made available to scholars as soon as possible. A further consideration was his desire to keep in the same location the many objects acquired during his lifetime—heirlooms, art objects, collections such as his ship models and naval prints, and the many gifts received by him as president. He proposed to place these collections in a building to be erected on the family estate in Hyde Park. The Congress accepted his offer and by a joint resolution approved July 18, 1939, established the library as a federal agency. The library building was built and equipped from privately subscribed funds without cost to the government. Mr. Roosevelt laid the cornerstone on November 19, 1939, and the government accepted the completed building on July 4, 1940. The museum portion of the library was opened to visitors a year later, and most of the manuscripts were made available in 1950.

The establishment of the library served as a precedent for the maintenance of presidential libraries by the government. From the time of George Washington, presidential papers by tradition have been regarded as the personal property of the president. Some of them were destroyed, others acquired by private individuals or institutions, and others deposited in the Library of Congress. With the passage of the Presidential Libraries Act of 1955, the government was permitted to accept and maintain the papers and other historical materials of any president of the United States and their associates and contemporaries and also the buildings to house them.

FIGURE 1. *The Franklin D. Roosevelt Library from the east, December 1971. (Courtesy Franklin D. Roosevelt Library.)*

The library building, which adjoins the Roosevelt home, a National Historic Site administered by the National Park Service, is built of gray field stone in the Dutch Colonial style of architecture (see Figure 1). Mr. Roosevelt's preference for the old Dutch style is evident not only in the library but in his own retreat cottage and in a number of public buildings in the Hudson River Valley. In 1971 north and south wings were added to the building as a memorial to Eleanor Roosevelt. They house a new research room, an auditorium, stack area for manuscripts, and an exhibit gallery devoted to Mrs. Roosevelt.

Pre-eminent among the library's 150-odd collections of manuscripts comprising 21,000,000 pages are Mr. Roosevelt's presidential papers, correspondence, and other papers dealing with his career as New York State senator, assistant secretary of the Navy, vice-presidential candidate in 1920, governor of New York, and presidential candidate. In addition to these official papers are those relating to his private life, family background, and special interests—the history of the United States Navy and the history of Dutchess County and the Hudson River Valley.

Among the other important papers are those of Eleanor Roosevelt, Vice-President Henry Wallace, Secretary of the Treasury Henry Morgenthau, Jr., Harry Hopkins, and Senator Elbert Thomas. Over 50% of the papers in the library are those of associates of President Roosevelt.

The nucleus of the library's collection of 37,000 books is the president's personal library of 15,000 volumes. From boyhood Franklin Roosevelt collected books on history, economics, government, public affairs, travel, and other subjects; and, after he became president, he received as gifts from authors, publishers, and others many books, especially those dealing with his administration. Mr. Roosevelt's specialities were books on the history of the Navy, Dutchess County, British and American literary classics, early juveniles, and ornithology. In addition to the manuscripts and books, the library's collections include 52,000 pamphlets and periodicals, 5,000 prints, 1,000 paintings, 90,000 still photographs, motion pictures, sound recordings, and 20,000 museum items.

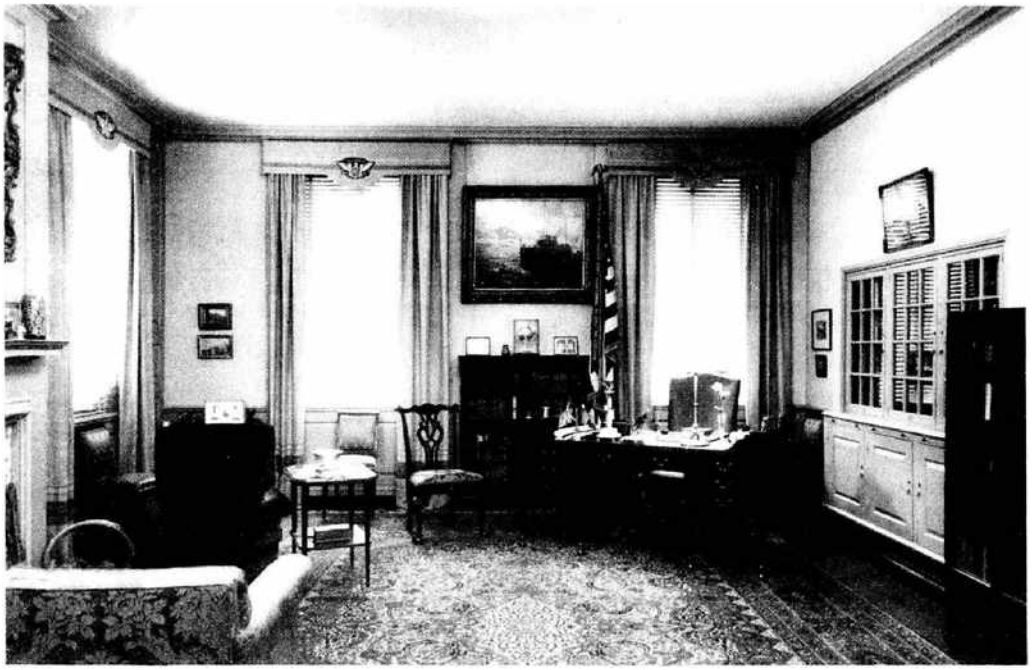

FIGURE 2. *The President's Room, Franklin D. Roosevelt Library, January 1969.* (*Courtesy Franklin D. Roosevelt Library.*)

The library's museum consists of a main gallery devoted to the life and times of President Roosevelt, a gallery on Eleanor Roosevelt, a naval exhibition room containing many of the president's collection of ship models and naval prints and paintings, and Mr. Roosevelt's office in which he worked, met with world leaders, and from which he made a number of important radio speeches (see Figure 2). In the basement are a sales shop and rooms containing a collection of unusual gifts, the president's manually operated automobile, iceboats, sleighs, and carriages.

As part of its task of making the Roosevelt papers available for research and to aid the scholarly community, the library has issued a number of guides, bibliographies, and documentaries. These are: *Calendar of the Speeches and Other Published Statements of Franklin D. Roosevelt, 1910–1920* (1952); *Franklin D. Roosevelt and Conservation, 1911–1945* (1957), an annotated collection of 1,200 items from Mr. Roosevelt's correspondence relating to his life-long interest in conservation; *A Preliminary List of Civil War Paintings, Drawings and Prints in the Naval Collection of Franklin D. Roosevelt* (1960); *The Old Navy, 1776–1860* (1962), a catalog of the traveling exhibit of paintings and watercolors from President Roosevelt's Naval Collection; *The Era of Franklin D. Roosevelt, A Selected Bibliography of Periodical and Dissertation Literature, 1945–1966* (1967) (this edition is out of print; a new edition is in progress); and *Franklin D. Roosevelt and Foreign Affairs*, an annotated collection of the principal documents in the Roosevelt papers pertaining to foreign affairs. Three volumes covering the first administra-

tion, 1933–1937, were published by Harvard University Press in 1969. In 1971 the library issued in conjunction with the National Historical Publications Commission a second microfilm edition of the press conferences of Franklin D. Roosevelt, 1933–1945.

The library's facilities are used by approximately 400 researchers a year. The museum of the library has been visited by over 5,000,000 people since its opening in 1941.

At the dedication of the library President Roosevelt said:

> It seems to me that the dedication of a library is in itself an act of faith. To bring together the records of the past and to house them in buildings where they will be preserved for the use of men and women in the future, a nation must believe in three things:
>
> It must believe in the past.
>
> It must believe in the future.
>
> It must, above all, believe in the capacity of its own people so to learn from the past that they can gain in judgment in creating their own future.

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J. W. MARSHALL

FRANKLIN INSTITUTE LIBRARY

The story of the Franklin Institute Library parallels the history and growth of the institute itself. Organized in 1824 by a group of prominent Philadelphians led by Samuel Vaughan Merrick and Professor William H. Keating, the institute was formed along the lines of the so-called "Mechanics' Institutes," but with the added features of a learned society. The founders chose the name of Franklin to exemplify

the broad aims of the new institution. Under the charter of 1824 the purposes of the Franklin Institute were set forth as follows:

> Section 2. And be it further enacted by the authority aforesaid. That the objects of the said corporation shall be the promotion and encouragement of manufactures and the mechanic and useful arts, by the establishment of popular lectures on the sciences connected with them, by the formation of a cabinet of models and minerals, *and a library*, by offering premiums on all objects deemed worthy of encouragement, by examining all new inventions submitted to them, and by such other measures as they may judge expedient (*1*).

In time these general aims came into sharper focus as more definite proposals were outlined.

> First, the delivery of lectures on the arts and the application of science to them; second, *by the formation of a library of books relating to science and the useful arts, and the opening of a reading room;* third, by the examination of all new inventions and discoveries by a committee of learned and honorable men; fourth, by the publication of a journal to contain essays on science and art, specifications of English and American patents, etc.; fifth, by holding exhibitions of American manufactures and awarding medals to worthy workmen; sixth, by building a hall for the meetings of the Institute and the use of the members; seventh, by collecting machines, minerals, materials, etc., used in the mechanic arts; eighth, by the establishment of schools in which should be taught architecture and mechanical drawing, chemistry applied to the arts, mechanics, and if possible, of a high school for giving young men a liberal and practical course of education (*2*).

The first act in creating the library was the formation of a Committee on Library on April 1, 1824. The first committee was headed up by Matthew Carey, a prominent bookseller and publisher, and included Samuel Vaughan Merrick, founder of the institute; William H. Keating, Professor of Mineralogy and Chemistry at the University of Pennsylvania and the Franklin Institute; J. Katez, bookbinder; and Peter A. Browne, counsellor. The actuary served as librarian and kept the minutes of the committee.

The first addition to the library was made on April 1, 1824, by Benjamin F. French, an engraver, and one of the original members of the institute. It is noted in the library minutes as "sundry copies of the Encyclopaedia plates." Samuel Vaughan Merrick presented the first periodicals on October 7, 1824, which numbered some sixty-five issues of four scientific journals imported from England. William H. Jones, a merchant and early member of the institute, presented the first book on January 17, 1825.

The original library was stored in the residence of one of the members of the library committee until the year 1829. In that year a reading room was opened on the second floor of the 3-year-old institute building on the east side of 7th Street. This modest room served as the library's home for over a century. Although the core of books and periodicals upon which the library collections were built con-

sisted of gifts by interested members, the most significant event affecting library acquisitions was the formation of the *Institute Journal* in 1826. Through this medium the library was able to formulate exchange agreements with other scientific institutions and publishers. The founders recognized very early the importance of the periodical to the scientific library. This enabled an institution with little in the way of financial support to build up complete sets of the important periodicals in the pure and applied sciences. In 1832 the number of periodicals received by exchange stood at twenty-seven, grew to 199 in 1882, and now exceeds 600.

In 1833 the library of the Maclurean Lyceum was acquired, and in 1882 large numbers of government publications were transferred from Moyamensing Literary Institute. The library's early interest in government publications centered around the patent literature, of especial interest in tracing the progress of the arts and manufactures. The library set out to arrange with various Patent Offices for the acquisition of patent collections. The British files were acquired from 1617, the United States files from 1790–1835 on microfilm, and from 1871 in printed form, and the Swiss files from 1888. To supplement these collections, abstracts of patents from Germany, Australia, Canada, and other countries were acquired.

The library built up its collections through the years by other means as well. In 1832 William S. Winder, an early member and officer of the institute, willed the library the modest sum of $28.00 which is significant, nevertheless, as the library's first legacy. The first trust fund came to the library in 1866 when Algenon S. Roberts, a long time member of the institute, died in 1865 and bequeathed to the library $1,000. Some nineteen separate trust funds have been set up for the library during the years 1866–1959, ranging from fairly modest sums to quite significant contributions. They have gone a long way towards sustaining the acquisition of important books and periodicals on scientific and technical subjects.

Of the many gifts of books, periodicals, and manuscript materials presented to the library over the years, several are worthy of special consideration.

The Wright Brothers' Aeronautical Engineering Collection was willed to the Franklin Institute by Dr. Orville Wright. Described in detail by Ralph McClarren (*3*), the collection includes the original drawings of the Wright biplanes of 1903, 1904, 1905, 1907, and 1910, including test data and notes.

In 1874 John Lenthall, Chief of the Naval Bureau of Construction from 1853–1876, deposited in the library a collection of books on naval engineering and original drawings of naval architecture made by himself. They contain drawings of American and foreign shipping during the period from the American Revolution to the Civil War. Included are numerous manuscripts containing information on maritime matters.

In 1920 Lewis Sharpe Ware bequeathed his collection of books, periodicals, and emphemera on sugar with a generous trust fund for new acquisitions and proper maintenance and preservation of the collection.

In 1885 the library of Robert E. Rogers, consisting of some 900 books on chemical subjects, was presented to the library.

The library was given over 1,000 letters of Oliver Wolcott Gibbs, prominent chemist, concerned chiefly with the Bache fund and the founding of the National Academy of Science.

Over the years a small but representative selection of Benjamin Franklin's imprints have been added to the library. Largely a gift of Samuel H. McVitty of Salem, Virginia, the collection includes some sixty titles ranging from Franklin's early work to some of his later imprints. This collection is described in the *Journal of the Franklin Institute* (4).

The Memorial Library of the International Electrical Exhibition was formed on the occasion of that exhibition in 1884. It includes about 3,000 titles of historical significance in the fields of electricity and magnetism. Funds were also provided to maintain, preserve, and add to the collection.

Gustavus W. Cook donated to the library a distinctive collection of classics in astronomy and mechanics.

The transfer of the National Association of Watch and Clock's Library from the University of Pennsylvania to The Franklin Institute provided the foundation for the finest collection of books on horological subjects in the country. The donation in 1970 of the famed Haschka Collection by the Hamilton Watch Company has expanded that collection to over 2,200 titles. With the contribution in that same year of over twenty significant runs of horological periodicals from the Hagans Clock Manor Museum, the Institute Library has become a storehouse of historical and contemporary information on time and time telling. A checklist of holdings was printed in 1956 and revised edition published in 1968.

These are only a sample of the important contributions made by interested and generous friends of the library.

The library historically has been a membership library, but as its value increased its restrictions relaxed. During the nineteenth century the general public was allowed access only to the patent literature. In the early twentieth century as the library became more important to the community, nonmembers were allowed to use the library on a reference basis, but were at the same time strongly advised to take out a membership. In 1961, realizing the importance of the library to the area, the doors were opened to the public on a reference basis. Since that date, use by the general public has increased 1000% while membership use has doubled.

Although the library during most of its history has been restrictive as to individual use, at no cost through interlibrary loan, it has provided books to governmental, academic, and public libraries. Periodicals have never been available for circulation beyond the confines of the library, but when photocopying came into vogue, the library provided this service at cost to the general public. The library has cooperated with the *Union List of Serials*, *New Serial Titles*, the *National Union Catalog* and the *Union Library Catalogue of Pennsylvania* since their inception. The library has privately printed a number of catalogs of its library and special collections to acquaint users with its holdings.

Despite its long history, the Franklin Institute Library has been guided by only

a few dedicated individuals who have served as librarians. Apparently the responsibility for direction of the library during the first 50 years of its existence fell on the shoulders of the actuary. The first person to hold the position as librarian was Emanuel Hiltebrand who served from 1824–1887. He was succeeded by Alfred Rigling who held the post over 50 years from 1887–1940. Walter Pertuch who served under Rigling from 1904 to 1940 assumed the position in 1941 and directed the library until December of 1959 when he was appointed librarian emeritus. John McGowan took on the post as director of the library in December of 1959 and held the position through August of 1966.

Although the early additions to the library indicate that the founders' interests were quite wide and diverse, the library soon restricted its acquisitions to those of materials in the physical sciences and technology. Along with the traditional acquisitions of books, periodicals, and patents, the library very early began collecting trade catalogs and pamphlets of historical importance. This collection exceeds 50,000 titles and the trade catalog portion represents one of the finest sources of historical information on scientific and technical firms anywhere.

The library now houses more than a quarter million volumes in the fields of mathematics, astronomy, chemistry, physics, geology, and engineering. Approximately 6 million patents cite new inventions both here and abroad. The library subscribes to about 4,200 periodicals in the physical sciences and technology and retains about 4,000 other journal titles which have ceased publication. Two-thirds of the current subscriptions are foreign, and especially strong coverage is given to periodicals from Russia, Germany, Japan, France, and Great Britain. Identification of these titles can be obtained through the standard tools, i.e., *Union List of Serials, New Serial Titles,* and *Chemical Abstracts Source Index.* In 1970 the library published a list of these periodicals with holdings.

Of the important early scientific periodicals, the library contains the *Philosophical Transactions of the Royal Society,* initiated in 1665, which continues publication to this day. The *Acta Eruditorum,* first published in 1682 and the first German scientific periodical, and the *Histoire and Memoires of the Academie Royale des Sciences* of Paris, an important serial of the seventeenth century, are also owned by the library. *Annales de Chimie et de Physique, Journal der Physik,* and the *Philosophical Magazine* are important titles of the eighteenth century held by the library. Important nineteenth century periodicals include the *American Journal of Science; Chemische Berichte; Compte Rendus* of the Academie des Science; *Monthy Notices of the Royal Astronomical Society; Report of the British Association for the Advancement of Science; Justus Liebig's Annalen der Chemie; Memoirs and Proceedings* and *Journal of the Chemical Society; Bulletin* of the Societé Chimique de France; *Monthly Microscopical Journal; Proceedings of the Royal Society; Quarterly Journal of the Geological Society of London; Quarterly Journal of Microscopical Science; Journal of The Franklin Institute; Zeitschrift für Mathematik and Physik; Fresenius' Zeitschrift für Analytische Chemie; Quarterly Journal of Science,* later called the *Journal of Science and Annals of Astronomy, Biology,*

Geology, Industrial Arts, Manufactures, and Technology; Hardwicke's Science Gossip; Meteorological Magazine; Nature; Proceedings of the Physical Society; Quarterly Journal of the Royal Meteorological Society; Analyst; Journal of the Society of Chemical Industry; Zeitschrift für Physikalishe Chemie; and *Geographical Journal*, all preserved by the library. Of equal importance to the historian are the library's many short-lived but important periodicals available only in a few other libraries.

The library has never been able to collect the world's entire output of books in its fields of interest. It has concentrated mainly on titles in English of permanent value to the historian, scientist, and engineer. Foreign titles have been purchased only when their value was exclusive and not paralleled in the English language.

Early acquisitions, gifts, and special purchases have provided the library with a significant rare book collection. Of special distinction are the collections in mechanics, judiciously and consistently acquired over the years. In 1954 the library displayed some sixty-five treatises written before 1700 on the occasion of the visit of the Grolier Club to Philadelphia.

A few of the library's important rare titles include Euclid's *Elementa Geometriae*, John Peckam's *Perspectiva Communis*, Archimedes' *Opera . . .*, Copernicus' *De revolutionibus Orbium Coelestium Libri* VI, Georg Aricola's *De Re Metallica, Hero* of Alexandria's *Spiritalium Liber*, William Gilbert's *De Magnete*, Tycho Brahe's *Astronomiae Instauratae Mechanica*, Johann Kepler's *Astronomia Nova*, Galileo's *Sidereus Nuncuis Magna*, John Napier's *Rabdologia*, Johannes Hevelius' *Selenographia*, Robert Hooke's *Micrographia*, Christiaan Huygens' *Horologium Oscillatorium*, Isaac Newton's *Philosophiae Naturalis Principia Mathematica*, Rene-Antoine de Reaumur's *L'Art de Convertir le Fer Forgé en Acier*, Thomas Cadwallader's *An Essay on the West-India Dry-Gripes* printed by B. Franklin in 1745, and Benjamin Franklin's *Experiments and Observations on Electricity*.

Although the library cannot claim to be comprehensive in its acquisition of the world's scientific and technical literature, it does try to bridge the gap through its ample store of bibliographies, indexes, and abstracting tools. Numbered among the important sources for bibliographic information are Reuss' *Repertorium Commentationum a Societatibus Litterariis Editorum*, etc.; Poggendorf's *Biographisch-Literanisches Handworterhich zur Geschichte der Exacten Wissenschften;* the Royal Society's *Catalogue of Scientific Papers; International Catalogue of Scientific Literature; Bullettino di Bibliografia e di Stonia dell Scienze Mathematiche e Fisiche; Zentralblatt für Mathematik; Mathematical Reviews; Science Abstracts; Physikalische Berichte;* Bolton's *A Select Biobiliography of Chemistry*, 1492–1892; *Chemisches Zentralblatt; British Chemical Abstracts; Chemical Abstracts; Engineering Index; ASM Review of Metal Literature; Metallurgical Abstracts; Bulletin Signaletique; and Nuclear Science Abstracts.*

The library has concentrated in the last decade on making information more accessible to its users. The library's Photoduplication Service was organized in 1960 to rapidly provide photocopies of periodical articles in lieu of lending the journals

themselves. In 1963 an experiment in the facsimile transmission of photocopies was successfully carried out between the library and General Electric, Missile & Space Vehicle Department, Space Technology Center, King of Prussia, Pennsylvania. The Science Information Service was organized in 1961 to provide a searching, translating, and current awareness capability for the library.

The archives of the institute constitute an important source of information on early American technology. Although constituted as a separate division of the institute under the direct responsibility of Dr. Joseph S. Hepburn, archives researcher, the activity is closely related to library operations. Hundreds of queries reach the institute each year requiring the use of both archival material and historical collections within the library. Along with many other notable distinctions, Dr. Hepburn is an expert in the history of Philadelphia, the center for early American technology. He receives hundreds of questions each year concerning the inventions, portraits, designs, and activities purported to be Franklin's, medals awarded by the institute and their recipients, artisans and their inventions involved in the institute's exhibitions, identification of drawings, and data on United States vessels, location and contents of correspondence of prominent scientists, data on early manufacturing firms, etc. In most instances the information is available solely at the institute and constitutes a considerable contribution to the history of science and technology.

Queries on Franklin at times prove most exhausting. Several seem to appear over and over; e.g., the alleged anti-Semitic speech of Franklin's at the Constitutional Convention which was claimed by Nazi Germany and other anti-Semitic groups over the years, but which has absolutely no foundation; the asserted Franklin flag which he was purported to have designed; the story of Franklin and his whistle; and the location of portraits of Franklin as a fireman. Questions of this type are endless and, though sometimes humorous, are nevertheless important to the inquirer.

As the library (and the institute) approaches its 150th anniversary, it is obvious that the services rendered are truly more public than private and more open than restrictive. The library has proven to be an important source for historians of science and technology, and a virtual storehouse of contemporary and up-to-date information on scientific research and development. The future will undoubtedly see a continuing expansion of these roles.

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FREE LIBRARIES

"Free Libraries" may be regarded as an idea, an index entry, or the legal name of a library.

The concept is probably as old as the accessibility of reading matter to persons beyond an individual owner's immediate circle, or would-be readers not necessarily belonging to a community in which the library is an integral element. Scholars and gentlemen enjoyed some "free" libraries in antiquity as well as in later times; numerous cloister and cathedral collections were "free" to some nonmembers.

More recently, "free" has come to mean above all the tax supported, legally "public" institution (q.v.); many incorporate substantial elements of private origin like the building grants of Andrew Carnegie (q.v.). The blurs in the line of distinction are further evidenced by the existence of numerous privately endowed libraries (q.v.) under corresponding private control but offering free service to the public.

The touchstone is accessibility to the general public. Numerous academic and school libraries are also tax-supported and "free" to their designated clienteles. Those clienteles however have so often been defined narrowly, whether by economic necessity or otherwise, that usage has long since separated their libraries from the "free."

The word "free" seems to have come into heavy use in the United Kingdom just after efforts to improve the Public Library Act of 1850 were defeated in the late 1870s. Those bothered most by the absence of public libraries in London formed a Metropolitan Free Library Association in 1877. *The Times Index* reveals, 1884–1888, that a number of libraries (the only ones mentioned) were called "free," and indeed uses "Libraries, Free" as the entry. A number of possible factors may be identified. First, the term "public" did not necessarily mean "free." It had referred for centuries to many different kinds of library, even a university library like the Bodleian which was not restricted to the faculty and upperclassmen of a particular college at the university. Second, "free" was almost equally venerable, having applied at least since 1608 to several town and other libraries with endow-

ments or some other nontax financing; such libraries were as "public" as any, but not in the post-1849 sense of being the property of the whole community and tax-supported. Third, there was some feeling, indicated at the international library conference of 1877, that "free" was resented in England as smacking of charity for the working class.

Whatever research may show about these and other aspects of the phenomenon, Greenwood's important book of 1884 was entitled *Free Public Libraries* (*1*) and *The Times Index* reveals, under "Libraries, Free" 1888–1892, the use of all three expressions in library names, "Free," "Free Public," and "Public." Although the leading advocate of improvement, Sir John Lubbock, referred often to "free" libraries, and many new ones were so named, the desired statute was called the Public Libraries Act of 1892. And from 1894 on, "Public Libraries" was the entry in *The Times Index*.

All the foregoing played some part in the United States, but less intensely. Both "free" and "public" were terms familiar in the library world long before they were discussed, but neither was used often as part of the name of a library until the "public library" vogue initiated by the New Hampshire Act of 1849 and those soon following it in other states. The Bureau of Education's celebrated report of 1876 (*2*) used "Public Libraries" to cover every institution it could learn about which was not maintained strictly for its owner's use but, significantly, the numerous lengthy listings in it do not bother to give full names of libraries. One can tell where any free public institution was located, but very seldom whether it was officially a "Free" or a "Public" library. Of the magazine articles on this subject "indexed" by Poole for the years 1802–1896, a few begin with "Free" but a great many more with "Public"; and *Reader's Guide* from the outset entered everything not clearly other-than-public under simply "Libraries."

When Vol. 1 of The Library Series was issued in 1897 as Ogle's *The Free Library: Its History and Present Condition* (*3*), the epoch of high prominence for that expression was over.

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SIDNEY L. JACKSON

FREE LIBRARY OF PHILADELPHIA

The Free Library of Philadelphia is the public library serving the citizens of Philadelphia and surrounding areas of southeast Pennsylvania. Although the library is among the younger city libraries in comparison to many others, it has become one of the largest public library systems in the United States.

The Free Library of Philadelphia was incorporated in 1891 by charter granted in Common Pleas Court No. 4, Philadelphia County, upon the initiative of Dr. William Pepper, stimulated by a bequest from his uncle, George S. Pepper. Litigation arose over the will as several existing libraries claimed the bequest. The Free Library of Philadelphia was opened March 1894 after the courts decided the bequest was for the express purpose of founding a new library, to be open to the general public.

The first location for the library was in three rooms in City Hall. On February 11, 1895, the library was moved to other quarters in the old Concert Hall, 1217–1221 Chestnut Street. These quarters were occupied until December 1, 1910, when the library was again moved, to quarters at the northeast corner of 13th and Locust Streets. On June 2, 1927, the library opened for service at its present location on Logan Square. This building had been in the planning stages since 1911; however, various obstacles, including World War I, halted progress on the building's completion. It serves as the main library and administrative headquarters for the Free Library of Philadelphia system.

During its history the Free Library has been administered by five librarians. The title of librarian was changed to director during the administration of the fourth librarian. The following are the librarians/directors and their years of tenure:

John Thomson	1893–1916
John Ashhurst	1916–1932
Franklin H. Price	1934–1951
Emerson Greenaway	1951–1969
Keith Doms	1969–to date

The latter two librarians have served as president of the American Library Association.

The Free Library is organized under two governing boards. Under the charter of the library a Board of Directors was established to manage the incorporated organization. This board continues to manage the affairs which still pertain to the private corporation. An ordinance of the Select and Common Councils of the City of Philadelphia, dated December 31, 1894, created a Board of Trustees to establish and maintain a Free Library. This Board of Trustees, under a management agreement dated June 19, 1958, acts as the agent of the Board of Directors, administering the current business of the latter board.

The Philadelphia Home Rule Charter adopted in 1951 makes the Board of Trustees an independent board, which reports its operations to the mayor of the

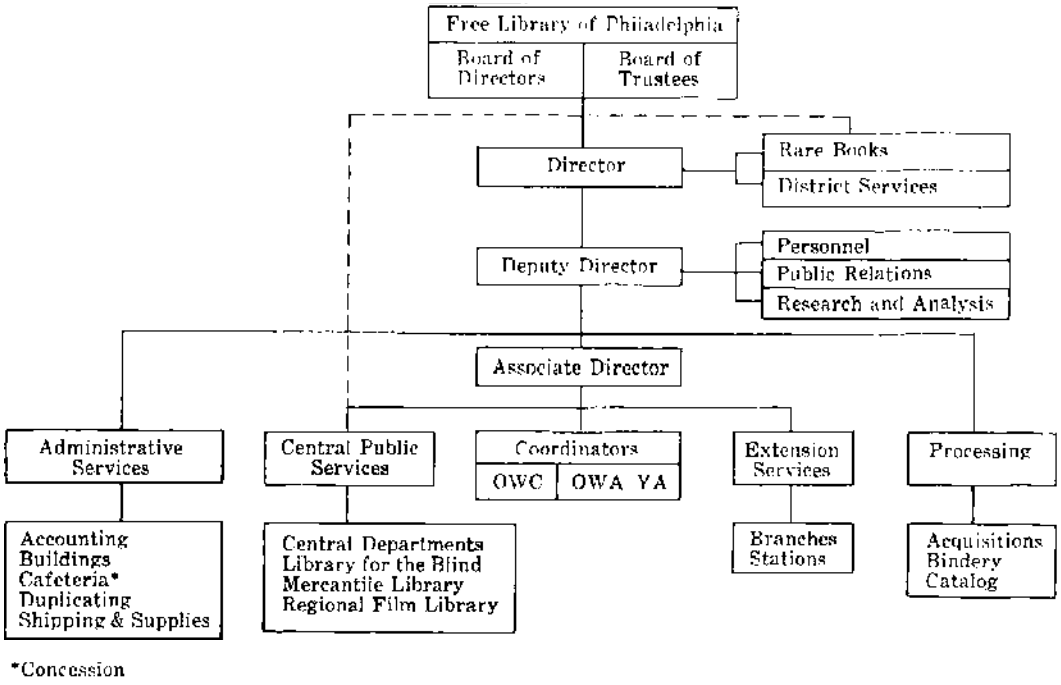

FIGURE 1. *Organization of the Free Library of Philadelphia.*

City of Philadelphia. This charter states that the "Board . . . shall exercise the powers and perform the duties vested in and imposed upon it by statute or ordinance."

There were eleven social libraries in Philadelphia which ultimately requested and received affiliation with the Free Library of Philadelphia. Although all these social libraries were controlled by boards of directors or trustees, only four boards actively continue today. The others dissolved themselves and turned over their assets to the Free Library of Philadelphia. Two of the remaining seven libraries have since been closed. One was returned to its original owner, the Free Library having acted as librarian and agent only during and shortly after World War II. The second library was dissolved and its collection used to partially stock a new bookmobile for the Free Library.

The Free Library of Philadelphia serves approximately 2,000,000 citizens of Philadelphia, in addition to extending reference services to areas immediately outside the city limits. There are 600,000 registered borrowers who are served by a system staff of over 1,100 authorized positions. The majority of funds for the operation of this library system are appropriated to it by the City of Philadelphia. In addition there are funds received from the federal and state governments, as well as private funds.

The organization of the Free Library of Philadelphia is illustrated in Figure 1. The executive organization of the Free Library is composed of the chiefs of the major divisions, plus several key staff officers and staff administrators. These positions together form an Advisory Council to the director.

FIGURE 2. *Central Library, Philadelphia.*

When the Central Library was opened in 1927, it was considered to be one of the most modern and up-to-date public library buildings in use (see Figure 2). Originally organized with a circulating department, a periodical department, and other such segments, it was reorganized in 1954. This reorganization created subject departments housing all cataloged materials pertinent to certain Dewey Decimal Classification numbers assigned to them, including periodicals pertinent to the subject area. The Central Library also houses all the administrative functions of the library system, including technical processing.

The Extension Division encompasses all operations beyond those of the Central Library. This includes forty-five branch libraries, one regional library, and the operation of the Stations Department, which includes three bookmobiles. The branch libraries range in size from book collections of 55,000 volumes to a collection of 10,000 volumes. The bookmobiles make a total of thirty-three stops on a weekly basis. Also within the Stations Department are the deposit collections which are placed in schools, institutions, and community centers. These collections numbered 353 in 1970. The Northeast Regional Library was opened in 1963 to serve as a medium resource library between the Central Library and the branch libraries in the northeast region of the city (see Figures 3 and 4). The regional library concept was proposed in 1956 for a total of five regionals. Other regional libraries are in the future planning of the Free Library.

The library materials collections of the Free Library of Philadelphia are general, all-encompassing collections aimed at serving the needs of all ages and educational levels. The collections total 6,013,430 items, of which 2,592,674 are books. The branch collections are geared to the general, popular needs of the public, while the Central Library's collections are in-depth research collections, as well as the general, popular materials. Recognition is given, in the acquisition of materials, to

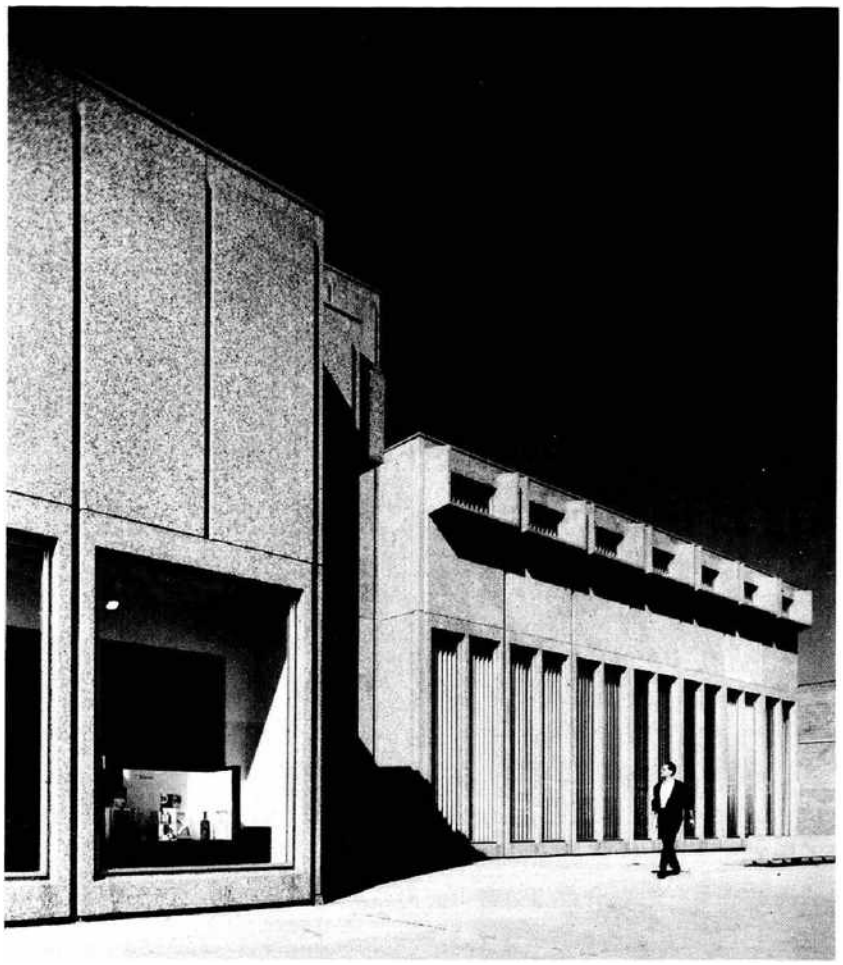

FIGURE 3. *Exterior view of Northeast Regional Library, Philadelphia.*

the total composition of the community, including such factors as age level, racial composition, religious affiliations, educational, economic, recreational and cultural characteristics, national origins, and political viewpoints. The Free Library endorses the Freedom to Read statement and the Library Bill of Rights.

Among the research collections of the Central Library are several special collections of outstanding merit. The Rare Book Department is the third largest collection of its kind in a public library in the United States. Its collections range from cuneiform tablets to icunabula to various collections of nineteenth and twentieth century authors and illustrators. The most recent major acquisition for the department is the Richard Gimbel Edgar Allan Poe Collection, which includes first editions of all Poe's work, letters, and the manuscripts of "The Raven" and "The Murders in the Rue Morgue." The Automotive Reference Collection is research material relating to the automobile from the time of its invention. The Theatre Collection contains materials devoted to theatre and cinema, with special strength in Philadelphia theatre. The Edwin A. Fleisher Collection of Orchestral Music is a

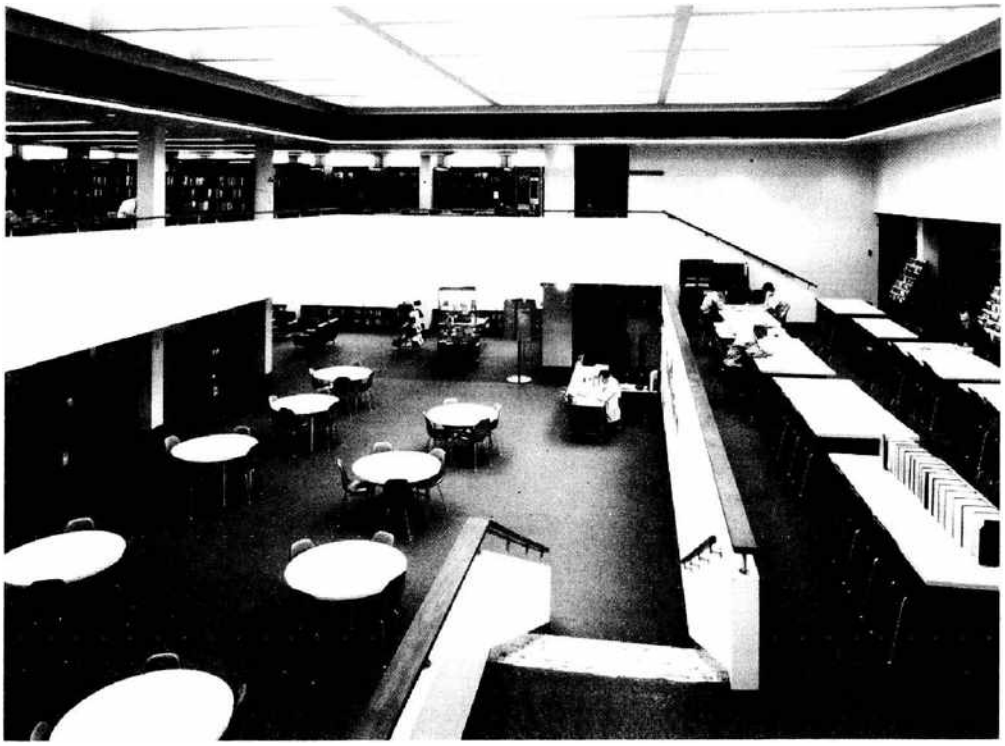

FIGURE 4. *Interior view of Northeast Regional Library, Philadelphia.*

world renowned collection of orchestral scores available for loan to orchestras. The range of materials in the Print and Picture Department covers photographs, reproductions of prints and paintings, and original prints, totaling nearly 1 million items. There are other special collections within the Free Library including the Map Collection, the Drinker Choral Library, and various special collections relating to specific subject departments.

Traditionally, the primary and basic service of a public library is to provide its users with the printed word. However, with twentieth century developments in the communications media, new horizons in service have been explored and adopted. Film, one of the older media forms, has been a service of the Free Library since 1959. The Free Library's film service is operated under contract with the Commonwealth of Pennsylvania to serve as a Regional Film Center for the eastern portion of the commonwealth, including the City of Philadelphia. Service to the blind and physically handicapped is made available to the people of eastern Pennsylvania, also under a contract with the commonwealth.

Just as the concepts in the communications media are changing, so are the concepts of public library service. With the aid of Library Service and Construction Act funds, and private funds, the Free Library in recent years has launched several innovative services to its patrons. The Reader Development Program was started in 1967. The basic objective of the program is to make available both book and nonbook materials which will aid the disadvantaged adult and young adult with a

reading level of eighth grade or below in overcoming the educational, cultural, and economic deficiencies in his life. A second objective is to bring library service to other underprivileged persons who for a variety of reasons have made no use of existing library facilities.

The Free Wheeler, a small mobile van, is designed to bring on-the-street library service to teenagers and adults of Philadelphia's Model Cities area. Paperback books, free pamphlet materials on a variety of subjects, film programs, multimedia programs, and special speakers are used to acquaint people with what the library has to offer and to introduce the people to their local library agency. Late in 1970 a library component was opened in the Spring Garden Community Center. This area is within the bounds of Philadelphia's Model Cities area and its population is predominately Spanish-speaking.

Another innovative library service is the library's component of the Model Cities Community Information Center. This unit, financed by a Library Services and Construction Act grant, was launched to provide input for a computerized data bank. thus releasing basic information needed by inner city residents along with community referral services. Early in 1971 the center received the first printout of the data bank. This marked the initial stages of developing a workable inventory of some 2,300 available services.

The Coordinator of Work with Children and the Coordinator of Work with Adults and Young Adults are responsible for programs held in all agencies of the Free Library of Philadelphia. There is a variety of programming done for all age levels, planned solely by library personnel as well as with various community and governmental organizations throughout the area. As examples of some programs for children, there are Book Concerts featuring musicians, dancers, and dramatists from several fields of interest; vacation reading clubs; film programs; special contests; record programs; and story telling.

Programming for adults and young adults includes film series, lecture series, discussion groups, chamber music concerts, and special ethnic programs. These programs, both for children and adults and young adults, may be sponsored in cooperation with the World Affairs Council, Family Service of Philadelphia, the City of Philadelphia's Department of Recreation, local community organizations, or friends groups organized to support the library's activities. Programming has been a significant part of the library's activities since its early years and has proven to be a service expected by its patrons.

The General Assembly of the Commonwealth of Pennsylvania enacted the Library Code in 1961. Under this code an informal, state-wide library network was created. This network is pyramidal from the local library at the base, to District Library Centers, to the apex of Regional Resource Centers. The network is composed primarily of public libraries.

The District Library Center serves in a consultative and advisory capacity to local libraries in a given geographical area. The code designates an authorized number of thirty such centers throughout the commonwealth. Delaware County is the district served by the Free Library of Philadelphia.

The Library Code created four Regional Resource Centers, each with specific subject responsibilities. Together, these four libraries cover the complete Dewey Decimal subject range, with financing to create in-depth collections in the assigned subject areas. These four libraries are the Carnegie Library of Pittsburgh, The Pennsylvania State Library, The Pennsylvania State University Library, and the Free Library of Philadelphia. Hence a patron in a local library has available to him the resources of all the public libraries of the commonwealth. The District and Regional Centers are connected by a teletype system which further speeds service to library patrons throughout the commonwealth.

KEITH DOMS

FRIENDS OF LIBRARIES

Organized bodies of friends are not peculiar to libraries. There have been Friends of the Cabildo, Covent Garden, French opera, the middle border, truth, and the National Zoo, but their mission is usually the same: to further the development of the program in which they have an interest. To more and more nonprofit organizations, faced with the widening gap between available funds and the service demands of their publics, citizens' groups banded together as friends promise a solution.

By and large, libraries have usually flattered themselves that they possess unnumbered friends with a small "f," and they are right, if one accepts Webster's definition of a friend as "one who looks propitiously on a cause, an institution, a project, or the like; a favorer; a promoter." Formation of these propitious lookers into a permanent, effective body that expresses its favorable attitude in an active, organized program, however, is not an easy task, nor has it always proved successful.

Because libraries frequently owe their establishment to bountiful collectors, societies of book lovers, women's clubs, or public-spirited citizens—friends certainly, but not always established under the title—the determination of the founding date and the name of the first group of Friends of the Library invites challenge. It is equally difficult to claim accuracy for figures regarding the growth of the movement since individual groups are not joined in any formal national organization. They function independently, have their own objectives, and frequently disband after the objectives have been reached.

Established "to buy books and to support the library," the San Juan Bautista Library Auxiliary of San Juan Bautista, California, was organized in 1896. A decade later in Davis, California, the Davis Library Club was formed to found a library and to seek funds for books. Neither group bore the name "Friends" but the purpose of each has been adopted by many a friends groups since.

It was in Paris that the first group known to have used the name of "Friends of the Library" was founded. With the aim of increasing and enriching the great

library collections of France, La Société des Amis de la Bibliothèque Nationale et les Grandes Bibliothèques de France was organized in 1913. Not quite 20 years later, in 1930, a branch of the société was formed in Berkeley, California.

Nine years after the foundation of La Société des Amis the first library group known to have been called Friends of the Library was established in the United States. This was the Friends of the Library of Glen Ellyn Free Public Library founded in 1922 in Illinois. That same year the Friends of Reading of Onondaga County, connected with the Syracuse (New York) Public Library and "devoted to the cause of good reading and the promotion of library welfare" was born.

Harvard University was the parent of the first friends group of an academic library as far as can be determined. Around the dawn of the twentieth century, Archibald C. Coolidge and Edgar H. Wells induced a number of donors to make annual contributions to augment the university library collections. This campaign proved successful, but after a time both interest and donations dwindled. In 1925, however, the same year that the Friends of the Bodleian was founded, the Friends of the Harvard Library was established. Within 5 years there were groups at Columbia, Yale, Princeton, and Johns Hopkins.

County libraries, like city library systems, have the same need for friends groups and the same appeal to the community. They also find the same advantages and disadvantages in such organizations. If the county is large and subdivided into many disparate communities, the problems of coordination may be complex.

State organizations, unless the incentive is strong, are difficult to organize and keep alive in the face of communication difficulties and the other obstacles imposed by geography. In a small, homogeneous state these may be overcome. In a larger state composed of communities varying widely in national background and in economic and social conditions, it usually requires an emergency to bring a friends group into being. The first reported state organization derived its income from gifts and bequests instead of dues. It was the Massachusetts Library Aid Association incorporated in 1918 "to aid libraries, to provide lectures, instruction and social meetings in cooperation with libraries."

The first friends group known to have been organized in the south was the North Carolina Citizens Library Movement, founded in 1927. Many of the state groups were formed to promote library service to rural areas and to foster general library development. Although independent groups exist, the state friends now tend to ally themselves with the state library association. Independent groups often affiliate with the state library trustee association.

Despite the early beginnings, interest in the friends movement apparently did not spread rapidly through the library world. One interested in Friends of Libraries would search in vain through the early indexes to periodical literature for the term. In the *Readers' Guide to Periodical Literature* of the pre-1920s, he would find "Friends of music, Society of the," "Friends of Italy, Society of the," and Friends of American art, of our native landscape, of medical progress, and of the Mexicans. Not until the 1925–1928 cumulation would he receive any encouragement in his search; there he would find the entry "Friends of reading." In the July 1935–June

1937 cumulation he would at last come on the heading, "Friends of the library," and below it, references. One cited an article on friends and memorials in the *Wilson Bulletin* for September 1935; the other two referred to *Library Journals:* April 15, 1937, for an article on Friends of the M.I.T. library; and May 15, 1937, for one entitled "When a Library Needs a Friend." The July 1931–June 1934 cumulation of the *International Index to Periodical Literature* indexed the *Library Association Record's* account of the first annual meeting of the Friends of the National Libraries under the name of the group.

At about the same time—1934—the heading "Friends of the Library" appeared in the *ALA Bulletin* index.

In the late 1920s and early 1930s the American Library Association was also feeling the need for friends. A Special Membership Committee, which in 1929 set out to promote sustaining and contributing memberships to advance the association's endowment plan, found that it faced a public blissfully unaware of the ALA. To create an interest that would persuade the laymen to take out a $25 or $100 membership in those depression days required a program of public education.

Accordingly, the committee sponsored a luncheon meeting in New York and another in Chicago at which prominent and wealthy people were told of the association's program and its need for increased revenues. In addition, luncheons were held at the annual conferences to recognize the contributions of library donors and to enlist the aid of public-spirited citizens. The committee reached the goal set for the endowment in 1931 and also the determination "to keep American Library Association Friends informed and interested and to cultivate new friendships for libraries and the association."

A few years later at the Montreal conference in 1934 the Special Membership Committee proposed a program for encouraging establishment of Friends of the Library groups in public and academic libraries by helping to publicize the purpose and activities of the friends. The committee hoped to act as a Friends of Libraries information clearing house.

Two free publications issued by the ALA appeared in 1935: the first edition of *Friends of the Library Groups*, a handbook; and *Remember the Library*, a leaflet encouraging gifts to libraries. Since that time a variety of publications relating to Friends of the Library have been published by the association in the effort to supply information on existing groups, to encourage the development of new ones, and to improve their programs and objectives.

The Special Membership Committee became the Friends of Libraries Committee in 1937, and in 1940 it revised its purpose. Solicitation of memberships or funds was exchanged for the encouragement of the organization of citizen groups to cultivate citizen interest, support, and understanding of library services and needs, and the consideration and recommendation of ways and means to correlate and develop the interest of such groups in the library. The Friends of Libraries Committee now functions under the Public Relations Section of the Library Administration Division.

Although this committee has worked through the years to discharge its mission, the basic problem of communication still exists. Many friends groups have no contact with the American Library Association. Individual members of a friends organization, vitally interested, will come to meetings of the Friends of Libraries Committee when the annual ALA conference is held in their area. They are often bewildered by the conference structure and disconcerted to find that the Friends of Libraries Committee is made up for the most part of librarians. Because it usually features a distinguished speaker, the annual luncheon sponsored by the Friends of Libraries Committee is a popular one. It plays an important role in focusing attention on friends of the local library despite the fact that the luncheon speaker as a rule does not take Friends of Libraries as a topic. The local friends groups often help with arrangements for the committee's conference program meetings. The most popular of these sessions are the practical demonstrations of what friends have done and how they do it—in short, a workshop approach.

Communication between groups of friends and with the ALA, however, cannot be said to be organized. The question of how to locate friends groups and who they are and where they are has been a perpetual problem to the Friends of Libraries Committee. Yeoman efforts have been made to establish directories, but the committee is always sadly aware that returns are incomplete and that much of the information will have changed before it can be published.

Because the American Library Trustee Association (ALTA) is the only division of ALA whose program is directed specifically to lay activities and because, in the main, its members are trustees and not librarians, it is only natural that many friends find membership in ALTA a welcome means of satisfying their desire for participation in library activities on a larger scale and of improving their knowledge of matters of present concern to libraries and their citizen supporters. ALTA also sees a welcome and natural alliance between friends and trustees and has encouraged enrollment of friends in the ALTA ranks. The Friends of Libraries Committee, however, has pointed out that since there are good reasons for friends of individual libraries cooperating with the trustees but remaining independent of their control, the same pattern of independence should be followed in the association. ALTA could argue in turn that because friends of a library should also cooperate with the library administration but not be a part of it, they are not properly members of a committee in the Library Administration Division. The discussion has remained academic however.

The proposal to establish a group of friends for a given library or group of libraries may come from a variety of sources: the librarian, the trustees, a college alumnus or alumnae association, or one, two, or a group of interested citizens who are convinced of the need for good libraries and who are willing to contribute money, materials, or service to help meet that need.

In any case, to ensure essential cooperation from the outset, the librarian must support the proposal. So must the library's governing board. A group cannot befriend a library unless the board, the librarian and staff, and the friends themselves understand and accept their position and obligations.

The next step is the organization of a planning committee. In many instances the librarian may call an informal meeting of a few leaders in the library's community of service, asking them to recommend potential members of a planning group and to suggest organizational procedures.

Small select groups of friends may proceed from this point by determining dues and objectives, preparing a proposed constitution or set of bylaws, and selecting a chairman or cochairmen in whose name membership invitations will be issued. Election of permanent officers as well as discussion and adoption of the constitution and bylaws will follow response to the invitation. This procedure, or one relatively similar, should be followed only if the objective is a small body of friends whose interest and fortune will support large annual contributions.

In most cases, however, the informal meeting with the librarian results in the formation of a planning committee. The librarian or trustees can move directly to this point without the informal consultation described, but the backing, understanding, and cooperation of a few respected community figures will do much to assure the enlistment of well-qualified recruits in the planning committee.

Once formed, the planning committee—which should not be too large—must set the time, place, and form of the first meeting. These considerations may have a profound effect on the composition of the friends. Few businessmen will come to an afternoon tea. If the rank and file of the community are to be asked to support the friends, the organization should not be launched at an expensive dinner. On the other hand, either the tea or the dinner might be eminently suitable as attractions to other prospective members. Public libraries usually hope for broad representation in their groups of friends. Therefore, the planning committee in this instance should attempt to invite a cross section of the community to the first meeting. Organizations are helpful in providing this cross section. Enthusiastic delegates from women's clubs, labor unions, service clubs, fraternal groups, business and professional associations, parent-teacher associations, national societies, church-related groups, and so on, will be invaluable in promoting membership in the friends by carrying the message back to their respective colleagues.

The planning committee in addition must decide how invitations will be issued—by letter, telephone call, or personal contact, who will preside at the initial meeting, and what will be the agenda. Someone must be chosen to present the proposed organization: what are the friends, what do they do, and what is their objective? Shall the organization take place at the initial meeting or later? A resolution to form a group of friends of the library in question would be fitting action for this first meeting. Whatever procedure is chosen, before much time elapses, the friends must adopt a constitution and bylaws, determine dues, elect officers, form committees, schedule meetings, and plan programs.

Outlines of steps to be followed in organizing a Friends of the Library group plus sample constitutions can be found in materials issued by the ALA. These materials will lead the reader to practical accounts of friends groups and their organization at individual libraries. Indexes to the library press should also be examined.

Since there are many kinds of libraries with many kinds of needs and there are many kinds of people who are concerned about libraries, it follows that details of organization, objectives, and activities of friends will vary. Sample constitutions and bylaws will suggest the elements usually considered helpful. A wise move and one which should be made early is the determination of the tax status of the organization. A group of friends should first incorporate as a nonprofit corporation and seek tax exemptions under Section 501(c)(3) of the Internal Revenue Code of 1954 as amended, at the same time making every effort to avoid classification as a private foundation. If tax exemption is granted, the corporation can accept funds and administer them on a tax-free basis. Because conditions governing incorporation vary according to state laws, each friends group would be wise to seek local counsel concerning its particular status.

Basically the dues asked by various groups depend upon the philosophy of the organization and its objectives. A small group must demand substantial membership dues if it is to carry on substantial programs; without question, large dues will limit the number of members. A broad-based organization, hoping to enroll people throughout the community, will establish modest fees or offer several categories of membership with dues at various levels.

The small group with a necessarily select membership is usually formed around rare books centers or university and research libraries, and in most cases the efforts of the friends are directed toward enrichment of the collections.

Public libraries and many college and university libraries feel that membership in their organized friends must be available to the majority of interested citizens in the community they serve. Although the activities of such groups are sometimes concerned with the enrichment and development of the collections, more frequently they are directed toward improving the library's physical facilities, increasing its financial support, or lobbying on legislative matters pertaining to libraries. Objectives such as these require a large and representative membership.

Before finally establishing dues, the friends should have their operating expenses fairly well outlined. Printing, postage, and programs cost money and may well consume an inadequate treasury. In addition an organization of any size or one with an ongoing program will soon find it essential to establish an office and hire a secretary to maintain records, handle mailings, and cope with the various daily problems of an active organization.

Annual dues in existing groups range from 1 dollar to several thousand. The folder *Suggestions for Friends of the Library*, based on one issued by the Colorado State Library in 1961 and included in the Friends of Libraries kit available from ALA, suggests that a dues scale is "often $1.00 with graduated amounts for Associate, Sustaining and Patron members." Another folder, *Friends of Libraries—Friends in Deed*, given by the Friends of the Dallas Public Library and included in the same kit, declares that dues may include such memberships as:

Student	$ 1.00
Regular	5.00
Contributing	25.00
Supporting	50.00
Sponsor	100.00
Patron	500.00
Life, individual	1,000.00
Life, industry or business	5,000.00

Friends of university and college libraries or of rare book libraries as a rule tend toward a somewhat higher dues scale. Average dues are likely to run around $10 annually. Friends of the Columbia Libraries may choose one of three classes of membership: contributing, not less than $25 a year; sustaining, not less than $50; and benefactor, not less than $100. "Columbia officers of instruction and administration, including trustee and presidential appointees of the staff of the Libraries," who wish to join the friends are asked for an annual contribution of no less than $15. A few groups, devoted to increasing the rare book and manuscript holdings of their chosen library, set a membership fee of $1,000 or $2,500.

Before collecting dues, the group must determine its membership year and make certain that persons who join understand it clearly. It is also important to send members some evidence of their payment of dues, probably a membership card.

Friends by any name will smell as sweet. Although the conventional name for these organizations is the Friends of the _____ Library, some groups substitute the word "Associates" or "Fellows" for "Friends." There are also such variations as the _____ Library Club, _____ Library Society, and so on.

Tangible rewards tendered friends vary as widely as do the names of groups and their dues. Strangely enough, in the accounts of how to organize the Friends of a Library, mention is seldom made of what return should be made to the generous men and women who will contribute their time, energy, and talent to further the library's aims. This is largely due to the scarcity of uncommitted funds available to most libraries and to regulations governing expenditures of money. So small an item as coffee to grace a meeting may have to come from the personal purse of the librarian or the staff. Little wonder that lavish banquets or valuable keepsakes are rarely proffered a library's friends. This has proved no deterrent to the growth of the movement however. People who are interested in the improvement and development of libraries are seldom seeking material benefits, although some few may hope to find the organization a stepping-stone to civic prominence, to acquaintance with social leaders, perhaps even to political office.

Friends of the Bodleian declare the privileges of members in their first and successive annual reports:

> Members receive free of charge the *Bodleian Quarterly Record*, are admitted without payment to those portions of the Library which are open to the public,

> and by arrangement to other portions not ordinarily shown to visitors. The names of the Friends of the Bodleian will be inscribed in a special Register, which will be exhibited in the Library. *Membership does not confer the privilege of reading in the Library; but Members who wish to become readers are asked to communicate with the Secretary, who will take the necessary steps for their admission.*

Privileges of the Friends of the Columbia Libraries are set forth in the issues of their publication *Columbia Library Columns:*

> *Invitations* to exhibitions, lectures and other special events.
>
> *Use of books* in the reading rooms of the libraries.
>
> *Opportunity to consult Librarians*, including those in charge of the specialized collections, about material of interest to a member. (Each Division Head has our members' names on file.)
>
> *Opportunity to purchase* most Columbia University Press books at 20 percent discount (if ordered via Secretary-Treasurer of the Friends).
>
> *Free subscription* to *Columbia Library Columns.*

Below this list of privileges, Columbia's Friends are reminded that "They are asked to assume no specific obligations" but that they are relied on for their friendship to the institution and its ideals. Should a friend wish to express his support through a yearly gift of money or materials, he will have given "tangible indication" that the "program to arouse interest in the pressing needs of the Libraries has been successful."

Although the various informational materials issued by or about friends seldom mention it, members will usually receive the library's annual report (if one is published for distribution) and announcements of lectures, exhibitions, film programs, book fairs, and other special events. It is not unusual for the library to offer friends a preview of an exhibit, or if the library issues a newsletter or periodical, it may also be sent to the friends. Many friends groups create their own privileges. They publish their own periodicals, facsimiles, reprints, and keepsakes; they sponsor lectures, tours to special libraries, exhibits or related events that are open to members only or are offered to members at a special rate. Activities such as these create privileges; therefore, tangible returns to a member depend upon the imagination and interest of the group, its objectives, the kind of library to which it is attached, and its financial resources.

The privilege common to all friends, however, and the one that is sought by the majority of members, is the furthering of their own commitment to the preservation and dissemination of man's recorded thought and association with others interested in the preservation and communication of human thought.

Libraries differ in their programs, collections, and needs; their publics vary in the informational resources available to them, their desire for the development and enrichment of those resources, and in their willingness to support better services; their friends differ in interests, industry, and resources. It is obvious therefore that the objectives established by individual groups of friends will also differ. Consider

the following objectives drawn from actual constitutions and bylaws formulated by friends of various college and research libraries:

> The primary objective of the Society shall be to promote the acquisition by the . . . Libraries of printed books and manuscripts of historical, literary, or archaeological importance . . . . The Society shall also have power to lend its assistance in advancing the interests of the . . . Libraries in any other way which may be thought desirable. . . .
>
> The Society will be prepared to assist in procuring photographic reproductions of books or papers of which the originals have left or are likely to leave the country, or of which for other reasons it is thought desirable that reproductions should be made.

* * * * *

> The object of the Society shall be to benefit the Library of the University . . . in any possible manner, more especially by raising funds to be devoted to the use of the Library. All income of the Society over and above the funds required for the operating expenses of the Society, shall be used for the purposes of the Library.

* * * * *

> The Society was founded . . . with the object of providing a permanent income for the purchase of rare books and manuscripts . . . where the statutable funds of the Library are insufficient for the purpose.

* * * * *

> The purpose of the Association shall be to maintain an organization of persons interested in books; to assist in bringing to the Library of . . . [the] University funds for special needs beyond the command of the Library Budget; to encourage gifts of books and manuscripts; and to cooperate with the Librarian and the Library Advisory Board for the development of the resources of the Library under the direction of the Library Committee of the Board of Trustees . . . .

* * * * *

> The purposes of the Friends organization are to promote and further among the alumni and the public an interest in the Libraries . . . . to provide ways to give them a fuller understanding of the role of the research library in education, to serve as a medium for encouraging gifts and bequests in support of the . . . University Libraries, and generally to assist . . . [the] University in showing through exhibits, programs, publications, and by other means the resources of the University and its Libraries.

* * * * *

Contrast the purposes above with the following, formulated by friends of public libraries—both county, city, and state:

> To maintain an association of the persons interested in books and libraries; to focus public attention on library services, facilities, and needs; and to stimulate gifts of books, magazines, desirable collections, endowments and bequests.

* * * * *

To maintain an association of persons interested in books; to create an awareness of the opportunities offered by the . . . Public Library; to increase its facilities and services; to focus attention upon library needs and to enrich the cultural advantages available to the citizens . . . .

The activities of the association shall include the securing of materials which are beyond the command of the ordinary library budget and the sponsoring of such projects as discussion groups, lectures, exhibits, books talks and children's story hours and to stimulate endowments and bequests.

* * * * *

To assist organized groups of . . . citizens in cultivating interest, support, and understanding of library services and needs; to encourage the formation of such groups, and to recommend ways of correlating and developing their interest in libraries.

* * * * *

To foster and stimulate interest in the community in the needs and services of the . . . Public library.

To enrich the cultural and social life of the community.

* * * * *

To promote the resources and services of the Library system for the benefit of the citizens of the State.

It accomplishes this purpose by encouraging the contribution of funds and library materials that are beyond the command of the conventional library budget.

* * * * *

From the comparison of these statements it is easy to see why most writers on the friends movement state as a general principle that friends of research, university, and college libraries are for the most part concerned with the enrichment of the collections through gifts of rare books, manuscripts, or money. Public library friends, on the other hand, are usually more concerned with greater financial support of their library system, new or improved buildings and equipment, promotion of greater public understanding of library services and needs, and extension of the library program. This does not mean that the university and college friends never concern themselves with buildings or services or that public library friends have no interest in rare books and manuscripts; in general, however, the contrast is true, although like most generalizations, it can be disproved when applied to individual cases.

The suggested bylaws for friends of a public library and for friends of a college library, included in the kit of materials on Friends of Libraries issued by the Friends of Libraries Committee of the Public Relations Section of ALA's Library Administration Division, bear out this difference in purpose.

The bylaws suggested as a guide in organizing a group of friends of a college library contain a statement of purpose as follows:

> a. To encourage understanding and appreciation of the work of the college library.
> b. To build up a greater realization of the importance of the library to the future development of the college and the community.
> c. To attract bequests and gifts of books, manuscripts, money and other appropriate materials beyond the resources of the library budget.
> d. To serve as a medium through which friends of the library may become acquainted and share their enthusiasm for books.

Public library friends will find the purpose quoted below in Article II of the bylaws suggested for them:

> The purpose of this organization shall be to maintain an association of persons interested in libraries; to focus public attention on the library; to stimulate the use of the library's resources and services; to receive and encourage gifts, endowments and bequests to the library; to support and cooperate with the library in developing library services and facilities for the community; to lend legislative support where needed; and to support the freedom to read as expressed in the Library Association Bill of Rights.

Despite individual differences it will be seen that most groups of friends have one or more of these aims in common: the increase or enrichment of the library's collections through gifts, endowments, and bequests; the encouragement of wider understanding of libraries and their services; and the provision of a meeting ground for those interested in books and reading.

Although libraries see the gifts of books or money for the purchase of materials as augmenting the library's regular income, trustees and government agencies as well as the public must sometimes be reminded that the friends are not organized to assume the city, county, state, or other responsible body's obligation to finance their libraries. The friends supply the extras that turn adequate libraries into superior ones.

The Friends of the Public Library of South Australia clearly saw the danger of assuming the taxpayer's burden and referred to it in the short history of their organization compiled by Ian Buttrose and published in 1950.

> Towards the end of 1935, the very important question arose as to what should be the future policy of the Society as to the purchase of books.
>
> It was pointed out that it had been emphasized at the beginning and throughout the life of the Society that it was not to take the place of the reduced Government Grant, but that, in spite of that reiterated statement, the Society's present practice of buying what might be called "bread and butter" books was, in fact, arriving at that result, and that so long as the Society continued to do so, the argument for the restoration of the Grant was to some degree defeated. On the other hand, if the Society adopted a definite attitude now and decided to buy only luxuries, the Library might be left without real necessities, and in fact, the appeal for funds to the public has been based on the cry that the Library needed essential books.

In corroboration of this viewpoint, the author goes on to point out that the function of the Friends of the Bodleian was not "the filling of ordinary gaps" but rather to help the library acquire rare or unique pieces as well as books of exceptional beauty or interest, which would not come to the library in the natural course of acquisitions.

An active group of friends is an interested one; an interested group is an active one. Objectives to a great extent determine the kinds of activities in which a given organization will engage. Forceful leaders can often be the determining factor. The wise librarian who would see the friends energy used in ways most productive to the library's aims will play an important, if sometimes unobtrusive, role in the selection of activities.

A survey made by the ALA Friends of Libraries Committee, published in June 1967, disclosed some of the projects undertaken by groups in thirty-three states. Friends reported that they had:

> Worked on a new building campaign, planned branch libraries, provided a children's room, commissioned murals for a children's room, remodeled a room to house a local history society.
>
> Bought microfilm, purchased special collections, increased reference collections, supplied magazine subscriptions, increased branch library collections, established circulating art and print collections, supplied classical records, sponsored rare book rooms, purchased furniture and small equipment including charging desks, card catalogues, and book drops.
>
> Contributed to state library associations legislative fund, carried on legislative campaigns for state and federal funds, appeared at budget hearings in support of their library, met with county commissioners regarding more adequate quarters for the library, financed court action to test validity of the bonding power law.
>
> Obtained bookmobiles, carried on five-county bookmobile projects.
>
> Provided truck and driver to move books to the library's new building.
>
> Encouraged memorial gifts of books and establishment of memorial collections, promoted bequests to library among lawyers and bank officials.
>
> Collected local history, established local history collection, produced documentary on local history, taped oral history.
>
> Underwrote hospitality for library programs, sponsored cultural and educational programs, concert series, travel programs, classic movie series, other types of film programs, art seminars, colloquia, forums, local artist shows, reading and discussion groups, book reviews, and little theatre groups.
>
> Organized exhibits of rare books, art, printing; secured space for library exhibits "downtown."
>
> Supported National Library Week, arranged NLW events, sponsored Children's Book Week, summer reading program, and story hours.
>
> Provided library service to shut-ins and to hospitals; operated program for the mentally retarded.
>
> Fostered interest in the library and promoted its public image; maintained speakers' bureau; carried on library liaison with the schools; prepared TV, radio, and newspaper publicity; sponsored daily radio spots.
>
> Sponsored authors' luncheon or "night," old timers' tea, open house, garden tours, dinners, and receptions.
>
> Supplied volunteer help for mending books, filing, shelving, and inventory; drove bookmobile and conducted story hours; "kept library open."

Sponsored book awards, essay contests, writing contests.

Raised money for the library, held annual book sale, print sales, "around-the-world flea market," rummage sales, card parties, bake sales, and dances; sold postcards of library and bookmarks.

Maintained community calendar of events.

Aided in recruitment program, gave library fellowships and scholarships as well as scholarship loans.

The list gives some idea of the wide range of activities in which groups of friends engage. Campaigns for new or better buildings and for increased operating funds appear repeatedly in the survey, mute evidence of the needs afflicting so many types of libraries. The ALA Friends of Libraries' kit contains a 4-page folder prepared by the Friends of California Libraries, Inc., entitled *How to Promote Passage of Bond Issues for Library Building*.

Book sales also appear frequently in the list of reported projects, sometimes characterized as annual events. In some cases it is stated that the sale is held for the benefit of the library; in others it may be assumed that profits go into the friends treasury to finance their operations. Another Friends of California Libraries folder, included in the ALA kit, gives suggestions and procedures to groups contemplating a used-book sale.

As the survey indicates, the growing interest in local history and in oral history has prompted some friends to move into this area. Again the ALA kit with another Friends of California folder, *How to Collect Local Lore and Oral History*, supplies basic information for such projects.

A surprising number of groups reported that they sponsor art shows and establish and maintain circulating collections of framed paintings and prints.

Another activity on which the Friends of Libraries kit gives special help is one that is not common among friends groups but which has been tried, notably in California: the sponsorship of a Junior Friends. According to the kit, this is a movement "which will enrich the children involved, stimulating an interest in books and study and perhaps in librarianship as a career."

Exhibits of rare books and manuscripts given to the library through efforts of the friends; programs featuring writers, collectors, historians, printers, type designers, and calligraphers; tours of other libraries or of plants specializing in fine printing or binding; and similar pursuits related to the world of books and reading characterize programs of some university Friends of Libraries groups.

Any report compiled from a questionnaire raises doubts in the mind of the fascinated reader. What of the library whose friends report that they "play bridge or auction." Or the one whose friends "assist the library board and library." Many friends do assist the board and the library. There is the group that declares it has a goal of 2,250 members, which would ensure an income-producing endowment of $337,500; the one that reports the passage of a million-dollar building program referendum through a campaign financed entirely by the friends; or the one that secured the first state and federal aid under the first Library Services and Construction Act.

The activities of friends are to some extent indicative of the size of the community and the library: smaller groups are more likely to be involved in rummage sales, bake sales, volunteer help, and similar programs. Larger public libraries and university and college libraries will probably attract groups that are more interested in enlarging the collections of rare and fine books and of manuscripts.

Deserving special mention and separate consideration are the publishing activities of Friends of Libraries. The products can be divided broadly into six categories:

Bookmarks
Membership promotion materials
Announcements and programs
Newsletters and periodicals
Annual reports
Catalogs, reprints, keepsakes

Beyond this the publications differ so widely in purpose, production methods, cost, and quality that they defy comparison.

Bookmarks are seen as a natural medium to attract a reader's attention. Among groups who have issued attractive, well-produced examples of this format to promote membership are the Friends of the San Francisco Public Library and the Friends of the Library of Hawaii. The Friends of the Anaheim Public Library used a bookmark to call attention to the need for "books, games, records, puzzles, and magazines" for their book sale.

Membership promotion pieces vary widely but as a general rule include a statement of the purpose and accomplishments of the friends and a membership form. Some pieces are accompanied by a return envelope. The Friends of the Library of Hawaii issued an attractive folder using the same stock, type, motif, and colors of their bookmark. The San Francisco Friends used the same illustration that embellished the bookmark mentioned above on a membership invitation and application. A three-fold pamphlet issued by the Friends of the Albuquerque Public Library described the services of the library, gave the branch locations, and promoted gifts of books as memorials; in addition, it presented a statement about the friends, listed the schedule of dues, and included an application form. The Denver Public Library has issued a variety of such pieces in widely different formats appealing to many different tastes. Friends of the Greenwich Public Library borrowed Geoffroy Tory's "F" and "L" for their beautifully designed red and black folder "Make It a Capital Letter." A matching bookmark was enclosed inviting the potential friend to leave his name, address, and telephone number at the circulation desk.

A folder issued by the Friends of the San Francisco Public Library was designed to attract corporation memberships of $250, $125, and $10. The cover title, "90 Seconds Between You and a Good Investment," referred to the reading time. The businessman who used the 90 seconds to read the folder was told briefly but clearly what a thriving library does for his business and for his community; what the friends do to help the library; and why the library needs his help. At the end of

this message, he found a two-sentence paragraph: "It took you just 90 seconds to read this brochure. It will take you less than half that time to fill out the application on the following page." A fine piece of typography, the broadside invitation to join the Friends of the Library, sponsored by the Humanities Research Center, University of Texas at Austin, stressed the benefits offered to a member of the friends.

Programs and announcements cover a wide range of formats and subjects: invitations to annual dinners, lecture series, or exhibits; calendars of events; reminders of a state library workshop; and descriptions of a memorial book programs, sometimes accompanied by appropriate bookplates. Their content and appearance reflect the objectives and activity of the sponsoring group, its sophistication, and its financial resources.

In the survey made by the ALA Friends of Libraries Committee, a great many groups reported that they published a newsletter, bulletin, or journal. Frequency of issue varies: monthly, quarterly, six to eight times a year, semiannual, and annual. The newsletters published at frequent and regular intervals tend to be letter size or legal size with a printed heading, and text produced from typed camera copy. Some are written in a chatty and informal style; others are more objective, following a journalistic style. There are groups that issue typeset bulletins of pamphlet or booklet size. Still others produce scholarly periodicals. An example of the latter class is *Books at Iowa*, published twice a year by the Friends of the University of Iowa Libraries. Its contents might include an illustrated article describing an unusual item or collection recently added to the holdings; brief descriptions of other acquisitions in a section called "Recent Acquisitions"; a list of the Council of the Friends of the University of Iowa Libraries; a short summary headed "News and Notes," announcing forthcoming friends events; and a schedule of membership dues. Authors of the articles are chiefly members of the university staff although authors from other institutions also appear. *Columbia Library Columns* began publication in the fall of 1951 with three issues a year. Through the years this journal has presented a succession of articles on the rich and varied acquisitions of the Columbia Libraries and on other book-related subjects, written by members of the university staff and of the friends. With a roster of members that over the years has included such names as Gordon Ray, Jacques Barzun, August Heckscher, Mrs. Donald Hyde, Norman Cousins, Clifton Fadiman, and Virginia Gildersleeve, the quality of the contents is guaranteed. To put out a creditable newsletter, bulletin, or journal, it is not necessary to have writers, scholars, and other leaders on the membership rolls, although it is undeniably a help. It is essential, however, to fit the production to the resources, skills, and money available to the issuing group as well as to the need to be filled.

Publication of yet another distinguished journal, the *Library Chronicle*, issued by the Mirabeau B. Lamar Library and the Humanities Research Center at the University of Texas, is assured through friends support. Well-designed and illustrated articles in the *Chronicle* appeal to collectors, bibliophiles, librarians, and scholars generally. The friends, who are sponsored by the Humanities Research

Center, also assure publication of the catalogs which, as the membership brochure modestly states, "have been in wide demand."

Like the Texas catalogs, several special publications—some unusually distinctive for their beauty or content—owe their existence to friends. The Friends of the Dartmouth Library announced the 1968 publication of *Studies in Type Design* by Rudolph Ruzicka, wood engraver, illustrator, and designer. Contained in a portfolio, Ruzicka's ten designs, "each suggesting a possible new type face," were reproduced in seven colors plus black.

A copper-colored cover, opening on a full-page portrait of Johann Gutenberg, introduced the reader to *Words That Changed the World*, the catalog of an exhibit of the same name. Both exhibit and catalog were made possible by the Friends of the Dallas Public Library. Eleanor M. Garvey, Assistant Curator of Printing and Graphic Arts at the Harvard College Library, and Peter A. Wick, Assistant Director of the Fogg Art Museum at Harvard, not only planned the exhibit, "The Arts of the French Book—1900–1965; Illustrated Books of the School of Paris," but also wrote the catalog with the same title. Again, both were sponsored by the Friends of the Dallas Public Library. The exhibit was shown in Dallas, March 28–May 6, 1967, and continued at the Sterling Memorial Library, May 22–June 26, 1967. A different sort of catalog is *The James Tice Phillips Collection*, a collection of Hawaiiana purchased by the Friends of the Library of Hawaii and presented to the Hawaii State Library Historical Collection.

An interesting form of catalog and report is the well-illustrated history of the Friends of the Public Library of South Australia, mentioned earlier in this account. Compiled by Ian Buttrose, the book also contains brief descriptions of the most important books presented to the library by the friends during the period 1933–1949. Reports can and do take the form of an issue of the newsletter, a yearly letter, or a special publication.

In 1970 the Friends of the Florida State University Library published a *Catalog of the Negro Collections in the Florida Agricultural and Mechanical University Library and the Florida State University Library.* The two institutions cooperated in building their respective collections, making a special effort to avoid needless duplication of titles. The catalog makes known to scholars the mass of materials available at the two universities.

It should be remembered that friends groups come and go. Moreover, the programs and activities of stable groups change with the times, the aims of the groups and their affiliated libraries, and the talent and interests of individual members. An organization may be blessed with some members who are talented editors, writers, designers, and printers during a given period. As these members grow older, lose interest, move away, or become too involved in other undertakings, the friends may find themselves without similarly talented successors. Publications should be adapted to the changing skills of their producers.

The examples cited in this article have been selected from the many at hand to bring out certain points. Because they were produced at various times, the titles mentioned here may not always be available. For that reason, friends who are

interested in reviewing various kinds of publications should look for the rich supply of samples from groups all over the nation shown at the Friends of Libraries Committee booth at the annual conference of the A.L.A. The Association's Library Administration Division in Chicago can also supply some samples. Even better, it can furnish names of active groups affiliated with the various types of libraries. With a few such names in hand, friends contemplating a publications program would do well to write to their opposite numbers at appropriate institutions, asking for samples and information. In this way, they are more likely to obtain answers pertinent to their particular situation than they would through a wholesale canvass of organizations.

Friends of the family may be very close but they have their place, a place that they must keep if friendship is to last. In the tripartite relationship of library, trustee, and friend, each has a special role with its own opportunities for stardom.

Almost all libraries have trustees who have responsibilities assigned to them by law or under a charter. In some instances they hire the librarian, the person responsible for administering the policies determined by the trustees and the programs they envision. They in turn rely on the librarian for advice and support him and his actions.

The librarian, as indicated above, implements the policies enunciated by the trustees and develops the programs that they outline. As the professional adviser to the board, he recommends both policies and programs for their consideration.

The Friends of the Library cooperate with the trustees and the librarian. In the broadest sense they are the liaison between the public, the trustees, and the librarian and library staff. They are, in effect, a sounding board for the board's policies and programs, a sympathetic and understanding "reactor panel."

Although the friends should be an independent organization—this point can be most important in regard to funds—there must be an established link between friends and trustees. Sometimes a member of the friends attends meetings of the trustees, and a trustee is delegated as the board's official representative to the friends. There is wide variance in both opinion and practice as to membership of trustees and library staff in the friends. Membership of trustees and staff may confuse the public as to the role of the organization, circumscribe the freedom of the friends, and prejudice its position as a pressure group. Since each of the three parts of this library triad has definite responsibilities distinct from those of the other two, it would seem desirable to maintain their separate identities but at the same time to establish open and frequent communication. Only through this exchange of information can the trustees be assured that the friends will not, through incomplete knowledge or lack of understanding, make public statements or take action that may embarrass the board or usurp its authority. Equally important, close liaison can awaken the board to problems in the community that need attention and to the many areas in which friends can be an effective aid in promoting public understanding of the library and community awareness of its services and needs.

Trustees should also remember that friends are there to help, but the most generous and unselfish friends welcome a word of thanks and recognition.

The staff, headed by the librarian, has an important role that is not always seen and performed creditably. They are the primary source of information for the friends—information about libraries in general and about their library in particular. From the staff, friends can learn about the strengths of their library's collections and services as well as its weaknesses and needs. Care must be taken that individual staff members do not intentionally or unintentionally solicit the endeavors of the friends in the interests of a particular department or activitity without the approval of the librarian and the trustees.

Within reason and with the approval of the board and administration, the staff can also relieve the friends of some of the details of running an organization, especially activities that fall within the library's operations such as making the physical arrangements for events to be held at the library.

Friends perform many useful services beyond the unaided capabilities of the board and the staff. Their most important role is the reflection of public opinion. As friends, but not members of the official family, their assessment of the library and its performance is unprejudiced, uninfluenced by the special interests that must of necessity be those of the staff and the trustees. Because of unbiased attitude, joined with a real interest in their library, a steadily increasing knowledge of libraries and library services in general, and continuing investigation into the objectives of the trustees, the friends form an effective pressure group. Again, their lack of self-interest makes them a suitable avenue for the promotion of gifts. Too often the friends are seen mainly as pressure groups or as gift-givers, and their important function as sounding boards of public opinion is overlooked.

One would have to search long and hard to find any public criticism of friends by librarians or of librarians by friends. Somewhat as families may quarrel among themselves but present a united front to the world so, among themselves, friends may criticize librarians and librarians criticize friends, but seldom will one criticize the other to outsiders.

Occasionally, however, a friend, conscious of an understanding listener, will say with a puzzled air: "But our librarian doesn't seem to want a friends group."

In the light of the glowing accounts of what friends have done for libraries, it seems impossible that there would be one librarian, much less many librarians, who do not "seem to want a friends group." Why should there be any such statement?

The answers do not characterize all friends. Nevertheless enough groups have fallen into one or the other of the following errors to make some librarians skeptics.

A prominent librarian, whose library rejoices in an active and colorful friends group with a national reputation, was asked what drawbacks there are to Friends of Libraries. The reply was instantaneous and heartfelt, "They don't mind their own business. They get into things that are not their concern." This is perhaps the greatest and most common drawback to Friends of Libraries—their tendency to usurp the rights, duties, and responsibilities of the trustees and the librarian.

Another common failing can be laid to overenthusiasm. Friends sometimes give misinformation or speak at the wrong times on library matters. Blame for this

failure on the part of the friends can be shared by the trustees and the library staff. Education of the friends is their joint responsibility.

A less frequent drawback but one that is real can be laid to the leadership of the friends—a tendency to blanket library concerns into other concerns. A good example was found in a midwestern library where an active and prominent clubwoman was asked to serve as organizing chairman and first president of a group of friends. Before long the staff and trustees found themselves involved in multiple activities only tangentially related to the library as the friends' president carried on all her many interests in one heterogeneous program.

Another danger, which is also rarely encountered, lies in the financial position of the friends. Occasionally, friends with a large treasury have contributed unwisely to the library or used their funds to give them improper influence. In one instance a group contributed an annual amount to the librarian's salary to hold the incumbent. Upon retirement of the librarian they withheld the extra money from the successor, who did not meet with the group's approval. Financial aid of this kind results in improper intervention by the friends into the prerogatives of the trustees. It is also an intrusion into the rights of the particular library's public, allowing a select group to exert powerful influence on the selection of that public's library administrator.

It has been noted earlier that too much dependence and emphasis on the financial contributions of the friends can be a serious detriment to the library's growth. Trustees, library staff, and public should look upon funds supplied the friends as a means of enriching collections and service, not as replacement of operational funds. The intention of the friends in making gifts is to improve and extend the resources of the library by augmenting public funds. There is, however, a tendency—especially in times of economic depression—on the part of governing bodies who control the community purse to look upon such gift funds as public moneys, relieving the citizens of their responsibility to support the library. Friends, trustees, and staff should engage in a continuing and coordinated program of public education regarding gifts, their purpose, and their importance to the intellectual, social, and economic development of the community.

Friends often rely too heavily on the library for secretarial and other staff help, printing, postage, and incidental expenses. On any sustained basis, staff time for friends' activities can usually be supplied only at a sacrifice to service, as libraries are notoriously understaffed. The more successful the friends organization is, the more burdensome this supporting role becomes. Just as friends contribute their time and talent to the library, so do many staff members give long extra hours to the friends. Contributions on either side, however, must be reasonable, allowing both friends and staff time for personal satisfaction and development beyond the library circle. Moreover, contributions—even small ones—of official time and library funds to the friends and other organizations are frequently forbidden by law or regulation.

To this point the dangers of friends organizations seem on the surface to be attributable to the friends themselves. A deeper look at the points outlined above,

however, reveals that trustees and library staff are joined with the friends in responsibility for any misuse of the friends or misdirection of their activities. Moreover, friends as well as librarians have complaints. It is discouraging, indeed insulting, for a group of interested, capable citizens to offer their services to the library and to be palmed off with such petty assignments as pink teas. Wise librarians and trustees assess their needs and the caliber of those interested in the friends, tailoring the objectives and program they suggest accordingly. Emphasis is purposely placed on objectives and program if a permanent organization is sought. The turnover in friends groups is high because they are often formed to meet an emergency—to lead a campaign for increased operational funds, to aid passage of a bond issue for a new building, to combat a censorship scare. When the crisis is over and the assignment completed, it is not surprising that the group disbands. When the next crisis arises, valuable time must be spent in rebuilding an effective organization. The trustees and the librarian have an obligation, therefore, if they are to presume upon the time and skills of leaders in the community to offer them a continuing program worthy of their talents.

Although much emphasis has been laid on separation of function, Friends of Libraries organizations offer an excellent training ground for potential trustees. Friends are in a good position to observe the performance of trustees in relation to the opportunities open to them and the needs of the library in question. They often have the opportunity to become familiar with library legislation and political procedures. Combined with their own professional skills and interest in library development, they offer the makings of superior trustees. In addition it cannot be denied that the presence of active, politically oriented friends has a salutary effect on incumbent trustees.

Friends, with surprising patience and forbearance, have rallied to the support of their library boards and staffs and have forgiven them their ingratitude. True, plaudits are given to the friends when new buildings are opened or bond issues are carried, but often a word of thanks for less spectacular but equally important steady, faithful support is left unsaid. Most friends admire their librarians and are eager to learn more about the world of librarianship; librarians should be equally willing to admit their ignorance of matters in which their friends may be proficient—advertising or public relations, investments or architecture, computers or air conditioning—and ask for their guidance and counsel.

Few organizations are so well named as the friends of libraries. Just as there are no set rules for friendship, so there are no set rules for good relations between libraries and friends. Trust, understanding, and respect lead to common satisfaction and growth.

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FUGITIVE MATERIALS

If librarianship derives its legitimacy in part from conservation and in part from acting as middleman between available information and prospective user, then handling of fugitive materials is the business of trafficking on the fringe of legitimate information exchange. By definition, fugitive materials evade the curator's efforts at preservation, and they do not readily lend themselves to organization for reuse.

Common examples of fugitive materials include newspaper clippings, photographs, programs, handbills, and posters. Indeed, no meaner source than a *Spectator* author wrote (in 1864) that "the greater part of periodical literature is meant to be, and ought to remain, fugitive." All these classes seem to share a sort of disjointure in the communications process, into which the fugitive materials curator would intrude: the newspaper and handbill are deliberately calculated to be of, at most, a few days' worth. The paper on which they are printed, the manner by which they are distributed, the style in which they are written and documented (or not documented), all suppose rapid assimilation by a known audience. Within a few hours or days they have served their intended purpose. Only when the conservator intrudes with his scrapbooks and vinyl jackets is the system's balance upset.

The librarian may argue in turn that availability of knowledge is always colored by a curator's special perceptivity: he sees in the distant future use for that which is today useless—so he saves.

Another operational definition for fugitive materials (what one *Library Trends* author gingerly labels "fragile, awkward library assets") might be simply "those nonbook items frequently housed in libraries, whose flimsy physical condition and large numbers in unbound form preclude their classification and storage according to systems used for books."

A legitimately published idea is one which is intended to withstand the twin tests of time and diffusion: (1) it has sustained interest beyond its initial propagation—it is repeated by others as interesting or useful; fugitive materials, as a class, fail to meet this test, except in so far as one initial publication is concerned. As well, (2) the published idea bears repeating and is held significant over a considerable period of time; fugitive materials are only immediately useful to their audience and almost as soon lose most of their inherent value.

Ideally, fugitive materials would be stored immediately in their original format, but would require minimal housing space. Items in the file would have been classified and prepared for use in the shortest possible time. In use, they could be searched according to a large number of organically determined parameters. The ideal system would allow for continual easy weeding of items whose value had fallen below a universally accepted threshold of minimum value. Finally, the scope of the system's contents would be known by all potential users of the system.

Good traditional storage and classification practices are spelled out in standard tracts on special materials handling. Among these are Jack Burkett, *Special Materials in the Library* (*1*); R. L. Collison, *The Treatment of Special Materials in Libraries* (*2*); and Donald Mason, *A Primer of Non-Book Materials in Libraries* (*3*). None of these deals with application of mechanical sorting or indexing techniques, which seem to offer the most hope currently to builders of new fugitive materials systems.

The designer of new systems may ask himself the following questions as he approaches his material:

1. Can keypunch equipment be used? Precisely because larger numbers of fugitive items must be cataloged than of booklike materials, use of tabulating

machine equipment suggests itself where new systems are to be designed. Keypunch equipment, while far from being free for the asking, is increasingly available as a tool for other mechanical information processing. As a list-making tool it is presently unsurpassed, providing the basic encoding and reading machinery is available. Note, however, that such memory devices as computers are probably still unwarranted in all but the largest ephemera system applications.

2. Will the material organize itself, or should a classification scheme be imposed? A second systems design concept is to let the organization of the search system grow organically from the way the fugitive materials are already titled or labeled, rather than imposing a system on them. While the resulting scheme may be no more useful than a neat, heirarchical classification scheme, it will certainly take less classification time, and can probably be entered into a system with less-skilled labor. The trade-off is thus considerable sacrifice of classification niceties in exchange for ability to use less-skilled personnel in a faster cataloging process. But the exchange may mean the difference between an operable fugitive materials file and the stacks of dead-stored cartons familiar to all large libraries.

3. Will a very simple classification scheme suffice? Few if any classification peculiarities distinguish fugitive materials handling from any other sort of classification. The common tendency to overclassify items in new systems (until they can be use-tested) can hardly be overemphasized. The relation between over-detailed classification of fugitive materials and failure thereby to keep abreast of acquisitions (most frequently donated) is perhaps the commonest fugitive materials problem. There is, after all, no reason why additional classification may not be done after the system is used, and its additional needs studied in the light of experience.

4. Will a microform prove more useful than the original format for handling and storage? While only large and very heavily used fugitive materials collections will justify acquiring of microform reading, storage, and print out equipment, these like the ubiquitous keypunch machine are frequently already available. The same is often true for service arrangements or equipment to film the materials on a continuing basis. Certainly the most important consideration in decisions to use microforms should be the relative convenience of using them for the application in question. More frequently than not, the original format will prove simpler to use, if bulkier to store.

Case Study: A System for Mixed-Format Fugitive Materials

A university library falls heir to a daily city newspaper drama critic's morgue of about 50,000 items. The collection, filed in 142 scrapbooks, is a valuable record of a city's day-to-day theatre life over 70 years, containing materials from before 1880 and essentially terminating during World War II. Materials are pasted in large format scrapbooks according to a very personalized system, so unpredictable that presumably even later custodians of the scrapbooks did not wholly understand their arrangement. Many items, particularly newspaper clippings and early handbills, are already so fragile that they shatter as the scrapbook pages are handled. In the collection are playbills from the entire period, broadsides announcing performances, clippings, correspondence as letters and telegrams, photographs and additional collected souveniers and mementos (see Figure 1). The problem: To make the collection usable for research work, while preserving the collection's original form and arrangement (one of the conditions of the acquisition).

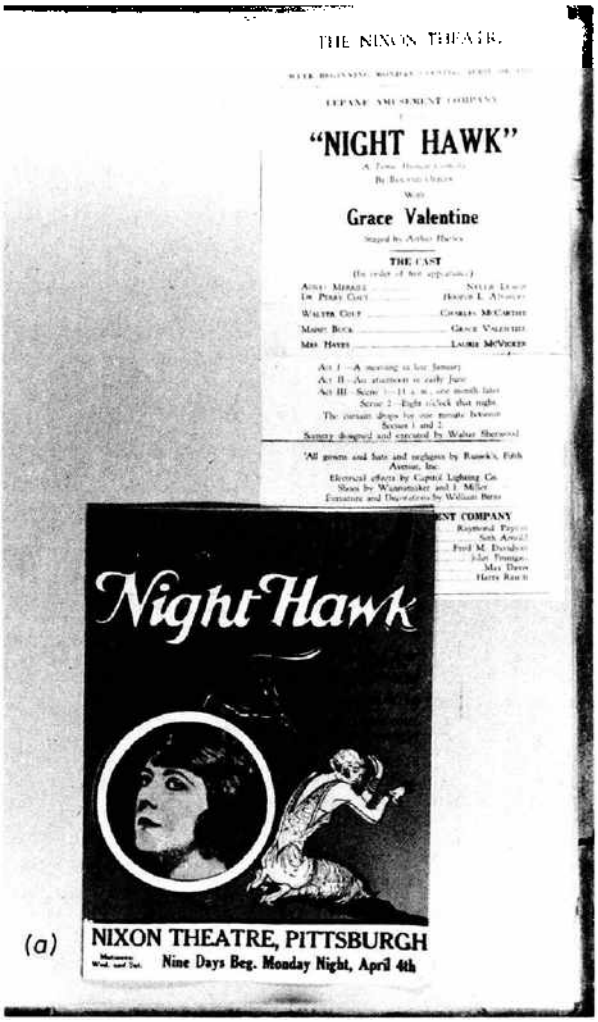

FIGURE 1a. *Original scrapbook page, showing two items. Scrapbook is designated only as "V" (Valentine).*

A work deck of microform images was prepared to reduce further disintegration of the originals from handling and to provide a copy of the whole system for more convenient daily use. A 35mm IBM aperture card for each scrapbook page was the result, 10,400 in all (see Figure 2). Each card was assigned an accessions number as it was photographed: all pages in one scrapbook fell in sequence, so items could later be located by individual scrapbook from the accessions number.

Using the deck of microfilm cards in a reader alongside an IBM keypunch, a technician selected easily definable aspects from every item on each scrapbook page. She encoded: *names* of principals involved without categorizing them as actors, directors, playwrights, etc.; *play titles; performing groups* by name of the group; *theatres* by name and city of location; and a limited number of *miscellaneous* catch words for items, usually newspaper criticism or commentary, which could not otherwise be entered in the system (see Figure 3).

FIGURE 1b. *Portion of another scrapbook page, as microfilmed (Victoria Regina).*

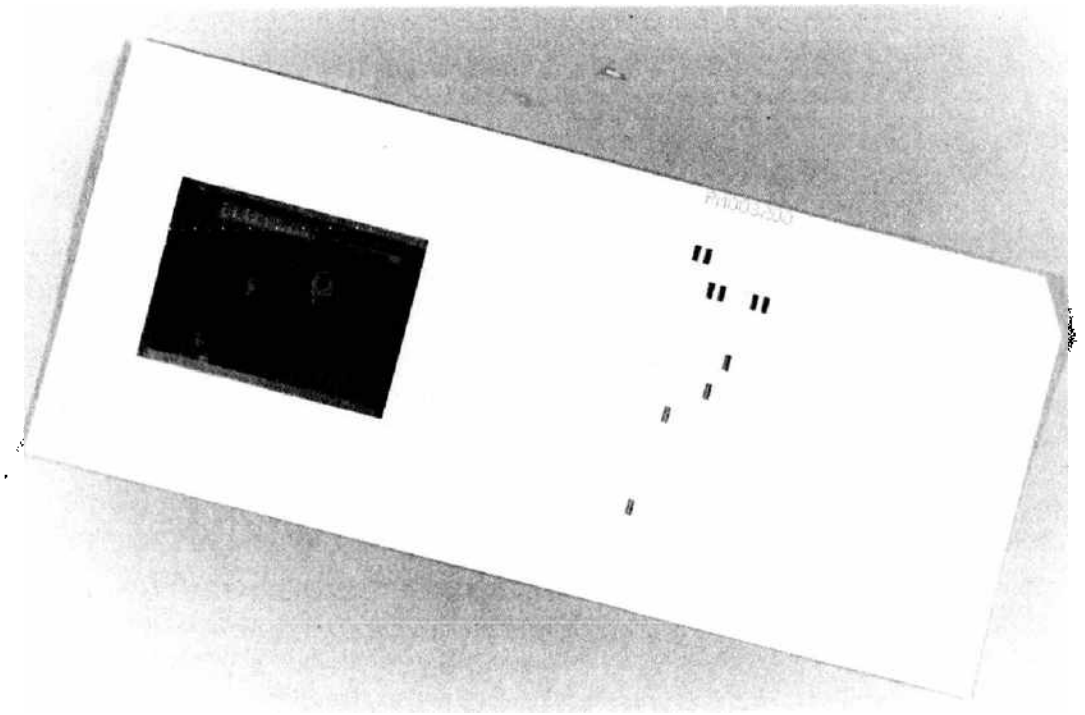

FIGURE 2. *IBM aperture card, bearing collection name and a photographed accessions number. Accessions number is repeated as a punched code in card.*

```
002321 PL FAUST UP TO DATE
008267 PL FAUST UP TO DATE
000365 PL LE FAUX MODELE
000019 PL FAZIO
000020 PL FAZIO
003666 PL FEDORA
009915 PL DER FELDPREDIGER
000391 PL FEMALE DRUMMER, A
002331 PL FEMALE DRUMMER, A
002332 PL FEMALE DRUMMER, A
002341 PL FEMALE DRUMMER, A
002334 PL FEMALE DRUMMER, A * TO 2339
000685 PL FENCING MASTER, THE
ALSO 2322 2323 2324 2325
009684 PL FERNCLIFF
009687 PL FERNCLIFF
004591 PL FICKLE FORTUNE
006998 PL FIDDLE-DEE-DEE
ALSO 7007 9256 9668 9669
002379 PL FIDDLERS THREE
010020 PL FIDELIO
008854 PL FIELD GOD, THE
001385 PL FIFTY MILES FROM BOSTON * TO 1397
002358 PL FIFTY MILES FROM BOSTON
000415 PL FIGHTING HOPE, THE
005186 PL FIGHTING HOPE, THE
008201 PL FIGHTING HOPE, THE
010077 PL LA FILLE DU REGIMENT
001353 PL FINE AND DANDY
002378 PL FINE FEATHERS
003768 PL FINE FEATHERS
008963 PL FINGER BOWLS AND ARAMINTA
005632 PL FIREFLY, THE
009589 PL FIREFLY, THE
006362 PL FIREFLY, THE * TO 6372
```

```
007977 PL FLIGHT INTO CHINA
007978 PL FLIGHT INTO CHINA
007979 PL FLIGHT INTO CHINA
010254 PL FLIRTING WIDOW, THE
002379 PL FLO-FLO
002342 PL FLORODORA
ALSO 7012 8172 8618 8661 9259
002343 PL FLORADORA * TO 2347
002218 PL FLORENCE, MR AND MRS W J *
002357 PL FLOWER GIRL, THE
001133 PL FLOWERS OF THE FOREST
001134 PL FLOWERS OF THE FOREST
001475 PL FLUFFY RUFFLES
006948 PL FLUFFY RUFFLES
005736 PL FLYING DOWN TO RIO
003522 PL FLYING DUTCHMAN, THE
ALSO 3528 3829 5329 8330 9921
002390 PL FLYING HIGH
007693 PL FLYING HIGH
008766 PL FLYING HIGH
002387 PL FOG
002388 PL FOG
002250 PL FOGG-S FERRY
002292 PL FOGG-S FERRY
006714 PL FOLLIES
002487 PL FOLLIES OF 1909
001350 PL FOLLIES OF 1917
003111 PL FOLLOW ME
003112 PL FOLLOW ME
003113 PL FOLLOW ME
005737 PL FOLLOW THE FLEET
001223 PL FOOL OF FORTUNE, A
001248 PL FOOL OF FORTUNE, THE
001249 PL FOOL OF FORTUNE, THE
002385 PL FOOL, THE
```

FIGURE 3. *Sorted and indexed list from "Play Titles" section of index. Sequence is: accessions number, "PL" for play title, and the title, "* to 2339" indicates that all items numbered between 2334 and 2339 refer to the title* A Female Drummer.

The technician had no previous cataloging training or experience. She avoided completely "correction" or updating of names, recording instead only what she saw on the item page.

The results was sorted mechanically and printed out as a book catalog for distribution in other research libraries (see Figure 4). It preserves intact the original collection, and provides a reliable and more detailed indication of the collection's contents than would have been possible using more traditional means.

Users handle aperture cards, from whose images copies may readily be made. If it becomes necessary to inspect the original, that is available and locatable, albeit under more strict control than the openly available microfilm deck. The aperture cards may easily be mechanically checked using a card sorter for items out of order or missing. The system has been in use, at writing, for about 4 years.

New and imaginative approaches to fugitive materials handling are bound to emerge as still-exotic information processing technology becomes more common. The result should make easier the preservation and use of some fugitive materials, and make clearer the distinction between that which is saved and that which is to be discarded.

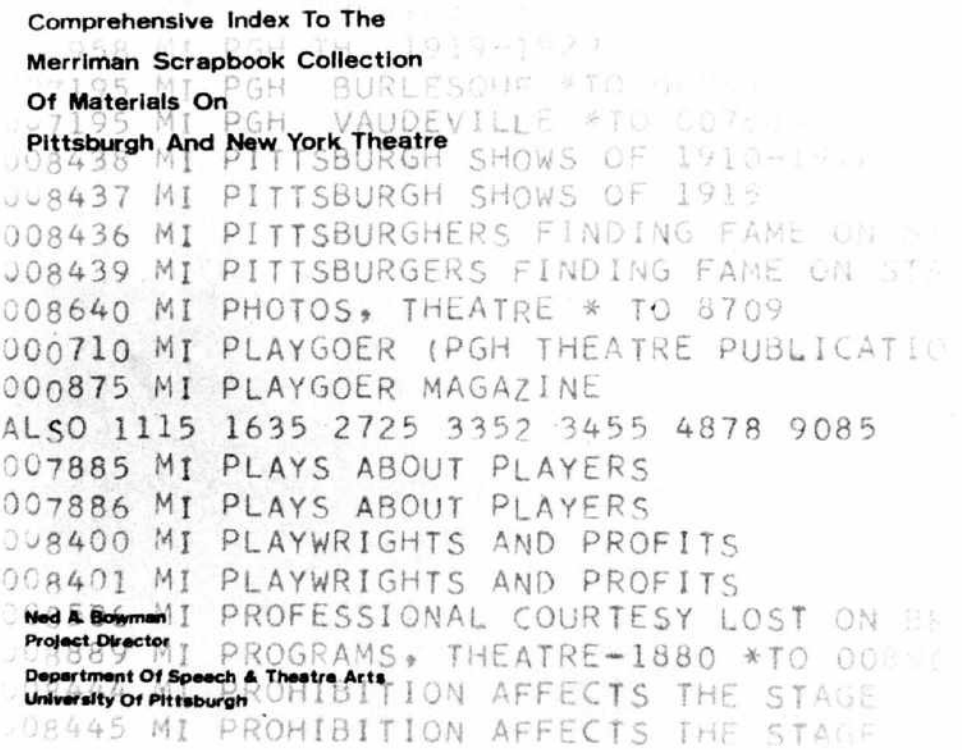

FIGURE 4. *Book catalog to finished system.*

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NED A. BOWMAN

FUNDING: LIBRARY ENDOWMENTS IN THE UNITED STATES

In 1970 generous Americans contributed a total of $18.3 billion to charitable institutions and causes, of which 45% ($8.2 billion) went to religion; education received $3.05 billion; hospitals, $3.02 billion; social welfare, $1.26 billion; and civic and cultural activities, $900 million (*1*). In addition to this current support, these nonprofit institutions, as a group, derived millions of dollars of additional income from gifts and bequests made in the past—the yield from their endowments, or those funds "which a donor or other outside agency has stipulated, as a condition of gift, that the principal is to be maintained inviolate and in perpetuity and that only the income from the investments of the fund may be expended" (*2*). Although there are no current statistics on the total endowment which this country's charitable and cultural institutions possess, in 1949 the estimated value of philanthropic property and endowment was placed at $22,948,000,000 (*3*). Twenty-two years later the total would obviously be much higher, reflecting not only the donations which took place

in the prosperous 1950s and 1960s, but also increased dollar values caused by the general inflationary spiral of the same decades. In fact, by 1970 the endowment of the fifty-two wealthiest colleges and universities alone had reached $8.3 billion (see Table 14).

Philanthropy for libraries falls into the categories of giving for education and giving for cultural purposes. The former embraces the libraries of schools, colleges, and universities; the latter, public libraries, privately-supported research libraries (sometimes called endowed reference libraries), and special libraries which are divisions of cultural organizations like art and natural history museums. Given this diversity, it would prove difficult, if not impossible, to determine with any degree of accuracy the total amount of voluntary support which libraries receive every year. Like other nonprofit institutions they too have endowments which supply them with additional income. However, in comparison with the funds attracted to educational institutions or to hospitals, philanthropy for libraries does not bulk large. There is, however, a long American tradition of giving to libraries—probably most dramatically exemplified by the gifts of Andrew Carnegie (and later the Carnegie Corporation) totaling $56 million for 2,509 library buildings in the United States and in the British Commonwealth (*4*). It is important to remember that one may conveniently divide library philanthropy, like other charitable contributions, into two types: gifts and bequests for current use, and gifts and bequests for capital purposes. The former come to libraries—as they do to other charitable, cultural, and educational institutions—to sustain general operating expenses or to provide for current acquisitions of library materials, for lectures and special events, and for bibliographical activities. In recent years we have also seen a growing amount of library philanthropy to support research in and study of library management and operations, bibliographical problems, and the like—best exemplified by the grants made by the Council on Library Resources since its creation by the Ford Foundation in 1956 (*5*). Gifts and bequests for capital purposes constitute the second main type of philanthropic donations. Most obvious in the library field is, of course, the library building; the many library structures on college and university campuses, in cities and towns, and as part of other cultural edifices like museums, constructed wholly or partially with funds supplied by private benefactors, testify to the lasting appeal of this form of giving. Collections of books represent another type of capital gift—one which is unique to libraries. Often carefully assembled by a bibliophile and then presented *en bloc* to an institution in which he is interested, such resources form an invaluable instrument for learning or recreation. Capital gifts for libraries take still another form in the endowment for library purposes, of which the most conspicuous example is the endowed book fund that provides the library with a permanent source of funds for adding to its holdings: the income from other endowments supplies revenue for general library operations, for staff salaries, for bibliographical studies and publications, and for lectures. Indeed, the combination of a collector's books and his money used to establish an endowment sometimes result in an important institution—the Henry E. Huntington Library and Art Gallery and the Folger Shakespeare Library, to name but two examples.

A comprehensive study of philanthropy and libraries would necessarily touch upon all of the above types of donations and their donors; one hopes that someday there will be, for the library field, a study parallel to that done by Merle Curti and Roderick Nash for higher education (*6*). The present article, as indicated by its title, deals only with one portion of this field: endowments for library purposes. It limits itself to the United States and, although it contains some historical background, does not attempt to study systematically the historical development of library endowments. Rather it seeks to provide some answers to such questions as these: What is the nature and extent of such endowment? How is it distributed among libraries and educational and cultural institutions with libraries? Does endowment income represent an important source of library revenue, and how does this vary from one type of library to another? But, because training of librarians is closely related to libraries and their operations, it does contain one section on the endowments of library schools. Even with these limitations, the task of assembling information remained formidable (*7*). Both the general literature of philanthropy and of librarianship yielded but scattered references to endowments; studies of the financing of educational and cultural institutions similarly offered little assistance; even histories of individual libraries provided little comment on their endowment. Library annual reports, especially those with sections on finance, helped, but when all of these sources failed to supply sufficient information, it became necessary to obtain material directly from individual libraries. Obviously no complete circularization of such institutions could be undertaken, but several hundred questionnaries went to libraries of all types and to all library schools that are members of the Association of American Library Schools (AALS). This study draws heavily upon their replies. For convenience the sections which follow consider each major type of library organization, beginning first with library schools, then moving on to public, college, university libraries, followed by the endowed reference (or research) libraries, special libraries, and library associations. The final section briefly discusses the development of library endowment, but—since little information is available—it draws on only a few cases, although they include some of the institutions with large accumulations of capital. One area the present study does not touch upon, however, is the policies which libraries follow in investing their endowment funds.

Library Schools

Education for librarianship, as exemplified by the library schools which are members of the AALS, has not attracted sizeable amounts of money for endowment, especially in comparison with such other professional fields as medicine, law, and business administration. While one can only speculate on the reasons for the paucity of such support, it seems clear that several factors have played a part. One, of course, is the relative newness of librarianship as a profession; another is the probability that many "book-minded" people have channeled their gifts to libraries rather than to library schools; the small number of graduates of library schools and

their relatively low salary levels have limited the possibilities for raising capital funds from them. Moreover, many library schools operate in publicly rather than privately supported universities, which traditionally attract less philanthropic support—especially in the form of endowments. Thirty-six universities (twenty-two public and fourteen private) reported on endowment of their library schools; sixteen (eleven state and five private) indicated that they possessed no endowment, while nine private and eleven state-supported institutions reported some endowed funds. As shown in Table 1, this capital ranges from $1,234 to $2,849,554; the average comes to $254,831 or to a more typical $81,849, if one excludes the large fund at the University of Chicago. It is interesting to note that while Chicago and Columbia, the two most heavily endowed institutions of the group, do also have the largest endowments for library education, there is no general correlation between an institution's rank in endowment and its rank in capital for library education; of the ten largest institutional endowments show in the table, only four (in addition to Columbia and Chicago) have one of the ten largest endowments for library education. In fact, the ten largest library school endowments (in descending order: Chicago, Columbia, Atlanta, Syracuse, North Carolina, Michigan, California–Berkeley, Denver, Illinois, and Case Western) total $4,955,722 or 94% of the grand total in the twenty universities. One might expect this marked concentration of endowment, because university endowment in general tends to be concentrated in a relatively small number of institutions with very large capital.

By size the twenty fund groups are distributed as follows: only one school—Chicago—possesses an endowment greater than $1 million; one (Columbia) falls between $500,000 and $999,999; four range from $200,000 to $499,999; three are between $100,000 and $199,999; and the remaining eleven are less than $100,000 each.

The largest single source of endowment for library schools was the Carnegie Corporation, which between 1917 and 1940 made gifts which totaled $2,075,000 to ten library schools (Table 27). The largest of them was, of course, the 1926 grant of $1 million to endow the Graduate Library School at the University of Chicago; the other large amount consisted of gifts ($250,000) to the School of Library Service at Columbia. With the general increase in investment values which has taken place since World War II, nearly all of these funds now have considerably higher book value and/or produce much larger returns than would be expected on the original amount. In fact, for eight of these grants for which current income is available, the yield had grown to $224,750 in 1969/1970, or 12.3% on the original Carnegie principal of $1,825,000.

Endowments for library schools, like other endowments, tend to consist of many funds, each of which comprises a relatively small capital amount. The twenty reporting schools possess 59 separate funds—and simple arithmetic shows the average principal amount to be $89,958 or only $41,361 if one excludes the largest fund (Chicago's $2,849,554). This is particularly true of funds for scholarships and fellowships; Table 2 indicates that the $696,817 capital of thirty-three funds averages only $21,115 per fund. (This would produce annual income of about

TABLE 1

Institutional and Library School Endowment in 36 Universities, 1970[a]

Institution	Total institutional endowment ($)	Library school endowment ($)
Albany (State Univ. N.Y.)	0	0
Atlanta	8,213,690	300,000
California (Berkeley)	239,482,000[b]	190,000
California (Los Angeles)	239,482,000[b]	17,412
Case Western Reserve	85,658,587	84,463
Chicago	264,116,469	2,849,554
Columbia	250,000,000[c]	612,700
Denver	15,494,232	134,304
Drexel	37,200,000	0
Florida State	79,993	25,000
Illinois	10,781,762	112,340
Kansas State	1,310,431	0
Kent State	—[d]	0
Kentucky	—[d]	16,000
Long Island	3,338,013	0
Louisiana State	687,307	0
Maryland	—[d]	0
Michigan	61,241,378	208,144
Minnesota	67,780,000	67,184
Missouri	6,750,000	0
North Carolina	18,104,019	214,217
Northern Illinois	—[d]	0
North Texas	0	0
Peabody	11,865,000	0
Pittsburgh	84,591,696	51,313
Pratt	9,710,649	69,228
Queens	62,080	0
Rosary	720,632	0
Rutgers	29,083,357	0
San Jose State	0	0
Simmons	15,289,934	27,336
Southern California	37,218,161	0
Syracuse	49,772,765	250,000
Texas Woman's	—[d]	10,000
Western Michigan	39,864	8,104
Wisconsin	19,200,481	1,234

[a]Source: Questionnaires returned by the library schools.
[b]Total endowment for University of California system.
[c]Estimate.
[d]Not available.

TABLE 2

Summary of Endowments in 20 Library Schools, 1970*

Purpose	Number of funds	Principal ($)
General support	16	4,077,293
Professorship	1	358,833
Scholarships and fellowships	33	696,817
Loans	3	16,522
Prizes	1	2,273
Lectures	2	87,373
Other purposes	3	9,422
TOTAL	59	5,248,533

*Source: Questionnaires returned by the schools.

$1,000 at a 5% return—only enough for a partial scholarship given present tuition levels at most private schools.) Of all library school endowments the Carnegie Corporation has provided the bulk of the capital—about $4,500,000 at present valuations (in contrast to the original gifts of $2,075,000). Although the Carnegie Corporation in 1946 released the restrictions on its gifts for endowment (permitting the recipients to spend the principal as well as income) (*8*), no library school appears to have followed this course of action. Most of the remaining funds have come either from individuals interested in the world of books (many not librarians themselves) or from alumni of individual library schools who have collectively established funds—usually for scholarships named in honor of distinguished teachers or directors and frequently raised on the occasion of such a person's retirement. The Margaret Mann Scholarship at Michigan, the Katherine L. Sharp Fellowship at Illinois, the Lawrence Clark Powell Scholarship at UCLA, and the Susan Grey Akers Scholarship at North Carolina are examples of this. A few bequests have created endowments. These funds to aid library schools have come into being over the past 60 years—the earliest date reported was the Carnegie Corporation's gift of $25,000 to Case Western Reserve in 1917; four funds were established in the decade of the 1920s; ten in the 1930s; nine in the 1940s; ten in the 1950s; and twenty-two in the 1960s (of the three others making the total of 59, one was established in 1971 and dates are not available for two). The fact that so many new funds came into being in the most recent decade may be grounds for some optimism, although certainly a portion of this would be due to the general upsurge in philanthropic giving and to larger dollar amounts that reflect inflation.

Table 2 shows the distribution of library school endowments by purpose. The relatively high percentage for general support again results from the gifts of the Carnegie Corporation and is of course an example of endowment restricted only as to its general purpose. Several schools commented on the usefulness of these funds which in effect can be used for expenditures that regular budgets do not provide for.

It is interesting to note that, despite the general popularity of the endowed chair as an objective on educational philanthropy, there is but a single example of this in the field of librarianship: the Melvil Dewey Professorship at Columbia University, established in 1938 by the Carnegie Corporation. One wonders which library school will be the fortunate recipient of the second endowed chair in the field. The total capital available for student aid in the form of scholarships, fellowships, loan funds, and prizes amounts to $715,612; given the ever-present demand for financial assistance to students, there is no doubt that additional funds of this type are urgently needed in light of increasing cost of higher education. The two endowments for lectures are the Phineas L. Windsor Lectureship at Illinois and the Isabel Nichol Fund at Denver. The three funds for other purposes deserve a word of comment: one at Columbia is "to sponsor studies of county and regional libraries in America"; the second is to aid the activities of the International Library Information Center at Pittsburgh (it resulted from conversion of a portion of a grant from the A. W. Mellon Educational and Charitable Trust into a small endowment); and the last is the George C. Allez Memorial Fund at Wisconsin "to purchase books and related teaching materials for the Library School."

Endowment income at seventeen schools amounted to $290,876 and thus represented 4.3% of these schools' total expenditures of $7,115,528 (Table 3). This certainly indicates that the contribution of endowment income to library school budgets is slight (and obviously nonexistent in the case of sixteen schools without any endowment at all). In only one case—Chicago—does it provide a significant percentage (26%) of the school's income; for Atlanta the proportion is 9% and for Columbia and California (Berkeley) between 4 and 5%; for all other schools it is less. Despite these small percentages it would appear from the evidence and from comments of deans that endowment income is far more important than statistics alone would indicate—important in the critical area of "enriching activities" like lectures and special programs which would otherwise remain unfunded. While it seems highly unlikely that any library school could become largely dependent on endowment income for its operating budget, perhaps their deans and university development officers have neglected the possibility of raising funds which might make an important contribution to enriching library education programs in such areas as lectures, research, publications, and international activities. Many more desirable students might be attracted into library and information science if they could receive greater financial assistance. One can only speculate on the effect that the income from, say, $50,000,000 of endowment might have on library education.

Public Libraries

In turning from library education to public libraries, one naturally speculates on the importance of endowment income to an institution which in its modern form receives basic support from public funds through various types of taxation. The picture here is incomplete, both because full information on the financing of public

TABLE 3

Expenditures and Endowment Income in 17 Library Schools, 1969/70[a]

School	Expenditures ($)	Endowment income[b] ($)
Atlanta	164,940	15,000
California, Berkeley	377,569	18,374
California, Los Angeles	428,575	450
Case Western Reserve	991,000	4,418
Chicago	608,031	158,182
Columbia	793,879	33,368
Denver	235,115	8,501
Illinois	553,160	4,780
Michigan	484,974	17,600
Minnesota	279,479	4,370
North Carolina	290,892	12,431
Pittsburgh	723,309	4,520
Pratt	228,793	6,449
Simmons	199,183	1,360
Texas Woman's	198,267	490
Western Michigan	207,228	405
Wisconsin	351,134	178
TOTAL	7,115,528	290,876

[a]Source: Questionnaires returned by the library schools.
[b]In a few cases where actual income was not reported, a return of 5% was assumed.

libraries is not available and because data on their income often lump together all private support (gifts, grants, bequests, and expendable trust funds, as well as true endowment). The following discussion therefore draws on a sample consisting of public libraries in the twenty-five largest cities (as shown in the 1970 census) and in a representative group of medium-size cities and utilizes data furnished by twenty-three of the former and eighteen of the latter, a total of forty-one libraries located in all parts of the country—from New York to Los Angeles, from Seattle to Miami and points between (see Tables 4 and 6). In this connection it is necessary to remember that there are twenty-seven public libraries in our largest cities, due to the special case of New York, where the New York Public Library's Branch Libraries serve three of the city's five boroughs and the Brooklyn Public and the Queens Borough Public one borough each. (For the present study the New York Public Library's Research Libraries are grouped with other endowed reference institutions—e.g., Newberry, Huntington, and Linda Hall.) In these large cities—all with populations of 500,000 or more—the expenditures of the public library in 1969/70 ranged from just over $1,000,000 to $18,404,062 (Table 4). The six systems in the four largest cities each spent over $10,000,000; of the remaining, six spent between $5 and $10 million; five between $3 and $5 million; five between $2 and $3 million; and five between $1 and $2 million. In comparison with these impressive totals the role of endowment income appears to be almost insignificant, except in a few cases. However, of twenty-four libraries reporting only four (Queens

TABLE 4

Public Library Expenditures and Endowment Income in 25 Largest Cities, 1969/70[a]

Rank	City	1970 population	Library expenditures ($)	Endowment income ($)
1	New York	7,895,563		
	NYPL Branch Libraries		18,404,062	86,968
	Brooklyn Public		10,889,575[b]	—[c]
	Queens Borough Public		10,193,851[b]	0
2	Chicago	3,369,359	13,389,420	21,410
3	Los Angeles	2,816,061	11,865,381	1,133
4	Philadelphia	1,950,098	10,109,839	113,387
5	Detroit	1,512,893	8,066,794	29,000
6	Houston	1,232,802	2,575,628	9,490
7	Baltimore	905,759	6,501,227	46,399
8	Dallas	844,401	3,784,803	9,695
9	Washington	756,510	5,620,683	1,681
10	Cleveland	750,879	7,200,141	19,388
11	Indianapolis	745,739	3,406,245[b]	—[c]
12	Milwaukee	717,372	4,671,273[b]	51,015
13	San Francisco	715,674	4,504,591	21,960
14	San Diego	696,769	2,978,519[b]	114[d]
15	San Antonio	654,153	1,248,950[b]	750
16	Boston	641,071	6,281,854	346,396
17	Memphis	623,530	1,763,836[b]	0
18	St. Louis	622,236	2,941,572	3,224
19	New Orleans	593,471	1,567,561	4,607
20	Phoenix	581,562	1,899,399[b]	0
21	Columbus, Ohio	540,025	2,513,945	1,707
22	Seattle	530,831	3,881,365	13,457
23	Jacksonville	528,865	1,106,957[b]	0
24	Pittsburgh	520,117	5,697,676	42,128[e]
25	Denver	514,678	2,832,530[b]	—[c]

[a]Sources: Questionnaires returned by libraries; 1970 census for population, as reported in *World Almanac, 1972*, p. 147.

[b]Income as reported in *American Library Directory, 1970–1971*, passim (most figures refer to 1968–1969).

[c]Not available.

[d]Excludes six other funds whose principal and income are being or have already been expended.

[e]Includes $17,737.51 received in 1970 and $24,390.80 anticipated annual income on $487,815.25 added to endowment in December 1970.

Borough, Memphis, Phoenix, and Jacksonville) indicated no income at all from this source. For the other twenty the sums ranged from $114 to $346,396 (Table 4). Grouping by amount reveals the following distribution: nine received less than $10,000; nine between $10,000 and $100,000; and only two (Boston and Phila-

TABLE 5

Endowment of Public Libraries in 25 Largest Cities[a]

Rank	City	Endowment ($)	Number of funds
1	New York		
	NYPL Branch Libraries	—[b]	—[b]
	Brooklyn Public	—[b]	—[b]
	Queens Borough Public	0	0
2	Chicago	392,429	15
3	Los Angeles	38,160	8
4	Philadelphia	2,025,091	55
5	Detroit	477,000	1
6	Houston	124,406	14
7	Baltimore	722,864	22
8	Dallas	159,134	5
9	Washington	41,900	8
10	Cleveland	390,588	18
11	Indianapolis	—[b]	—[b]
12	Milwaukee	723,532	27
13	San Francisco	240,000	3
14	San Diego	2,281[c]	1[c]
15	San Antonio	12,000	2
16	Boston	7,944,661[d]	121
17	Memphis	0	0
18	St. Louis	231,106[e]	6[e]
19	New Orleans	86,000	3
20	Phoenix	0	0
21	Columbus, Ohio	30,500	15
22	Seattle	212,270	3
23	Jacksonville	0	0
24	Pittsburgh	997,778	15
25	Denver	—[b]	—[b]
	TOTAL	14,851,700	342

[a]Source: Questionnaires returned by libraries.

[b]Not available.

[c]Excludes six other funds whose principal and income are being or have already been expended.

[d]Book value.

[e]Excludes sundry small funds.

delphia) more than $100,000. Even in the last two cases, income from this source represented under 6% of expenditures in Boston and around 1% in Philadelphia.

As shown in Table 5, in nineteen of the twenty-five largest American cities the public libraries reported total endowment of $14,851,700 (three, as already mentioned, reported none; information from two was not available; and the three systems in New York City present a special case). Of this, one library, Boston, accounts for more than half of the total with $7,944,661 (although, as indicated below, this figure does include several funds functioning as endowment, which will be liquidated to aid

TABLE 6

Endowment of Public Libraries, by Amount, in 25 Largest Cities[a]

Amount of endowment	City and population rank
Over $1 million	Boston (16)
	Philadelphia (4)
Between $500,000 and $999,999	Pittsburgh (24)
	Milwaukee (12)
	Baltimore (7)
Between 250,000 and $499,999	Detroit (5)
	Chicago (2)
	Cleveland (10)
Between $100,000 and $249,999	San Francisco (13)
	St. Louis (18)
	Seattle (22)
	Dallas (8)
	Houston (6)
Less than $100,000	New Orleans (19)
	Washington (9)
	Los Angeles (3)
	Columbus (21)
	San Antonio (15)
	San Diego (14)
None[b]	Jacksonville (23)
	Memphis (17)
	Phoenix (20)
	New York (Queens Borough) (1)

[a]Source: Adapted from Tables 4 and 5.

[b]Information not available from New York (New York Public Branch Libraries), New York (Brooklyn Public), Indianapolis (11), and Denver (25).

in paying for construction of the addition to the central building), and Table 6 shows that only four other libraries possess over $500,000 in such funds. The average figure per library comes to only $781,668, or to a more typical $383,780 if one excludes the Boston Public. There does not appear to be any correlation between either a city's population or the expenditures of its public library and the size of the library's endowment; however, in general, the larger endowments are found in older eastern and northern cities, in contrast with the younger metropolitan centers in the south and west, as shown by comparing the larger amounts in Table 6 for Boston, Philadelphia, Pittsburgh, Milwaukee, Baltimore, Detroit, Chicago, and Cleveland with the smaller figures for New Orleans, Washington, Los Angeles, Columbus, San Antonio, San Diego, Jacksonville, Memphis, and Phoenix.

As one might expect, a similar situation exists for the public libraries in eighteen medium-size cities (populations from 103,564 to 497,421), where expenditures range from $336,300 to $6,486,415 (Table 7). Again the contribution of endowment income is insignificant with two exceptions: Providence, where it amounts to a very high 33% of total library expenditures and—to a much lesser extent—Louisville,

TABLE 7

Public Library Expenditures and Endowment Income in 18 Medium-Size Cities, 1969/1970[a]

City	1970 population	Library expenditures ($)	Endowment income ($)
Albuquerque	243,751	583,325	0
Atlanta	497,421	2,308,000	5,000[b]
Cincinnati	452,524	6,486,415	15,787
Gary	175,415	941,653[c]	0
Hartford	158,017	1,083,000	84,505
Lincoln, Nebraska	149,518	719,370	692
Louisville	361,958	1,699,902	148,400
Miami	334,859	2,831,064[c]	0
Nashville	447,577	1,020,570[c]	0
Norfolk	307,951	964,541[c]	0
Providence	179,116	1,054,869[d]	348,300[d]
Salt Lake City	175,885	811,493	27,465[e]
Scranton	103,564	336,300	4,000
Syracuse	197,297	1,067,241	1,959
Topeka	125,011	524,239	5,625
Trenton	104,638	1,024,879	3,325
Wichita	276,554	1,016,396[c]	0
Worcester	176,572	1,070,459	9,859

[a]Sources: Questionnaires returned by libraries; 1970 census for population figures, as reported in *World Almanac, 1972*, p. 147.

[b]Anticipated annual income (fund received in 1970).

[c]Income as reported in *American Library Directory, 1970–1971*, passim (most figures refer to 1968–1969).

[d]Figures for 9 months only due to change in fiscal year.

[e]Includes $14,414 received as gifts into endowment income account.

where it contributes almost 9%. However, it is interesting to note (Table 8) that of the eighteen cities in this group six (one-third of the total) report no endowment and that all four of the largest amounts appear in northeastern cities (Providence, Hartford, Cincinnati, and Worcester). Southern and Western cities—e.g., Albuquerque, Miami, Nashville, Topeka—report little or no endowment. The total for ten cities giving actual amounts comes to $8,739,669, or an average of $873,967; excluding Providence and Hartford, with their very large figures, results in an average of only $107,204 for the remaining eight cities.

Endowments in public libraries, like those available in other types of institutions, tend to consist of many funds, each of which represents a relatively small capital sum. The libraries supplying data reported total endowments of $23,591,369, composed of 450 separate funds (Tables 5 and 8). Thus the average fund contains only $52,647, which would produce annual income of about $2,632 (assuming a 5% return). While the range in size of principal is from as little as several hundred to several million dollars, the majority of funds appear to fall between $1,000 and

TABLE 8

Endowment of Public Libraries in 18 Medium-Size Cities[a]

City	Endowment ($)	Number of funds
Albuquerque	0	0
Atlanta	100,000	1
Cincinnati	288,844	16
Gary	0	0
Hartford	2,061,638[b]	—[c]
Lincoln, Nebraska	5,000	0
Louisville	—[d]	—[c]
Miami	0	0
Nashville	0	0
Norfolk	0	0
Providence	5,820,402[b]	44
Salt Lake City	—[c]	3
Scranton	31,000	8
Syracuse	38,545	5
Topeka	83,264	12
Trenton	76,380	5
Wichita	0	0
Worcester	234,596	13
TOTAL	8,739,669	108

[a]Source: Questionnaire returned by libraries.
[b]Book value.
[c]Not available.
[d]Department store building owned by library; rental income based on percentage of gross sales.

$10,000. Several of the largest amounts belong to the Boston Public and are funds functioning as endowment, rather than true endowment. Their purpose was to provide for expansion of the central building, and in the intervening years income was used to increase principal; with the building addition nearing completion, these funds will be liquidated (9). Among them are the Benton Building Fund (received in 1936), which was to accumulate until its total reached $2,000,000, and the John Deferrari Foundation (1947), which was to accumulate until reaching $2,000,000, when one-half would become available for construction and the other one-half would accumulate until again reaching $2,000,000, at which point the net income becomes available "to carry on work of said Public Library."

Analysis of the purposes of the 450 funds indicates that nearly all fall into one of five broad categories: (1) general support of library operations, (2) general support of a specific unit of the library, (3) lectures, (4) staff benefits, and (5) funds to purchase books and other library materials. (The few funds designated for other purposes would form a sixth, or miscellaneous, group.) The first category includes nearly all of what we may call unrestricted endowment. As examples, one might cite the Hiram Kelly Fund (principal of $265,000) at Chicago, the Simon Hersheim

Memorial Library Fund ($40,000) at New Orleans, the Eugene Atwood Bequest ($200,000) at Seattle, the Theodore W. Noyes Bequest ($16,500) at Washington, and the largest of such funds, the General Fund ($4,942,772) at Providence. The second type of fund—restricted for the benefit of a particular unit of the library—occurs when the donor is interested either in a particular branch (or other separate facility) or in a division of the main library (art and music seem to be most popular). Examples of the former are the Oakland Hill Trust Fund ($11,784) for the maintenance of the Mattapan Branch at Boston, the Victor F. Barth Memorial Library Fund ($3,500) for the Ballard Branch at Seattle, and the Sarah E. B. Allis Fund ($240,000) for the care and upkeep of the Allis Art Library building and premises at Milwaukee. In the latter category one might mention the Mabel L. Gillespie Fund ($541,528) for the upkeep of the Anna Randolph Darlington Gillespie and David Lindsay Gillespie Rooms at the Carnegie Library of Pittsburgh; the Joseph Sylvain Fund ($50,000) for the purchase of books, periodicals, records, furnishings, and equipment for the Music Room at Houston; the G. W. Ware Fund ($5,000) for the benefit of the Fine Arts Department at Dallas; and the Metelene E. Wickwire Trust Fund ($32,005) for service to the blind at Cleveland. The existence of relatively few lecture funds at public libraries suggests that this type of activity has not appealed greatly to donors; among the few examples are the Maury A. Bromsen Lecture in Humanistic Bibliography ($2,500) at Boston, the Humphrey Moore Fund ($49,879) at Enoch Pratt in Baltimore, and the Ralph Munn Lecture Series Fund ($26,996) at Pittsburgh.

Endowment funds to provide staff benefits seem, at least in part, to be the result of philanthropy in an earlier day, when fringe benefits were few and salaries low. For instance, at Seattle the Gertrude Rinehart Grant ($2,500) offers vacation funds for a librarian, and at Scranton the J. McCourt Fund ($2,000) provides for "relief and assistance of any employee who may become ill"; at least two endowments support travel: Cincinnati's Cochran Fund ($2,913) assisting staff members to travel in foreign countries and Enoch Pratt's Maria Clarke Brace Fund ($54,070) aiding attendance at professional meetings.

However, none of these constitutes the most widely found type of endowment in public libraries. That distinction goes to the endowed book fund. Almost all libraries with sizable endowment report a considerable number of such funds, some of which have come by gift, others by bequest. While some are simply for "purchase of books," the majority carry a restriction as to the subject on which books are to be acquired. It is, for example, not uncommon to find that the donor of a special collection established an endowment, large or small, so that the library will acquire additional volumes in this field. Another frequent origin of such funds is the memorial, established in honor of a relative, business or professional colleague, teacher, or friend; in these cases the field specified is generally one related to the occupation or interest of the person being honored. So diverse are these funds that the variations in principal amount, dates established, subjects represented, and other conditions seem endless; the twenty-five representative funds listed in Table 9 illustrate the wide range of these characteristics. While no exact computation was

TABLE 9

Representative Endowed Book Funds at Public Libraries[a]

Name of fund	Date est.	Library	Field in which acquisitions made	Principal ($)
Anonymous gift	1970	Boston	History and culture of Ireland	1,325
Burton Historical	1921	Detroit	History, chiefly old Northwest Territory	477,000
Callender, Walter R.	—[b]	Providence	Books from Yale Univ. Press	5,000
Codman, Henry Sargent	1899	Boston	Landscape gardening	2,854
Davis, Julia	1961	St. Louis	American Negro and peoples of African descent	2,500
Eizen, Louis	1942	Chicago	In Jewish or Hebrew language	2,400
Geological	1931	Houston	Petroleum	1,275
Harlow, Margaret	1937	Worcester	Foreign books	4,873
Hertzberg	1942	San Antonio	Circus	2,000
Joseph, Philip	1964	Baltimore	Material relating to Dead Sea Scrolls or other discoveries of same character	22,191
Magaw, William	1954	Topeka	Nonfiction	1,000
Miner's Bequest	—[b]	Washington	History of Negroes in the District of Columbia	1,500
Mooney	—[b]	Columbus	Insurance laws	1,500
Schmulowitz	1967	San Francisco	Wit and humor	10,000
Schnitzer	1966	Houston	Theater, drama, opera	5,000
Smith, J. T.	1898	Scranton	Mines and mining	1,000
Stanton, Sophy Carr	—[b]	Washington	Far East	10,000
Steedman	1928	St. Louis	Architecture	47,708
Technology Library Fund	1970	Pittsburgh	Books, periodicals, and other library sources for Science & Technology Department	332,829
Ticknor, George	1871	Boston	In Spanish and Portuguese languages	4,000
Trager	1955	Cincinnati	Travel	20,000
Vine, Israel	1943	Trenton	History and biography	5,000
White, John G.	1933	Cleveland	Rare books, folklore, orientalia	267,772
Williams, William C.	1921	Syracuse	Scientific books	5,000
Zeisler, Louis T.	—[b]	Milwaukee	Atheism	2,500

[a]Source: Questionnaires returned by libraries.
[b]Not available.

made, most endowed book funds possess modest capital—many do not exceed $5,000, and the large principal of the Burton Historical, John G. White, and Technology Library Fund is the exception rather than the rule. The subjects of interest to the donors not only cover the entire field of human endeavor, but range from the quite narrow and specific (circus, atheism) to the very general (foreign books, nonfiction). The Boston Public Library provides another example of this diversity: the majority of its 121 endowed funds (Table 5) are for book purchases, and among the subjects specified are music, mathematics and astronomy, landscape gardening, government, Spanish and Portuguese, dramatic arts, Shakespeare and Emerson, newspapers, children's literature, prints, Italian, military arts, ceramics, and Ireland.

In summary, while yield from endowments in the forty-one public libraries here considered (and very probably in others as well) furnishes but a small percentage of their total income, it is obvious that endowed book funds play a special role in supplementing money furnished by taxation for library materials. Indeed, sometimes they make a unique contribution: the development of special collections and areas of strength that would not otherwise come into being.

College Libraries

Thirty privately-supported liberal arts colleges provided information on their library endowment. Although this group (Table 10) includes institutions in various parts of the country, it is probably not typical in that the average institutional endowment comes to nearly $15 million, a much higher figure than most liberal arts colleges would possess—as recently as 1952, for instance, only twenty-five of 411 colleges had endowments valued at over $5,000,000 (*10*). Perhaps this group might be described as thirty "better known and wealthier" colleges. Only one, Southwestern at Memphis, reported no endowment for library purposes; the remaining twenty-nine reported total capital of $7,355,246 for this purpose, or an average of $253,629. Coincidentally this figure happens to be almost the same ($254,831) as that reported by twenty library schools. Another characteristic similar in the two groups is that the institutional rank in total endowment does not correlate with rank in library endowment; of the ten institutions with highest figures in Table 10, only six (Carleton, Wabash, Bowdoin, Oberlin, Denison, and Bryn Mawr) also have one of the ten largest capital amounts for their libraries. However, the ten largest endowments (the six named, plus Beloit, Whitman, Mills, and DePauw) add up to $5,913,345, or 80% of the grand total; the remaining twenty colleges have, as a group, only 20%. Given the general concentration of endowment in relatively few institutions of higher education, this comes as no great surprise.

As already mentioned, one institution reported no library endowment; in the remaining twenty-nine, the figure varied from $541 to $1,434,274, with distribution as follows: one over $1,000,000; two between $500,000 and $999,999; six between $250,000 and $499,999; seven between $100,000 and $249,999; and the remaining thirteen below $100,000.

TABLE 10

Institutional and Library Endowment in 30 Colleges[a]

Institution	Total institutional endowment ($)	Library endowment	
		Principal ($)	No. of funds
Austin	4,584,067	541	1
Beloit	8,511,018	454,008	33
Bowdoin	30,683,000	832,098	101
Bryn Mawr	32,992,139	362,876	70
Carleton	27,464,615	1,434,274	22
Coe	7,451,000	118,083	1
Colgate Univ.	23,124,420	165,540	9
Cornell	7,930,459	230,028	—[b]
Davidson	16,123,767	55,591	1
Denison Univ.	15,423,816	424,894	13
DePauw Univ.	14,752,990	239,962	25
Dickinson	11,500,000	232,400	—[b]
Earlham	7,250,000	17,200	2
Franklin and Marshall	9,381,598	61,116	23
Furman Univ.	10,392,646	1,219	1
Mills	11,680,257	337,087	18
Mount Holyoke	33,466,976	196,002	34
Oberlin	77,286,761	467,546	73
Oklahoma City Univ.	2,281,145	18,767	2
Redlands, Univ. of	13,518,000	137,531	8
Reed	5,606,391	65,000	9
St. Catherine	1,462,142	11,421	2
St. Lawrence Univ.	6,861,536	12,864	7
St. Olaf	3,629,445	38,048	12
St. Thomas	4,498,127	7,000	2
South, Univ. of the	21,000,000	72,450	18
Southwestern at Memphis	7,119,212	0	0
Stetson Univ.	3,821,660	1,100	2
Wabash	16,375,000	996,000	17
Whitman	12,894,304	364,600	24
TOTAL	449,066,491	7,355,246	530

[a]Source: Questionnaires returned by libraries.
[b]Not available.

On the whole, the average endowment fund for college libraries is relatively small. There are only fifteen instances of funds larger than $100,000, but they underscore the impact of the large gift or bequest, since they total $4,135,700 or 56% of the grand total (Table 11). In other words, the remaining 515 funds amount to only $3,219,546 and average $6,252 in size, in comparison with the average of $275,713 for the fifteen large funds. Endowment in college libraries has generally come from individuals, whether by gift or bequest. However, not infrequently

TABLE 11

Library Endowment Funds of Over $100,000 Reported by 30 Colleges[a]

Name of fund and donor	Date est.	Library	Purpose	Principal ($)
Library (donor unannounced)	—[b]	Carleton	General library support	1,313,045
Lilly (Lilly Endowment)	—[b]	Wabash	General library support	776,200
Doane (Doane Family and others)	1938	Denison	Operation and maintenance	376,029
Iva M. Butlin	1961	Beloit	Library salaries	244,407
Frederick W. Pickard (his bequest)	1952	Bowdoin	Purchase of books and other materials	152,500
Lucille F. Fargo (her bequest)	1964	Whitman	Purchase of books	152,317
Azariah Smith Root (Carnegie Corp.)	1930	Oberlin	Salary of librarian	151,820
Library Fund (various gifts and bequests)	1965	Mills	General library support	150,000
Russell Burno	—[b]	Beloit	Books on history, art, and literature	133,394
Ann Davis Ginn Fund (bequest of Thomas D. Ginn)	1969	Bowdoin	". . . for furthering research through books . . ."	126,000
R. W. Stewart	—[b]	Coe	General library support	118,083
William Ireland Knapp (his bequest)	1936	Colgate	Purchase of books	114,644
Brooks Leavitt (his bequest)	1899	Bowdoin	General library support	111,642
Myron M. Winslow	1965	Redlands	—[b]	109,351
Thomas Hamlin Hubbard	1908	Bowdoin	Maintenance and improvement of library building and library	106,268
TOTAL				4,135,700

[a]Source: Questionnaire returned by libraries.
[b]Not available.

college classes make gifts, often on the occasion of their twenty-fifth or later reunion. But few institutions could probably match Bowdoin's total of thirteen funds established between 1908 and 1969 by the Classes of 1825, 1875, 1877, 1882, 1888, 1890, 1901, 1904, 1912, 1914, 1916, 1924, and 1929, with the total principal amounting to $46,535. Another common type of fund results from the group gift which colleagues, friends, relatives, and/or former students make to establish a

book fund in honor of a professor. Foundations are also responsible for some endowment; although this tends to occur less often, the size of the fund is larger than average. For instance, the Carnegie Corporation between 1921 and 1935 donated a total of $1,385,000 to twelve colleges (not all included in the present survey) for library endowment (Table 27).

Nearly all endowments to colleges fall into one of four categories: (1) general support, or unrestricted within the area of the library; (2) library operations and maintenance; (3) support of salaries; and (4) book funds. In general, most colleges report relatively few funds in the first three groups, in contrast with the fact that five of the fifteen large funds shown in Table 11 are for general purposes (of the remainder two are for operations and maintenance, two for salaries, and five for books, with one unspecified). However, in the area of general support, it is worth noting that between 1921 and 1934 the Carnegie Corporation made a series of grants for general library endowment to ten colleges (Emporia, Cornell, Grinnell, Hamilton, Mills, Mt. Holyoke, Oberlin, Swarthmore, Vassar, and Whitman); ranging in size from $50,000 to $160,000, they came to $785,000 (Table 27). Only a few other institutions report either sizable capital or more than a few funds as unrestricted library endowment. Carleton and Wabash, in addition to the large funds indicated in Table 11, have received a number of smaller gifts and bequests for this purpose. At Whitman, in addition to the Carnegie grant, there are nine other funds for this purpose, with principal amounts ranging from $1,424 to $5,074; the same situation prevails at Oberlin, where thirty-seven funds supporting library operations vary from $158 to $33,396 in principal and, in the aggregate, come to $105,961. Oberlin's total library endowment consists of seventy-three funds with a value of $467,546; the funds for operations just mentioned thus compose 23% of the total; one fund for the librarian's salary ($151,820) makes up 32%; and 35 book funds ($209,775) account for the other 45%. However, such distribution is not typical, since, as already noted, most colleges report little in endowment aside from book funds.

Support of salaries may take the form of a specific endowment for the librarian (as at Oberlin) or of general support of the total salary budget. The Oberlin endowment was one of four grants of $150,000 each made in 1930 and 1931 by the Carnegie Corporation; the other three recipients were Lafayette, Swarthmore, and Wesleyan. A 1969 Irvine Foundation gift of $500,000 establishing the A. J. McFadden Library Endowment to provide for the salary and related expenses of the director of the Claremont Colleges' Honnold Library indicates that this type of fund still has attraction (*11*). As an example of endowment for salaries in general, there is the Butlin Fund ($244,407) at Beloit.

However, at the college library, as at the public library, the majority—and perhaps as many as 75%—of endowed funds support the acquisition of books. However, the average size of book funds is small (at Oberlin $5,996), and some have a principal of only several hundred dollars—perhaps reflecting an earlier era of philanthropy! Unrestricted book funds leave the library free to purchase volumes in any field and are probably more useful, but many donors continue to specify the

field in which books are to be acquired. Some simply indicate an academic subject—chemistry, classics, education, English and American literature, history, mathematics, and philosophy being among those most commonly mentioned. In a few instances a college has received several funds to develop resources in the same subject—e.g., music at Mills and French at Bryn Mawr. Interesting examples of more restricted fields specified by donors include the following: Biblical literature and Christian ethics (Bryn Mawr); Canada (Reed); Celtic (St. Thomas); contemporary oral expression (Denison); Far Eastern field (Bryn Mawr); history of the labors, trials, and works of Baptists (Colgate); Huguenots (Bowdoin); Maine (Bowdoin); mental retardation (Bryn Mawr); Norwegian music (St. Olaf); pioneer America (Reed); temperance (Oberlin); and urban affairs and problems (Oberlin).

The role of endowment income in the overall financial picture varies far more in college libraries than in public. Among the thirty reporting institutions, income from endowment provides support as high as 49% of library expenditures (Wabash); one other institution, Carleton, also ranks high, with endowment earnings equal to 38% of library expenditures, but in only five other cases did the former figure exceed 10% of the latter: Beloit, Bowdoin, Mills, Oberlin, and Whitman (Table 12). It seems fair consequently to assume that at most institutions endowment provides supplemental rather than basic support for the library.

The range in endowment income at the colleges goes from $33 to $94,362, distributed as follows: above $75,000, one; between $50,000 and $74,999, two; between $25,000 and $49,999, one; between $10,000 and $24,999, seven; between $1,000 and $9,999, ten; below $1,000, eight. The total endowment income of $448,989 averages $15,479 for the twenty-nine reporting colleges (Table 12) and equals just under 7% of their expenditures. Except at a few institutions, it plays a minor role in financing the college library.

University Libraries

University libraries form one of the two groups possessing the largest concentrations of library endowments (the other, discussed below, consists of the privately supported reference or research library not affiliated with an institution of higher education). Table 13 indicates the magnitude of such funds: fifty-six universities whose libraries are members of the Association of Research Libraries (ARL) have total institutional endowment of $3,935,967,335, of which $93,137,277 is for library purposes. These figures would be even larger if they reflected market rather than book values; for comparison, note that the 1969 *market* value of fifty-two colleges and universities with largest endowments reached $8,317,600,000—with Harvard alone accounting for over $1 billion (Table 14). The present group, representing about 80% of the ARL membership exclusive of Canadian institutions, embraces thirty-five publicly-supported and twenty-one privately-supported universities (counting "state-related" Pittsburgh and Temple in the latter group) and forms an "élite" of the university library world. Even so, it is interesting to note that seven of

TABLE 12

Expenditures and Endowment Income in 30 College Libraries, 1969/70[a]

Library	Expenditures ($)	Endowment income ($)
Austin	158,924	33
Beloit	152,359	24,900
Bowdoin	286,881	53,022
Bryn Mawr	307,418	21,524[b]
Carleton	194,139	94,362
Coe	184,483	5,591
Colgate Univ.	244,511	8,010
Cornell	143,982	9,201
Davidson	245,018	2,666
Denison Univ.	245,000	20,934
DePauw Univ.	223,596	11,998
Dickinson	283,725	3,130
Earlham	191,157	989[c]
Franklin and Marshall	262,061	5,142
Furman Univ.	263,214	76
Mills	138,200	18,405
Mount Holyoke	304,377	13,994
Oberlin	579,366	67,731
Oklahoma City Univ.	138,164	820
Redlands, Univ. of	225,990	6,877[d]
Reed	168,520	1,717
St. Catherine	200,928	356
St. Lawrence Univ.	158,399	870
St. Olaf	187,205	1,252
St. Thomas	245,884	265
South, Univ. of the	229,213	3,982
Southwestern at Memphis	180,325	0
Stetson Univ.	73,000	65[d]
Wabash	127,000	48,000
Whitman	227,708	22,986
TOTAL	6,570,747	448,898

[a]Source: Questionnaires returned by libraries.
[b]Book funds only.
[c]Includes estimated income on one fund received in 1971.
[d]Assumed yield of 5%.

the publicly-supported institutions (listed in Table 15) report no library endowment (thus reducing this group from thirty-five to twenty-eight, whereas all twenty-one privately-supported universities have some capital funds for library support. However, as the statistics for library schools and college libraries indicate for those groups, again an institution's rank by total endowment does not always provide an indication of its rank by library endowment, although in this group the ten largest institutional figures in Table 13—Harvard, Yale, Chicago, Columbia, California (entire system), Northwestern, Pennsylvania, Princeton, Dartmouth, and Washington

(St. Louis)—do repeat themselves in the library endowment column with only two exceptions: Chicago and Washington (St. Louis) replaced by North Carolina and Cornell. (The California case is, of course, complicated by the fact that available figures for endowment cover the entire U.C. system, whereas three campuses—Berkeley, Los Angeles, and Davis—are separate members of ARL). The rank order of ten largest university library endowments becomes, then, Harvard, Yale, Princeton, Columbia, Northwestern, Dartmouth, North Carolina, Cornell, UCLA, and Duke. This list also confirms the general fact that endowment is concentrated in relatively few institutions, because they hold $82,286,455, or about 88% of the grand total shown in Table 13. This means that the average size endowment in this group is a very high $8,228,645, whereas the average for all forty-nine universities with capital funds for library purposes amounts to only $1,900,760.

Further study of Table 13 reveals several other facts worthy of mention. One is that, on the whole, the privately-supported universities have amassed far more substantial library endowments than their publicly-supported sisters (with only four conspicuous exceptions: North Carolina, UCLA, Virginia, and Michigan). If we total the ten largest endowments in the two groups of institutions, we find that they average $836,087 at state universities, but three times that much ($2,708,524) at private institutions! On the other hand, this fact does not appear to have hindered the development of four of our largest university libraries: Illinois, Michigan, California (Berkeley), and Minnesota (Table 16). It would certainly be unwise, however, to push this thesis too far, as the factors responsible for the development of a great research library are too numerous and too intangible to consider financial support as preeminent. Nevertheless, even to the nonprofessional eye, it would appear that the greatness of the Harvard and Yale collections must owe something to their combined library endowments of well over $50 million (this amount does not reflect the complete picture, since figures for the former cover only the Harvard College Library attached to the Faculty of Arts and Science and exclude endowment of the libraries of other faculties such as law and medicine). However, even on this basis, these two institutions account for nearly 58% of the $93 million total. In other words, our two largest university libraries have attracted a concentration of endowment which their rivals at Columbia, Cornell, and Chicago fail to match even on a proportionate basis. It is unlikely that inclusion of figures for Stanford (not available for the present study) would change this fact materially, although obviously the percentage would drop somewhat. As a group, our ten largest university libraries had, at the end of the 1969/1970 fiscal year, almost $1.50 in endowment for each volume in their collections.

Forty-nine universities report as their library endowment 1,853 separate funds (Table 13), ranging in principal amount from several hundred to several million dollars. The number of funds at a given institution could be anywhere from one to 396 (Yale)—and large numbers also occur at Harvard (254 in the Harvard College Library only), Princeton (198), Cornell (113), Brown (89), and Pennsylvania (85). However, if one were to distribute these funds evenly, every institution would receive thirty-eight funds with capital of $50,263 each, a principal sum considerably

TABLE 13

Institutional and Library Endowment in 56 Universities[a]

Institution	Total institutional endowment ($)	Library endowment	
		Principal ($)	No. of funds
Arizona	3,906,272	5,000	1
Boston	20,000,000	86,456	16
Brown	97,757,545	—[b]	89
California (Berkeley)	239,482,000[c]	—[b]	39[d]
California (Los Angeles)	(239,482,000[c])	2,149,065[e]	10[e]
Chicago	264,116,469	514,369	29
Cincinnati	45,906,173[f]	373,096[f]	20
Colorado	7,907,939	130,407	5
Columbia	250,000,000[g]	4,727,147[h]	47[h]
Connecticut	1,076,982	8,239	2
Cornell	95,262,217	2,170,614	113
Dartmouth	153,244,799[f]	2,531,335	70
Duke	76,219,588	1,725,533	23
Florida State	79,993	13,000	2
Georgia	7,945,794	458,186	11
Harvard	733,060,638	32,092,274[i]	254[i]
Howard	—[b]	0	0
Illinois	10,781,762	146,444	1
Indiana	7,463,290	0	0
Iowa	4,264,000[g]	0	0
Iowa State	2,750,000[g]	0	0
Joint Univ. Libs.	87,108,665[j]	1,483,577[k]	13[k]
Kansas	27,000,000[l]	—[b]	—[b]
Kentucky	814,716	15,182	10
Louisiana State	687,307	0	0
Massachusetts	1,258,508	13,612	3
MIT	100,237,659	415,999	22
Michigan	61,241,378	998,385	40
Michigan State	—[b]	0	0
Minnesota	67,780,000	105,758	6
Missouri	6,750,000	4,120	3
Nebraska	13,013,780	192,658	8
North Carolina	18,104,019	2,355,302	23
Northwestern	179,085,669	3,193,458	44
Ohio State	24,245,566	167,871	22
Oklahoma State	10,635,240	816[g]	1
Oregon	3,540,980	19,517	5
Pennsylvania	156,217,165	1,151,767	85
Pennsylvania State	—[b]	89,090	12
Pittsburgh	84,591,696	417,296	8
Princeton	154,412,571	9,745,058	198
Purdue	19,236,056	44,700	8
Rice	114,685,056	42,044	4

(continued)

TABLE 13 (*continued*)

Institution	Total institutional endowment ($)	Library endowment	
		Principal ($)	No. of funds
St. Louis	24,096,855	516,893	21
Southern California	37,218,161	496,986	9
Southern Illinois	—[b]	0	0
Syracuse	49,772,765	122,500	24
Temple	6,915,281	559,855	2
Tennessee	6,940,826	327,172	55
Texas	—[b]	180,683	4
Utah	4,076,726	98,133	6
Virginia	76,479,073	1,128,818	61
Washington (Seattle)	53,381,303	2,155	2
Washington (St. Louis)	116,068,000	322,548	22
Wisconsin (Madison)	19,200,631	197,500[g]	4
Yale	389,046,222	21,596,659[m]	396[m]
TOTAL	3,935,067,335	93,137,277	1,853

[a]Sources: Questionnaires returned by libraries; in a few cases, the institution's financial report.

[b]Not available.

[c]Total endowment for University of California system.

[d]General Library only.

[e]Includes endowment of William Andrews Clark Library ($1,750,000).

[f]Market value.

[g]Approximate figure.

[h]Figures for 1968.

[i]Figures for Harvard College Library only (Faculty of Arts and Sciences); endowment for libraries of other faculties not available.

[j]Endowment total for Vanderbilt University, Peabody College, Scarritt College, and Joint University Libraries.

[k]Includes endowment of Joint University Libraries and funds held by Vanderbilt for benefit of JUL.

[l]University of Kansas Endowment Association.

[m]Includes University Library and school, college, department, and special libraries.

larger than the average found in the college or the public library. Even so, the fund of $100,000 is not uncommon, and there are a respectable number which exceed $500,000 or even $1,000,000. Examples of these large amounts include the following: the William Andrew Clark Fund ($1,750,000) to endow that library at UCLA; the Edgar A. and Frederick Bancroft Foundation ($2,904,475) at Columbia for the purchase of books or literary materials on American history, American diplomacy, and American international relations; the Willard Fiske Library Endowment ($457,900) at Cornell for salaries of library staff and purchase of books; the George Washington Flowers Fund ($608,422) at Duke to support acquisitions on "the life and thought of the Southern states"; the Archibald Cary Coolidge Bequest and

TABLE 14

Colleges and Universities with Largest Endowments, 1969[a]

Rank	Institution	Total in millions ($)
1	Harvard	1,158.1
2	Yale	521.8
3	Massachusetts Institute of Technology	447.4
4	Texas	425.0[b]
5	Rochester	401.6
6	Princeton	399.3
7	Chicago	327.0
8	California	280.4[c]
9	Northwestern	259.5
10	Columbia	250.0[d]
11	Stanford	245.8
12	Pennsylvania	199.5
13	Cornell	185.8
14	William Marsh Rice	156.1
15	Johns Hopkins	155.0
16	Dartmouth	137.9
17	Washington (St. Louis)	135.0
18	Emory	131.0
19	California Institute of Technology	128.2
20	Carnegie-Mellon	122.0
21	Wellesley	116.3
22	McGill (Canada)	111.0
23	Brown	106.3
24	Vanderbilt	106.0
25	Amherst	95.3
26	Duke	94.1
27	Case Western Reserve	88.5
28	Oberlin	86.9
29	Pittsburgh	81.1
30	Minnesota	75.5
31	Michigan	66.1
32	Vassar	65.9
33	Smith	64.6
34	Williams	61.6
35	Swarthmore	55.4
36	Tulane	51.9
37	Rochester Institute of Technology	51.4
38	Cincinnati	44.8
39	Lehigh	44.3
40	Pomona	40.7
41	Brandeis	40.4
42	Mount Holyoke	39.4
43	Lafayette	39.2
44	Ohio State	38.7
45	Bowdoin	35.6
46	Rutgers	34.9

(continued)

TABLE 14 (*continued*)

Rank	Institution	Total in millions ($)
47	Purdue	29.6
48	Union Theological Seminary	29.6
49	Lawrence	26.5
50	Tufts	26.2
51	Trinity	25.6
52	Northeastern	25.1
	TOTAL	8,317.6

[a]Source: Vance, Sanders and Co., *Brevits*, No. 1, 1970.
[b]From *American Universities and Colleges*.
[c]Total endowment for University of California system.
[d]Estimate supplied by Columbia's School of Library Service.

Residuary Bequest ($975,813) at Harvard for the purchase of books and for administrative purpose; a part (amounting to $4,155,123) of Thomas W. Lamont's Bequest to Harvard for general library purposes; the Charles Shepard Lee Memorial Fund ($1,027,562) for the "benefit of Harvard College Library"; the W. A. Whitaker Fund ($600,329) at the University of North Carolina to purchase incunabula, books from famous presses, first editions, beautiful bindings, etc.; the Frank C. Engelhart Library Endowment Fund ($1,500,000) at Northwestern for general support of the university library; the William Watson Smith Memorial Fund ($3,000,000) at Princeton for general support and book purchases; and William Robertson Coe Fund ($4,622,259) at Yale for two purposes—(a) to pay the salaries of the Librarian, the Head Reference Librarian, the Librarian of the Collection of Western Americana and his assistant, and (b) to provide for purchases in Western Americana and American Studies. However, probably the most remarkable contribution consists of a series of five funds established by members of the Beinecke family at Yale. Representing a total capital of $14,229,682, they provide income for (1) the purchase of rare books; (2) the maintenance and operating costs of the Beinecke Rare Book and Manuscript Library; (3) the purchase of books, periodicals, manuscripts, and other research material; (4) acquisition of material identified as Western Americana; and (5) "primarily for the purchase of illuminated manuscripts and rare books." These gifts to Yale's capital, made over the 20 years 1948–1968, appear to be unequalled in the annals of philanthropy to endow American libraries. But the large number of funds of smaller size indicates that giving in this area has often come from persons of more modest financial means than those who have provided institutions of higher education with endowment for professorships, complete departments, or large-scale research. In this sense they are more comparable to donations whose income provides for scholarships and fellowships or the presentation of a lecture.

It is obviously impossible to analyze the purpose of each of the 1,853 library endowments at these universities, nor indeed is this necessary, since review of in-

TABLE 15

Library Endowment, by Amount, of 56 Universities[a]

Amount of endowment	Publicly-supported universities[b]	Privately-supported universities[c]
Over $20 million	None	Harvard, Yale (2)
Between $10,000,000 and $19,999,999	None	None
Between $5,000,000 and $9,999,999	None	Princeton (1)
Between $2,500,000 and $4,999,999	None	Columbia, Northwestern (2)
Between $1,000,000 and $2,499,999	California (Los Angeles), North Carolina, Virginia (3)	Cornell, Dartmouth, Duke, Joint Univ. Libraries, Pennsylvania (5)
Between $500,000 and $999,999	Michigan (1)	Chicago, St. Louis, Temple (3)
Between $250,000 and $499,999	Cincinnati, Georgia, Tennessee (3)	MIT, Pittsburgh, Southern California, Washington (St. Louis) (4)
Between $100,000 and $249,999	Colorado, Illinois, Minnesota, Nebraska, Ohio State, Texas, Wisconsin (Madison) (7)	Syracuse (1)
Between $1 and $99,999	Arizona, Connecticut, Florida State, Kentucky, Massachusetts, Missouri, Oklahoma State, Oregon, Pennsylvania State, Purdue, Utah, Washington (Seattle) (12)	Boston, Rice (2)
None	Howard, Indiana, Iowa, Iowa State, Louisiana, Michigan State, Southern Illinois (7)	None

[a]Source: Adapted from Table 13.
[b]Principal amount not available for California (Berkeley) and Kansas.
[c]Principal amount not available for Brown.

stitutional data indicates that differences are more in extent of funds than in their purposes, which for the most part resemble the four types already discussed—unrestricted endowment to support general operations and funds restricted to operations and maintenance, salaries, and book funds. Examples of these exist not only in the large amounts already mentioned, but also in a considerable number of funds of lesser amounts of principal. Nearly all of these funds for the first three purposes have come into being at privately–supported institutions; state universities have, on the whole, attracted only those capital gifts and bequests which, at least for library purposes, provide for the purchase of books and other materials. In connection with

TABLE 16

Volumes Held, Expenditures and Endowment in 10 Largest University Libraries, 1969/70[a]

Rank	Library	Volumes	Expenditures ($)	Endowment	
				Principal ($)	Income ($)
1	Harvard	8,278,473	8,523,698	32,092,274[b]	1,844,320[b]
2	Yale	5,645,982	7,593,202	21,596,659	908,000
3	Illinois	4,611,167	5,277,890	146,444	5,448
4	Michigan	4,175,686	5,988,750	998,385	68,375
5	Columbia	4,091,911	5,959,305	4,727,147[c]	331,402[c]
6	California (Berkeley)	3,845,050	6,450,681	—[d]	34,331
7	Cornell	3,605,517	5,489,933	2,170,614	216,937
8	Stanford	3,447,372	5,972,704	—[d]	—[d]
9	Chicago	2,977,647	3,667,681	541,369	25,802
10	Minnesota	2,944,844	4,578,099	105,578	3,550
	TOTAL	43,623,649	59,501,943	62,351,650[e]	3,438,165[f]

[a]Sources: Association of Research Libraries, "Academic Library Statistics, 1969/70" for volumes and expenditures column; questionnaires returned by libraries for endowment principal and income columns.

[b]Endowment figures for Harvard College Library only.

[c]Figures for 1967/68.

[d]Not available.

[e]Eight libraries only.

[f]Nine libraries only.

endowment for salaries, it is worth noting that an endowed chair may provide for the head librarian's position—e.g., Brown's John Hay Professorship of Bibliography; in addition, there are several funds designed to provide salary support for the curator of a special collection, such as the Elizabeth Wakeman Dwight Memorial Fund ($178,174) for the curatorship of the Yale Collection of American Literature and Cornell's two funds (both given by Willard Fiske and totaling $42,000) for the curators of the Icelandic and Dante–Petrarch collections.

Before turning our attention to the endowed book fund, let us consider several other types of funds which are either nonexistent or of slight import in college and public libraries. One such group consists of lecture funds, which while not large in number often memorialize a distinguished librarian. Two examples are the William Warner Bishop Fund ($1,482) at Michigan and the Philip and Frances Hofer Lecture Fund ($29,971) at Harvard (already noted under library schools was the Phineas L. Windsor Lectureship at Illinois; Mr. Windsor was the long-time director of both the library and library school). A related fund is the Dr. A. S. W. Rosenbach Fellowship in Bibliography ($20,000) at Pennsylvania.

Publications funds are not numerous, but they aid in the issuance of the general journals from our two largest collections. The William A. Jackson Fund ($81,154) and the George Luther Lincoln Publication Fund of the Harvard College Library

($200,000) provide financial support to the *Harvard Library Bulletin*, and the Danford N. Barney Memorial Fund ($39,579) to the *Yale Library Gazette*. Two more funds for more specialized publications are the Willard Fiske Icelandic Publications Endowment ($5,000) at Cornell for *Islandica* and the Albert T. Clay Publication Fund ($1,210) to help meet the cost of publications of the Yale Babylonian Collection. Finally, a few funds exist for two other purposes: prizes for undergraduate book collection—the Elmer Adler Book Competition Fund ($5,000) at Princeton; and endowment for the group known as the friends (or associates) of the _____ University Library. At least two groups, those at Columbia and Cornell, benefit from such funds for their activities: at the former the Friends of the Library Fund ($1,847) and at the latter the Walter Jennings Memorial Fund ($33,275).

This brings us to the endowed book fund, for the university as for other types of libraries, the purpose that has attracted both the greatest number of funds and the largest amount of capital. Indeed, as already indicated, at publicly-supported institutions library endowment consists almost entirely of book funds, and even at privately-supported schools they represent a high proportion of overall figures. At American universities there are literally hundreds of endowments whose income serves "to buy books for the library," and consequently they constitute the unrestricted book funds. In contrast, restricted book funds (those whose income is used for a designated purpose) fall into several groups: (1) those that specify only a broad subject area, often corresponding to an academic field (English, chemistry); (2) those that specify a narrow field (Ancient Greece and Rome, the endowment method for institutions of education and charity in the United States); and (3) those that provide for acquisition of special forms of material (rare books, manuscripts). The total range of endowed book funds at a university which has received a steady stream of capital for this purpose may be very wide, however, since some donors provide for the fields covered by the professional schools as well as the arts and sciences. The twenty-nine funds at the University of Chicago illustrate this diversity; ranging from $1,068 to $72,868 in principal, they total $514,369. Three are unrestricted; ten for law, two for medical, and one for divinity school books; one helps to maintain the library at the Country Home for Convalescent Children and one provides books for the library of the elementary school; the remaining eleven specify purchases in these special fields: American authors, drama and short story writing, Lincoln, advertising and marketing, American history, New Testament, law and ethics, consumption economics, public relations, and the last two finance additions to the Harriet Monroe Modern Poetry Collection.

Some examples of narrow designations placed on funds by donors are these cases at Yale: origin of the Socialist party and labor movement, relations between America and Great Britain on both sides of the Atlantic from 1750 to 1816, playing cards, shorthand, books of or dealing with Christmas carols, relations between the East and the West, and practical mechanics.

Two fields—literature; geography and history—call for additional comment. For the former there are funds for specific literatures and periods or genres within them

and others for publications by and about individual authors. UCLA has a fund for English literature of the eighteenth century, Brown one for the Spanish Renaissance era, and Cornell one for later Latin literature. Among the authors who have received this distinction one finds St. Thomas Aquinas (Princeton); Boswell, Johnson, and their circle (Northwestern); Dante and Petrarch (Cornell); Oliver Goldsmith (Harvard); Milton or his contemporaries (Yale); Montaigne and Rabelais (Princeton); and Perseus (Harvard). In the historical and geographical field numerous funds name a particular geographic area or political unit on which publications are to be acquired—e.g., Alaska (Princeton), Arizona (Arizona), Canada (Yale), Ceylon (Virginia), Italy (Columbia), Latin America (Yale), Pacific Northwest (Yale), Rhodesia and South Africa (Yale), and Siam (Harvard). There are also funds devoted to important figures in history—the most popular probably being Lincoln (Boston, Chicago, Cornell, and Illinois); others include Joan of Arc (Harvard), Anne of Britanny (Nebraska), Napoleon and French history of his time (Yale), and Woodrow Wilson (Virginia). In the areas represented by professional fields most funds provide books for law and medical collections. Interestingly enough the law funds seem most often only designated for that broad area, while in medicine there are instances of individual specialties named for acquisitions. Of forty funds at the Yale Medical Library, many are for general purchases, but individual funds restricted to each of the following specific areas do exist: bacteriology, medical history and neurological sciences, allergy, surgery and surgical pathology, anatomy, psychiatry, radiology, herbals, cardiovascular fields, history of surgery, cancer research, physical medicine, dentistry, dermatology or endocrinology, and occupational health.

Although endowment income of fifty-six university libraries exceeds $5.2 million, this figure loses much of its impressiveness when measured against expenditures of $176.5 million (Table 17); in other words, endowment income is equivalent to only 2.95% of expenditures. In fact, only ten libraries receive from this source more than $100,000: UCLA, Columbia, Cornell, Dartmouth, Harvard, Joint University, Northwestern, Pennsylvania, Princeton, and Yale (an eleventh, North Carolina, normally is in the group, but temporarily receives less than a normal return on certain investments); in only four cases does this equal 10% or more of the library expenditures: Harvard (21.6%), Dartmouth (13.2%), Yale (12.0%), and Princeton (10.9%). If, however, one could measure the contribution of endowment income to expenditures for books and other library materials, he would certainly find the role to be more noteworthy, although still quite moderate in most cases (especially in publicly-supported institutions). In short, evidence indicates that, with very few exceptions, endowment income plays a minor role in current financing of university libraries.

However, university libraries do offer some contrasts with the other types we have considered, despite the fact that at first glance one thinks of them as having simply larger capital funds. In comparison with college libraries, for instance, they not only have more separate funds (an average of thirty-eight for each of the forty-nine universities with library endowment), but these funds vary more in their

TABLE 17

Expenditures and Endowment Income in 56 University Libraries, 1969/1970[a]

Library	Expenditures ($)	Endowment income ($)
Arizona	1,695,387	200
Boston	2,236,652	3,391
Brown	1,946,903	78,540[b]
California (Berkeley)	6,450,681	34,331[c]
California (Los Angeles)	6,815,259	122,438[d]
Chicago	3,667,681	25,802
Cincinnati	1,410,886	96,590[e]
Colorado	2,598,041	7,056
Columbia	5,959,305	331,402[f]
Connecticut	2,162,380	363
Cornell	5,489,933	216,937
Dartmouth	1,587,496	209,584
Duke	2,790,561	59,778
Florida State	1,528,973	900
Georgia	2,932,396	22,706
Harvard	8,523,698	1,844,320[g]
Howard	1,118,554[h]	0
Illinois	5,277,890	5,448
Indiana	5,149,957	0
Iowa	2,438,054	0
Iowa State	1,884,238	0
Joint Univ. Libs.	1,588,940	103,080[i]
Kansas	2,210,528	20,000[j]
Kentucky	2,174,520	5,360
Louisiana State	1,582,493	0
Massachusetts	2,162,928	1,036
MIT	2,168,921	31,021
Michigan	5,988,750	68,375
Michigan State	3,144,531	0
Minnesota	4,578,099	3,550
Missouri	2,114,800	165
Nebraska	1,994,230	5,521
North Carolina	2,817,729	72,712
Northwestern	2,710,236	209,940
Ohio State	3,690,778	8,157
Oklahoma State	1,152,487	41
Oregon	1,596,664	1,006
Pennsylvania	3,400,770	128,751
Pennsylvania State	4,767,250	3,361
Pittsburgh	3,206,066	22,656
Princeton	3,215,251	349,449[k]
Purdue	2,921,484	2,412
Rice	1,195,054[h]	2,134
St. Louis	973,741	21,875[l]
Southern California	2,108,122	24,618
Southern Illinois	4,030,224	0

(continued)

TABLE 17 (*continued*)

Library	Expenditures ($)	Endowment income ($)
Syracuse	2,091,325	6,738
Temple	2,685,907	22,043
Tennessee	2,767,518	13,836
Texas	5,406,545	12,414
Utah	2,334,583	8,707
Virginia	2,173,690	57,279
Washington (Seattle)	3,753,657	162
Washington (St. Louis)	2,612,605	31,661
Wisconsin (Madison)	3,982,769	6,260[m]
Yale	7,593,202	908,000[n]
TOTAL	176,561,322	5,212,106

[a]Sources: Association of Research Libraries, "Academic Library Statistics, 1969/70" for expenditures column; questionnaires returned by libraries for endowment income column.

[b]Excludes income of John Hay Professorship of Bibliography.

[c]General library only.

[d]Includes William Andrews Clark Library.

[e]Includes library's portion of various other endowment funds.

[f]Figures for 1967/68.

[g]Figures for Harvard College Library only (Faculty of Arts and Sciences); endowment income of funds of other faculties not available.

[h]Figures for 1970/71.

[i]Includes endowment income of Joint University Libraries and of funds held by Vanderbilt for benefit of JUL.

[j]Approximate amount received from University of Kansas Endowment Association.

[k]Book funds only.

[l]Includes estimated income on one fund received in 1970.

[m]Approximate figure.

[n]Excludes Law Library.

purposes. Even the most typical form, the endowed book fund, delves more often into exotic subjects. Moreover, the university library endowment often aids not only the general library but also those of the several professional schools, so that its scope is broader (or, as the pessimist might say, its resources are spread more thin). Finally one notes major differences in the cases of the publicly– and privately-supported schools.

Reference Libraries

The scholarly world has not agreed upon a simple phrase to describe this group of libraries which share similar characteristics. Although they collect research publications for the scholar rather than popular materials for the layman and do not lend them for home use, they are "public" in the sense of being open to all

TABLE 18

Library Endowment and Expenditures in 11 Reference Libraries[a]

Library	Expenditures, 1969/1970 ($)	Endowment	
		Principal ($)	No. of funds
American Antiquarian Society	215,578	2,487,725	71
Boston Athenaeum	337,049	3,315,686	91
Center for Research Libraries	—[b]	0	0
John Crerar	1,253,392	7,171,444[c]	10
Folger Shakespeare	795,655	18,758,780	—[d]
James Jerome Hill	359,000	9,600,000[c]	—[e]
Henry E. Huntington	1,509,344[f]	20,525,530[f]	1[g]
Library Company of Philadelphia	—[b]	4,159,673[e]	8
Linda Hall	1,057,925	24,000,000	2
Newberry	987,847	21,389,843	16
New York Public Research Libraries	10,374,854	70,461,766	97
TOTAL	16,890,644[h]	181,870,447	296

[a]Source: Questionnaires returned by libraries.
[b]Not available.
[c]Market value.
[d]Separate funds not identified.
[e]Original fund plus "various bequests" between 1933 and 1969.
[f]Expenditures and endowment for art gallery, botanical gardens, and library.
[g]All funds held as single "Permanent Endowment."
[h]Nine institutions.

qualified users. But unlike public libraries they draw their financial support from private sources (chiefly endowment income), and they remain unattached to universities or learned societies. For these reasons they are sometimes referred to as "endowed research" or "privately-supported reference" libraries, or the even longer "independent, privately-supported research libraries." Table 18 lists eleven of the most important institutions of this type; there are a few others, but the number is small and not likely to increase significantly. (A somewhat similar group consists of libraries attached to museums and learned societies, but they often limit their collecting to one or two specific fields and, of course, this constitutes only one of their parent organization's activities.) However, as Tables 18 and 26 indicate, this type of institution holds special importance for a study of endowment, because they possess $181,870,447 (or approximately 56%) of the grand total of such funds. One might say that endowment literally made these libraries possible. Indeed the largest single amount of library capital funds consists of the $70 million endowment of the New York Public Library's Research Libraries, an institution which came into being in 1895 as the amalgamation of the Astor Library, the Lenox Library, and the Tilden Trust. Some members of this group were founded much earlier (1812 in the case of the American Antiquarian Society), others later (1949 for the Midwest

Inter-Library Center, the original name of the Center for Research Libraries). It is interesting to note the wide geographical spread of these institutions: five along the East Coast (Worcester, Boston, New York, Philadelphia, and Washington), three in Chicago, one in St. Paul, one in Kansas City, and one in San Marino, California.

Although the Center for Research Libraries has no endowment, the matter has received consideration (*12*). Formed as a "libraries' library," it does differ in several respects from the others, while sharing with them the essential characteristic of collecting scholarly (if often little used) resources. Assessments on the university and other libraries which are its members provide the basic financial support for the center's operations. Endowment of the remaining ten libraries ranges from $2.5 to over $70 million. Aside from the large figure at the Research Libraries of NYPL, four (Folger, Huntington, Linda Hall, and Newberry) cluster around the $20 million mark, while the remaining five are less than $10 million. In six cases (Crerar, Folger, Hill, Huntington, Linda Hall, and Newberry) nearly all, or at least a very high proportion of the endowment continues to be the fund given or bequeathed by the original donor (or donor and his wife). Since the Library Company of Philadelphia has relatively few separate funds, only at three libraries has the endowment resulted from many individual gifts and bequests. At both the American Antiquarian and Boston Athenaeum nearly all individual funds are relatively modest in size (the average is $35,038 at the former and $36,435 at the latter), but the Research Libraries of NYPL show donations of greater magnitude. However, even more striking is the concentration of the endowment in a few large funds; there are eighteen of more than $1 million each, and they total $41.2 million, accounting for 58.5% of the Libraries' capital. In other words, all other funds together (seventy-nine) make up the remaining 41.5%.

The book fund plays a less important role, as a part of endowment, in these institutions than it does in public, college, or university libraries. The fact that the large original gifts and bequests establishing most of the ten libraries—and many later ones as well—are unrestricted and thus finance salaries, acquisitions, building maintenance, and other expenditures, probably explains this. One wonders whether other donors exhibit less interest in creating funds at institutions which so prominently feature the name of their founder. In some instances large funds provide support for acquisitions, staff, and even other expenses; this is true for three of the best known special collections at NYPL (the Berg Collection of English and American Literature, the Arents Tobacco Collection, and the Spencer Collection of Illustrated Books in Fine Bindings) as well as of the John M. Wing Foundation (i.e., collection) on the history of printing at Newberry. In these cases each fund exceeds $1 million; three funds totaling $250,000 operate in similar fashion on behalf of Newberry's Edward E. Ayer Collection on discovery and exploration from the Renaissance to the end of the nineteenth century. There are fourteen book funds at the American Antiquarian, some of which designate a specific subject for purchases (e.g., books, maps, and charts of South America; biography and writings of distinguished lawyers and judges; New England books), and thirty-seven restricted funds—twenty-two for books (with a principal of $637,732) and fifteen for other

purposes (with principal of $284,794)—do provide special support for acquisitions at the Boston Athenaeum. Crerar has received gifts and bequests that fund additions in four designated medical areas (lungs, heart, and kidneys; eye and ear; histology and immunology; sex organ of the male), two others with only a general restriction to medicine, and one for the history of science. A few miles away at the Newberry Library, eight endowed book funds aid the development of resources as follows: William B. Greenlee (Portuguese history and literature), Frederick Ives Carpenter (early English prose fiction and Spenser), Alfred E. Hamill (rare books and manuscripts), Horace Hawes Martin (first editions of modern poetry), Jane Oakley (music), Edward L. Ryerson (rare books and manuscripts), Platt R. Spencer (calligraphy and other materials related to American handwriting), and Flora Mayer Witkowsky (materials pertaining to drama and the theater) (*13*). In addition, many of the restricted funds at the New York Public do support book purchases, but little information is readily available on the subject strengths they help to maintain (*14*).

Of course, in financial terms the most unusual characteristics of these libraries is their dependence on income from endowments. In fact, it is likely that examination of the record would reveal that in their early years this source provided nearly 100% of their revenue. The proportion remains high, however, in all cases but the Crerar and the New York Public (Table 19), where especially in the years since World

TABLE 19

Income from Endowment Compared with Other Income in 10 Reference Libraries, 1969/70[a]

Library	Income			Endowment as % of total
	Endowment ($)	Other ($)	Total[b] ($)	
American Antiquarian Society	144,081	60,290	204,371	70.5
Boston Athenaeum	264,434	72,615	337,049	78.5
Center for Research Libraries	0	—[c]	—[c]	0
John Crerar	337,083	900,187	1,237,270	27.2
Folger Shakespeare	833,374	66,647	900,021	92.6
James Jerome Hill	359,000	0	359,000	100.0
Henry E. Huntington	1,559,046	144,487	1,703,533	91.5
Linda Hall	993,345	64,580	1,057,925	93.9
Newberry	751,578	116,969	868,547	86.5
New York Public Research Libraries	3,525,529	3,716,383	7,241,912	48.7
TOTAL	8,767,470[d]	5,142,158[d]	13,909,628[d]	63.8[d]

[a]Source: Questionnaires returned by libraries.

[b]These figures will not usually match Expenditures column in Table 18 because income fell short of or exceeded expenditures.

[c]Not available.

[d]Nine libraries.

War II the pressure of rising costs has placed demands upon endowment which income from existing capital funds could not meet. The Crerar developed its special services to industry and its affiliation with Illinois Institute of Technology in part to secure an adequate income. The Research Libraries at NYPL now receive less than 50% of their income from endowment—a marked contrast with earlier years; the remainder comes from a variety of sources, including gifts for current operations, aid from New York state, and contract income from the Board of Higher Education of New York. Interestingly enough, the five institutions which have the highest proportion of endowment income (Folger, Hill, Huntington, Linda Hall, and Newberry) still draw their chief support from the general endowment fund provided by the founder (or founder and his wife), and even at Crerar the original fund continues to form most of the endowment, although the income therefrom only provides about a quarter of the budget. It should be noted, however, that in almost every case the original principal has grown over the years through profits from investments, so that it now really represents the founder's gift or bequest and subsequent capital accumulation (exclusive of unrealized appreciation in their portfolios). It seems certain that all of these libraries, like privately-supported universities, will come under increasing financial pressure in the years ahead, a situation which some of them are already anticipating in intensified efforts to secure currently expendable gifts from the general public and especially from "Friends" and "Associates" groups.

Other Library Endowment

Available evidence indicates that the four types of libraries already discussed, along with library schools, hold most of the country's library endowment (see Table 26). However, to have a complete picture, it is necessary to mention other funds, although they amount to less than 4% of the grand total.

Of the three national libraries in the United States, neither the National Agricultural Library nor the National Library of Medicine report endowment (Table 20). The Library of Congress does hold, or receive income on, funds amounting to approximately $6,777,677—the result of gifts and bequests since 1925, when the Library of Congress Trust Fund Board was established by act of Congress approved March 3, 1925 (Public Law 541, 68th Congress). Because of the board's unique characteristic, a few words of history seem in order. When, in 1924, Elizabeth Sprague Coolidge approached the Library of Congress as a possible permanent home for the chamber music festivals she had promoted, no government agency had authority to accept such an endowment (*15*), as indicated by the fact that some years earlier Congress had passed special legislation—Public Law 276, 62nd Congress, approved August 20, 1912—to accept, on behalf of the library, the bequest of Gertrude M. Hubbard in the amount of $20,000. As a result of Mrs. Coolidge's inquiries, the bill which Congress passed created the Library of Congress Trust Fund Board and authorized it "to accept, receive, hold, and administer such gifts or bequests of personal property for the benefit of, or in connection with, the Library,

TABLE 20

Expenditures and Endowment in National Libraries[a]

Library	Expenditures 1969/1970 ($)	Endowment		
		Income 1969/70 ($)	Principal ($)	No. of funds
Library of Congress	62,284,248	282,291	6,777,667	31
National Agricultural Library	3,419,000	0	0	0
National Library of Medicine	7,179,000[b]	0	0	0

[a]Sources: Questionnaires returned by libraries.
[b]Library operations rather than total expenditures.

its collections, or its service, as may be approved by the board and by the Joint Committee on the Library" (*16*).

The initial gift of Mrs. Coolidge to further music research, composition, performance, and appreciation of music took place in 1926 (later increased by bequest). Since then the library has received twenty-nine other funds (*17*). By date they came to the Trust Fund Board as follows: ten prior to 1930 (including the Hubbard and the Coolidge funds); eight between 1931 and 1940; five between 1941 and 1950; four between 1951 and 1960; and four between 1961 and 1970. The principal amounts vary from $1,000 to $1,538,609, with the average being $218,312 (this includes the approximate value of a few funds whose principal is held not by the board but rather by an outside trustee who turns the income over to the library). Individuals provided most of the funds, either by gift or bequest, but several did come from groups (Carnegie Corporation, Friends of Music in the Library of Congress, the National Library for the Blind, Inc., and the Beethoven Association).

The gift from Elizabeth Sprague Coolidge proved to be prophetic, because subsequent gifts and bequests were made for some purpose connected with music, activities of the Music Division, or strengthening the library's musical resources; by 1970 ten funds existed in this area, including the library's largest single endowment, the Gertrude Clarke Whittall Foundation ($1,538,609), established in 1936 and increased in 1966 and 1967, to maintain the collection of Stradivari instruments and Tourte bows she presented to the library and to sponsor programs in which these instruments are used. Among the other donors was Serge Koussevitzky. An interesting example of a specialized interest within the field is the Dayton C. Miller bequest to endow the flute collection of 1,500 instruments and 5,000 books, pamphlets, and pieces of music which he had given to the library. With a principal of $3,708,729, these funds account for more than half of the library's total endowment.

The twenty-one other funds reveal a wide range of interest on the part of the donors. Several, established by Archer M. Huntington, provide support to the

Latin American, Portuguese, and Spanish Division (formerly the Hispanic Foundation) in terms of acquisition of materials, consultants, and maintenance of the Hispanic Society Room. In the case of two of them, one-half of the income goes to maintain a chair of poetry in the English language. During the 1920s the concept of having chairs at the library, similar to endowed chairs at universities, attracted the interest of some benefactors, and they were established in the fields of American history, fine arts, aeronautics, and geography. At present these funds seem to be used, in large part, to support varied activities related to these areas. Several funds assist in the development of the library's collections in American history: two given by James B. Wilbur finance the acquisition of reproductions of manuscript material on American history in European archives and the treatment of source material; the Alfred Whital Stern Memorial Fund maintains and expands the Stern Collection of Lincolniana. Two endowments, both established in the 1950s, further the library's work with the blind. The R. R. Bowker Fund ($14,843), dating from 1926, supports bibliographical services, and the Alexis V. Babine Bequest ($6,685) is for the purchase of Slavic materials. Two funds came to the library with such general terms that they should probably be considered unrestricted endowments: the Henry Kirke Porter Memorial Fund ($290,500) may be used for consultantships or other special activities of the library, and the Roberts Fund ($62,704), established by bequest from Margaret A. Roberts for "the benefit of the Library of Congress, its collections and service," is used, with the approval of the Trust Fund Board, for the publication of material about the library.

At first glance it appears that the contribution of endowment income to operations of the Library of Congress must be negligible, since it is equivalent to less than 1% of the library's expenditures. On the other hand, this support representing recurring income for designated purposes, not subject to change as Congressional appropriations are, provides the library with the means to offer enriched services and programs in the areas so supported. This seems particularly true of music, where some at least of the library's preeminence may be due to the fact that an annual income of around $160,000 provides a "margin for excellence" that appropriated funds might not.

The discussion of endowed reference libraries mentioned the existence of a related group of libraries, consisting of those attached to museums and learned societies. Each one is, in effect, a special kind of special library, in that it does not resemble the special collection set up to provide up-to-the-minute information in the profit-making bank, advertising agency, or manufacturing plant; rather it complements the scholarly activities of the museum or society, and in this it parallels the departmental library in a university. Like both of these types, however, it usually concentrates on one or two fields—especially those relating to the primary interests of the parent organization. There seems to be little information either on these libraries as a special group or on the sources of their support, but obviously most of the country's prominent museums have, to greater or lesser degree, created such information centers. The same applies, in lesser quantity probably, to learned societies.

TABLE 21

Institutional and Library Endowment in 4 Museums and Societies[a]

Name	Total institutional endowment ($)	Library endowment	
		Principal ($)	No. of funds
American Philosophical Society	14,574,036	446,990	11
Art Institute of Chicago	46,167,065	320,849	—[b]
Metropolitan Museum of Art	112,881,180	—[b]	—[b]
New York Historical Society	12,690,454	623,272	15

[a]Source: Questionnaires returned by libraries.
[b]Not available.

The present study unfortunately draws on only a small sample: two leading art museums, one historical society, and one general learned society (Table 21).

Information from these organizations makes clear the difficulty in attempting to segregate endowment for library purposes, since support for the library usually comes as a part of the total budget, which in turn derives in varying degree from the income from general or unrestricted endowment.

The Metropolitan Museum of Art does not report any special endowment for its libraries (the Thomas J. Watson Library and the Photograph and Slide Library), both of which are funded as a part of the museum's regular operations. However, the yield from the museum's $112,881,180 endowment provided more than half of the 1970 income of $8,020,861. In contrast, the Art Institute of Chicago has funds with a principal of $320,849 as endowment for its library; their income represented about 9% of library expenditures. At the New York Historical Society, fifteen of its "Special Funds"—varying in principal from $600 to over $400,000—seem to be restricted to library purposes, chiefly for purchase of books and other materials. There is one unrestricted fund for the library; three for the purchase of manuscripts; one for the purchase of prints; three for binding of books; and one for the purchase of books, manuscripts, and prints. The largest, the Lathrop Colgate Harper Fund, provides that ¾ of its income go in four equal amounts to purchase (1) pre-1700 books, (2) eighteenth century books, (3) nineteenth century books over 100 years old, and (4) books on New York City and State over 100 years old and additions to the Spanish-American War collection. (The remaining ¼ of income is added to the principal.) Four other book funds have stated objectives for their expenditures: the care and increase of the Naval Historical Society Library, the increase of the Phoenix Collection of Heraldry and Genealogy, the purchase of works relating to the state of Rhode Island, and the purchase of books over 100 years old.

The remaining fund endows the publication of works relating to the early history of New York and other American provinces.

Although the principal of these funds totals $623,272, the income they produce is not available. However, of the society's total income of $811,006 (1970), endowment furnished about 7/8 ($709,954). Obviously the library expenditures, both for salaries and for acquisitions, would show a heavy dependence on the society's general and "special" funds.

The eleven funds composing the American Philosophical Society's endowment for library purposes total $466,990. Established between 1827 and 1931, they vary in present book value from $4,294 to $113,596. One fund, the largest in the group, came from the Carnegie Corporation in 1931 for maintenance of the library, while another, the Seybert Fund (received in 1883), was assigned to the library in 1909 and is presumably unrestricted; nine are book funds. Seven of them seem unrestricted as to field, while the Phillips Fund is for books on archaeology and philology, and the Balch International Law Library Fund apparently provides for acquisition in this area.

It is obvious from this very limited inquiry into museum and society libraries that further work remains to be done to identify the exact role of endowment in supporting the special collections established by such bodies.

A final type of endowment is that of professional associations in the field of librarianship, the most prominent being, of course, the American Library Association. The association has ten endowment funds, with a total principal of $3,649,853. The largest fund ($2,880,089) results from a series of gifts between 1926 and 1933 from the Carnegie Corporation; the general endowment, made up of life memberships in the association, ranks next, standing at over $500,000. These, together with the Carnegie Fund of $154,000, account for 97% of the association's endowment and are unrestricted in purpose. In fact, in recent years the association drew on the Carnegie Corporation Fund to the extent of about $1,175,000 for the construction of the new headquarters building in Chicago, with the understanding that 6% of the annual income of the Regular Activities Fund (and contributions to the Building Fund) would, over a period of years, return this money to endowment. However, the Association's Council at the annual conference in Detroit in 1970 rescinded this action, reducing the previous balance in the fund by transfer of $866,896 to the Building Fund (*18*).

The association's seven other funds are quite small, ranging from $502 to $63,605, the latter being the Frederick Melcher Scholarship Fund. Endowment income now appears to have a limited role in the association's finances, since the Carnegie Corporation Fund and the General Endowment Fund together yielded $115,240 in 1969/70, or less than 10% of the net membership dues ($1,368,633).

Information on endowments of such other groups as the Special Libraries Association and the Medical Library Association are not readily available. It is unlikely, however, that the total would begin to approach that of the American Library Association, since the Carnegie Corporation—the largest donor to ALA—has apparently contributed nothing to their endowments (*19*).

The Development of Library Endowment

While the present study, as indicated in its opening paragraphs, does not attempt to trace historically the development of library endowment, it does seem appropriate to make a few observations at this point, especially as data are available on the growth of the two largest holdings, those of New York Public and Harvard, since the early twentieth century. They offer some interesting comparisons and contrasts. Although exact information is lacking, at the time of the consolidation creating the New York Public Library—Astor, Lenox and Tilden Foundations, its endowment probably far exceeded that of any other library; by the end of 1912, the first complete year of occupancy of the central building, the library's capital stood at $10.3 million. It increased about 50% in the next decade, but a 1922 study of the Research Libraries (then titled the Reference Department) showed the need of adding at least $6 million to the endowment fund. John D. Rockefeller, Jr., offered to contribute up to $3 million, provided other persons would match the sum; two trustees, Payne Whitney and Edward S. Harkness, donated respectively $2 and $1 million to secure the full amount of the Rockefeller pledge (*20*). Further increase took place in the 1920s, but the 1930s and the World War II years saw little growth (Table 22). It is interesting to note that apparently the library has never embarked on a full-scale capital drive to add to the endowment, although it did successfully hold a fund-raising campaign for its Centennial in 1948, which seems to have aimed at obtaining unrestricted, expendable gifts, rather than additions to the endowment. However, a report issued some years later commented, "The endowment fund has

TABLE 22

Growth of Endowment, New York Public Library, Research Libraries[a]

Fiscal year[b]	Endowment ($)	Income ($)
1912	10,361,000	—[c]
1915	10,628,947	504,032
1920	13,212,030	614,505
1925	22,595,601	1,046,718
1930	37,720,929	1,200,671
1935	41,454,568	1,329,292
1940	40,231,801	1,401,807
1945	42,868,990	1,504,739
1949/50	—[c]	1,957,600
1954/55	—[c]	2,465,600
1959/60	64,338,776	3,143,200
1964/65	—[c]	3,613,818
1969/70	70,461,766	3,525,359

[a]Sources: New York Public Library, *Financial Statements, 1915* to *1969/70;* "Gifts to the Endowment," *Bull. N. Y. Public Lib.*, 27, 116–119 (1923), for 1912 figure.

[b]Earlier years ended December 31; later ones June 30.

[c]Not available.

TABLE 23

Growth of Library Endowment, Harvard University[a]

Fiscal year[b]	Endowment[c] ($)	Income[d] ($)
1904/05	457,425	51,025
1909/10	574,040	42,717
1914/15	978,300	79,003
1919/20	1,243,775	123,559
1924/25	1,598,955	106,993
1929/30	2,698,364	161,101
1934/35	2,831,126	143,269
1939/40	3,722,484	185,186
1944/45	8,040,077[e]	319,084
1949/50	15,909,665	664,973
1954/55	16,333,488	780,468
1959/60	22,575,583	1,062,036
1964/65	30,549,834	1,456,046
1969/70	32,092,274	1,844,320

[a]Source: Harvard University, *Financial Report to the Board of Overseers of Harvard College, 1904/05* to *1969/70* (title varies).

[b]Year ending June 30.

[c]Earlier years' reports include some current gift funds, which are excluded from this column whenever they could be identified; some later years include transfers to principal from General Investments Gain and Loss Account.

[d]Earlier years' reports include gifts, sales, fines, and fees as well as investment income on a page giving total library income; these amounts are excluded from this column whenever they could be identified.

[e]Includes a transfer to Library Endowment of $4,000,000 from Harvard Endowment (1917) Faculty of Arts and Sciences (by 1970 additions to principal had resulted in a total of $5,649,312).

shown a healthy growth over the years both by enhancement of market values and from bequests and gifts" (*21*). Although the trend continued, the *net* growth of endowment slowed very markedly as larger and larger deficits were met by drawing on unrestricted funds previously functioning as endowment. Furthermore, as expenditures mounted, the proportion met by endowment income decreased, so that it now equals less than half of the Research Libraries' budget.

An even more spectacular growth of library capital occurred in the case of Harvard (Table 23), where the principal of funds has jumped from less than $500,000 to over $32 million. Once only $\frac{1}{10}$ of what NYPL possessed, Harvard's library endowment now approaches ½. Thanks to the recent generosity of the Beinecke family, Yale's libraries would probably show an even more astonishing growth. Perhaps somewhat more representative of privately-supported institutions is the case of Northwestern, where library endowment remained quite small until the 1950s (while total university endowment was increasing quite rapidly). The following 20 years did witness nearly a fivefold expansion in these funds (Table 24).

TABLE 24

Growth of Library Endowment, Northwestern University[a]

Fiscal year[b]	Endowment ($)	Income ($)
1884/85	24,952	—[c]
1890/91	116,633	—[c]
1894/95	—[c]	—[c]
1899/1900	121,536	—[c]
1904/05	130,172	—[c]
1909/10	130,177	—[c]
1914/15	131,177	—[c]
1919/20	50,516	—[c]
1924/25	156,316	—[c]
1929/30	673,820	32,605
1934/35	478,030[d]	—[c]
1939/40	480,153	19,557
1944/45	599,413	22,216
1949/50	648,232	33,846
1954/55	1,109,221	63,946
1959/60	1,268,793	92,597
1964/65	1,421,032	109,713
1969/70	3,193,458	209,940

[a]Source: Northwestern University, *Financial Report 1884/85* to *1969/70*.

[b]Earlier years ended June 30; later ones August 31.

[c]Not available.

[d]Some variation in figures for early years reflects carrying value assigned to land representing investment of Orrington Lunt Fund; in 1934 the book value of this fund was reduced from $350,000 to $150,000, and this accounts for decrease shown from 1929/30 to 1934/35.

As a group, the endowed reference libraries seem to have increased their endowment more through capital gains than through additional funds. The Huntington's growth from an original $9 million to $21.2 million in 1971 illustrates this (Table 25). Obviously there is a strong relationship with investment policy.

Little is known about the place of library endowment in the capital fund drives that now come, as every alumnus knows, with increasing regularity from colleges and universities. Given the absence of data, we must rely on a few examples to show, at least in some institutions, the concern for increasing the library's capital funds. Stanford's PACE campaign sought $4.5 million for libraries—$2 million in term support and $2.5 million for endowment. The Brown Bicentennial campaign included an objective of $1 million for library endowment, and Vanderbilt's $30 million Program one of the same magnitude to endow purchase of books, scientific journals, and periodicals at the Joint University Libraries. More ambitiously Cornell's Centennial Campaign proposed to raise $3 million for endowed book funds and $250,000 to provide special collections with a standby fund to use when items important to Cornell's holdings become available.

TABLE 25

Growth of Endowment, Henry E. Huntington Library and Art Gallery[a]

Year ending June 30	Net gain or (loss) on securities ($)	Endowment ($)
1927		9,000,000[b]
1939	(98,813)	9,172,810
1940	41,080	9,213,890
1941	57,027	9,270,918
1942	(75,007)	9,195,911
1943	64,526[c]	9,260,436
1944	71,197[d]	9,331,634
1945	1,302,820[e]	10,634,454
1946	101,536	10,735,990
1947	687,516	11,423,506
1948	(24,524)	11,398,982
1949	(4,533)	11,394,448
1950	44,285	11,438,733
1951	97,632	11,536,365
1952	276,286	11,812,651
1953	467,681	12,280,332
1954	76,425	12,356,757
1955	97,850	12,454,608
1956	753,756	13,208,363
1957	112,506	13,320,869
1958	1,855,930[f]	15,176,799
1959	577,716	15,566,295
1960	471,080	16,037,375
1961	166,520	16,203,895
1962	1,069,651	17,273,546
1963	475,615	17,749,161
1964	521,512	18,270,673
1965	566,827	18,837,500
1966	42,345[g]	18,879,845
1967	3,423	18,883,268
1968	62,961	18,946,229
1969	733,178	19,679,407
1970	846,123	20,525,530
1971	733,532	21,259,062

[a]Source: Henry E. Huntington Library and Art Gallery, *Annual Report, 1938/39* to *1970/71*.

[b]Approximate amount of original endowment (cf. *Report* for 1938/39, p. 26).

[c]Includes small gain on sale of real estate.

[d]Includes $7,000 gift.

[e]Includes $914,508 attributable to the fact that interest since 1941 used to reduce carrying value of a block of 5% income bonds in part redeemed and in part sold during year.

[f]Includes $1,181,463 gain on liquidation of Huntington-Redondo Company.

TABLE 26

Summary of Endowment, by Type of Library[a]

Reporting institutions	No. with endowment	Endowment principal ($)	Per cent of total	No. of funds	Per cent of total
36 Library Schools	20	5,248,533	1.6	59	1.8
41 Public Libraries	31	23,591,369	7.3	450	13.8
30 College Libraries	29	7,355,246	2.3	530	16.3
56 University Libraries	49	93,137,277	28.9	1,853	56.9
11 Reference Libraries	10	181,870,447	56.3	296	9.1
3 National Libraries	1	6,777,677	2.1	31	1.0
4 Special Libraries	3	1,391,111	0.4	26	0.8
1 Library Association	1	3,649,853	1.1	10	0.3
182 TOTALS	144	323,021,513	100.0	3,255	100.0

[a]Source: Adapted from Tables 2, 5, 8, 10, 13, 18, 20, 21, and text above.

More recently two of the endowed reference libraries have embarked upon fund-raising campaigns. The Newberry Library seeks $4.25 million in the form of $1.5 million in immediate capital gifts (presumably for addition to the endowment); $1.5 million in gifts, grants, and bequests (partially expendable?); and $50,000 annually as the equivalent of the yield on the remaining $1,250,000. The American Antiquarian Society has proposed a campaign in two phases (ending in 1975) with a total goal of $5,042,500, of which about 80% would be in the form of additions to the endowment. Specifically, the amounts sought are $2,325,000 for salaries and new staff positions, $1,125,000 for acquisitions, $550,000 for fellowships, and $37,500 for lectures (22).

Conclusion

This article has attempted to review the nature and extent of endowment in American librarianship, including such funds of public, college, university, reference, national, and special libraries, as well as those in library schools and in the major professional association. Table 26 recapitulates the findings. Three-quarters of the library endowment is concentrated in forty-nine university and ten reference libraries, although the former have more than half of the separate funds. Given the incomplete nature of available data, these figures are minima; it seems safe, however, to assume that the major institutions here tabulated account for 75 or 80% of the country's total library endowment; in other words, the total probably does not exceed $400 million, although there may be hundreds or even thousands of individual small funds in many less-known institutions. The relatively large size of individual funds at the endowed research library is apparent: while they have

56.3% of the capital, they account for only 9.1% of the funds; in contrast, educational institutions (colleges and universities) hold 73.2% of the funds. However, in almost all cases, library endowment has come primarily from individuals, either by gift or by bequest. Foundations, which have, of course, aided libraries in many ways, have apparently contributed relatively little to their endowment. The Carnegie Corporation is the exception, having given nearly $6 million for endowment from 1917 through 1940. As indicated in Table 27, library schools received about ⅓ of this, the American Library Association another ⅓, and the final ⅓ went to colleges and other libraries including, however, only two grants to universities (Princeton for the Marquand Art Library and Vanderbilt on behalf of the Joint University Libraries).

The need for further studies of endowment is obvious if we are to have a complete picture of philanthropy for libraries.

TABLE 27

Carnegie Corporation Grants for Library Endowments, 1911–1961[a]

Purpose and institution	Date	Amount[b] ($)
Library Schools		
Atlanta University	1940	150,000
University of California	1937	150,000
University of Chicago	1926	1,000,000
Columbia University	1938	250,000[c]
University of Denver	1939	50,000
Emory University	1940	100,000
University of Michigan	1937–41	200,000
University of North Carolina	1940	100,000
Pratt Institute	1939	50,000
Case Western Reserve University	1917	25,000
SUBTOTAL		2,075,000
College Libraries		
College of Emporia	1921	50,000[d]
Cornell	1921	75,000
Grinnell	1920	75,000[d]
Hamilton	1920	75,000[d]
Mills	1925	50,000
Mt. Holyoke	1934	150,000
Oberlin	1925	50,000
Swarthmore	1925	50,000
Vassar	1935	160,000
Whitman	1925	50,000
SUBTOTAL		785,000
College Librarian's Salary		
Lafayette	1931	150,000
Oberlin	1930	150,000
Swarthmore	1931	150,000
Wesleyan	1931	150,000
SUBTOTAL		600,000

(continued)

TABLE 27 (*continued*)

Purpose and institution	Date	Amount[b] ($)
American Library Association	1926–33	2,000,000
Sarah C. N. Bogle Memorial Fund	1937	2,500
Other		
American Philosophical Society	1930	100,000
Library of Congress	1927	75,000[c]
Mark Twain Library, Redding, Conn.	1920	10,000
Princeton University	1926	50,000[f]
Spence School	1930	20,000
Vanderbilt University (for Joint University Libraries)	1938	250,000
GRAND TOTAL		5,967,500

[a]Sources: Florence Anderson, *Carnegie Corporation Library Program, 1911–1961*, pp. 65–92; Florence Anderson, letter to author, March 20, 1972.

[b]Amount of grant, not current value.

[c]Includes $150,000 to endow professorship and $100,000 general endowment resulting from the Corporation's "final grant for support."

[d]Not in published list.

[e]For Chair of Fine Arts.

[f]For Marquand Art Library.

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WILLIAM VERNON JACKSON

G

G.E. 250 INFORMATION SEARCHING SELECTOR

The G.E. 250 Information Searching Selector was a special purpose computer designed for searching telegraphic abstracts. It was a General Electric information retrieval system which was to provide rapid inquiry and selection from large files (*1*).

The design permitted entry of up to ten inquiries for simultaneous processing against files stored on magnetic tapes. The tapes were to be searchable at the rate of 15,000 characters per second for satisfaction of any or all of the ten inquiries.

The significance of the selector is that it represented one of the last attempts to develop a special purpose information retrieval computer. High cost and limited market forced indexing systems to be used which were much less complex than the telegraphic abstract. General-purpose computers have been quite suitable for searching these types of indexes.

The G.E. 250 design followed that of the Western Reserve University Searching Selector, built by James W. Perry.

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ALLEN KENT

GAME THEORY

Game theory is concerned with the class of problems in which there is conflict or competition between two or more parties, and where each party has some control over the outcome of the competing interests. The classical interpretation of competing parties would be two players opposing each other in a game; however,

game theory applies to many other situations where conflict or competition are present, such as business competitors, opponents in a war, marketing campaigns, rivals for space, political campaigns, or clashes with nature.

Life is replete with conflict and competition. Game theory is a mathematical theory that has its roots in certain problems abstracted from real life situations, where the decision makers' preferences are not in consonance with each other.

The underlying theory dates back to 1928 when the great mathematician John Von Neumann published the first article on the subject. Many books and articles have been published on game theory since then, but the fundamental work of Von Neumann is still the basis for most treatments of the subject (*1*).

The basic concepts of game theory relate to 2-person zero-sum games: these games involve two adversaries, as the name suggests, who are diametrically opposed to each other so that what one competitor wins, the other loses. The opponents are not limited to individual persons; for example, they may be two companies or two armies in competition with each other. Because the fundamental ideas of game theory stem from 2-person zero-sum games, this article will focus primarily on that aspect of the subject, and not on more advanced, less structured areas involving n-persons games, infinite games, and cooperative games (*2*).

As an introduction to game theory, consider the game of matching pennies. In the game are two players, designated as P_1 and P_2. Each player chooses either heads or tails. After each player has made his choice without the knowledge of the other player, their choices are made known. If the pennies match, player P_1 wins, and P_2 pays him one penny. If the pennies do not match, P_2 wins, and P_1 pays him one penny. A payoff matrix is set up in game theory to show the results of the strategies of the competing players. The playoff matrix for the penny matching game is shown in Figure 1. This matrix shows a $+1$ payment when the pennies match. Thus, if both players choose heads or tails, P_2 pays P_1 one penny. The matrix also shows a -1 payment when the pennies do not match, which indicates a payment from

		Player P_2	
		Heads	Tails
Player P_1	Heads	$+1$	-1
	Tails	-1	$+1$

FIGURE 1. *Payoff matrix.*

P_1 to P_2. The plus and minus signs indicate the direction of the payment, where the plus payment shows payment to P_1 from P_2, and the minus payment indicates a payment to P_2 from P_1.

The objectives of the game theoretic approach are:

(1) To choose the optimum strategy for one or more players, from among various alternative strategies.
(2) To determine the value of the game.

By optimum strategy is meant the course of action that will give a player the maximum expected value (mathematical expectation) of the payoff. The value of the game is the expected value of the payoff (*3*).

These objectives will be interpreted in terms of the penny matching game. Refer to Figure 2. Player P_1 should choose heads one-half of the time and tails one-half of the time. It is called a mixed strategy because he plays more than one strategy as the game is repeated. As can be seen in Figure 2, the optimum strategy of P_2 is also to play heads one-half of the time and tails one-half of the time.

The second objective in solving a problem in game theory is to determine the value of the game. The value of a game can be determined for various different strategies, but usually it means the value of the game when each player is using his *optimum* strategy. The value of the penny matching game is zero, that is, if each player plays his optimum strategy, the expected value of the payoff is zero. The computation of the optimum strategy and the value of the game will be considered later.

A 2-person zero-sum game is expressed frequently in general symbolic form as a matrix, shown in Figure 3. The payoff function is represented by any $m \times n$ matrix A, where m denotes the number of strategies for player P_1, and n denotes the number of strategies for player P_2. The elements of matrix A, such as a_{11} and a_{12}, are any real numbers which indicate the payoff corresponding to the strategy se-

		P_2	
		.5H	.5T
P_1	.5H	+1	−1
	.5T	−1	+1

FIGURE 2. *Mixed strategies with payoff matrix.*

Player 2

$$Y = [y_1 \quad y_2 \quad \cdots \quad y_n]$$

Player 1

$$X = \begin{bmatrix} x_1 \\ x_2 \\ \vdots \\ x_m \end{bmatrix} \begin{bmatrix} a_{11} & a_{12} & \cdots & a_{1n} \\ a_{21} & a_{22} & \cdots & a_{2n} \\ \vdots & \vdots & & \vdots \\ a_{m1} & a_{m2} & \cdots & a_{mn} \end{bmatrix} = A$$

Matrix Symbolism

$$[y_1 = .5 \qquad y_2 = .5]$$

$$\begin{bmatrix} x_1 = .5 \\ x_2 = .5 \end{bmatrix} \begin{bmatrix} +1 & -1 \\ -1 & +1 \end{bmatrix}$$

FIGURE 3. *Penny matching game.*

lected by each player. For example, element a_{12} represents the payoff when player P_1 plays his Strategy 1, and player P_2 plays his Strategy 2. A plus sign attached to a number in the payoff matrix indicates the payment is from P_2 to P_1, whereas a minus sign denotes the payment is from P_1 to P_2. In game theory, the strategies may be represented by row or column matrices. The strategy for player P_1 is usually shown as a column matrix, as is shown by matrix X in Figure 3. When the strategy for player P_1 is shown as a column matrix, the strategy for player P_2 is shown as a row matrix denoted by Y in the figure. The probabilities associated with each of the elements of matrices X and Y are the proportions of time that each strategy is used by the respective players. Thus, referring to the penny matching game shown in Figure 3, player P_1 would play his Strategy 1 one-half of the time and his Strategy 2 also one-half of the time. The probabilities for each player are, in statistical language, probability density functions. This means that the probability value for each strategy is equal to or greater than zero, and the summation of the probabilities for each player must equal 1.

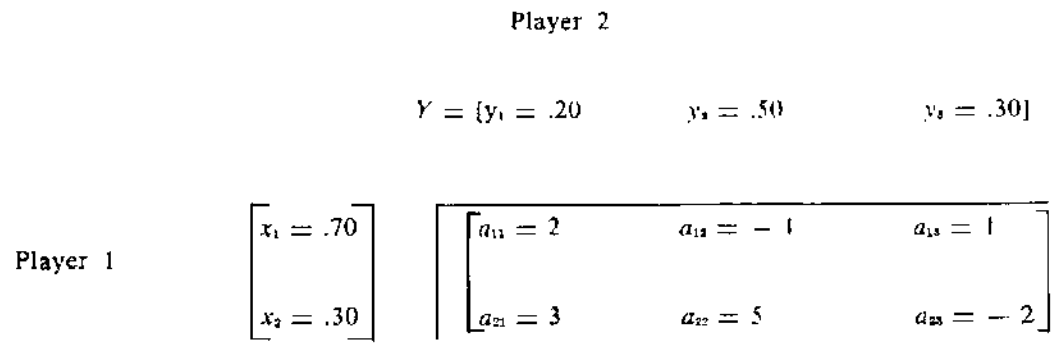

FIGURE 4. *Game problem.*

A strategy is a *complete* plan for the play of an *entire* game. If a player has three strategies, he has three complete plans for the play of an entire game. He can play only one strategy in a single game because each strategy covers the play of an entire game. If it turns out that one strategy is better than any of the other strategies, regardless of which strategy the opponent plays, the player has what is called a pure strategy. Every time he plays the game he should use the strategy. However, often there is no single strategy that should be played to the exclusion of the other strategies. The best plan of action then is to alternate strategies, with a certain relative frequency (proportion) assigned to each strategy. This is called a mixed strategy. We cannot play a mixed strategy in a single game; we can play only one strategy in a game. The term "mixed strategy" refers to the play of successive games (*4*).

Now we consider the calculation of the expected value of a game. It is assumed here that the optimal strategies have already been determined for each player. Figure 4 depicts a specific game with the numbers corresponding to the symbolic notation developed in Figure 3. For example, Player 1 has two strategies, and he should play Strategy 1 (x_1) 70% of the time, and Strategy 2 (x_2) 30% of the time; Player 2 has three strategies, and he should play Strategy 1 20% of the time, Strategy 2 50% of the time, and Strategy 3 30% of the time. If Player 1 plays Strategy 2 and Player 2 plays Strategy 3, then the payoff is $a_{23} = -2$.

In matrix language the expected value of the game is $X^T A Y^T$. The result of this multiplication follows:

$a_{11}x_1y_1 = (2)(.70)(.20)$	=	.28
$a_{12}x_1y_2 = (3)(.30)(.20)$	=	.18
$a_{13}x_1y_2 = (-1)(.70)(.50)$	=	.35
$a_{23}x_2y_2 = (5)(.30)(.50)$	=	.75
$a_{13}x_1y_3 = (1)(.70)(.30)$	=	.21
$a_{23}x_2y_3 = (-2)(.30)(.30)$	=	−.18
Expected value of game		.89

This means that on the average P_2 would be paying P_1 .89 units per play of the game.

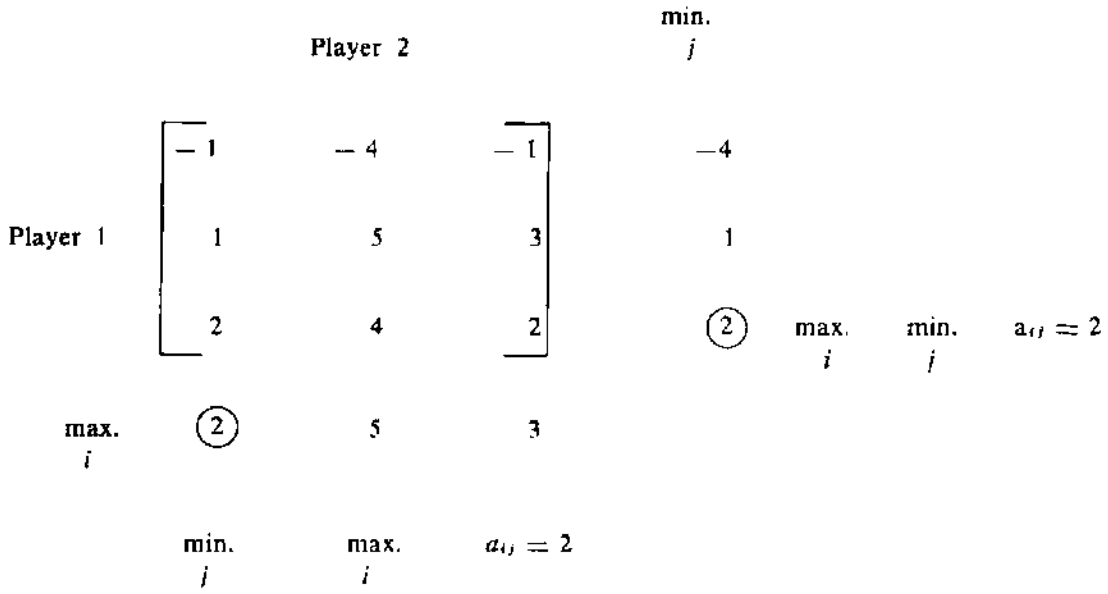

FIGURE 5. *Determining maximin and minimax.*

We will now consider some basic concepts relative to the selection of the optimum strategies for a game. Game problems are usually solved on the basis of the *maximin theorem*, sometimes called the *minimax theorem*, developed by Von Neumann. This theorem is based on the assumption that we want to select the strategy in which the worst outcome is better than the worst outcome in any other strategy. It also assumes that the opponent wants to do the same thing from his own point of view. This approach is indeed a conservative one.

The statement, the maximin theorem proceeds on the assumption that we want to choose the strategy in which the worst outcome is better than the worst outcome in any other strategy, will now be clarified by reference to Figure 5. It is seen that each player has a choice of three strategies. The worst outcome for Player 1, if he chooses Strategy 1, is −4. Under the $\min_j$ column is recorded this −4, which represents the worst outcome for Player 1 when he plays Strategy 1. Continuing for Player 1, if he chooses Strategy 2, the worst outcome is that he receives a payment of one unit, and if he chooses to play Strategy 3, the worst outcome is that he receives a payment of 2 units. The assumption under the maximum theorem is that the player wishes to select the *best* of these three worst outcomes. Thus, if Player 1 *always* plays Strategy 3, the worst that he can do is receive a payment of 2 units for each game played regardless of which strategy his opponent chooses. In the $\min_j$ column, the maximum number is 2, that is, 2 is the maximum of the minimum values.

The same procedure can be applied to Player 2. Because he is the minimizing player, his objective is to obtain the lowest payoff.

The worst outcome for Player 2 if he uses Strategy 1 is a payment of 2 units;

likewise, for Strategy 2 it is 5, and for Strategy 3 it is 3. These values are shown in the row marked $\max_j$.

From the standpoint of Player 2 the best of these three worst outcomes is 2 because it would be worse to pay out 5 units or 3 units to Player 1. The best choice for Player 2 is to choose the minimum of these maximum values, which is 2 units. The symbolic notation at the bottom of Figure 5 represents the minimum of the maximum payoffs for Player 2, and the symbolic notation at the right side represents the maximum of the minimum payoffs for Player 1.

For this problem the maximum of the minimum values equals 2 which is equal to the minimum of the maximum values. When this equality holds, we have what is called a "saddle point." The payoff corresponding to the saddle point is the value of the game.

The optimum strategy for Player 1 is Strategy 3, and the optimum strategy for Player 2 is Strategy 1. The saddle point is the value in the payoff matrix where this row and column intersect, which is 2 in this case. Figure 6 shows the location of the saddle point and the optimal strategy mix for each player. Thus Player 1 should play the pure Strategy 3 all the time. Strategies 1 and 2 are inactive because the proportionate times to be played is zero for both strategies. Similarly, Player 2 should play the pure Strategy 1 all of the time, with Strategies 2 and 3 being inactive.

If the game has a saddle point, the game is solved. The saddle point is the value of the game, and each player plays the pure strategy that denotes the saddle point. Thus the optimum strategies are known as soon as the saddle point has been determined. If the game does not have a saddle point, this means that a mixed optimal strategy (strategic saddle point) exists for one or both players. This game may be solved by linear programming or other mathematical techniques (5). Computer pro-

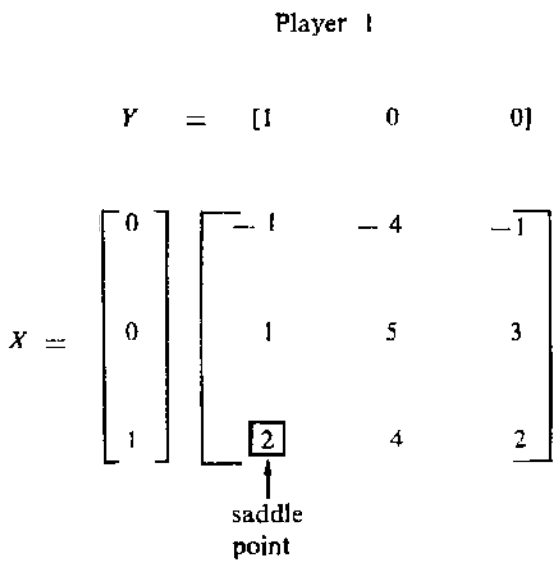

FIGURE 6. *Saddle point and optimum strategies.*

Politician 2

Politician 1	0 days	1 day	2 days	3 days	min. $_j$
0 days	0	− 800	− 1100	− 1000	− 1100
1 day	800	0	− 300	− 200	− 300
2 days	1100	300	[0]	50	0
3 days	1000	200	− 50	0	− 50
max $_i$	1100	300	0	50	

$$\max_i \min_j a_{ij} = \min_j \max_i a_{ij} = 0$$

FIGURE 7. *Payoff matrix and solution.*

grams are available for solving such problems. Due to their complexity, they will not be considered here. Problems in which only two strategies exist for at least one of the players can be solved very easily by graphical methods (*6*).

As a practical application of game theory, consider the following problem (*7*): Two politicians are competing against each other for a particular political office, and with only 3 days remaining before the election, the polls indicate that the expected election result is presently a toss-up. Both are firming up their campaign plans for the final 3 days, and they are both planning on campaigning in two key areas having 10,000 and 5,000 votes, respectively. They will spend an integer number of days in the respective areas and are uncertain as to how they should spend their time for these 3 days.

It is estimated that both politicians would get 50% of the vote, for either area, if they spend the same number of days there. But if one spends no time in an area, then the other politician would get 55, 58, and 60% of the vote if he spends 1, 2, or 3 days there, respectively. Also, if either politician spends 1 day there, the other would get 53 and 55% of the vote in that particular area by being there 2 days and 3 days, respectively. If one politician devotes 2 days to an area, the other one would get 52% of the vote by campaigning in the area all 3 days. Neither politician will know his opponent's schedule until he has made final his own.

The strategies can be expressed as the number of days spent in the 10,000 vote area. The payoff matrix denotes the estimated difference between Player 1's total votes and Player 2's total votes. The payoff matrix and the solution are shown in Figure 7. A saddle point is seen to exist which indicates that both politicians should spend 2 days in the 10,000 vote area. The remaining time, 1 day, should be spent in the 5,000 vote area.

The Von Neumann 2-person zero-sum game is considered as the classical work in game theory; however, many extensions beyond this classical structure have evolved in attempting to solve more complex games (*8*).

A nonzero-sum game would be appropriate if cooperation is a better policy for both parties, whereby both firms could improve on the profits of pure competitive behavior.

Cooperative games should be considered when coalitions can be formed. These are *n*-person games, which may or may not be zero-sum.

It is also possible to have continuous games, in which there are an infinite number of strategies. An example of this type of game would be in economics, where an item may have an infinite number of price possibilities. It is perhaps in this application that game theory may be used in library and information science research, as cooperative programs are contemplated, particularly with regard to the acquisition of materials. In addition, some gaming approaches have been considered in information systems design.

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A. G. HOLZMAN

GARAMOND, CLAUDE

The fame of Garamond (or Garamont, as his name appears in those books where he is named as publisher) rests upon his work in Paris as a letter-cutter and founder of types. He has been described as the most important type designer of the sixteenth century, for not only was his work quickly adopted by the best printers in France (including Robert Estienne, the royal printer), but his types were soon in demand even in Italy—hitherto the most influential producer of roman types. Thereafter the early Venetian style of letter cutting passed out of fashion. Christopher Plantin of Antwerp acquired many fonts of Garamond's types and even some punches and matrices when Garamond's effects were sold off in 1561 after his death. Another purchaser at the sale was André Wechel, who took the French designs to Frankfurt, where again they found eager customers although the Germans strongly favored the use of gothic types.

For about 200 years after his death Garamond's types continued to be used by discerning printers throughout Europe; and other famous designers made close copies of them, or at best used them as models. Then, after a period when such Old Face types were themselves out of fashion, they were closely copied again in the early twentieth century by several foundries in Europe and the United States. Similar revivals were also produced in the 1920s for use with the then relatively new Monotype and Linotype systems for mechanical composition.

Garamond's early history is somewhat obscure. He was probably apprenticed to the punch-cutter Antoine Augerau in Paris; he may have been practising on his own in 1510; and he became the associate of the printer, Pierre Gaultier through marriage to his daughter. Although Garamond cut other fonts for which he is justly famed, his reputation and his chief influence on the future of type design stem from the romans he cut between 1530 and 1560. Guillaume Le Bé was one of his apprentices and later bought a considerable quantity of his punches, matrices, and foundry equipment at the sale in 1561.

The romans were modeled on those cut by Francesco Griffo in 1495 for the Venetian printer, Aldus Manutius, but Garamond gave them a greater elegance, and in this form they have been, over the centuries, the foundation of many subsequent Old Face designs. They are beautiful alphabets, open and clearly cut. They are characterized by a narrow a with a low bowl, an e with a very small loop and a subtle down-tilt to the cross-stroke, and top serifs to such letters as i, m, n, p, and r that are slightly scooped out. In the early form the capital M has no right-hand serif at the top, and all the capitals are rather large in proportion to the lower case letters and owe something to the designs of Geoffroy Tory. They are well formed, particularly the Qu ligature; and both upper and lower cases possess freedom and spirit of line in combination with typical French elegance and brilliance of cut. Robert Estienne of Paris began to use the new Garamond romans in 1531, and all three sizes appear with magnificent effect in his Bible of 1532.

Garamond was also a pioneer producer of fonts of italic related to romans. Hitherto founders had cut individual roman or italic faces without thought for the close relationship of form, weight, and color that was desirable if the two designs were to appear within the same setting. His interest in the italic face developed when he decided to embrace publishing as well and wished to produce some pocket classics. Unhappily in this instance he followed the Aldine counterpart again, though not slavishly. He did reduce the number of ligatures and cut sloping capitals instead of using upright romans. In the latter case he was not the first to do so, but it was his example that caused many others to follow and make it standard practice. However, it was to be Robert Granjon (q.v.) whose italics were to set the style for this kind of printed letter.

Where his Greek types are concerned, the connection between Garamond and the French royal printer, Robert Estienne, is clearly documented. It is well known that, in 1541, Garamond was paid by the royal treasury through Estienne for cutting the *grecs du roi.* Three sizes were produced and they earned for their cutter the designation, *tailleur de caractères du roi.* As Estienne also used these for the king and had stood as personal sponsor to Garamond during the preparation of the punches, it is assumed that the royal choice must have been guided by Estienne's admiration for the earlier romans.

Contemporary fashion required that printed Greek should be a very close reproduction of the best handwriting. Garamond's model was the hand of Angelo Vergecio, a Cretan calligrapher employed at the French court, and he achieved an excellent likeness with a cursive quality that was particularly marked in the largest size. Such verisimilitude inevitably involved a vast number of ligatures to complicate the work of the compositor, and the admiration for it (as for the Aldine Greeks) unfortunately encouraged the production of many similar calligraphic fonts over the years. The intermediate size (the most effective in print) was ready first, and it appeared in Estienne's *Eusebius* of 1544, a superb folio with decorations and initials cut after the style of Vergecio's manuscript embellishments.

In 1900 visitors to the Paris Exposition had been tremendously impressed by the fine old types which the Imprimerie Nationale used so well. Some of these were known to be Garamond's; others—apparently on good authority—were thought to be, but erroneously, as will be shown. The interest provided the impetus for a whole series of revivals, and the first true copy of a Garamond design was made by the Fonderie Ollière in France in 1913, but it was hardly noticed.

Deberny & Peignot (also of France) had begun to produce their version, based on original Garamond punches, in 1912; and then, in 1919, the American Type Founders Company (A.T.F.) began to issue their "Garamond" designed by M. F. Benton and T. M. Cleland. It was intended—like the others—for hand-setting. A.T.F. used as their model a font of the *caractères de l'université* owned by the Imprimerie Nationale and generally accepted as having been cut by Garamond. Later evidence showed this to be a false premise, but this has never mattered in the sense that the A.T.F. "Garamond" is an excellent face which quickly found its adherents in Europe as well as in North America. It was first imported into Britain by

the Cloister Press, and by 1921 the enthusiasm of leading printers was great enough to persuade the Monotype Corporation in London that they should issue a version for machine composition and casting.

In 1920 Frederic Goudy was appointed art adviser to the Lanston Monotype Company of America, and he recommended that they should lead other foundries by reviving a number of the fine old and historically important faces. Accordingly Garamont was put into production in 1921. Goudy made freehand drawings of the type which had been used for Claudin's *Histoire de l'Imprimerie en France en XV et XVI Siècles* as part of the new publishing program of the Imprimerie Nationale at the beginning of this century. This was also attributed in those days to Garamond, and Goudy reproduced the spirit of the old letters as closely as possible. He endeavored to avoid eliminating anything of the mannerisms that existed as a result of the original punches having been cut by hand. Nevertheless, something of Goudy's own twentieth century attitude to type design crept into the modern version, but he refused to allow his designs to be changed in any way, and the company had no reason to complain when 685 fonts were sold within 5 weeks.

In the face of such competition the Monotype Corporation pressed on with their own plans. Stanley Morison, not yet their official typographic adviser, visited the Imprimerie Nationale to obtain a suitable piece of printing as a model, and Monotype "Garamond" appeared in 1922. The reviewers greeted it with something akin to rapture and prophesied that it would be used for fine display work as well as for books. The italic, which included some fine alternative swash capitals, was also praised for its vigor and freedom. And it is also part of a modern mystery.

For some reason now unknown, Morison recorded in *A Tally of Types* that he had advised the Monotype Corporation to base their italic for "Garamond" upon that of Robert Granjon. He considered that the related font as used by the Imprimerie Nationale was not contemporary with the roman. However, those who were brave enough to trust the evidence of their own eyes have never accepted the accuracy of this, although there is no record of Morison's having been asked to comment on this before he died. Nor has independant research succeeded in identifying any sign of a separate model for the italic.

The true identity of the cutter of the *caractères de l'université*, those romans in the Imprimerie Nationale used alike as models by A.T.F., Lanston Monotype. the Monotype Corporation, Typefoundry Amsterdam, Linotype, and Intertype, was eventually discovered in 1926 by Paul Beaujon (Mrs. Beatrice Warde). Scepticism about the origin of the *caractères de l'université* had first been generated over the A.T.F. "Garamond," but their ascription to Garamond by such authorities as A. Claudin, A. Christian (Director of the Imprimerie Nationale), and D. B. Updike stifled all criticism.

Beatrice Warde had been alerted to the problem by H. L. Bullen when she had worked as his assistant in the library of A.T.F., and eventually she stumbled upon the clue (a piece of printing by Jean Jannon, 1580–1658) while engaged on unrelated research in the British Museum. Her findings, published in *The Fleuron*, 5 (1926), demonstrated that the *caractères de l'université* were in fact brilliant re-

vivals (rather than careful facsimiles) of Garamond's letters made by Jannon in Sedan from 1615 onward, and offered to the trade in his specimen of 1621 as a seventeenth century means of reviving the past glory of Estienne's printing. A comparison of Jannon's specimen with those modern fonts that acknowledge the *caractères de l'unversité* as their model now clearly reveals the likeness; and if Jannon's fonts are compared with those in the Egenolff-Berner specimen of 1592, which are known definitely to have been cut by Garamond, it will be seen that the latter's alphabets have more grace and suavity than those which Jannon called his *Typi Academiae* in 1615. In particular, the scooped-out top serifs already referred to are seen to be exaggerations of the true Garamond form.

The closest modern facsimile revival is Linotype Granjon (1924)—another misnomer—which was designed by George W. Jones of London for machine composition, but the italic is less successful. Stempel's "Garamond" of 1925, though also a close copy, prints darker than the original and is spoiled by descenders which are too short.

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JAMES A. DEARDEN

GENEALOGICAL LIBRARIES AND COLLECTIONS

Genealogy is the study of family history, the tracing of a line of descent through successive generations or a pedigree, the history of a family or group of families. It may be presented in tabular or chart form, or as a narrative of the several generations. It may be merely a list of the names comprising the pedigree arranged in chronological order, usually with lines drawn to connect them; or, in addition to the dates of birth, marriage, and death, embellished with biographical details of education, occupation, migrations, places of residence, public offices held, and unusual facts set against the background of the times and communities in which it flourished. In the one form it is merely a skeleton of dry bones; in the other it is a form of history akin to local history.

The study of family history opens a vista of the continuity of time, and the events of history assume an intimate meaning to those who undertake the writing of a family genealogy, the study of the activities and migrations of a family. It has often been said that "genealogy is the handmaiden of history"—it is a valuable tool available to the historian whose skill in using it may reward him with insights which might otherwise be denied him. To take but one example: many aspects of the reign of Henry VIII are more easily understood if the historian has before him a chart of the family relationships of the members of his court, his ministers, his favorites, and his queens.

Genealogy is a rewarding hobby which may be pursued during leisure hours and while on vacation; by correspondence or in travel to search for and investigate original, unpublished records; and by reading and study, acquiring and utilizing knowledge gleaned from public records, land evidences, court cases, geography, maps, and a great variety of institutional and private records. It may become a profession which, as experience and competence in locating and interpreting records are achieved, offers a means of livelihood to those who like to work on their own time and have an aptitude for history, and some familiarity with offices and their records in the municipality, the county, and the state as well as the national archives. Although a baccalaureate degree is not essential, the discipline of study and training in the use of scholarly techniques are of considerable advantage. An inquisitive, intuitive, and analytical mind is probably the greatest asset of a genealogist. It hardly seems necessary to stress that scrupulous care in handling and citing all sources used, as well as personal integrity, are essential to recognition, whether as a amateur or a professional.

The usual steps in compiling a pedigree, the skeleton which is the basis for the history or genealogy of the family, consist of arranging in an orderly fashion what is known about the successive generations, recording the names in each, and gleaning additional data from the older living relatives, the family Bible (it may be in a distant cousin's possession), old letters, and other papers which may have survived a succession of moves and been saved for sentimental reasons or because of a vague

sense of history. Then comes searching for births, marriages, and deaths either in the town hall or the county court house; visiting cemeteries for inscriptions on gravestones (which should be carefully copied into a notebook); going to the clerk of the church favored by the family for records of baptisms, marriages, and burials; going to the probate (or surrogate's) office for wills and the attendant records of distribution; and going to the registrar of deeds for real estate transactions and conveyance of property by or among heirs. Numerous other sources of information may have to be found: local histories, school registers, membership rosters of fraternal lodges, and others which may be preserved in state and local historical societies. In some instances intuition may lead the genealogist to what may seem an unlikely source of information: in one case the essential clue and evidence was found in the fading stitchery of an heirloom, a "friendship quilt," each block of which was worked and signed by a friend or relative, which a distant cousin produced when asked about what records she might have. Thus, step by step, the succession of generations is worked back to a progenitor (propositus), the earliest known "head" of the family.

There are three competencies which the genealogist should acquire: skill in reading the handwriting used in each of the successive centuries covered by the pedigree; the variations in spelling which prevailed in each; and the meaning of terms expressing relationship in those same periods. The handwriting of the first half of the seventeenth century differs markedly from that of the later seventeenth and the eighteenth century, and some squiggles or flourishes may seem just that but have real significance. The shapes of some letters are such that they may quite easily be confused with those of a later date. Then there are ligatures used to save time when everything was written by hand: for example, "yt" is "that" and "ye," is "the," a character not to be confused with the old form (ye) of the personal pronoun "you." Excellent handbooks and transliteration cards are available, either from The Genealogical Society of the Church of Jesus Christ of the Latter-Day Saints (hereinafter called The Genealogical Soc.) (107 South Main Street, Salt Lake City, Utah 84111), or The Society of Genealogists, London.

Spelling, before the advent of Noah Webster and his dictionaries (1806–1828), was a matter of ear, especially among those of a lesser degree of education. The searcher will soon learn the idiosyncracies of particular clerks and scribes and their variant spellings, but it takes discernment to spot unusual variants in the spelling of surnames. Sometimes trying to pronounce aloud what is written on the paper will give the clue. For example, an ennumerator taking the 1850 federal census in a town containing several families of recent immigrants from Germany produced some strange spellings, such as Cegler for Ziegler.

Terms of relationship vary in meaning from century to century. In a will dated, in 1676 a man left bequests of his "cousins," children of his brother and sisters. Another testator named his natural son in one clause and his son-in-law in another (the "natural" was his son by his first wife, not a bastard as the term infers today; the "in-law" was his second wife's son by her first husband). In the seventeenth century a grandson was frequently called nephew.

Those who would be genealogists, amateur or professional, should take heed that all that is found in print is not necessarily true. Not only do typographical errors and misprints occur in books, journals, and carefully edited source materials, such as the *Vital Records* of some of the towns in Massachusetts, but also some historians and genealogists have allowed wishful thinking and sentimentality to over-shadow common sense and accuracy. A few professional genealogists, who flourished in the late nineteenth century and who were engaged to search for the connections between the immigrant and his progenitors in England, found it worth their while to satisfy the vanity of their employers by fabricating documents in order to create the links that would tie the immigrant into an authentic "county" family of the same, or very similiar, name, which flourished, say, a century before the emigration. In using the older genealogies it is wise to check the citations and obtain photocopies of the documents cited if there is any suspicion of forgery or misquotation. Sometimes a discrepancy in dates, say the burial of the "father" 4 or 5 years before the christening of the emigrant, or a missing generation, is sufficient to create suspicion about accuracy.

Sometimes documentary evidence linking two generations, say the head of a family in Erie County, New York, and the alleged progenitor in Windham County, Connecticut, cannot be found, even after a thorough search of land evidences, vital statistics, and probate records. In such a case there may be circumstantial evidence sufficiently strong to justify claiming the relationship. That evidence must be presented in a logical order and the reason for its acceptance argued as cogently as possible. A categorical statement, without any supporting evidence, should not be accepted; it will not stand up in an appraisal made by an expert. If a link is suggested, it should be made perfectly clear that no evidence has been found and the connection is believed to be possible. In using a book in which there is no evidence, beware of the words "probably," "possibly," and "undoubtedly." These are red flags of warning that documentary evidence is lacking, or hasn't been found, and only the slimmest circumstantial evidence, such as similiarity of name or propinquity of locale, has suggested the linking of two families.

A genealogist should use standard abbreviations whenever there are any and certainly refrain from appropriating a well-known contraction of a word and giving it a new meaning. The form "rec'd" is widely used to mean received: one genealogist used it to signify record, saving thereby the space of a single letter and confounding an editor who, fortunately, fathomed what was meant by it. Be consistent in citations and avoid "catch-words." If a long or cumbersome title is to be cited frequently, abbreviate it or devise a shortened form of it, and explain it in a table of abbreviations at the beginning of the paper, article, or book. In fact, it is always advisable to provide such a table—some reader may be unfamiliar with even standard abbreviations.

For those who wish to know the location of official vital records in the several states, the U. S. Department of Health, Education & Welfare has issued three Public Health Service Publications (Nos. 630 A, B, and C) which are available from the Superintendent of Documents, Government Printing Office, Washington, D.C.

20402, for a total of 25¢. These are entitled: *Where to Look for Birth and Death Records in the United States*, *Where to Look for Marriage Records in the United States*, and *Where to Look for Divorce Records in the United States*. Alphabetically arranged by states and territories, these indicate the dates of the earliest records on file, the fee charged for a copy or a certified copy, and the postal address of the office from which such copies may be obtained.

The official manuals published by most states give the location of the various courts, including probate (surrogate) and orphans, the name of the county seat, etc. The state library and most of the public libraries in each state, the town, or city clerk's office usually have the latest issue of the state's manual, so, in lieu of an atlas, the information regarding location may be easily obtained.

A good map of the area in which research is centered is invaluable. It should be studied to determine the distances between one town and another, the border lines of counties, and the location of rivers along which migration may have progressed. Some states, such as Massachuetts, issue pamphlets giving historical data on the settlement of the several towns (in some places called townships) and other pertinent information.

There are bibliographies of local history for several of the states, some published by the state historical society, some by the state library, and some by private organizations. The American Library Association (Chicago) in 1970 published P. W. Filby's *American & British Genealogy & Heraldry*, which gives the authors and titles of books and journals, classified under general headings and by state. G. H. Doane's *Searching for Your Ancestors* (Univ. Minnesota Press, Minneapolis, 1960) has a large section devoted to bibliography, classified by state or geographical area. These and other guides are of use to the genealogist trying to find books that might help.

There are several important indices which the genealogist should know:

Jacobus, Donald Lines. *Index to Genealogical Periodicals* (3 vols., New Haven, Connecticut, 1932–1953; reprinted, Genealogical Pub. Co., Baltimore, Maryland, 1963–1965). Volume 4, covering 1953–1957, is being compiled by Robert Carder, Madison, Connecticut. This index includes the articles and subjects, but not every name, found in the most important genealogical periodicals, beginning with *The New England Historical and Genealogical Register*, Boston, Vol. 1, 1847 to date. In the third volume Mr. Jacobus included his "Own Index" to the families represented in a selection of the best lineage books and ancestral records, such as Mary Walton Ferris's *The Dawes-Gates Ancestral Lines* (2 vols., privately printed, Chicago, 1931–1943), a model well worth careful study by anyone proposing to publish such a record.

Waldenmaier, Inez. *Annual Index to Genealogical Periodicals and Family Histories*, 1956–1962. Indexes only current journals during the period indicated.

Rogers, Ellen S. *Genealogical Periodicals Annual Index*, 1963–1965. Continues the above, and is continued by the following:

Russell, George E. *Genealogical Periodicals Annual Index*, 1966 to date (published by the compiler, Bowie, Maryland). Indexes nearly 100 current genealogical journals, the majority of them published by state and local, plus some regional, genealogical societies.

Similar to the above but concerned with biographical and genealogical sketches included in a great number of local histories containing genealogical sections or appendices, innumerable compendiums of state and regional biographical sketches, and a large collection of county histories, all found in the Newberry Library in Chicago (and many of them in other libraries as well), the famous "Wall Index" of that library, comprising about 500,000 references, was reproduced by photo-offset as *The Genealogical Index of the Newberry Library,* (4 vols., Hall, Boston, 1960). This is a key to a great mass of genealogical data, arranged by surnames. That data is of varying value but, even when incorrect, it offers clues to sources of information. The Newberry Library will not examine or abstract any of the references, but the searcher may find the very volume he has been led to in a library in his own locality. The "Wall Index" was discontinued because of the enormous cost of keeping it up and the lack of help during World War I. It has never been revived, at least on such a scale, by any other library.

The American Genealogical Index, edited by Fremont Rider (48 vols., Middletown, Connecticut, 1942–1952) consists of a consolidation of all names found in the indices of a considerable number of published genealogies and family histories. In the *Second Series* it is being expanded to include indices to the Genealogical Department of the defunct *Boston Evening Transcript,* many of the rosters of Revolutionary War Soldiers, such as *Massachusetts Soldiers and Sailors of the Revolutionary War* (17 vols., Massachusetts Secretary of State, Boston, 1896–1908), the published schedules of the federal census of 1790, and more genealogies. The 2nd series is in process of publication so, for names in the last two-thirds of the alphabet, only the original series can be used.

Because census records are of considerable aid in locating families, it is important to know something about the federal censuses, as well as colonial and state censuses. A discussion of these may be found in genealogical guides such as Doane's *Searching for Your Ancestors.* Several colonial censuses have been published; very few state censuses, and only one federal census *in toto,* that of 1790, have appeared in print. Bits of later censuses have been put in print by societies and private individuals. The censuses of 1850, 1860, 1870, and 1880 are the more valuable to the genealogist because all members of each household were listed. All of these are available from the National Archives on microfilm, and individuals may buy the rolls covering the particular state or county in which they are interested.

Many libraries have genealogical collections which are frequently found in a special room devoted to "Genealogy and Local History." A comprehensive list of such libraries is published about every 2 years in *The Genealogical Helper* (The Everton Publishers, Logan, Utah). Practically all of these libraries refuse to do any research for patrons—they simply do not have and cannot afford to maintain a staff adequate to such work. Most of them will not lend books from such collections but require that they be used on the premises. So it is necessary for the genealogist to visit them in person and be prepared to spend as much time as he can afford searching for the data he seeks.

The Genealogical Society, Salt Lake City, not only has a large and rapidly expanding library devoted to genealogy and local history, but it also has a far-reaching program for microfilming all kinds of records needed for genealogical research, such as church, municipal, county, state records, parish registers, and land evidences. The great vaults high in the mountains outside of Salt Lake City contain more than 800,000 reels of microfilm of American, British, and other European records. In the Society's library in Salt Lake City there are about 200 microfilm readers, so much in demand that it is wise to arrange for the use of one about a month in advance. Copies of these microfilms will be sent to its branch libraries in various parts of the United States for use there. For information write to The Genealogical Society, 107 South Main Street, Salt Lake City, Utah 84111.

Genealogists should not overlook the U.S. National Archives in Washington, D.C. A *Guide to Genealogical Records in the National Archives,* compiled by Meredith B. Colket, Jr., and Frank E. Bridgers (1964) is available for 50¢ from the Superintendent of Documents, Washington, D.C. 20402. This is not an index, but a list of the various collections of documents found in the National Archives, with brief descriptions of a paragraph or more of each collection. The pension records of the War Department and Veterans Administration are among these. The papers and affidavits accompanying the applications of those who claimed service in the Revolutionary War and the War of 1812 frequently disclose Bible records, lists of children or heirs, certified birth and death certificates, as well as statements of service: all of these are of value to the genealogist. The General Services Administration (National Archives) will, for a fee, photo-copy the accompanying papers.

In 1969 The Genealogical Society held a World Conference on Records in commemoration of the seventy-fifth anniversary of its founding. Distinguished genealogists and archivists from the United States and many foreign countries were invited to speak at this conference: 250 papers were presented and 7,000 people were registered. A great variety of subjects were discussed, ranging from methods of preserving records, migrations to the United States and within it, and searching for ancestors in several different countries, to the editing and publishing of genealogies and genealogical periodicals, in all thirteen "areas" or categories were discussed. A list of the lecture papers, as well as about 100 Research Papers (brief guides to the records available in certain countries), may be had upon application to the Publications Secretary.

Before attemping (or commissioning) any genealogical research in overseas countries, it is important to prepare a summary of all known facts about the emigrant and his family. The dates of birth, marriage, death, and arrival in America, the area or place from which he is reputed to have come; the names of any relatives brought with him or left behind in the "old country"; and even any tradition about his forebears or reasons for migration should be written out in a logical order, clearly and distinctly. Sometimes it is astonishing how much may be gleaned from records available here and from obituary notices in local newspapers. More clues may be found in books about the ethnic or national elements in the population of the United States, especially those which deal with their history and settlement here.

Canada

In Canada there is a sharp division between families of American and British origin and those of French origin whose progenitors settled along the St. Lawrence River in the seventeenth century. During, and for a decade or so following, the Revolutionary War, many of loyalist sympathy migrated from the States to Ontario and Nova Scotia. During the nineteenth and twentieth centuries many immigrants arrived from the British Isles. The Public Archives of the Dominion of Canada, Ottawa, Ontario, was organized in 1872, into which have been gathered a great mass of records, well arranged and cataloged. There are also provincial archives and county records. The Public Archives has published a pamphlet, *Tracing Your Ancestors in Canada* (available at the Government Book Store, Ottawa, for 25¢), which is a useful, brief survey. Required reading, however, is Milton Rubineam's "Ontario" in *American Society of Genealogists Genealogical Research,* Volume 2, Washington, D.C., 1971, pp. 228–254, a revision of his earlier essay in *Genealogical Research: Methods and Sources,* greatly expanded and improved. Since that was written the Centre Canadien des Recherches Généalogiques (Case postale 845, Haute-Ville, Québec, Québec) has been organized and has become the source for information about research in French Canada. Cyprien Tanguay's *Dictionnaire Généalogique des Familles Canadiennes* (7 vols., Montreal, 1871–1890) is the classic work on the French families, but there are errors. Since many American loyalists fled to Nova Scotia, where others, engaged in fishing, had already settled as early as 1765, the records of that province are of considerable interest, especially since descendants of those people filtered back into New England in the nineteenth and twentieth centuries. The Provincial Archives are at Dalhousie University in Halifax; some of their publications are especially valuable. Early in the twentieth century Crowell published in the *Yarmouth Herald* (Yarmouth, Nova Scotia) a long series of articles, "New Englanders in Nova Scotia." A set of these, clipped from the newspaper and mounted in order in a huge volume, is preserved in the New England Historic Genealogical Society. Although the articles are not free from error, they are very useful. A supplementary series by another genealogist is not as reliable. In addition to the American Society of Genealogists chapter cited above, consult Filby, *American & British Genealogy & Heraldry,* pp. 95–97; and The Genealogical Society's World Conference *Lecture Papers,* 144, 145, and 147 (available from the Publications Secretary). The society has over 10,400 reels of microfilm copies of Canadian records.

England

Required reading for anyone interested in genealogical research in England is Sir Anthony Wagner's *English Genealogy* (Oxford Univ. Press, Oxford, 1960) wherein he, the Garter King of Arms, by his office and in his own right the premier genealogist in England, has written a classic, the history of English genealogy. The book is not

only fascinating reading, it is packed with information. As an introduction to the field, Sir Anthony has published an abridgement, *English Ancestry* (Oxford University Press, Oxford, 1961). Even more concise handbook is the *Genealogists' Handbook*, 5th ed., by Peter Spufford and A. J. Camp, published by Phillimore, Chichester, Sussex, for the Society of Genealogists, of which Sir Anthony is one of the vice-presidents and fellows. This, too, is required reading for those interested in research in England. A very useful guide to the location of records is the list of *Record Repositories in Great Britain* published by H. M. Stationary Office, London (4th ed., 1971), which may be purchased from the British Information Services, New York. As a companion to this, The Genealogical Society, Salt Lake City, has published a series of "Research Papers," one for each of the counties (or shires) in England, available separately at 50¢ each. Another important tool, which should be used with and as a complement to *Records Repositories* and the appropriate "Research Paper," is Anthony J. Camp's *Wills and Their Whereabouts* (Phillimore, Chichester, Sussex)—not even all the historians are aware that there are thousands of wills in the county archives of which there are not copies at Somerset House, the central repository in London. For other important books on English genealogy and its many aspects, consult Filby, *American & British Genealogy & Heraldry*, pp. 98–116; and the references cited in *Genealogical Research in England and Wales* by David E. Gardner and Frank Smith (Bookcraft, Salt Lake City, 1964–1966). Three volumes of the later have been published; a fourth is in preparation.

Scotland

Those whose interest in genealogy leads them to Scotland will do well to approach first The Scots Ancestry Research Society, 42 North St. David Street, Edinburgh 2, the object of which is to assist people seeking ancestors in Scotland. Many pedigrees are on file at the Court of the Lord Lyon King of Arms, H. M. Register House, Edinburgh, and vital records are preserved in the office of H. M. Registrar General, at the same address. Official vital records commenced in Scotland in 1855. For handbooks, etc., consult Filby, pp. 123–127; and L. G. Pine *The Genealogist's Encyclopedia* (available in paperback since 1970), pp. 91–96.

Two excellent books have been published by Phillimore, Chichester, Sussex, in 1971 and 1972: *In Search of Scottish Ancestry*, by Gerald K. Hamilton-Edwards, and *Sources for Scottish Genealogy and Family History*, by D. J. Steel.

Wales

Moving into the principality of Wales, the genealogist is handicapped by a language problem—comparatively few read or speak Welsh, yet the great bulk of the records are in that language, hence it is usually necessary to employ a specialist to search. However, there are aids available. One aspect of Welsh genealogy should be kept

in mind: many of the Welsh pedigrees are based on oral tradition. It is, however, tradition with a difference, for the Welsh bards of old were rigorously trained to recite the pedigrees as accurately as humanly possible. Required reading on Welsh genealogy is the long essay by Maj. Francis Jones, "An Approach to Welsh Genealogy," published in the *Transactions of The Cymmrodorion Society*, 1948, pp. 303–446. The National Library of Wales, Aberyst-Wyth, has the great collection of manuscripts and records. For other references see Filby, pp. 128–130, and Pine pp. 97–100.

Ireland

Like the Welsh, early Irish pedigrees, some of them dating back to the apostolic period of Christianity, were for centuries handed down by the bards orally. Legends and traditions were collected by the annalists and chroniclers, who copied and recopied the ancient manuscripts. One of the chief sources, printed a century or more ago, is *The Annals of the Four Masters*, but there are many others. Dr. David Humiston Kelley, a genealogist and scholar of the University of Alberta, Calgary, Canada, has synthesized these ancient pedigrees as a result of his study. His essay on "Early Irish Genealogy" appeared in *The American Genealogist*, **41**, 65–76 (1965). Many records essential to the pursuit of genealogy in modern Ireland were destroyed during the rebellion of 1921–1922 in which the Public Records Office was burned and invaluable manuscripts destroyed. A great effort has been made to replace these by appealing to private collectors, especially for wills preserved in individual families. Those of Northern Ireland bid fair to go the same way during the present troubles. The great study of Irish genealogy is Margaret D. Falley's *Irish and Scotch-Irish Ancestral Research*, privately published by her (2 vols., Evanston, Illinois, 1961–1962). Mrs. Falley now lives in Wilmette, Illinois. The Irish Genealogical Research Society, in London, publishes *A Simple Guide to Irish Genealogy* (revised in 1971 by Rosemary ffolliott and published by Phillimore, Chichester, Sussex) as well as *The Irish Genealogist*, its journal. For further references see Filby, pp. 117–122; and Pine, pp. 104–113.

Europe

The discussion of genealogical research and the location of records in other countries of the world is confined to brief references to sources of information. These are given under the names of those countries. They are in English, but many of the books cited in the references are in the native language of the country. For convenience in locating the specific country, the names are arranged in alphabetical order. The citations are to three sources: (1) L. G. Pine, *The Genealogist's Encyclopedia* (1970 ed.) cited as Pine. (2) American Society of Genealogists, *Genealogical Research: Methods and Sources* Volumes 1 and 2 (1960–1971)

cited as A.S.G. and A.S.G. II, respectively. (3) The Genealogical Society of the Church of Jesus Christ of the Latter-Day Saints, World Conference, 1969, *Lecture Papers* cited as G.S. L.P. and the number of the lecture paper: these are available from Salt Lake City. Volume 5 of *Archivum* consists of the *Annueire International des Archives* (253 pp.). This is a list of all official repositories of archives in the western world.

Albania. Pine, p. 147.

Austria. G.S. L.P. D7; Pine, pp. 126–127.

Belgium. G.S. L.P. D5, D6c, F4a, F4c; Pine, pp. 128–130.

Bulgaria. Pine, pp. 147–148.

Czechoslovakia. G.S. L.P. D13, D14b, D14c; Pine, pp. 145–146.

Denmark. A.S.G. pp. 402–408; G.S. L.P. E1, E2a, 1, 12, 13, 14; Pine, p. 121.

Finland. A.S.G. pp. 402–408; G.S. L.P. E15; Pine, pp. 122–123.

France. A.S.G. pp. 391–395; GS. L.P. F1, F2, F3; Pine, pp. 131–134.

Germany. A.S.G. pp. 375–381; G.S. L.P. D3, D4a, D4b, D4c, D5, D6a, D6b, D6c, D6d, D6e, D10, D11; Pine, pp. 123–125. See also Heinz F. Friederichs *How to Find My German Ancestors and Relatives* (Degner, Neustadt, 1969) which has a list of local archives in Germany. Wilhelm Karl, Prinz von Isenburg. *Sippen- und familienforschung* (120 pp., 1943) is a useful introduction; and Erich Wasmansdorff *(VdFF-Verzeichnis deutscher Familienforschuer and Familieanverbände, Familienstiftungen und familienkindlicher Vereingungen* (4th ed., 1956) is an invaluable directory of family associations, etc.

Greece. Pine, p. 148.

Hungary. Pine, p. 146.

Iceland. G.S. L.P. D1, D2c, E17, E18; Pine, pp. 121–122.

Italy. G.S. L.P. F11; Pine, pp. 138–139.

Liechtenstein. Pine, pp. 140–141.

Lithuania, Latvia, and *Esthonia.* Pine, pp. 144–145.

Luxembourg. Pine, pp. 139–140.

Monaco. Pine, p. 140.

Netherlands. A.S.G. pp. 382–390; G.S. L.P. D5, D6e.

Norway. A.S.G. pp. 402–408; G.S. L.P. E8, E9, E10; Pine, pp. 116–117. Jan Olstad's *How to Trace your Ancestors in Norway,* the 3rd edition of a brief introduction of Norwegian genealogy for those living outside the country, has recently been published by the Royal Ministry of Foreign Affairs, Department of Cultural Relations, and is available in the United State at the Counsellor General's Office in the large cities or from the Norwegian Embassy Information Service in Washington, D.C. Cato Krag-Rønne, *Asttegransking* (225 pp., 1943) is still a useful introduction to the subject, with considerable detail about sources and an excellent bibliography; whereas Harald Anderson, *Norsk lokalhistorie, en bibliografi* (148 pp., 1969), is indispensable to anyone undertaking serious research.

Poland. G.S. L.P. D9; Pine, pp. 143–144.

Portugal. G.S. L.P. F12; Pine, pp. 137–138.

Rumania. Pine, pp. 148–149.

Russia. Pine, pp. 141–143; check G.S. L.P. D9 which deals with German migration through Russia.

Spain. G.S. L.P. F13a, F13b, F13c, F14a, F14b; Pine, pp. 134–137.

Sweden. A.S.G. pp. 402–408; G.S. L.P. E1, E2a, E3, E4, E5, E6; Pine pp. 119–120.

Switzerland. A.S.G. pp. 396–401; G.S. L.P. F5, F11; Pine pp. 130–131.

Yugoslavia. G.S. L.P. D13 D14b, D14c; Pine p. 147.

Other Countries

China. G.S. L.P. H6–10b; Pine pp. 173–174.

Egypt. G.S. L.P. G9 (Note: This deals with ancient royal lineages only).

India. G.S. L.P. G10, G11a, G11b, G11c.

Korea. G.S. L.P. H12–H16, H17a.

Latin America, including *Central American* and *Mexico.* G.S. L.P. F15a, F15b, F16; Pine pp. 174.

Japan. G.S. L.P. H1, H2, H3, H4, H5a, H5b; Pine pp. 171–173.

Polynesia and *Oceania.* G.S. L.P. G1–7.

South Africa. G.S. L.P. G7, G8a, G8b.

Special Fields

Biblical genealogy has been given a great deal of attention in the past, and has frequently been a pastime for amateur students of the Bible. It is not as simple as it seems, as anyone will discover who tries to reconcile the genealogy of Christ as given in Matthew and Luke. The most easily accessible modern study is found in *The Interpreter's Dictionary of the Bible* (c1962), Vol. 2, pp. 362–366. It consists of two article: the one on the Old Testament genealogies by R. A. Bowman, and the other of the lineages of Christ by B. H. Throckmorton, Jr. Consult also the first part of the article on "Genealogy" in the 11th edition of the *Encyclopaedia Britannica,* Vol. 4, pp. 573–575, by Stanley Arthur Cook. Both articles have bibliographical references.

Huguenots, a persecuted people who wandered through several countries before many of them settled in the United States, have also received consideration as a special field. There are societies devoted to them in both England and the United States, and quite a body of their records have been published. There is a chapter in A.S.G. II, 256–290; and three of the *Lecture Papers* of the Genealogical Society, F5, F9, and F10.

Jewry has elicted a great deal of study and many important genealogical studies have appeared, the most recent being that of Rabbi Malcolm H. Stern in A.S.G. II, pp. 291–311; see also Pine pp. 151–170.

Black genealogy is developing as a result of an interview with Alex Haley in *The Wall Street Journal*, March 29, 1972, and an article by him in *The New York Times Magazine*, Sunday, July 16, 1972, a prelude to his book, *Roots*, which will be published by Doubleday in 1973, in which he will explain his use of oral tradition and its documentation.

GILBERT H. DOANE

GENERAL SEMANTICS

General semantics is a general theory of evaluation based on modern scientific knowledge and postulates. It was formulated by Alfred Korzybski (1879–1950) in his book, *Science and Sanity: An Introduction to Non-aristotelian Systems and General Semantics*, in 1933 (*1*).

The system, of which general semantics is the *modus operandi*, was called "non-aristotelian," as it includes and goes beyond the traditional "aristotelian." It does not fall within linguistics, but is an overarching system to which linguistics and other scientific, mathematical, etc., fields contribute. It represents a methodological synthesis of intellectual trends in the Western world that evolved during the first quarter of the twentieth century and earlier. It has both theoretical and practical aspects. As a methodology, general semantics offers means whereby the new outlooks may be learned, applied, and taught. In its concern with evaluation and behavior, it aims to bring achievements and growth in social areas into accord with those in scientific fields, and to unify the exact sciences and general human orientations methodologically. The name is often confused with "semantics," from which it differs in many respects.

Origins of General Semantics

The theory which was developed into "general semantics" originated in Korzybski's new definition of *man* as a *time-binding class of life*, as set forth in 1921 in his *Manhood of Humanity: The Science and Art of Human Engineering (2)*. In considering the forms of life, and differentiating men, animals, and plants, he made the following classifications on the basis of function: plants are called "chemistry-binding" or "energy-binding"; they have the ability to transform energy from the sun into organic chemical energy. Animals are called "space-binding"; they are able to move about from one place to another. Humans are called "time-binding." Together with the abilities of plants and animals, they also have the capacity to use the accumulated achievements inherited from past generations, to build upon them, and

pass them on to the next generation. This unique time-binding capacity gives to man a different living dimension.

According to this theory, there are two widely different laws of progress; they represent different rates of growth. Knowledge in scientific and technological fields has advanced in a rapidly increasing geometrical progression, while developments in social areas have lagged behind, hampered by traditions and habits of bygone days. The great gap in rates of change has created imbalances which result periodically in social cataclysms.

In following through to the practical consequences of the time-binding theory, it became apparent that the chief means through which men have been able to transmit to each other, and from one generation to another, has been through the use of language and other symbolic forms of representation. Scientists, engineers, etc., who have been able to achieve remarkably predictable results, have used a special, rigorous language called *mathematics*, which is similar in structure to the processes they deal with. Our ordinary language, inherited from past generations, was found on investigation not to be similar in structure to the facts of science and life as known today.

Korzybski was particularly influenced by Cassius Jackson Keyser and his work in mathematical philosophy. Among Keyser's formulations was the principle of "fate and freedom:" we have the freedom (in accord with the laws of thought) to choose our assumptions, but once chosen, the consequences follow with a "logical fate." Since we are usually not aware of our silent assumptions hidden in the structure and undefined terms of our language, and underlying our actions, we must investigate our assumptions. We must question whether they are based on facts as we understand them.

Among others whose work especially influenced Korzybski's early formulations were Alfred North Whitehead, Bertrand Russell, Henri Poincaré, and Albert Einstein. He sought to show what the import of their revolutionary theories was for our everyday lives. All our doctrines, and our education, would have to be revised, he concluded, in accordance with the new outlooks.

Besides the developments in mathematics, mathematical logic and foundations, physics, etc., the ground-breaking work of the early twentieth century in biology, neurology, psychology, psychiatry, colloidal chemistry, anthropology, etc., was also drawn upon. The underlying structural assumptions of these changing outlooks were seen to be aspects of one larger system embracing the new trends. This more inclusive system was formulated as a methodological integration, and was called "non-aristotelian" (not "anti-aristotelian").

The preceding euclidean, newtonian, and aristotelian systems which have influenced Western civilization for centuries had a structurally interrelated world view. The non-euclidean and non-newtonian (einsteinian) systems already formulated were expressions of the altered perspectives that were emerging. The three new systems were found also to have an interdependent underlying structure and metaphysics. This new trilogy—non-euclidean, non-newtonian, and non-aristotelian —was *more general* than the old, and included the former ones as special cases.

A rough formulation of what was later to be called "general semantics" was published in 1924 under the title *Time-Binding: The General Theory*, with a further elaboration in 1926. In *Science and Sanity*, published in 1933, the general theory was presented in detail. For the second edition (1941) a 50-page new introduction was written including new material.

History of the Term "General Semantics"

Korzybski had decided in 1931 to call his work "general semantics." His reasons for selecting this name were given in the "Author's Note" in *Selections From Science and Sanity*, 1948 (*3*), as follows:

> The term "General Semantics" seemed most appropriate to me because of the derivation from the Greek *semainein*, "to mean," "to signify." A theory of evaluation seemed to follow naturally in an evolutionary sense from 1) "meaning" to 2) "signification" to 3) *evaluation, if we take into account the individual*, not divorcing him from his reactions, nor from his *neuro*-linguistic and *neuro*-semantic environments. Thus we allocate him in a *plenum* of some values, no matter what, and a *plenum* of language, which may be used to inform, or misinform by *commission* and/or *omission*, deceiving the individual himself and/or others. With such problems, without exception, the individual has to cope to be human at all. That's what I learned from the theory of time-binding and what I tried to convey to others through General Semantics and psycho-biological non-aristotelian considerations.

Premises and Principles of the Theory

The following assumptions are basic to general semantics: the dynamic, changing, nonadditive, nonlinear, process-character of the universe. Its orientations are holistic, infinite-valued, relational, functional, flexible, etc. These may be contrasted with static, additive, linear, two-valued orientations, with predominantly subject-predicate verbal structures.

For example, the addition of one child in a family is not a simple "additive" event, but affects the entire family life and relationships. Two-valued polarizations in terms of "either-or" tend to freeze attitudes rigidly, rather than leave them flexible with many-valued possibilities.

"ABSTRACTING" AS A KEY TERM

The relational orientations mentioned were a part of the new world-view evolving in Western civilization. A distinguishing characteristic of general semantics is its construction in terms of orders of abstractions. The term "abstracting" refers to a general activity of all living protoplasm. On neurological levels, the nervous system *abstracts* (selects, omits, separates, summarizes, the summarizing and integrating being special aspects), etc.

From the multiplicity of ongoing processes, we abstract what we perceive through

our "senses" (not to be separated from "mind"). These may be called "abstractions of lower orders." On another, higher, level we may *name* or *describe* what we see, hear, feel, etc. We may have indefinitely many higher orders of abstractions on verbal levels in the form of generalizations, inferences, theories, hypotheses, etc.

These higher orders are projected onto the submicroscopic processes going on around us, maintaining the "circularity of human knowledge" and giving the possibility of continuous feedback. It is necessary to check our beliefs, assumptions, or opinions in the light of the "facts," different experiences, or new knowledge, so that our evaluations will not be impaired or out-of-date. For example, if we rigidly cling to a stereotype learned years ago, it will be imposed on changing conditions and lead to misevaluations, conflicts, etc.

Consciousness of abstracting is central to general semantics theory, and involves the continuing awareness that at different neurological levels of our functioning we omit some factors, select others, that we summarize and generalize in a new form on higher orders. Korzybski's model, called the "Structural Differential," shows this stratification into different orders. It is used as a training model to incorporate this awareness into one's everyday reactions and for the analysis of any problem.

Humans, unlike animals, are not only able to abstract on indefinitely many higher orders in their generalizing, inferring, etc., but can know that they do so, can build theories and test them in practice, write books, can "think about thinking," etc. Generalizations of higher orders are acknowledged to have important benefits for economy and simplicity in building theories, and for the transmission of knowledge. They may also be dangerous if not checked with "facts" or related to consequences. Inferential knowledge, when consciously accepted as inferential, forms the hypothetical knowledge of modern science and ceases to be a dogma. The "as if" character of our knowledge can be applied to our ordinary living. Consciousness of our processes of abstracting and projecting is connected with the basic premises of general semantics.

GENERAL SEMANTICS PREMISES

Using an analogy of relations between a map and the territory, the premises may be stated as:

> First. A map *is not* the territory.
> Second. A map does *not* represent *all* of a territory.
> Third. A map is *self-reflexive* in the sense that an "ideal" map would include a map of the map, etc., indefinitely, and the map would include the map-maker.

Applied to daily life and language:

> First. A word *is not* what it represents.
> Second. A word (or a statement) does *not* represent *all* of the "facts," etc.
> Third. Language is *self-reflexive* in the sense that in language we can speak *about* language.

The third premise turned out to be an application to everyday life of Bertrand Russell's theory of mathematical types. In developing his system Korzybski could not accept the mathematical theory by which Russell attempted to solve self-contradictions in the foundations of mathematics. But he found later that the principles of different orders of abstractions, multiordinality of terms, second-order reactions, etc., in effect generalized Russell's theory of mathematical types.

The link between the map and territory, the verbal and nonverbal, is seen on the basis of structural relationships. The dynamic process-world inferred by modern science is ever-changing, continuously in flux. Language and other symbolic forms are static in effect. How can the nonverbal and verbal forms become "similar in structure?" Here Korzybski used techniques derived from physicomathematical methods, where change, motion, space-time, etc., are dealt with. By the use of a few simple devices, called *extensional devices*, the structure of language could be modified in such a way as to take into account process, duration of time, uniqueness, specificity, generality, environmental factors, holistic principles, etc.

EXTENSIONAL DEVICES

Indexes. The use of a numerical subscript, showing the uniqueness of every person or event, indicating differences as well as similarities, as in: car_1, car_2, car_3, etc., $child_1$, $child_2$, $child_3$, etc., communication medium $_{1,2,3,n}$ . . . (radio, television, movie, . . .).

Chain-indexes. The use of two or more subscripts to indicate multiple cause-effects, different conditions, or environmental factors. Thus $Smith_{1_1}$ [or $Smith_{1\text{-}1}$] feeling ill as different from $Smith_{1_2}$ [or $Smith_{1\text{-}2}$] feeling well; book $_{1_1}$ in a dry attic as different from $book_{1_2}$ in a damp cellar.

Dates. Specifying a date, as a reminder of changes over a period of time. For example, $Communism^{1918}$ as different from $Communism^{1971}$.

The indexes and dates are not necessarily written or spoken, but rather are usually used silently, as a part of one's orientation in each situation.

Et cetera (*etc.*) to indicate that any statement can *not* cover *all* the characteristics of a situation, reminding one of the second premise. This aims to eliminate dogmatic "period-and-stop" attitudes and to develop flexibility and openness.

Hyphens. The use of hyphens brings to awareness the interconnectedness of the complexities in this world and indicates their inseparability. For example, "space-time," "psycho-somatic," "organism-as-a-whole-in-an-environment."

Quotes. These serve as reminders that a term is not to be trusted, as it may violate scientific postulates or lead to metaphysical speculations, and that the reader may do well to take this into account in his interpretation. For example, "reality," "truth," etc.

Although the use of these devices appears simple and obvious, in practice it has not been found easy for adults, as it requires a change of orientation to a more "extensional" one.

The principle of *nonidentity* is at the basis of the system, and is connected with consciousness of abstracting, extensional devices, awareness of differences as well as similarities, etc. This states the denial of any existing identities whatsoever and posits the uniqueness of each individual and each event. "Identity" is used in this context as "absolute sameness in all aspects." Examples of false-to-facts identifications would be: acting on an inferential statement as if it were a factual one, responding to a person as if he were another person he somewhat resembles (father, mother, teacher), diagnosing an illness on the basis of a similarity to another as if it were the same, disregarding differences. Some identifications may be harmless, some disastrous in their consequences.

The involvement of the nervous system in all our reactions, including linguistic, was stressed by terms such as "neurolinguistic," and "neurosemantic." Korzybski brought out the deep psychological significance of mathematics as a form of human behavior (e.g., notions of "infinity," "invariance," "the semantics of the Einstein theory," "the psychological importance of the theory of aggregates and the theory of groups," etc.), and sought to bring neurologists and mathematicians closer together in understanding.

Applications and Teaching

Because of the generality of the theory, applications have ranged widely throughout almost every field, in professional or personal life. Far from regarding it as a panacea, those who work in general semantics are aware, as Korzybski was, that results can be expected only to the extent that it is acted upon, not only talked about. Usually, when it has been applied, the consequences have been found to be beneficial. The old dichotomies such as "intellect" and "emotion," "thinking" and "feeling," "body" and "mind" have given way in the new orientations, and the interrelationships of formerly separated categories are becoming more recognized.

Application of extensional methods to medicine has shown the old division of "organic" and "functional" diseases, as well as other dichotomies, to be no longer tenable. The methods have been found helpful as an aid to psychotherapy and in the alleviation of combat exhaustion on the battlefields. They have been applied to the practice of law, in business and industrial problems of management and efficiency, and in the handling of communication barriers; in hospitals, in prisons, and in home life, etc., to mention a few of the areas. Chiefly, however, the educational aspect has been emphasized.

It has been demonstrated that general semantics can be effectively taught to young children, and that it can result in significant changes in thinking quality which do not ordinarily accrue to the same degree from the regular curriculum, a school psychologist has reported (*4*). It has also been found to increase some factors of creativity in children.

Besides elementary education, it is being taught at high school, college, and graduate levels, in adult education, and in the U.S. Army. Several thousands of persons have attended seminars in France since 1962.

In many courses the principles are incorporated in the presentations of other subjects, for example, in speech (in studies of communication processes, speech behavior, stuttering, etc.), in English composition, literary criticism, mathematics, physics, journalism, psychology, etc. It is included in training courses for teachers of many subjects, and for school psychologists. In some sixth grade science classes children are learning epistemological issues through general semantics principles. Usually children are enthusiastic about such an approach, which helps them to see the relevance of their school subjects to their everyday living.

The teaching of general semantics is highly individual, and is dependent on the teacher's understanding and skill. There is as yet no formal accreditation for teachers. It ranges from distorted dilutions to brilliant and imaginative insights. The teaching must, to be successful, be more than intellectually competent—it seeks to bring about new outlooks and ways of evaluating. The Institute of General Semantics is the center for teaching and for the training of teachers, and offers seminar-workshops during the summer or at other specified dates. At such seminars, nonverbal experiencing, sensory awareness, small-group interactions, the Ames perception demonstrations, and various visual aids and experiments are a part of the training, besides the theory. On the premise that evaluations involve all aspects of living—organismal, electrochemical, muscular, perceptual, feeling, etc., as well as verbal—the training takes these into account.

Publications and Conferences

There are many books, textbooks, and articles in explication of the theory, or relating it to different fields, some more "popular," some less so (see Bibliography). Among the first of these, beginning in 1938, were those by Stuart Chase, S. I. Hayakawa, Irving J. Lee, Francis Chisholm, and Wendell Johnson. Hayakawa, through his deft writing, brought general semantics to the attention of many. But his mixture with traditional rhetoric and other influences brought about some distortions of the theory unacceptable to Korzybski. Some wrote from a scientific background (neurology, biochemistry, mathematical biology, etc.), others from the fields of education, English, speech, business executive training, etc. The literature is continuing to expand.

J. Samuel Bois, after many years of writing and teaching general semantics, has developed his relating of the theory with the "epistemological profile" of the late French philosopher-scientist Gaston Bachelard. This led to what Bois calls "epistemics" (from "episteme," as described by Michel Foucault in *Les Mots et les Choses*, 1966, translated *The Order of Things*) (5). "Episteme" refers to the general systems of knowing that were dominant in our culture at different times of history.

National or international conferences have been held at periods of about 3 to 5 years. The most recent was in 1968. A series of small conferences has taken place since 1969 organized by Elwood Murray to foster research in general semantics, and to explore relationships with general systems theory, creative education programs, rhetorics, and mental health. The proceedings from the first two of these are

scheduled for publication by Gordon and Breach, New York, in 1972 or 1973. The proceedings from later conferences will follow.

Each year since 1952 an outstanding scholar in some related field is chosen to give the Korzybski Memorial Lecture. These lectures are now (1971) being prepared for publication in a volume.

Organizations

In 1938 the Institute of General Semantics, now at Lakeville, Connecticut, was organized, and it was directed by Korzybski until his death in 1950. Its program for linguistic, epistemologic, scientific research and education is continuing. The *General Semantics Bulletin*, founded in 1950 and edited for many years by M. Kendig, is its annual publication for members of the institute, including libraries. The institute also publishes books and monographs. It was affiliated with the University of Denver in 1964.

The International Society for General Semantics was begun in 1942, with offices currently in San Francisco, California (P.O. Box 2469). It publishes and sells books, and issues the quarterly journal *ETC.: A Review of General Semantics*. Numerous groups have been organized, some of which are chapters of the International Society, in New York, San Francisco, Chicago, Milwaukee, Detroit, Montreal, and London.

Viewpoints Institute in Los Angeles has ongoing classes for study "toward a new general system of evaluation and probability in human affairs," where emphasis is on epistemics, general semantics, and related areas.

The General Semantics Foundation and the Alfred Korzybski Foundation are concerned with aid for research, education, publication, etc., in general semantics.

Summary and Evaluations

Korzybski has been regarded by many as an important forerunner of the present continuing cultural revolution, synthesizing trends which are now more generally accepted or taken as granted. However, the deeper implications of the theory, requiring a more radical change of orientation, have been less understood and accepted, and in some areas skepticism remains.

Some criticisms, when based on more than ill-founded surface acquaintance or oversimplified popularizations, have shown relationships to different outlooks and raised questions for fruitful dialogs.

Mother Margaret Gorman, for example, writes from a Thomistic point of view in *The Educational Implications of the Theory of Meaning and Symbolism of General Semantics* (6), republished later under the title, *General Semantics and Contemporary Thomism*. She gives an excellent survey of the literature of general semantics and explores relationships between Thomistic and Korzybskian approaches. Among her conclusions she says:

> The dangers lie not in the questions they [the writers on general semantics] raised but in their answers. Their answers invaded the realm of metaphysics and epistemology when they claimed to be a purely empirical discipline. And in so doing, they did not penetrate far enough and gave incomplete and misleading answers.

The philosopher Max Black commented in *Language and Philosophy* (7) that although any reader of *Science and Sanity* "must be impressed by the liveliness, vigor and freshness of the exposition," he felt that not enough importance was given to perceiving similarities, in addition to differences. He concluded that the theoretical foundations of general semantics showed "a lack of clarity and self-consistency."

The late anthropologist Clyde Kluckhohn in "General Semantics and 'Primitive' Languages" asked,

> To what extent is this work [*Science and Sanity*], for all the sweep and imagination of its synthesis, palpably tinged—perhaps limited—by the Western culture that is its matrix? . . . Korzybski appears to me to attribute to the approach of science a kind of primacy or ultimacy. . . . Yet the "scientific attitude" in its deepest and fullest sense itself requires us to question this evaluation (8).

Korzybski stated that his work was limited, and that he refrained from speaking about other cultures besides the Western because he had not studied them enough. This suggests directions for further investigations.

F. S. C. Northrop, however, has pointed out that in a certain respect the theory of general semantics has elements in common with those of some Eastern philosophical systems. In "Mathematical Physics and Korzybski's Semantics" (9) he referred to two different epistemological ways of knowing. Important as what Northrop called the "concepts by postulation" of mathematical physics are to the backgrounds of general semantics, there is another aspect of it relevant to our needs. The "concepts by intuition" mode of knowing has heretofore been neglected in Western thinking.

> This is where the concrete image type of analysis in Korzybski's semantics is tremendously important. It brings us back to aesthetic immediacy, to the concrete, blurred and vagrant particular images and to what he so appropriately termed "the silent level." At this point his thinking touched the silence of the Oriental Buddhist's intuition and the Hindu's ineffable immediacy when he becomes one with Brahman (9).

Although general semantics is open-ended and subject to revision, it may be questioned whether fundamental changes are as yet necessary. Russell Meyers, M.D., neurologist, and neurosurgeon, wrote in 1958, in his Preface to the fourth edition of *Science and Sanity*, ". . . the continuing substantiality of Korzybski's 1933 formulations must be regarded as a tribute to his vision and integrative genius." And in 1971 Dr. Meyers wrote (in a personal communication):

> With some knowledge of the interim developments of science and of the sociopolitical events that have materialized since 1933, I can say in retrospect that any modifications that might now have to be made in the original text would be trivial.

> mainly technological supplements; none *in principle* ("structure"-as-function). Korzybski has proved far more a prophet than he would ever have allowed himself to fancy. What a tremendous breadth and depth of insight, analytic and synthetic achievement!

Further, *Science and Sanity* "is far and away the most profound, insightful and globally significant book I have ever read."

Korzybski had anticipated modifications of general semantics, or changes in emphases, and the building of new, perhaps more inclusive, systems as our knowledge increased. This process itself would be an example of "time-binding."

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GENNADI, GRIGORIY NIKOLAEVICH

Grigoriy Nikolaevich Gennadi (1826–1880) was the first bibliographer of Pushkin, Gogol, and other great Russian writers. His *Prilozeniya k sochineniyam A. S. Pushkina, izdannym Ya. A. Isakovym* (*Appendices to the Works of A. S. Pushkin*), Ya. A. Isakov, St. Petersburg, 1860, contains a chronological index of Pushkin's works with textological notes, and index of translations into different languages, and an index of Russian and foreign publications about Pushkin. This comprehensive work was fundamental for the development of the study of Pushkin.

Gennadi's *Literatura Russkoy bibliografii* (*The Literature of Russian Bibliography*), St. Petersburg, 1858, is an annotated index of almost all the Russian bibliographical literature, and has not lost its scientific importance to this day. Other works of Gennadi are *Spravochnyi solvar' o Russkix pisatelax i uchonyx umershix v XVIII i XIX stoletiyax* (*A Reference Dictionary of Russian Writers and Scientists who Died in the Course of the Eighteenth and Nineteenth Centuries*), Vols. 1 and 2, Berlin, 1876–1880; Vol. 3, Moscow, 1908; *Ukazatel' bibliotek v Rossii* (*An Index of Russian Libraries*), St. Petersburg, 1864; *Spisko Russkix anonimnyx knig s imenami ix avtorov i perevodchikov* (*A List of Anonymous Books with the Names of Their Authors and Translators*), St. Petersburg, 1874; *Les écrivains franco-russes*, Dresde, 1874; "Inostrannye sochineni o Suvorove" ("Foreign Publications about Suvorove"), *Voennyi Zhurnal*, **1857**, No. 1; and a contribution to *Portrety i drugiye izobraženiya Petra Velikogo* (*Portraits and Other Likenesses of Peter the Great*), compiled by G. K. Friedeburg, St. Petersburg, 1872; and others, over 160 in all.

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OLGA AKHMANOVA

GEOGRAPHICAL CODES

A geographical code is a sign or symbol assigned to an area, line, or point identifiable on the surface of the earth. Many words or terms used by all of us in daily conversation are geographical codes, since we perceive things not only in relation to time, but also in terms of space. Words by which we identify or label a place such as Boston, a larger region such as Maryland, or a highway or street such

as Broadway, are geographical codes. Many codes, especially those employed in print, appear as abbreviations or acronyms, e.g., long., lat., USA, DC, GB, etc. Numerous codes then are pictorial symbols, particularly those used by cartographers on maps. (These are usually simple symbols with self-evident meaning—blue circuitous lines for rivers, a single line for a highway, double lines for railroads, two or more intersecting lines indicating a crossroad or intersection, etc.)

Other geographical codes are designed and employed by various scholars, managers, and those involved in mass data processing such as statisticians, information systems analysts, or computer programers working for governmental agencies, international organizations, military establishments, and private business firms. Most of such codes facilitate the computerized processing of spatial data and are used in alphabetic (AFN), alphameric (4E, A2AF4, A2-AF/4), or plain numeric (4002, 40-0:02) forms.

Another set of geographical codes employs words or acronyms to identify places, lines, or areas in a more general sense. A single word or acronym denotes a large number of areas, lines, or points. Usually called geographical terms or concepts, this type would signify, for example, the meridian (mer.), the north (N), the equator (E), etc. They are accepted on a worldwide basis. Many in this category are proposed by geographers, cartographers, or statisticians for their own internal use. Examples are CBD, Central Business District; and SMSA, Standard Metropolitan Statistical Area. (CBD stands for the central portion of the American city that has the highest land-values and the highest daytime population densities. SMSA is defined here as those United States counties that are metropolitan in character, contiguous to, and integrated with a city of at least 50,000 population. For a precise definition of this concept see *Standard Metropolitan Areas* 1967, U.S. Government Printing Office, Washington, D.C. 20402. The geocode SMSA of July 1, 1971 defines 233 cities and their contiguous metropolitan counties.)

No comprehensive dictionary of geographical codes exists. Widely used word-like codes are listed in any well respected atlas or gazetteer, usually attached to a set of maps under the lable, Index of Geographical Names. Numerous atlases also list and interpret the meaning of those popular codes that appear as abbreviations or acronyms, labeled Glossary of Geographical Terms and/or Abbreviations. Pictorial geographical codes, so frequent on maps, derive their meaning from the context of the map or from the legend that accompanies any good map. Most basic pictorial codes are consistent and easily interpreted by anyone familiar with map reading. Many codes associated with a geographical concept (term) are defined in any geographical dictionary or in any basic textbook on geography. Among the sources of information that can be utilized to interpret these codes are the following:

Bartholomew (John) and Son, ltd., *The Times Atlas of the World*, a comprehensive edition, produced and published by the *Times* in collaboration with John Bartholomew and Son, Ltd. Times Newspaper, London, 1967.

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The Times, London, *Index-Gazetteer of the World*, Times Publishing Co., London, 1965.

Librarians and those involved in the information science field are capable of easily interpreting most of the above-mentioned geographical codes. They will be asked to perform this function with increasing frequency in the near future. Since geographical codes communicate spatial data quickly and accurately, they will continue to serve as one of the most popular and simplest modes of storing and retrieving geographical information.

Artificial Geographical Codes

It is useful to define two classes of codes: (1) natural and (2) artificial geographical codes. The first class includes those which are a part of a natural, i.e., spoken or written manifest langauage. The wordlike codes, abbreviations, and acronyms, such as Chicago, Canada, north, lat., and SMSA, are a few typical examples. The artificial codes, often termed *geocodes*, are part of, or compatible to, an artificial computer-oriented language, e.g., AFN, 5B, 15213, 400/23.

The source of natural codes is related to the origin of the natural language in which they are included; they originate individually to satisfy the immediate linguistic needs of the given population group. On the other hand, the artificial geocodes are designed as part of an aggregate of codes—part of an information system or scheme. They are proposed according to a set of rules that are compatible with a given artificial computer-oriented language by an information science specialist to facilitate efficient storing, processing, and retrieving of geographical data sets.

An ever-increasing number of information specialists are involved in this process, which is becoming a new discipline in the information science field. As public and private data processing agencies acquire more computer hardware, more mass data will be processed. This will inevitably lead to more frequent use of geocodes as well as to the designing and redesigning of new and additional systems for geocodes. More and more information and computer specialists will be involved in working

with geocodes, and more reference librarians will be asked to work with, and interpret the meaning of, the artificial geocodes.

INITIAL GEOCODE SYSTEMS

The process of designing geocodes is a recent development in the field of information science. It is a method of translating spatially arranged and distributed geographical "observations, data, or facts" into computer readable format and storing them in a geographical base file. During the last 20 years the method of designing geographical code systems—referred to briefly by some as geocoding or encoding—has developed from the arbitrary manual assignment of numbers or letters for countries and census tracts to the current complex information systems that assign as many as eighty character-long codes to a great variety of geopolitical and administrative units, transportation links, and locations where the flow of goods and people originate or terminate.

One of the first attempts to encode all countries and major geographical regions and continents was originated within the Secretariat of the United Nations Organization in 1949. For the purpose of collecting and processing statistical data, a simple scheme of geocodes was proposed for use by UNO agencies and as a basis for similar geocode systems to be adapted on a worldwide scale. Seven basic regions of the world were recognized and identified by a four-digit code:

Africa	1000	Europe	5000
North America	2000	Oceania	6000
South America	3000	USSR	7000
Asia	4000		

Within each major region the independent countries were identified by digits 101–390, numbers 400–790 were allotted to dependent territories, series 800–890 to regions formed by a group of countries, and digits 900–990 were allocated to "special areas." An improved version of this geocode scheme was adapted by the United Nations Educational, Scientific, and Cultural Organization (UNESCO) in the 1950s. The United Nations Convention on Road Traffic has established a scheme of geocodes, called Distinguishing Signs of Vehicles in International Traffic. To each country an alphabetic code has been assigned. Some countries have received a one-character, others two- or three-character mnemonic code: Austria, A; Finland, SF; United States, USA. Many codes in this series are readily recognizable, while certain others, indigenous to a foreign language, have meanings not so obvious to an English speaking person. This standard country code system, to which 121 governments have subscribed, is registered with the Secretariat of the United Nations.

During the early and late 1960s, several schemes of geocodes were constructed and put to use by numerous international agencies. After a considerable effort, the *International Telecommunication Union* (Advisory Committee of Telegraphy and Telephony) adopted a geocode system that would fit the technological capacities of current communications systems and would be flexible enough for incorporation

into the existing and future volumes of local and international telephone traffic. Countries with a high density of traffic were identified by two digits while those with low usage received three digits. An alphabetic geocode scheme was also recommended in order to facilitate automated telegraph and telex services. One- or two-character mnemonic alphabetic codes denote all European countries. To serve the needs of international automatic telex traffic, a geocode system consisting of one or two digits was later adopted.

The *Universal Postal Union* (UPU) has invested a great deal of time, money, and effort into coordinating individual countries' geocode schemes, most often called Postal Codes for Routeing and Delivery of Items. More recently, UPU has made an attempt to establish a geocode scheme that would identify every country's postal department or office. *International List of Offices* was published in 1968. It consists of a Preface and three volumes—A–G, H–O, and P–Z, respectively. The post offices are arranged in alphabetical order. The list is derived from official information made available by member countries of the UPU as of July 1, 1967. The information on each post office or department is given in three columns—name of post office; postal codes (geocodes) and name of country; and the column that includes regional or political subdivisions (state), county, district, etc.

The ZIP code system (Zoning Improvement Plan) is a five digit geocode scheme used in the United States. Each post office and branch delivery office has its unique ZIP code number; 15213, for instance. The first number connotes one of the basic geographical regions. The first two numbers indicate a state, or a densely populated portion of a state, or as many as two or more lesser populated states. The first three numbers denote an area within the state, called a "Sectional Center Post Office," which is located at an important air, rail, or road intersection or terminal. The last two numbers of the ZIP code identify either a post office or one of its delivery departments.

The technique of encoding as employed in developing the above mentioned geocode schemes is very simple. The main purpose or objective of the geocode scheme is first defined, then all units to be coded are identified, and to each a code is manually assigned according to a set of operational rules deduced from the definition of the objective. The process of manual encoding is much more complex and possibily unmanageable, particularly when the number of units to be coded approaches an indefinitely large quantity, or whenever the units change their size and/or shape rapidly in time. If this is the case, an automated technique of encoding must be employed. Numerous attempts to design an automated technique of encoding were made in the United States during the early 1960s by varous agencies in the U.S. Department of Defense and NASA (National Aeronautics and Space Administration). Within the civilian domain, two attempts have been made in the early 1960s: (1) AULT (AUtomatic Location Table) developed by the Tri-State Transportation Commission (New Jersey, New York, and Connecticut) and (2) SACS (Street Address Conversion System) developed at the University of Washington Urban Data Center by Robert Dial.

The AULT system consists of an automated digitizer-plotter capable of mechanically assigning a geocode to any point specified on a map. The margin of the map is overlayed by a frame forming a coordinate system of a vertical and horizontal axis. At the moment a desired point is reached, the keyboard is activated and an alphameric code, read by the digitizer automatically on the x and y coordinate, is stored into a geographic base file. A territory, block, or line-like feature, i.e., street, boundary, etc., is defined by a large number of coordinate readings (geocodes). By using this digitizer the personnel of the Tri-State Transportation Commission have coded millions of street segments, city blocks, and origins or destinations of trips taken by people during a travel survey conducted within 75 miles from New York. The AULT produced a geographic base file that was a detailed description of the New York region's human geography. This file was then used as an information base for aggregating, merging, and analyzing the stored data, as well as a base for representing the results in map format.

The SACS system is a technique for assigning a computer readable geocode to a street address. Any information associated with a street address location is thus labeled by a geocode, consisting of a coordinate pair, and stored into a geographic base file. From this file the information can be retrieved individually, or merged and retrieved as a spatial aggregate termed a polygon. The routine of retrieving data as an aggregate is a "point-in-polygon" technique, while more advanced is the "polygon-versus-polygon" method. All geocoded pieces of information are stored in the base file within a set of polygons called "data zones." A different set of polygons, termed "retrieval zones" is overlayed on the data zones. The retrieval zones determine which geocoded pieces of data that are to be retrieved are aggregated. Results can be mapped or presented in a tabular format.

The Current State of the Art

The existing major geocoding systems can be grouped into three classes: (1) international code systems dealing with international geopolitical units, e.g., countries, states, major geographical regions, continents, and dependencies; (2) national code systems dealing with units identifiable within a country, e.g., states, districts, statistical units, counties, and urbanized areas; and (3) local code systems considering small scale units, e.g., city blocks, neighborhoods, streets, and street segments. The first level code systems, usually called country codes, are designed for the purpose of improving communications among countries and of economizing the collecting and processing of international statistical data sets. The second level coding schemes are designed primarily to improve, facilitate, or economize administrative functions of public and private agencies within the domain of an independent country; secondarily, they may economize a country's census-taking activities. The third level coding schemes were invented as a tool for city or regional planning, serving to collect, process, and retrieve large sets of census-like data.

INTERNATIONAL CODING SCHEMES

Numerous international coding schemes are identifiable in literature, and several additional schemes are being currently developed. About a dozen major international organizations and United States public agencies have generated or are constructing individually and independently a country code system. Many of the existing code systems have been adopted and are used with various degrees of success by individual agencies or organizations according to their internal needs.

The *Economic Commission for Europe* (ECE), through its Trade and Technology Division, is engaged in composing standards for international trade documents. As an initial output, a special information format known as the "ECE Layout Key" has been developed. It is a basis for establishing a country coding scheme suitable to computerized and automatic transmission of trade information among European countries. The *International Air Transport Association* (IATA) is involved in updating its City Code Directory which contains a list of all cities with an international airport. Each city is labeled by the country's code in which it is located; the code is a mnemonic two-to-five character code. The *International Atomic Energy Agency* (IAEA) has utilized the FIPS (Federal Information Processing Standards—discussed below) scheme made available by the U.S. Department of Commerce, National Bureau of Standards. The *International Federation for Documentation* (FID) uses Universal Decimal Classification, a system of hierarchically ordered numerical codes. The *International Federation of Library Associations* (IFLA) has considered the problem of adopting a country code especially in relation to its activities in the field of cataloging. The *International Telecommunication Union* (ITU) uses several different country code schemes within the organization: the long established telephone, telex, and gentex systems as well as a "reduced country code," which consists of a maximum of three alphamnemonic characters.

The *United Nations Organization* (UNO) established United Nations Standard Country Code in 1970. It is a six-digit code; the first three digits are common, so that it can be used in practice as a three-digit code, or modified according to the other agencies' specifications. The code is complemented by a Standardized Abbreviated English Country Names, in which each country code is paralleled by a four-, eight-, and twelve-character abbreviated alphabetic code. UNESCO uses the FIPS code for its external communications and the United Nations Standard Country Code for its internal operations. UPU is in the process of designing a geographical numeric code scheme. The proposed system consists of three-digit codes; the first digit determines the continent and the remaining two numbers identify the country. The *World Intellectual Property Organization* (WIPO) has used a two-digit mnemonic code since the mid-1960s. It is a country code that is included in a larger system for information retrieval among patent offices distributed over approximately 150 countries. Several million records are coded by this coding scheme.

Three United States agencies have invested time, effort, and money in constructing a country code scheme: (1) U.S. Department of Commerce, National Bureau of Standards, has evolved and prescribed its FIPS (Federal Information Processing

Standards) code for basic geographical-political entities, e.g., countries, dependencies, and areas of special sovereignty; (2) U.S. Bureau of the Census, Foreign Trade Division, has drawn up a scheme of country codes and domestic custom district codes; and (3) U.S. Library of Congress is reviewing and modifying its Geographical Area Code.

The *U.S. Department of Commerce*, National Bureau of Standards, has produced the FIPS code in response to the demand for automated interchange of computerized data among governmental agencies, public organizations, and private business firms. It has been effective since January 1, 1971; all specifications are contained in: U.S. Department of Commerce, National Bureau of Standards, *Federal Information Processing Standards Publications, No. 10*, Government Printing Office, Washington, D.C., 1970. This publication lists all the geographical-political units with their assigned codes and identifies by cross references large geopolitical entities to which the basic units are related. The geocode is a mnemonic two-character identifying symbol. The FIPS code supercedes the General Service Administration international geocoding scheme that was utilized by some agencies after 1962. (U.S. General Service Administration, Office of Finance, *Geographical Location Codes*, Washington, D.C., 1960.) The FIPS code is not viewed as a permanent standard. It has been under review since June 1971 by the American National Standards Institute. The improved scheme should consist of a three-character alphamnemonic code complemented by a three-character numeric code. The alphamnemonic symbol represents the country's English name and the numeric one the country's territory. The numeric codes were assigned to each entity by using a random numbers generating algorithm.

The *U.S. Bureau of the Census*, Foreign Trade Division, has implemented a geocoding system for the purpose of collecting and diffusing statistical data on the imports and exports of the United States. The country code structure is a set of three-digit codes. Countries are arranged according to their geographical relations to major continental divisions. Each country belonging to the same continental division is identified by the same first digit. The remaining two digits were assigned at random.

The *U.S. Library of Congress* has invested a great effort in developing a geographic code scheme that would assist the area specialists in taking a subject-oriented approach to literature. A working group of subject and area specialists of the Reference Department was established in cooperation with the MARC Development Office and the Subject Cataloging Division which have generated the Geographic Area Code. It is a hierarchically arranged set of alphabetic codes. Each code consists of seven characters. Five levels of geographic entities are recognized according to the hierarchical levels:

1. Continent or Ocean—identified by the first letter.
2. International Region—second letter.
3. National State—third and fourth letter.
4. Region—fifth letter.
5. States or Provinces—sixth and seventh letter.

The units are the present geographical and/or political entities. Neither historical, religious, ethnic regions, nor cities are recognized as the basic units of the scheme. Material on a city may be found by searching the code of the country in which the city is located, and then by searching the subject heading fields for the name of the city.

The above listing of international and United States organizations and agencies that are actively engaged in geocoding indicates a great proliferation of various international coding systems. To avoid a further duplication of efforts, the *International Organization for Standards* has initiated several meetings and activities to establish a standard country code. Cooperation and consensus of all national and international agencies and organizations, which would use a standard country code within their domain, is needed. It has been widely recognized that cooperation is highly desirable and several agencies have indicated their willingness to conform to an internationally recognized standard country code. It has also been recognized that many country codes have already been adopted on a rather large scale, and that any change in the applied scheme would have, for some agencies, prohibitive economic and monetary consequences. Even if an international standard country code were to be adopted today, it would take at least 2 to 3 years to print, disseminate, and implement the system. It can thus be expected that the proliferation of differing country codes will continue for a decade or so before any large-scale adoption of an international standard country code will be accomplished.

NATIONAL CODING SCHEMES

From the large number of national coding schemes that are widely dispersed through the literature or remain unpublished in governmental and private files, only a set of major United States national schemes is herein described. Substantial effort and time have been invested at the Massachusetts Institute of Technology (MIT) Urban Systems Laboratory in evaluating, describing, and classifying the major United States national schemes. (Pamela A. Werner, "A Survey of National Geo-coding Systems," a paper prepared for the National Geo-coding Conference for Transportation, organized by the U.S. Department of Transportation in December 1971.)

The *U. S. Department of Commerce*, Bureau of the Census, has generated a comprehensive geocoding system for numerous levels of geographic, political, and administrative areas, such as Region, Geographic Division, Economic Sub-Region, State Economic Area, County, Congressional District, Minor Civil Division, Census County Division, Ward, Place, Municipality and Township, Standard Metropolitan Statistical Area, Standard Consolidated Area, Urbanized Area, Central Business District, Major Retail Center, Census Tract, Enumeration District, Block Numbering Area, Block Group, City Block, Block Face, and Special Purpose District. All these geographical entities were defined and geocoded for the primary purpose of collecting and disseminating statistical data. The units are defined in U.S. Department of Commerce, Bureau of the Census, *1970 Census User's Guide*,

Part 1, U.S. Government Printing Office. Washington. D.C., 1970. The coding schemes for states, counties, metropolitan statistical areas and congressional districts are published in U.S. Department of Commerce. National Bureau of Standards, *FIPS PUB 5-1, 6-1, 8, 9*, U.S. Government Printing Office, Washington, D.C., 1968-69.

The *U.S. Army Corps of Engineers*, Waterborne Commerce Statistics Center, is responsible for instituting a geographic coding scheme that is an integral part of its information system, called The Vessel Code, which identifies vessels, ports, commodities, etc. It is a coding structure containing seven-digit identifiers. The first two digits, called the Flag Code, are geocodes designating a port district or country. (U.S. Department of the Army, Office of the Chief of Engineers. "Reports and Statistics; Waterborne Commerce Statistics," Regulations No. 335-2-1, 1970.)

The *International Business Machines Corporation* (IBM) has generated and instituted for its customers and its intraorganizational needs a numerical code for cities, counties, and states. Originally a three-digit code, it has been expanded into a four-digit code, known as the New City Guide, listing codes for 5,463 cities and 3,134 counties. Every city having a population of 2,500 or more in 1960 is included. These codes are compatible with the IBM full eleven-digit code. (International Business Machines Corporation, *Numerical Code for States, Counties, and Cities of the United States*, GC 20-8073-0, IBM Technical Publications Department, White Plains, New York, 1961.)

The *American Trucking Association* (ATA) and the *Association of American Railroads* (AAR) jointly constructed and implemented The Standard Point Location Code in 1966. A revised version was adopted in 1968. It is a hierarchical code structure consisting of six numbers arranged into three pairs. Each coded geographical unit that is recognized as a part of a larger next level area is coded as such. The smallest unit recognized is a "location." There are three types of location: (1) Point—city, town, community; (2) Place—a street address, railroad station, place of business, etc., and (3) Site—a specific platform for loading or unloading. (Transportation Data Coordinating Committee, *Standard Point Location Code Congress: Addresses and Panel Discussion*, Washington, D.C., 1970.) The *Federal Aviation Administration* (FAA) has developed a coding scheme for selected United States airports, heliports, and seaplane bases. It consists of three-letter mnemonic codes. The same code structure is used to identify approximately 2,700 airports located abroad.

The *U.S. Department of Commerce*, Bureau of the Census, Transportation Division, has established the PICADAD (Place Identification Characteristics Area and Direction) computerized system. It is designed to facilitate data collecting activities and analyses of data dealing with transportation movements within the United States. The system recognizes approximately 37,000 places that are alphabetically stored in the Place File, all hierarchically arranged and identified by thirteen geocodes. The code structure makes it possible to describe and record all commodity movements. The Place File is complemented by the Key Point File which includes 5,600 points that, in a simplifying manner, represent all places recognized

and included in the Place File. The county seat is generally the key point, although large counties usually have more than one. The key points are arranged at random and identified by geocodes in a similar manner as the places. (U.S. Department of Commerce, Bureau of the Census, *PICADAD: A System for Machine Processing of Geographic and Distance Factors in Transportation and Marketing Data*, Donald E. Church, August 1970.)

The *U.S. Department of Transportation*, Office of Systems Analysis and Information, has drawn up a geocode structure that is suited for monitoring all the transportation movements taking place on each of the following modal networks: highway, rail, waterway, air, and pipeline. Each network is described as a set of nodes (intersections or terminals) and links (transportation routes directly connecting two nodes). The highway network consists of approximately 2,500 nodes; the rail system of approximately 2,600; the inland waterways and major coastal routes are defined as a set of 1,800 nodes. The air and the pipeline systems have not yet been fully coded. Each node is identified by a set of two geographic plane coordinates and also geocoded in relation to a geographic system of transportation zones. Each Standard Metropolitan Statistical Area (SMSA) forms a transportation zone; also a group of contiguous counties, not containing SMSA, are defined as transportation zones. There are 533 zones in all, each geocoded. (U.S. Department of Transportation, Federal Highway Administration, Bureau of Public Roads, "Urban Transportation Planning General Information and Instruction to System/360," June 1970.)

The *U.S. Department of Commerce*, Bureau of the Census, Geography Division has prepared for the Office of Civil Defense, Department of Defense, and the National Resource Evaluation Center, Office of Emergency Planning, the National Location Code (NLC). This system divides the country into approximately 43,000 small geographic areas generally known as Standard Location Areas (SLA). The code structure consists of numeric (with a few alphabetic) codes arranged hierarchically within the region, state, area and county. Eight regions are defined. Each SLA is identified also by geographical grid coordinates. The NLC was drawn up for the purpose of geographically identifying and estimating all aspects of national damage and resource evaluation programs. (U.S. Department of Commerce, Bureau of the Census, "National Location Code: OCP-OEO Region 2, Fg-D-3 ½," 1962.)

LOCAL CODING SCHEMES

Local coding schemes are designed for the purposes of urban and regional planning, management of urban areas, and census-taking activities. All are structured to maintain, in a computerized format, the geographical characteristics of urban information at a fine level of detail. As such, they describe the detailed geography of an urban area, e.g., streets, blocks, block faces, and neighborhoods, for the purpose of functioning as a geographic reference file, capable of retrieving the stored data as computer maps, displayed by the computer printer or by a Calcomp pen-plotter. After numerous attempts had been made by both public and private agencies

and university research groups, the U.S. Bureau of the Census developed the most successful and respected local coding schemes. An Address Coding Guide (ACG) was prepared for the urbanized portions of 145 SMSA participating in the mail-out and mail-back Census of Population and Housing. Individual addresses on the mailing list were geocoded to facilitate census tabulations by small geographical areas. The addresses were related to the basic unit of the coding structure called a "block face" or a "block side." A block side is one side of a street between two intersections on that side of the street. Each block side is hierarchically geocoded in relation to: State, County, Minor Civil Division, Place, ZIP Code, Census Tract, Street, Address Range, Census Block Number, SMSA, District Office, Ward, Annex, and Congressional District. Despite the fact that the ACG system was used for geocoding 1970 census questionnaires, the Census Bureau, Geography Division, had recognized in the mid-1960s that the logical structure of the system had to be modified. This recognition led to the development of a new scheme called DIME (Dual Independent Map Encoding) by staff members of the Census Operations Division and the New Haven Census Use Study. The DIME system is based on a combined logic of the ACG and of a coordinate geographical base system. In the DIME system, a boundary segment (a portion of a street delimited by intersecting streets or of natural line-like features such as railroad tracks and administrative boundaries) and block (area delimited by segments) were recognized as the basic coding units. Each boundary, or street, segment is defined both by its two end nodes and by its right and left block. Moreover, each intersecting node is identified by two geographic grid coordinate readings. Each DIME geocode contains all information needed to locate a given street segment on a map, associate an address with it, specify its contiguous blocks, and relate the unit to other geographical areas, regions, or aggregations included in the DIME file. The coding structure is very flexible; it permits computer editing as well as generating and ACG output and coordinate files that can be used for computer mapping programs. All these operations can be done only because the DIME scheme stores practically all the information of the source map.

COORDINATE CODING SCHEMES

There also exist categories of coding schemes that do not conform to the above classes of international, national, and local coding schemes. This group of coordinate coding schemes is also known as geographical grid systems. The dominant feature of the international, national, and local schemes was their recognition of the existing and observable areas such as geographical regions, political areas, districts, countries, streets, and city blocks as the basic units to be coded in their entirety. The coordinate coding schemes, on the other hand, differ in the sense that they assign geocodes only to areas of uniform size and shape, or to geodetically definable lines. Thus the coordinate coding schemes are derived from a different logical base; they ignore the geographical observable features and treat the surface of the earth as a geometric sphere.

The most basic and oldest is the World Geographical Grid which is a set of north–south (meridians) and east–west (parallels) lines; all are located as a uniform grid of lines intersecting each other at 90°, oriented to the rotational axis of the earth. The axis intersects the surface of the earth at the north and south pole. An infinite number of meridians and parallels can be drawn over the surface of the earth, and thus every point on the globe can be exactly determined in relation to the basic world geographical grid. The geographical grid was, and still is, the logical basis underlying medieval and modern navigational techniques. The history and/or a detailed description of the geographical grid systems can be found in any textbook on cartography and geography.

The logical basis of the geographical coordinate grid systems has been often modified, or extended and applied, in designing coordinate systems for non-navigational purposes. Only a few examples can be mentioned. The *U.S. Army* designed and implemented the Military Grid Reference System in 1951. It identifies sixty north–south uniform zones that cover the entire surface of the earth. Twenty east–west (horizontal) uniform zones intersect each north–south (vertical) zone. The resulting grid consists of square-like areas that extend 6° in longitude (east–west) and 8° in latitude (north–south). Each geographical area is identified by an alphameric geocode and is subdivided hierarchically into smaller square-like geographical areas. The smaller the geographical area, the larger the geocode identifying it. The geocode is written as a continuous series of numbers and letters. (U.S. Army and U.S. Air Force, *The Universal Grid Systems*, TM5-241 to 16-1233, Government Printing Office, Washington, D.C., 1951).

Another coordinate system widely used is that developed for surveying by the *United States Coast and Geodetic Survey* in 1934. Its logical design is related to that of the United States Public Land Survey system which was authorized by the Congress in 1785. One of the modern extensions of the coordinate grid system is The American Telephone and Telegraph Vertical–Horizontal Coordinate System generated to facilitate easy calculations of rate mileage on toll messages. (American Telephone and Telegraph Company, Long Lines Department, *Administration of Rates and Tariffs*, Publication Nos. 255 and 245, New York, 1968.)

The logic of coordinate grid systems has been applied in numerous attempts to design a geocoding scheme for small local (especially urban) areas. The grid of equally spaced lines, forming uniquely labeled squares of uniform size and shape, has often been used as the only logical framework of a given coding scheme, or in some cases in combination with the more popular approach of geocoding political, administrative, and other observable areas and features of the urban geography. The major disadvantage of the "uniform area coordinate grid system" is the fact that the grid lines often intersect city blocks or other observable units, thus dissecting two or more entities. It is then almost impossible to distribute information obtained for the city block, as a whole, over the individual parts formed by the grid lines; it is very difficult to estimate how much of the block area is included in one or another uniform grid area.

Future Research Approaches

At this time the process of geocoding is poorly understood. That being the case, it is not surprising to observe a lack of standardization, the absence of a well-defined methodology, and no compatability among the existing individual geographic coding schemes. As indicated above, many individual public and private organizations have developed their own approaches to geographic coding and have generated independent schemes serving only their internal needs. In most cases the kind of spatial data to be coded determines the method of encoding. The methods thus far defined vary from a simple manual assignment of geocodes to units, identified on a map or listed alphabetically, to those methods assigning geocodes automatically by using a digitizer or a computer. The manual method or the method of automated geocoding may follow a well-defined logical framework or a random process. More research effort is going to be directed to the methodology of automated geocoding. These efforts, however, must proceed in addition, or as a complementary activity, to solving two fundamental problems of geocoding; (1) that of defining a conceptual framework, and (2) that of geographical compatibility among systems.

Numerous public organizations and university based research groups are engaged in defining a conceptual framework for geocoding. Among the public agencies the most active are U.S. Department of Commerce, Bureau of the Census and National Bureau of Standards; U.S. Department of Defense; U.S. Department of Transportation. Among the schools are Harvard University, Massachusetts Institute of Technology, Northwestern University, University of Iowa, University of Michigan, University of Pittsburgh, and University of Washington.

Although the problem of geographical compatibility is generally well recognized and most of the research effort is directed toward it, no solution appears to be immediately forthcoming. Two approaches to a solution are identifiable in the research work. These are labeled: (1) standard geocoding scheme, and (2) common denominator geocoding scheme. The process of developing a standard geocoding scheme is identical to that of drawing up a standard computer language. More specifically, the goal of designing a standard single geocoding scheme for all geographical data is as unrealistic as is designing a standard computer language. The standard geocoding scheme could be defined and generated only after a general agreement among all the potential users. The agencies who are using their own coding scheme are not interested in reaching an agreement by compromise since this would mean, in most cases, giving up specific capabilities incorporated into their own systems. Also, the cost of converting to a new standard coding system may, for many users, be economically prohibitive. Thus the attempts at designing a standard geocoding scheme are not productive and lead into the approach labeled above as the common denominator coding scheme. The underlying assumption of this approach is that each user will maintain its present system in operation and, in addition, develop a translator system, capable of assigning to those geocodes currently in use others that are part of another widely used geocoding scheme. The widely used geocoding scheme, in most cases a geographical grid coordinate system,

would function as a common denominator. The cost of generating translator files could be substantial, but in any case less than the costs involved in constructing a standard geocoding scheme and converting all currently operating geocoding systems to it.

At this time the common denominator approach seems to be the only realistic and economic solution. But there is no hope that numerous translator files will be constructed and made available in the near future. The proliferation of differing, individual, and independent geocoding schemes will continue. Thus it is safe to assume that the methodology of designing geographical coding schemes will remain, for some time to come, an uncoordinated activity classified by many as an underdeveloped subdiscipline of the field of information science and, as such, an area for future investigation.

KAREL J. KANSKY

GEOGRAPHICAL LIBRARIES AND MAP COLLECTIONS*

Introduction

Few studies dealing with the overall growth and development of geographical libraries and collections have been published in the last few decades. Except for compilations on a country-wide basis, the latest of which are listed in the Bibliography, a thorough search of the literature reveals no current and comprehensive treatment of the subject. Although it is not possible to deal with so vast a topic within the limits of an encyclopedia article, a synthesis of the available literature, including where possible the interpretation of some of the statistical compilations, has been attempted. The gap in our general knowledge regarding the growth and structure of geographical libraries and collections is apparent. Some effort to remedy this situation is presently being made by the Geography and Map Libraries Subsection of the International Federation of Library Associations (IFLA). Up-to-date information on an international scale will be gathered by means of a questionnaire being sent to several hundred libraries, archives, and societies that are assumed to have substantial cartographic collections. Until this information is available, perhaps in a year or two, the reader is referred to the annual reports of the great libraries of the world and to the occasional histories of geographical libraries, societies, and collections that appear from time to time in the library literature. One final note: the emphasis on map and atlas collections in the following pages is a reflection of the nature of geographical information. Such collections form the core of all "geographical" materials. Furthermore, they have been studied and recorded to a much greater extent than have the monograph, report, and serial

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segments of the great geographical collections, particularly with reference to the large governmental, academic, and research libraries.

Historical Growth and Development

The question of "where?" most certainly predates the invention of writing, and and is presumed to have been asked long before the Sumerians developed a widely usable writing system. Although libraries were established by the Sumerians as early as 2700 B.C., it is not possible to state whether any of them were "geographical" collections. Certainly the reports of military campaigns, vital statistics as evinced in tax and temple rolls, and other recorded social and political phenomena could be considered geographical. In addition to recording spatial information in textual form, the early peoples—Egyptians, Babylonians, Chinese, and the early Western Hemisphere Incas and Aztecs—also made maps. Theirs was a practical cartography which included cadastral plans, site plans for buildings, and plans for road and canal construction. Only the Babylonians, so far as is known from an extant cuneiform tablet of ca. 500 B.C. found in the library of King Ashurbanipal at Nineveh, a copy of one much older, had a world view. This tablet, which contains names of countries and cities, was obviously compiled from some store of geographical knowledge. It is thus one of the earliest evidences of a geographical collection to come down to us. Egyptian maps of ca. 2000 B.C., as depicted in paintings on sarcophagi, were probably copied from contemporary maps of different parts of the Nile Valley. They, of course, cannot be considered as collections but as single, simple examples, graphic in form, of the geographical knowledge of Ancient Egypt.

Spatial organization has been an important concern of man for ages. The locations of people, places, and things appear in the poems of Hesiod and Homer, and in the writings of Herodotos. The Greeks also exhibited a great curiosity about the characteristics of places and postulated a certain balance and similarity for widely separated places, particularly those situated on the same parallel (climata). It has been said that Aristotle was the first person to collect, preserve, and use the culture of the past. One may assume that geographical works and maps were included in his collection. The most important Greek libraries were established during the Hellenistic Age at Pergamum in Asia Minor and Alexandria in Egypt, the city founded in 332 B.C. by Alexander the Great. The latter became the intellectual and literary center of the Greek world. The library of the Museum, an academy of scholars under royal patronage, contained manuscript scrolls acquired by various means and translated into Greek from all known world languages. This collection grew to an estimated 700,000 rolls by the middle of the first century B.C. It is important to our discussion for, as noted by Nora Corley in the article on *Geographical Literature*, it is here that Eratosthenes, a geographer of the third century B.C., completed his famous experiments in earth measurement. The library of the Museum and a second library, the Serapeum, which contained more than

100,000 papyrus rolls, must have embraced an enormous quantity of geographical information and, one might assume, also many materials of a cartographic nature. As is well known, both Alexandrian libraries were destroyed. It should be noted that the collection at Pergamum is believed to have been given by Antony to Cleopatra and that the latter added it to the collection of the Serapeum.

The Romans were collectors as well as conquerors, and many private libraries were established when their generals brought back spoils of war from their many campaigns. The truly educated man during this period required Greek and Latin works, thus giving rise to large and comprehensive collections certain to have contained much material of a geographical nature.

Public libraries were established during the Augustan Age, and there were some twenty-five in Rome during the second century. Libraries were also located throughout the Empire. The importance of geographical knowledge to the Romans with their far-flung empire cannot be underestimated, but few works of importance have come down to us. Exceptions are the contemporaneous works of Strabo, Claudius Ptolemy, and Pliny the Elder. These compilations, literary and cartographic, provide us with most of our knowledge of classical geography, and of the Greek and Roman conceptions of the extent of the *oikumene,* or inhabited world. These maps, also, must have been based on substantial collections of travelers' reports and other geographical lore. But, alas, only the compilations have survived, and none of the original source material.

The period from the fall of the Roman Empire to the early stirrings of the Renaissance in Italy is of some importance, and the material which has survived provides us with some idea of the extent of geographical knowledge of the time. Most geographical knowledge of the earliest part of the period came from two sources: The writings of Greek historians and philosophers and the Bible.

Muslim scholars of the eighth to eleventh centuries and their Byzantine counterparts also received many of their facts and inspirations from the early Greeks. In Europe during the Middle Ages, geography and Christian theology were inextricably interwoven. The geography of the churchman and philosopher, however, was quite different from that of the commercial traveler, soldier, or pilgrim. Maps of this period are poor and do not indicate any better cartographic standard than those of the Greek and Roman periods. The encyclopedic textual description of places and people is continued, but with many more fanciful depictions and elaborations. Some of these geographical materials survived and, in much copied form, have found their way into modern collections. However, no separate inventories of maps from the Middle Ages are known to us. Individual maps, however, are mentioned in library inventories that have survived the ravages of time, war, and natural disasters. The book (codex) was regarded by medieval literate man as an item that should be given safe housing and good care. It was probably not until sometime during the fourteenth century that the map became regarded as a document to be accorded special treatment similar to books. It is from this time that this article attempts to trace the growth of geographical libraries and, more specifically, map and atlas collections.

At this time there developed the beginning of a differentiation between types of maps according to functions, e.g., surveyors plans, illustrations for the encyclopedic works (*Imagine Mundi*) of the time, and, most importantly, the portolan or early sea charts which date from the late thirteenth century. There were other, important land route maps, also. One of England constructed by Matthew Paris about 1250 is an outstanding example. Other local and regional maps appeared from the thirteenth century onward, and those that remain to us are of some importance, primarily as historical records.

It was not until the western revival of Ptolemy's *Geographia* (ca. 160 A.D.), brought from the Byzantine Empire to Italy at the beginning of the fifteenth century, that scientific geography and cartography were reborn. The eight books of this Greek manual contained instructions for the construction and drawing of maps, tables of coordinates of latitude and longitude for towns and physical features, a world map, and twenty-six separate maps of countries. It was translated into Latin by 1409. The maps were redrawn and the first printed edition was issued in Bologna in 1477. A Latin translation, without maps, had previously been issued in 1475. The *Geographia*, in its several subsequent editions, e.g., Rome 1478, Florence 1482, and Ulm 1482, influenced geographical thought until the end of the sixteenth century. New and redrawn maps were introduced into the *Geographia* as Europe expanded its horizons by exploration and trade.

The study of historical geography and cartography began during the first half of the sixteenth century, and was a direct cause of the collecting of maps by public libraries and private collectors. The map, in addition to its scientific depiction, is also a specimen of graphic art. Contemporary map makers, quite aware of the visual appeal of a decorative map, catered to this appeal. Maps also supplied information, as noted above, concerning current European voyages of discovery. Contemporary travel literature, travelers' tales, and reports of new geographical discoveries, of course, have been avidly sought by map makers since earliest times. Material from these varied sources of geographic information was collected, edited, transformed into cartographic format, and widely disseminated, particularly after the invention of printing. With publication costs reduced and production increased, maps, atlases, and other geographical works became more readily available. The accelerating demand for maps during this period was a direct result of the European voyages. Venice, and after 1550 Rome, and subsequently Austria, Switzerland, France, and the southern Netherlands after 1570, became important centers for the collection and processing of geographical knowledge and cartographic production. Near the end of the century there seems to have been a burgeoning interest in book collecting and, in the Netherlands in particular, the records of the private collector finally emerge. A general interest in collections of works dealing with voyages of exploration and discovery appears in the early years of the seventeenth century. These privately assembled and owned collections form the nucleus of many important public and private scholarly libraries of the present time. Some collections of importance are discussed in the following text under their parent country and institution. For example, the Fuggers of Augsburg

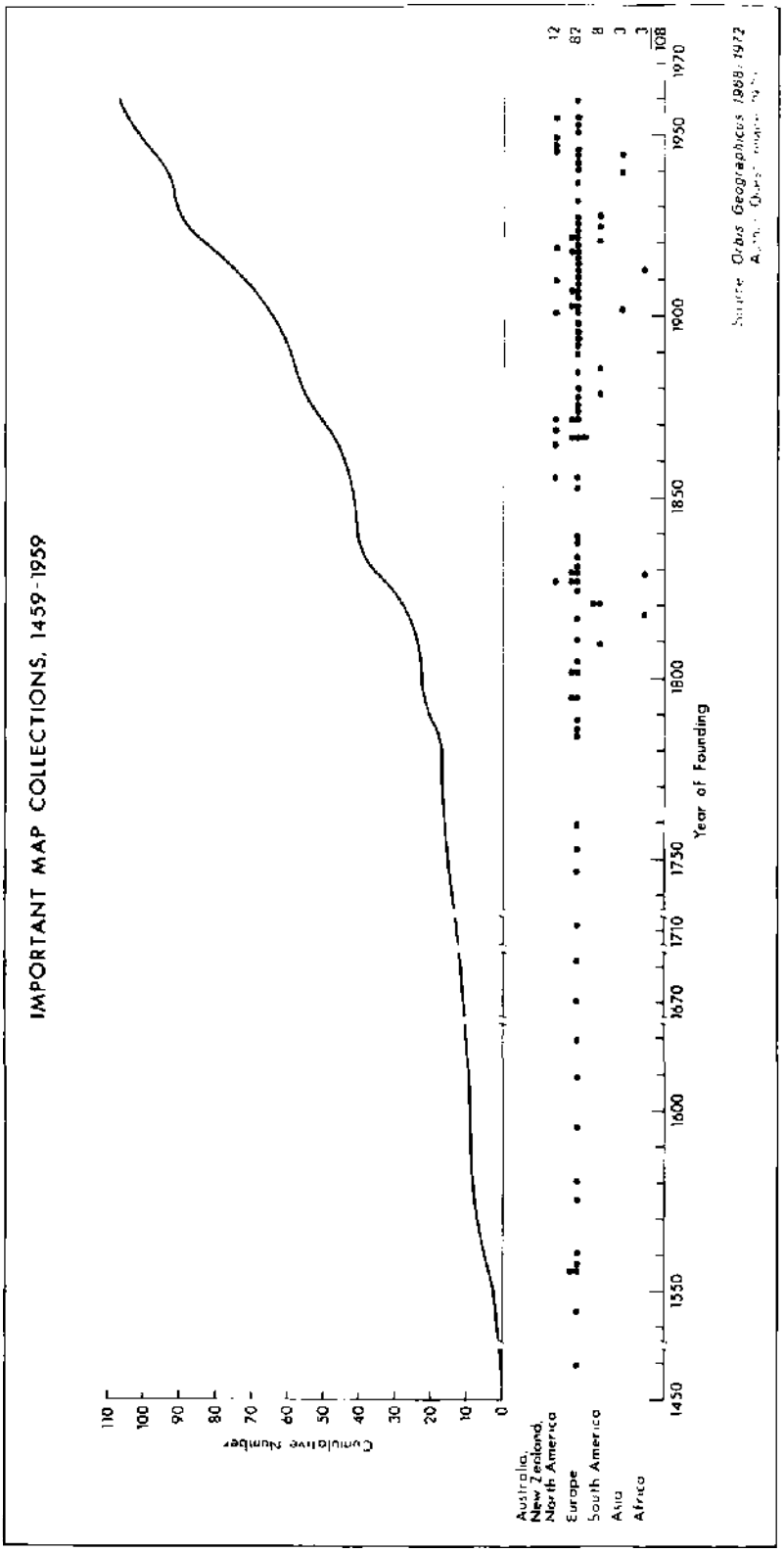
IMPORTANT MAP COLLECTIONS, 1459-1959
Cumulative Number
110
100
90
80
70
60
50
40
30
20
10
0
1450
1550
1600
1670
1710
1730
1800
1850
1900
1950
1970
Year of Founding
Australia, New Zealand, North America
Europe
South America
Asia
Africa
12
82
8
3
3
108

FIGURE 1.

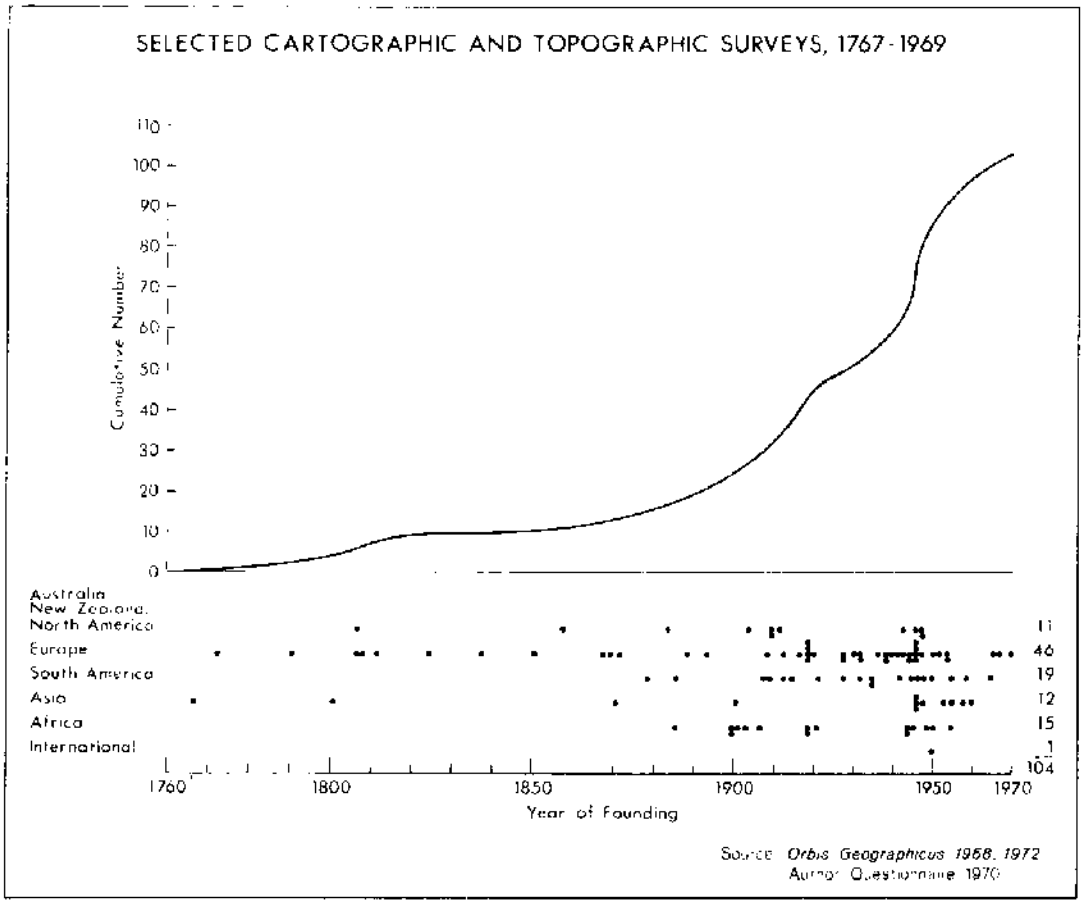

FIGURE 2.

had a large collection of maps which was given to the Hofbibliothek in Munich at the end of the sixteenth century. The foundations of the Dresden collection were laid by Kurfürst August of Saxony. The British Museum map collections were enriched by the presentation of George II's Royal Library in the middle of the eighteenth century. It should be noted that the oldest extant catalog of a European collection is that of the humanist Viglius von Zuichem dated 1575.

Selected map collections, some 108 of those considered most important, the first of which was established in 1459, are cumulated and graphed by date of foundation in Figure 1. It can be seen that for slightly over 300 years, from 1459 to 1790,, growth was slow and very few collections were established. Only 20 were recorded by the sources used for the graph. The period from 1790 to the middle of the nineteenth century in Europe seems to stand out as a definitive era in the establishment of map collections. This was due, for the most part, to the establishment of military surveys during the early colonial period. Maps produced by these surveys found their way into the great libraries and collections of the time. A comparison of Figures 1 and 2, important map collections, and selected cartographic and topographic surveys, reveals a rough graphic similarity

in cumulation by date. The graph of map collections contains somewhat less than 5% of those in existence in 1972. It does, however, include most of the outstanding collections. As will subsequently be seen, there are at least 900 collections in the United States, some 273 in the Federal Republic of Germany, and 87 in Canada. Not all, of course, are of more than local importance.

After a mid-nineteenth century hiatus, map collection foundation seems to exhibit a steady growth. By 1878 some 50% of those recorded were established, and 40 years later, in 1918, slightly over 75% were in existence. The great impetus to the founding of geography and map collections, therefore, seems to have come in three periods: (1) first half of the eighteenth century; (2) last quarter of the nineteenth century up to World War I; and (3) subsequent to World War, II, particularly in the United States, Canada, and in the former European colonies. Topographic and cartographic surveys recorded in Figure 2 exhibit the same pattern for the latter two periods, with the greatest growth coming during the post-world War II period. Of the surveys recorded, a substantial percentage of those in existence today, 50% had been established by 1931 and 75% by 1950.

It should be noted that the reformation of cartography and the first topographical survey of an entire country based on new scientific methods was initiated in France. The shape and circumference of the earth was determined; an arc of the meridian at high, middle, and low latitudes was measured, beginning in 1669; and correct positions were located for a large number of places. The great French accomplishment, the triangulation of France, begun by J. D. Cassini in 1733, and the first ever attempted on a firm geodetic base, was completed by his son, César François Cassini de Thury, in 1744. Preparation of the maps began about 1750 and when completed consisted of 182 sheets on a scale of 1:86,400, or 1.36 miles to the inch. The British commenced official topographic surveying in 1791 with the establishment of the Ordnance Survey, and other countries soon followed suit.

Although surveys of a military or civil nature undoubtedly had a great effect on the establishment of geography and map collections, the founding of geographical societies was certainly of equal importance. There were close ties between the early national topographical surveys and the societies, and many early surveyors, geographers, cartographers, and explorers were associated in one way or another with both types of institutions. This was true in the newly emerging nations as well as in the European overseas colonies.

Figure 3 shows the rise in number of geographical societies from 1821 to 1968. Like the previously noted graphs, there also seem to be definite periods during which societies were established. The geographical society seems to have appeared first in Venice in 1558, where the Accademia del Fama, also known as Accademia Veneta Prima, was founded by Federico Badoaro. It was dissolved in 1561. In 1684 Vencenzo Coronelli founded the Accademia Cosmografica degli Argonauti, which existed for some 35 years until Coronelli's death in 1719. In 1698 the Kayserliche Cosmographische Gesellschaft was established in Venice. Anton Friedrich Busching, Johann Tobias Mayer, and other geographers and interested

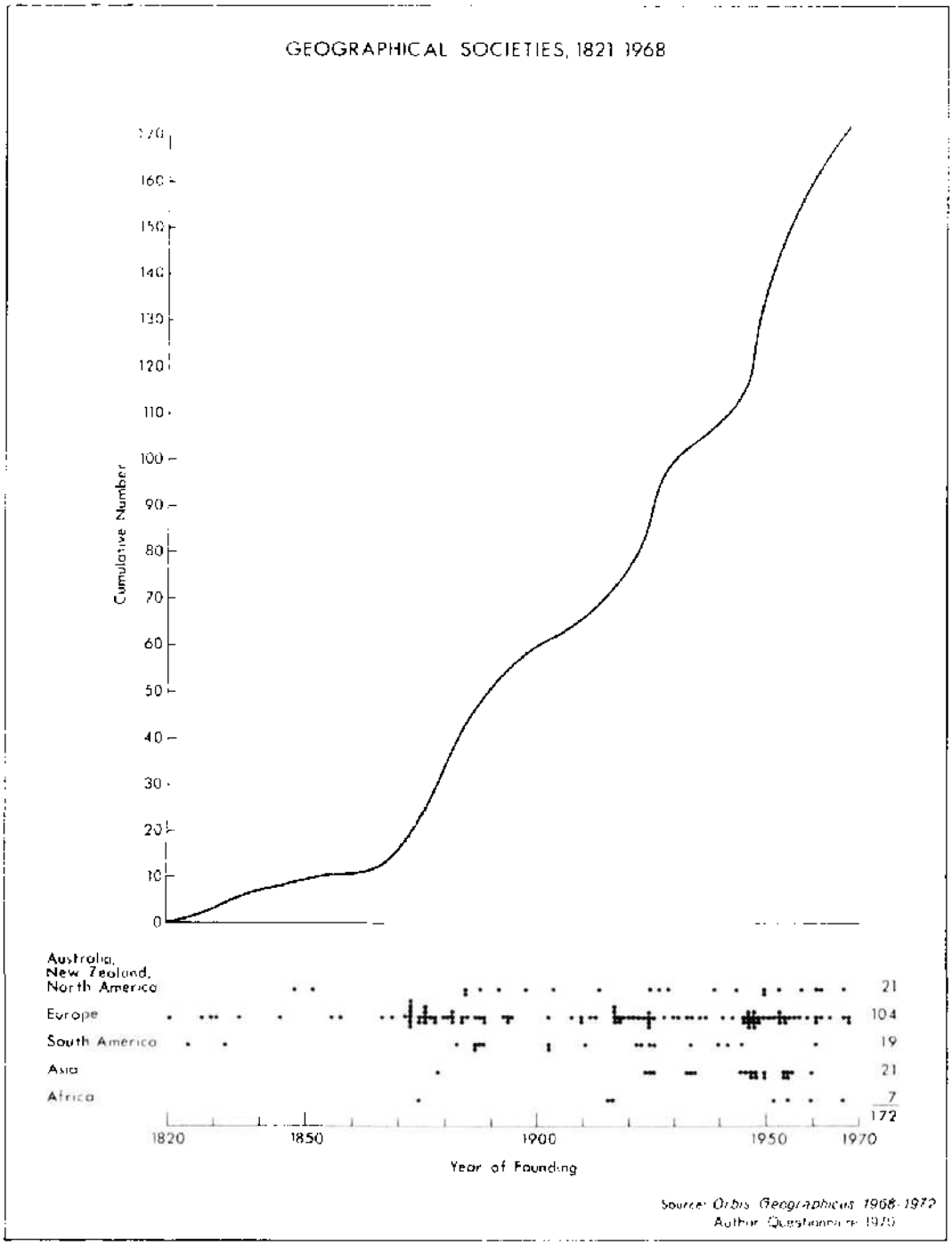

FIGURE 3.

laymen founded the Kosmographische Gesellschaft in Nürnberg which flourished during the period from 1740 to 1757. The latter society seems to have been quite successful for over a decade and some thought was given to publication of a journal; however, financial problems caused its eventual demise.

Josef Marx, Freiherr von Liechtenstein, founded a Kosmographische Gesellschaft in Vienna in 1790, which had several goals of some interest to this discussion. These were: (1) the improvement of cartography; (2) collection and publication of statistics; (3) education of capable cartographers; and (4) consideration of the products of graphic geography, i.e., graphs and tables. They are quite similar to the expressed goals of cartographic societies today. A geographical-statistical periodical was established but it failed in its first year. Liechtenstein, however, founded the Kosmographisches Institut which published three different periodicals, many geographic monographs, and trained several important cartographers, among whom were Sartorius, Schweickhardt, and Kindermann. It may be considered the first modern school of cartography established in central Europe.

The modern geographical society had its origins in Paris in 1821. The Société de Geographie de Paris was the first to endure for any length of time and has recently celebrated its 150th anniversary with the assistance of members from scores of other geographical societies from every continent. It has been said that the blossoming of societies after 1820 came in response to great social changes. The hundred-year period after the Battle of Waterloo was, for the most part, peaceful, at least in Europe. Europe continued to expand overseas, empires were consolidated, and exploration and colonization were carried on at an increased rate. Settlements were established on many frontiers in both the New and Old Worlds. People became interested in the geography of their own countries and, as has been seen, topographic, hydrographic, and geological surveys were begun on a systematic basis.

The establishment of the Paris society was followed by the Gesellschaft für Erdkunde zu Berlin in 1828, the Royal Geographical Society in 1831, the Sociedad Mexicana de Geografia y Estadistica in 1833, and that of Frankfurt am Main in 1836. The Institut Historico e Geografico de Brasil was founded in 1838, the Imperial Russian Geographical Society in 1845, and the American Geographical and Statistical Society was established in New York in 1852, making it the eighth oldest geographical society in the world. By 1886, some 25% of all present geographical societies (Figure 3) had been founded, but it should also be noted that half of the societies have been established since 1925. There are three periods of growth apparent from an examination of Figure 3. The first came during the latter half of the nineteenth century and is concentrated between 1864 and 1894. Some forty-five societies were begun during this period. The second period spans the years between 1914 and 1935, when some thirty-nine societies made their appearance. We seem at present to be in the third period of expansion, which extends from 1944 to 1968, and presumably beyond. Fifty-nine societies, the largest number, were founded during this time. Extra European societies, particularly those in Asia and Africa, show a marked expansion during the latter period. A total of 172 societies have been recorded as established since 1821. Several are no longer active. Of nine geographical societies established in the United States since 1852, only the American Geographical Society survives as a viable active professional organization. The geographical societies of Minnesota, Philadelphia,

and Alaska (Seattle), among others, have all been disbanded. It has been determined that most scientific societies tend to reach an early numerical growth ceiling, around which they fluctuate or grow very slowly. Subgroups tend to form within societies and these eventually break off to form new societies, causing a doubling of numbers of societies at approximately 20-year intervals. Geographical societies seem to have a doubling rate of approximately 40 years, quite a slow rate when compared with other scientific societies.

Of particular interest to us are the specific activities of these societies in relation to the collection and preservation of geographical information. John K. Wright divides the activities of geographical societies into five types, all of which seem to have some bearing on his item 3: (1) publication of documents; (2) assembly or meetings; (3) collection and preservation; (4) stimulation and recognition of research and educational achievement; and (5) professional promotion. Only a few of the larger and older societies are able to maintain substantial collections of books, maps, photographs, instruments, etc. Table I indicates the range in size of

TABLE 1

Selected Geographical Society Library Monograph Holdings, 1933–1971

Library	Year of founding	No. of volumes	
		1933[a]	1971[b]
Royal Geographical Society, London	1831	80,000	500,000
Société de Geographie, Paris	1821	300,000	500,000
Instituto Histórico e Geográfico, Brasiliero, Rio de Janeiro	1838		285,000
Societá Geografica Italiana, Rome	1867	60,000	200,000
American Geographical Society, New York	1852	97,500	170,750
Sociedade de Geográfica de Lisboa, Lisboa	1875	40,000	105,000
Sociedad Mexicana de Geografia y Estadistica, Mexico, D.F.	1833		95,000
Suomen Maantieteellinen Suera-Geografiska Sällskapet i Finland, Helsinki	1888		53,000
Gesellschaft für Erdkunde zu Berlin, Berlin	1828		24,000
Sociedad Geográfica de Lima, Lima	1888		20,000
Koninklijk Nederlands Aardrijkskundig Genootschap, Amsterdam	1873		13,000
Instituto Geografico y Catastral, Madrid	1870		11,000

[a] Enrique Sparn, "Cronologia . . . de las sociedades de geografia," *Boletin de la Academia de Ciencas* (Cordoba), 32 (1932–1935).

[b] *The World of Learning, 1971–72*, Europa Publications, London, 1972, 2 vols.

monograph holdings of several geographical societies. Growth is also depicted for those society libraries for which earlier figures could be discovered. There seems to be no correlation between the number of books and maps that a collection contains. This ratio is, most probably, a function of type, size, or some other parameter, such as historical emphasis or administrative policy.

The several different types of geography and map libraries and collections can, tentatively, be placed within the following categories:

1. *Large government research libraries* (Library of Congress, British Museum, Bibliothèque Nationale).
2. *Government libraries with a specific function* (U.S. Geological Survey Library, U.S. Army Topographic Command Library, Public Records Office Library).
3. *Geographical society libraries* (American, Royal, Paris—with large map, atlas, book, and serial collections).
4. *Public libraries* (New York, Boston, Philadelphia—all with large map holdings).
5. *University research libraries* (Harvard, Yale, Columbia, Wisconsin, Illinois, Minnesota—all with large map and/or aerial photo collections).
6. *Historical and other learned society libraries* (New York and Wisconsin historical societies, Boston Athenaeum, American Antiquarian Society).

Selected United States map collections arranged by the above categories and their growth, in some cases since 1892, are depicted in Table 2. It can be seen that public and university libraries are leading in map collection growth. Most of this growth is post-World War II and much of it occurred between 1946 and 1970. There has been no indication of a slowing of the growth rate. Map production, increasing in a presumed exponential fashion similar to the general growth rate of publications of all kinds, accounts for the present rate. The older established collections seem to be growing at a lesser rate, due no doubt to their extremely large size. The basic stimulus for most large United States map collections was the U.S. Army Topographic Command depository collection, and it was really during the late 1940s and early 1950 that most nonfederal map libraries in this country were established.

United States and Canadian map collections were surveyed in 1954 and in 1970, and Canadian map collections were also surveyed in 1968. Although there has been a significant increase in the number of reported collections in the United States and Canada from 1954 (527) to 1970 (603), the ration between large and small collections remains approximately the same.

1954: 15,188,405 maps in 428 collections	25% of maps in 2 collections 50% of maps in 12 collections
1970: 21,874,990 maps in 475 collections	25% of maps in 3 collections 50% of maps in 20 collections

The numerical distribution of map collections seems to approximate the rank-size rule (Bradford-Zipf distribution). The same pattern is observed in Canada, the

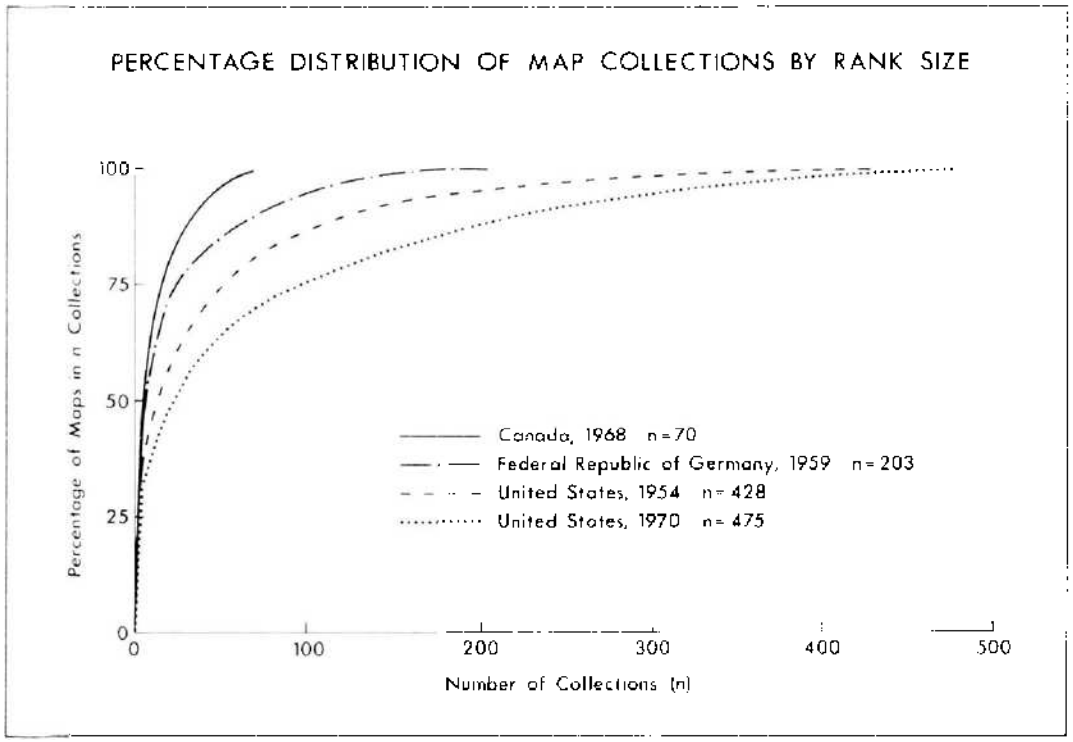

FIGURE 4.

Federal Republic of Germany, and Great Britain. For example, a survey of Canadian map collections in 1968 showed the following distribution.

1,530,900 maps in 71 collections	29% of maps in top collection
	50% of maps in 4 collections
	75% of maps in 13 collections

Perhaps this phenomenon could be described as the law of the primate map collection, to paraphrase a title from Mark Jefferson's "Law of the Primate City." In other words, there is always a largest collection, larger usually by an order of magnitude, in any given political jurisdiction.

Figure 4 illustrates this point very well. It can be noted that only a few collections are required to account for the great bulk of maps. And, conversely, that a very large number of collections contain a much smaller percentage of the total number of maps. This same distribution pattern holds true for geographical book and atlas collections, too, although no attempt has been made to include them in this essay.

Some growth rate postulations can also be made. By examination of available statistical information it would appear that the entire field of map collecting is in the center, or exponential portion, of the classic logistics curve (see Figure 1). As long as map production maintains its present rate, map libraries will continue to grow in size, if not in number. Any increase in large-scale map production will

TABLE 2

Selected United States Map Collections

Library	Number of maps					
	1892[a]	1930[b]	1954[c]	1970[d]	Increase 1954–1970	Percentage increase[e]
U.S. Government Libraries						
National Archives			800,000	1,600,000	800,000	100.0
Oceanographic Office	12,000	20,058	34,000	62,000	28,000	82.3
Library of Congress	40,000[f]	655,000	2,250,000	3,350,000	1,100,100	47.7
Topographic Command[g]		1,000,000	1,500,000	1,600,000	100,000	6.6
Coast and Geodetic Service	12,000	67,200	350,000	350,000	0	0
Geological Survey	20,000	44,035	100,000	100,000	0	0
Census Bureau[h]		16,000	600,000	400,000	−200,000	−33.0
Air Chart & Information Center[h]			395,000	200,000	−195,000	−48.5
Geographical Societies						
American Geographical Society			230,000	310,000	80,000	34.9
National Geographic Society	2,500		56,800	72,200	15,400	27.1
Historical Societies						
Wisconsin State Historical Society	1,500		11,000	45,200	34,200	4×
New York State Historical Society			50,000	60,000	10,000	20.0
Public Libraries						
Brooklyn, New York			4,000	65,000	61,000	16×
San Francisco, California			3,000	33,000	30,000	10×
Portland, Oregon			5,000	40,033	35,033	8×
Boston, Massachusetts			37,000	320,000	283,000	8×
St. Louis, Missouri			32,236	67,640	35,404	110.0
Buffalo and Erie County, New York			25,000	45,000	20,000	80.0
Philadelphia, Pennsylvania			67,800	116,000	48,200	71.6
Minneapolis, Minnesota			15,350	26,000	10,650	68.5
Milwaukee, Wisconsin			45,000	65,000	20,000	44.4
New York, New York			210,000	287,202	77,202	27.2

University Libraries				
University of Washington	13,435	182,000	168,565	13×
University of Maryland	10,000	85,000	75,000	7.5×
University of Minnesota	40,000	160,000	120,000	4×
University of Kansas	35,000	120,000	85,000	3.5×
Southern Illinois University	33,560	115,000	81,000	3.5×
University of California at Los Angeles	82,000	220,000	138,000	62.7
University of Illinois	150,000	249,800	99,800	40.8
Yale University	100,000	150,000	50,000	33.3
University of Wisconsin	80,000	113,250	33,250	29.1
Other Collections				
United Nations: Dag Hammarskjold Library	45,000	75,000	30,000	40.0
Canada				
Public Archives[i]	22,000	461,017	439,017	20×

[a] William Lane, *Notes on Special Collections in American Libraries*. Cambridge, Massachusetts, 1892.

[b] U.S. Map Information Office, *Map Collections in the District of Columbia*, Washington, D.C., 1930.

[c] *Map Collections in the United States and Canada*, Special Libraries Assoc., New York, 1954.

[d] *Map Collections in the United States and Canada*, 2d ed., Special Libraries Assoc., New York, 1970.

[e] Increases of more than 150% are indicated by the sign "×," where "×" signifies the 1954 figure and 1–2–3, etc., indicate multiples, e.g., 4× = a fourfold increase. Percentages are rounded off to the nearest 0.10.

[f] The Library of Congress Division of Maps and Charts—now the Geography and Map Division—was established in 1897 and this figure is from that date.

[g] The U.S. Army Topographic Command keeps only a current collection. Superceded maps and atlases are transferred to the Library of Congress Geography and Map Division.

[h] Current collections. Superceded maps and atlases are transferred to the Library of Congress Geography and Map Division.

[i] Selected as an example of the phenomenal growth of a national map collection.

cause accelerated growth of collections, particularly in the larger depository libraries. It can be said that the size of map collections is a function of map scale, which in turn determines the number of maps required for coverage of a given area. The larger the scale, the larger the number of maps and the larger the map collection. When one considers that over 2,500 maps are required to cover the earth at a scale of 1:1,000,000, or approximately 16 miles to the inch, it can readily be seen that an increase in coverage to a scale of 1:63,360 or 1 mile to the inch will enormously increase the number of maps required by several orders of magnitude. For example, although only two sheets of the International Millionth Map of the World are needed for the entire United Kingdom, some 189 topographic maps (Ordnance Survey, Seventh Series) are required for coverage at a scale of 1:63,360. New editions of existing topographic maps, city maps, hydrographic charts, etc., form an extremely large and potentially unmanageable mass of cartographic information. The great increase in numbers of thematic maps, e.g., economic, transportation, and planning, also adds to the problem. The ways in which this information is presently controlled and made available are well documented in current map library literature. The Bibliography lists those works considered to be of importance to the subject of map and atlas processing.

EUROPEAN COLLECTIONS

Selected European map collections are depicted cartographically in Figure 5. The map is to be considered experimental for the statistics used are from a wide variety of sources and, unfortunately, do not represent the same time period. However, the geographical distribution, with collections of significant size generally appearing in Europe north of the Alps and east of the Polish–USSR border, is most certainly a fair representation. It shows a marked similarity to the distribution of universities and great state, public, and society libraries. It can be seen that the largest collections tend to be in the west and in the capital cities of countries, states, and provinces (London, Paris, Munich), or in cities which contain universities and geographical societies (Oxford, London, Paris, Florence). A similar pattern can be seen in Figure 6 which depicts selected map collections in the eastern United States and Canada. The lack of symbols in Czechoslovakia and the scarcity of symbols in Scandinavia and in countries bordering the Mediterranean Sea reflect a lack of statistical material *and* a probable lack of collections of a significant size. Of course size does not determine the general scholarly worth of a collection, and many excellent and valuable geography and map collections are overlooked in graphic representations of this kind. Nevertheless, the distribution is an interesting one to speculate on.

Significant collections are described under their respective countries.

Great Britain

The British Museum in London, established by an Act of Parliament in 1753, contained at that time three principal collections: the Cotton, Sloane, and Harleian.

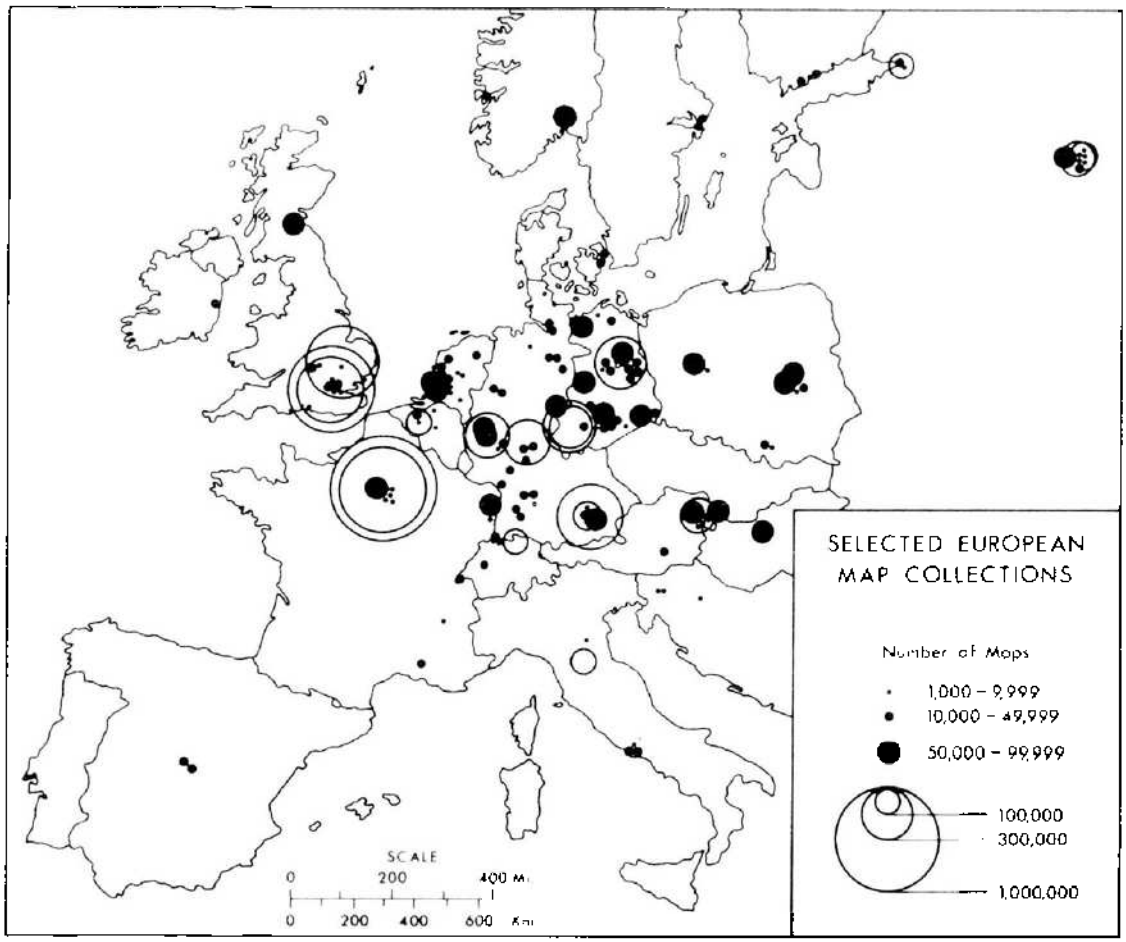

FIGURE 5.

In 1757 George II presented the Royal Library to the museum. These four collections contained many important early manuscript and printed maps.

The library of George III was given to the museum in 1828. This contained the finest geographical collection in Europe. Some 50,000 maps and charts, including many contemporary manuscript surveys of the North American and Eastern wars were included. Among other treasures contained in the museum's geographical collections are the libraries of Joseph Banks, Thomas Grenville, and the original drawings of the first editions of the Ordnance Survey topographic maps.

The British Museum, under the Copyright Act of 1911, is the principal copyright library in the United Kingdom and receives one copy of all published works. The Map Room of the museum, since 1892, has been a division of the Department of Printed Books. Manuscript maps were transferred to the Department of Manuscripts in the same year. Like the map rooms of most large research libraries, it can be considered the center of geographical studies in the museum. Several catalogs are available but the most important and widely distributed are (1) *The Catalogue of Manuscript Maps, Charts, and Plans, and of the Topographical*

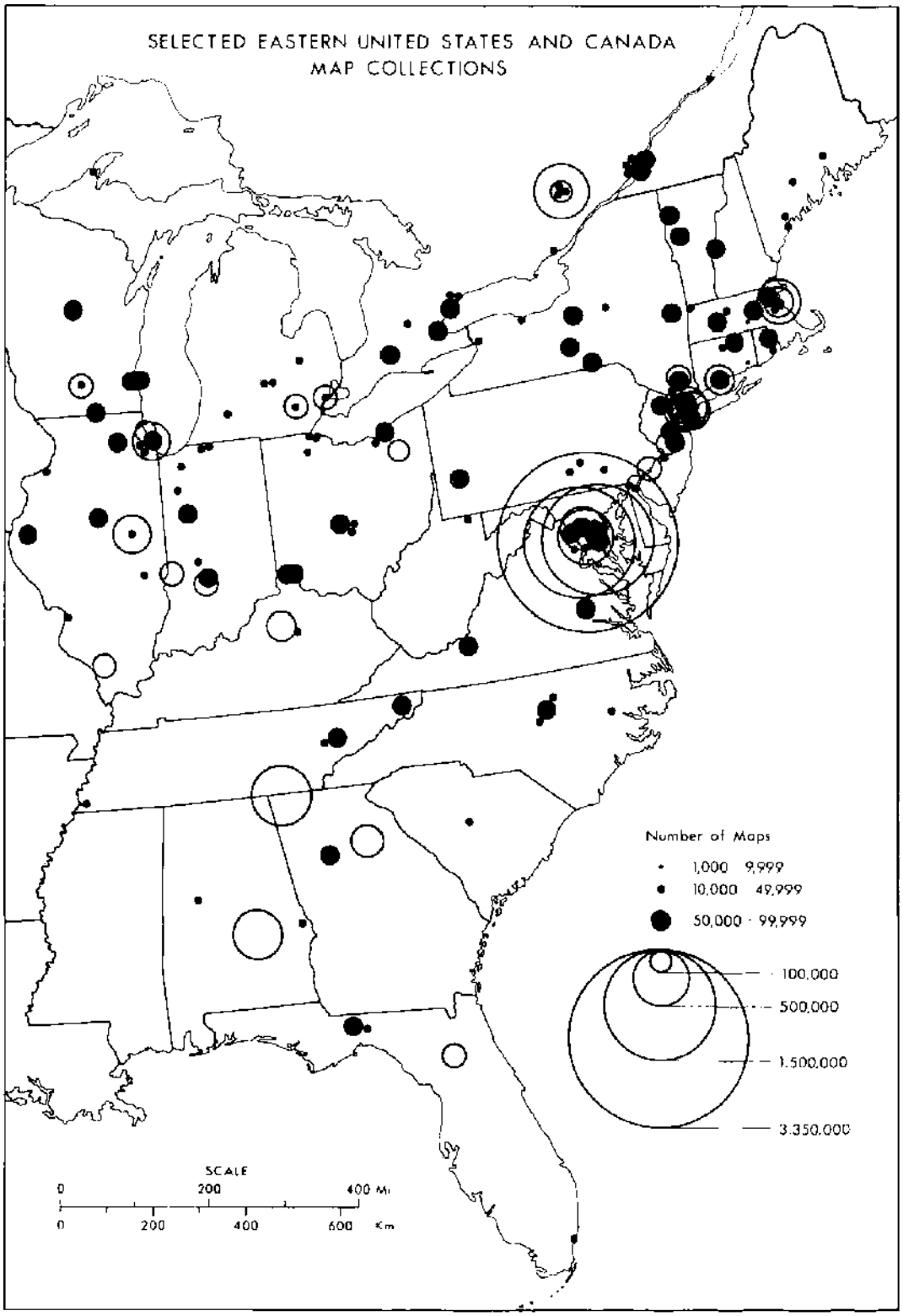
SELECTED EASTERN UNITED STATES AND CANADA
MAP COLLECTIONS
Number of Maps
1,000 9,999
10,000 49,999
50,000 99,999
100,000
500,000
1,500,000
3,350,000
SCALE
0 200 400 Mi
0 200 400 600 Km

FIGURE 6.

drawings of the British Museum, in three volumes, 1844–1861, and (2) *Catalogue of the Printed Maps, Plans and Charts in the British Museum*, fifteen volumes, which includes the holdings up to 1964. An annual accessions list updates the latter catalog. The collection has grown from some 50,000 printed and 20,000 manuscript maps to over 800,000 printed maps at present, thus making it the largest in the United Kingdom and certainly one of the largest recorded map collections in the world.

Other large official collections in London are in the Public Record Office, India Office Library, Library of the Geological Survey and Museum, and the Royal Geographical Society.

The Public Record Office map collections were begun in the mid-1850s, but it was not until 1926 that a separate catalog was initiated. At present the maps come from various government departments under statute. There has, however, been no policy established for formal collecting. Reference to maps of the British Isles from ca. 1410–1860 is found in *Maps and Plans in the Public Record Office*, Volume I, which was published in 1967.

The Royal Geographical Society has played an important part in the development of geography as a discipline for the past century and a half, and this development is reflected in the collections of the library and map room. One of the main objectives of the society since its foundation in 1830 has been the formation of a library of the best books on geography and a complete collection of maps and charts from the earliest period to the present. Although the early years were quite difficult in terms of funding, by the latter part of the century the two collections were firmly established. In 1854 a temporary appointment as librarian and map curator was made, and in 1866 the position was made permanent. The library and map room grew rather slowly, but with the establishment of exchange agreements with domestic and foreign institutions growth soon became substantial. In 1894 the library contained some 30,000 volumes and in 1933 80,000 volumes were reported. The collection today approaches 500,000 items, including over 100,000 volumes, more than 200,000 photographs, negatives, and lantern slides, and several thousand pamphlets and offprints. The most comprehensive collection of geographical periodicals in the United Kingdom is also housed in the Library. Current accessions are listed in *New Geographical Literature and Maps*, published twice a year. The society also publishes *The Geographical Journal*, one of the world's most important and long-lived geographical journals, and occasional monographs, pamphlets, facsimile maps, etc.

The University of Cambridge Library has one of the three largest map and atlas collections in the United Kingdom and a substantial number of books on geographical subjects. The earliest known catalog or shelflist, begun in ca. 1424, lists some 122 books. Several maps and atlases had been acquired by the end of the seventeenth century. The collection continued to grow at a moderate rate and by 1880 a report states that one large room and part of another were used to house maps. Since 1935, when a new and large map room was made available, the collection has grown at a much faster rate. In 1970 the map room collection numbered

approximately 600,000 maps and 5,000 atlases. Annual accessions total some 20,000 maps. Old and modern manuscript and printed maps and atlases of Great Britain and overseas areas, books on cartography, and gazetteers make up the collections. A catalog and several indexes are available for consultation in the map room, but no published catalog exists.

The Bodleian Library, Oxford, was founded in 1327, probably by Thomas Cobham. Humphrey, Duke of Gloucester, provided a new building in 1488, but in 1550 the books were destroyed or carried away during Edward VI's reformation of the university. Sir Thomas Bodley restored the library in 1598 and in 1602 it opened with some 2,000 volumes of which several score were geographical in nature. In 1971 the library contained 820,000 printed maps, 1,000 manuscript maps, and 7,000 atlases. Important collections include the Gough Topographic collections of several thousand volumes, maps, plans, and views devoted to British local topography.

France

The most comprehensive map collection in France is housed in the Bibliothèque Nationale's Département des cartes et plans. Its history begins with Napoleon, who showed great interest in founding a map collection during a visit to the library in 1808 and contributed 50,000 francs for this purpose. In 1832 Martignac established the Depot de Geographie. Jomard was made director but had a difficult time developing the division according to his plans. After his retirement in 1862 the division was given to the Department des Imprimes. Since 1875 the collection has grown rapidly. In 1930 it contained 220,000 maps and plans and 20,000 books. Today the collections include over 800,000 maps and 39,000 volumes with annual accessions of 10,000 maps and over 540 volumes. Many valuable collections have been acquired, among which are the 8,000 maps, classified about 1750, of M. de Gaignières and M. de Lacroix.

The collection of 10,000 maps begun by the geographer d'Anville in the eighteenth century, purchased by the king in 1780 and formerly housed in the Ministry of Foreign Affairs, was transferred to the Bibliothèque Nationale in 1924. Maps from the Archives of the Service Hydrographique de la Marine, some 15,000 pre-1801 published and manuscript maps and charts, were acquired by the department in 1947.

The largest documented collection in France, according to the statistical sources used for this article, is that of the Ecole Nationale des Sciences Geographiques in Saint Mandé. It includes 36,000 volumes, 950,000 maps, and 2,100,000 aerial photographs. These holdings also make it the largest map and aerial photograph collection in Europe and one of the ten largest in the world.

Other collections of importance are in the Institut Geographique National, the largest map collection in France, the Institut de Géographie of the Université de Paris, the aforementioned Service Hydrographique de la Marine, the Direction du Génie, and the Société de geographie de Paris.

Netherlands

The golden age of Dutch cartography occurred during the period 1630 to 1730, and it was during this time that the great private and public collections were founded. C. Koeman documented the history of map and atlas collection in the Netherlands in 1961, and notes that three outstanding bibliographer/historians of cartography have had a lasting effect on Dutch collections and cartobibliography in general. Frederik Muller, F. C. Wieder, and J. T. Bodel Nijenhuis were the personification of the history of Dutch map collections during the last hundred years.

There are several important map and atlas collections in the Netherlands but none of any great size. The Universiteitsbibliotheek van Amsterdam, because of its location, came to be one of the most important cartographic collection centers. Some 35,000 maps, of which 20,000 are of historic importance, were recorded in 1961. Since 1880 the collections of the Koninklijk Nederlands Aardrijkskundig Genootschap, which presently include 13,000 volumes, 600 current periodicals, and 30,000 maps and charts, have been housed in the Amsterdam university library. The first printed catalog of the K.N.A.G. map collection appeared in 1887. A full-time curator of maps was first appointed in 1962.

The Rijksuniversiteits, Universiteitsbibliotheek, Utrecht, also houses important collections. The Moll collection of maps and atlases acquired in 1838 and the Ackersdijk collection donated in 1863 are the two most important collections in the Utrecht library. The Geografisch Instituut of the Rijksuniversiteit founded in 1808 includes over 3,000 important maps and atlases in its collections. Of special interest are the wall maps of Covens and Mortier, the great terrestrial globe by Blaeu, and the Lulofs collection of works on ancient geography.

German Democratic Republic

The map collection of the former Preussische Staatsbibliothek is divided between the Deutsche Staatsbibliothek (Marburg) and the Deutsche Staatsbibliothek (East Berlin). The map collection of the Preussische Staatsbibliothek goes back to the time of the Great Kurfürst, but its orderly development does not begin until the second half of the nineteenth century. The collection grew slowly and was added to at infrequent intervals. General v. Scharnhorst's collection was purchased in 1856. At the present time the Berlin collection has holdings of 328,000 maps and 10,000 atlases representing some 500 years of cartographic production. It is interesting to note that in 1931 the Preussische Staatsbibliothek contained 400,000 individual sheet maps and 200,000 duplicates. Fortunately damage during World War II was negligible. Once the collections are again brought together, they will be much more useful for cartographic research.

The Deutsche Bücherei (German Library) in Leipzig has for many years had a significant map and atlas collection. It was founded in 1912, and the collecting of materials has been restricted to works published in Germany after 1913. In

1931 there were over 25,000 maps in the collection. By January 1968 the collections had grown to over 70,000 maps and 1,900 atlases. An important publisher's collection is that of the Geographische-Kartographische Anstalt, VEB Hermann Haack, in Gotha. The core of this collection was brought together by Adolph Stieler as source material for the preparation of his *Hand Atlas*, first published in 1817. August Petermann added greatly to the collections from 1855 to the latter part of the nineteenth century. In 1931 there were about 200,000 maps in the library. Some 184,000 maps, 2,300 atlases, and over 70,000 books are now recorded in the Haack collection.

Other important collections are those of the Sachsische Landesbibliothek in Dresden, which has a collection of 53,000 maps and atlases. Although it was founded in the sixteenth century, little growth was experienced until 1718 when the Kunsthammer collection was received. After 1800 the collection grew rapidly, and now contains significant holdings of seventeenth and eighteenth century series maps.

Federal Republic of Germany

The Bayerische Staatsbibliothek in Munich is one of the most important in the two Germanies. With the library of John Jacob Fugger, acquired in 1571, came some 40 maps. Seventy more maps, probably from the collection of the Nurnberger Hartmann Schedel, acquired by the Fuggers in 1552, were presented to the library in 1586. Philip Apian's cartographic works were supported by the library and in 1576 he made his famous globes for the library collections. By 1915 there were 60,000 maps, in 1931 at least 80,000, and at the present an estimated 500,000 maps are included in the collections of the library. The Universität zu Göttingen map collection goes back to the beginning of the university and at present comprises approximately 50,000 maps. There are many sixteenth and seventeenth century works, and English and American materials are especially well represented.

The Gesellschaft für Erdkunde zu Berlin, the first German geographical society, founded in 1828, now numbers 24,000 books and 20,000 maps in its collections.

The map collection of the Institut für Landeskunde in the Bundesforschungsanstalt für Landeskunde und Raumordnung, in Bonn-Bad Godesberg, has increased from 212,500 maps in 1953 to approximately 300,000 at the end of 1970. Some 1,300 atlases are also included in this sizable collection. The institute, in addition to its planning activities, is also a prolific publisher of monographs, serials, and bibliographic aids in the fields of geography and cartography.

Other European Collections

Philippe Van der Maelen founded the Musée Geographique, Brussels, Belgium, in 1821. A catalog of the collection published in 1842 lists 1,600 maps and general atlases and 23,000 map sheets published by several different European and North

and South American countries. The Bibliothèque Royale acquired his collection in 1880. At that time there were 100,000 items of which 40,000 were maps. In 1971 some 100,000 maps were reported.

The university libraries of Scandinavia have, in many cases, quite significant collections of maps and atlases. The Geografisk Institut in Oslo has almost 40,000 maps. The Kungliga Biblioteket, Stockholm, map and print department was established in 1916. The map collections of the Uppsala University Library and the Kongelige Bibliothek in Copenhagen were both established in 1908. These collections, however, had their origins before the middle of the seventeenth century and are rich in historical geographic and cartographic materials.

The maps in the collections of the Österreichische Nationalbibliothek in Vienna have been important items since they were first acquired during the seventeenth century. Until 1891 the maps were in four different places with, beginning in 1853, a catalog begun only for the printed maps. A separately organized map collection was established in 1905. The collections include the famous Peutinger Tafel acquired by Prince Eugene. In 1931 there were 112,000 maps reported. By 1971 more than 180,000 maps were included in addition to 167,000 geographical and topographical prints and photographs and 113 globes.

The smaller central European countries have collections of moderate size. The Bibliothèque Nationale Suisse in Berne includes 20,000 maps in its general collections. The Bibliothèque Publique et Universitaire de Genéve, founded in 1561, contains 1,200,000 volumes and 23,000 maps. The largest recorded collection is that of the Zentralbibliothek in Zurich with 1,600,000 volumes and 110,000 maps. The Kiril i Metodi Narodna Biblioteka in Sofia contains over 1 million volumes and 68,000 maps, prints, and portraits. Polish libraries have for several centuries been repositories of outstanding map collections. The newly established Institute of Geography in Warsaw, founded in 1952, houses 67,000 volumes, 1,600 atlases, and 65,000 maps in its collections. The Geographical Institute of Warsaw University, another newer collection, includes 49,000 books and periodicals, 1,000 atlases, 53,000 maps, and 20,000 photographic film slides. The university library of Krakow and the Jagellonian library also contain important collections.

LATIN AMERICAN COLLECTIONS

One of the oldest geographical societies in the world, the Sociedad Mexicana de Geografia y Estadistica, founded in 1833, contains 95,000 volumes in its library. The Pan American Institute of Geography and History, also located in Mexico City, is composed of member nations of the Organization of American States. Its library houses 55,000 books and some 25,000 volumes and issues of periodicals. Other Latin American collections are the Bibliotheca Nacional do Rio de Janeiro with 1,000,000 volumes and 250,000 engravings, maps, and photographs; the Biblioteca Nacional in Lima with a half million volumes and over 11,000 maps; and the Instituto Geográfico Militar in Buenos Aires, established in 1879, with 45,000 volumes and 80,00 maps and plans. An example of a lesser governmental

library collection is the Mapoteca do Ministério das Relacões Exteriores in Rio de Janeiro which includes 33,424 maps and atlases, and 12,094 photographs.

AFRICAN AND AUSTRALASIAN COLLECTIONS

There are few recorded map and atlas collections on the African continent, and of those the government and university libraries of South Africa are most important. Other African collections of some importance are the institutional, archival, and university collections of the emerging nations. A survey of African geography and map collections is sorely needed.

Although there are several excellent map collections in Australasia, they are, for the most part, quite small. The exception is the National Library of Australia in Canberra which has among its large holdings of over 1 million volumes at least 170,000 maps. The Alexander Turnbull Library in Wellington, New Zealand contains important historical materials among which are 10,700 maps. The New Zealand General Assembly Library has 22,000 maps in addition to its other substantial collections. A survey of Australasian map collections would be of great value.

NORTH AMERICAN COLLECTIONS

The history of the establishment and growth of geographical libraries and map collections, with particular emphasis on those of the United States and Canada, has been discussed elsewhere in this essay. General growth is depicted in Figure 1 and more specifically in Table 2. The great emphasis which has been placed on geography on the continent is reflected in the large number of map collections in existence today.

Canada

There are 87 map collections listed in a survey taken in 1968. Of these, the most important in terms of absolute numbers and general historical importance is the National Map Collection of Canada, a division of the Public Archives of Canada. At present the collection holds approximately a half million maps, dating from as early as the twelfth century. No special attention was paid to maps in the archives collections until 1907 when the first map curator was appointed. In 1912 the first and only catalog was published. The growth of the collection was slow with some 274 maps accessioned in 1919. In 1970, however, 52,000 maps were accessioned. This enormous number included many foreign topographical map series as well as domestic maps of all types. The objectives of the collection are to acquire and maintain the complete cartographical collection of Canada and a comprehensive but selective collection of foreign maps. The National Union Catalogue of Maps, a joint project of the National Map Collection and the Association of Canadian Map Libraries, was initated in 1967.

United States

The preeminent collection of maps and atlases in the world is in the Geography and Map Division of the Library of Congress. Although maps and atlases were listed in the first Library of Congress catalog of 1802, they were destroyed when the Capitol was burned in 1814. Another fire in 1851 destroyed much of the geographical material acquired by the 1815 purchase of Thomas Jefferson's collection and other important individual items and collections.

None of these geographical materials, however, was treated as a separate entity until the establishment of the Hall of Maps and Charts under Philip Lee Phillips in 1897. As early as 1853 Lt. Edward B. Hunt of the U.S. Army Corps of Topographical Engineers was calling for the establishment of a Geographical Department in the Library of Congress. His plea to an annual meeting of the American Association for the Advancement of Science was followed, in 1856, by a similar proposal by Johan Georg Kohl. In a lecture at the Smithsonian Institution, Kohl proposed that a Cartographical Depot be established. In 1871 Daniel Coit Gillman, a Yale geographer, in a speech before a meeting of the American Geographical Society in New York suggested that it was time to seriously consider a central government map repository. Interest became reality in 1897 when the more than 40,000 maps in the library's collection were brought together. By 1902 the presently named Geography and Map Division had, by actual count, 62,388 maps and 2,533 atlases. Thousands of important atlases and maps have been added to the division's collections over the years since its foundation. At the end of the first 75 years of separate existence, there were almost 3½ million maps and over 36,000 atlases in the collections. In addition, several thousand reference works, serials, and gazetteers, and hundreds of relief models and globes were also a part of the collections. Annual accessions exceed 140,000 items with 70,000–75,000 maps and atlases being added to the collections each year. Much of this material is transferred from other federal agencies, although a strong current acquisitions program is also maintained.

Several important cartobibliographies have been published in the past. Although space does not allow their listing, as in most libraries of this type a current publications list is available upon request. A major publication, *The Bibliography of Cartography*, which includes over 35,000 references to works on maps and map making, will be available sometime in 1973.

The Cartographic Archives Division of the National Archives and Records Service contains the most important federal cartographic records collection. Established in 1937, the collections at present comprise over 1,600,000 maps and 2,500,000 aerial photographs. All map-producing agencies of the federal government are required to deposit record copies in the division, and at present 134 individual record groups are maintained.

Several other Washington, D.C. collections deserve mention. The U.S. Geological Survey Library map collection is, although small, particularly strong in thematic (geological, soils, etc.) maps. The library itself houses a fine book and serial

collection. The libraries of the Smithsonian Institution, Department of Interior and other cabinet level libraries and, of course, the great military libraries, in particular the Army Topographic Command, Oceanographic Office library, and in St. Louis, Missouri the Aerospace Center Library, are all worthy of mention. Some idea of their scope and importance for research can be gained from a perusal of the surveys, descriptions, and annual reports of these libraries, except, of course, for those of military significance.

The American Geographical Society, since its foundation in 1852, has had a library and map collection of significance. As early as 1870 it was noted that the library contained the largest and most valuable collection in the country. Today, with 173,000 volumes, over 328,000 maps, 5,000 or more atlases, and several thousand photographs and pamphlets, augmented annually by the addition of 10,000 items, it remains of great importance for geographical research. Other important collections in New York City are housed in the Map Divisions of the New York Public Library and the United Nations Library. The New York Public Library contains a very large number of valuable items, both in the map and atlas collections and in the book collections. Over 300,000 maps are in the collections with several thousand added annually. The United Nations Dag Hammarskjold Library map collection, although containing less than 100,000 items, is important for its world coverage, particularly in thematic maps and atlases.

The Harvard University Winsor Memorial Map Room, as it is presently designated, has one of the most valuable map and atlas collections in the United States. In 1818 Col. Israel Thorndike purchased the Ebeling collection of 10,000 maps and charts and 3,200 books on America for the university, thus forming the nucleus of what was to be one of the most important geographical collections of the nineteenth century. Not much was done with it, however, until Justin Winsor became librarian of the university. He acquired the Kohl collection of hand-drawn facsimiles of early American maps from the War Department (the collection is now in the Geography and Map Division of the Library of Congress). Due to his aggressive acquisition policies, by the turn of the century there were some 20,000 loose sheet maps and 900 bound volumes of maps and atlases in the collections. Expansion continues to take place and cataloging of the map and atlas holdings has been underway for some time. It has been estimated that there are upwards of 150,000 items in the collections with several thousand of these being of some historical significance.

Other collections of importance are listed in Table 2, but it should be noted that there are several score collections which, although not large, are most valuable for research in many fields. The Newberry Library in Chicago, the Bancroft Library of the University of California, Yale, Princeton, and Columbia University libraries, and the James Ford Bell Library of the University of Minnesota, to mention but a few, have immensely important research materials. Catalogs exist or are in preparation for many of these collections. Recent publications in many different fields carry in their prefaces and notes mention of the great value of these

and other geographical libraries and map collections. Although size is not a determining factor where historically oriented research is concerned, it is when research dealing with current problems of a country-wide or worldwide scope is being contemplated. The great American libraries, Library of Congress, and National Archives are still the most valuable for these purposes.

Conclusion

Geographical libraries and map collections have, as has been seen, a long and varied history. Growth has been significant in all but a few collections and the current information explosion promises continuance of this modern phenomenon.

No attempt has been made in this article to outline the processing problems which beset map collections nor any of the attempts which have recently been made to solve them. The MARC Map machine-readable map cataloging project of the Geography and Map Division of the Library of Congress is one of the most viable solutions to the problem of map cataloging in existence today. With over 17,000 individual cataloged entries in the data store and between 5,000 and 6,000 additional entries made annually, it would seem to be the most comprehensive system in use today. With the proposed release of magnetic tapes containing MARC Map entries sometime in the near future, and the possibility of printed retrospective catalogs being made available, it would seem that some of the technical problems have been moved closer to solution, at least for the Library of Congress. Further research and experimentation, however, will be needed to produce answers to some of the remaining current and pressing map and atlas cataloging and classification problems.

With the advent in the last few decades of entirely new systems of recording, synoptically, landscape changes throughout the world (e.g., remote sensing by aerial photography, thermal and radar imagery, satellite photography), a new and certainly different look at processing controls must be taken. The rapid growth in computer mapping techniques may very well require the establishment of computer data stores in map libraries, with many different programs of access to this information. Indeed, a redefinition of geographical information, in light of the fast-changing concepts in the field, is already needed. The difference between archival and current collections of maps and atlases (or map and atlas-type information in digital data form) should be the subject of research and experimentation. Future geographical libraries and map collections will be quite different than those in existence today. It is incumbent upon the great libraries of the world to lead the way in solving the problems of the treatment and provision of these most important reference materials.

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GEOGRAPHICAL LITERATURE

Geography is, by definition, the science that describes the surface of the earth: the land, the sea, the air, the distribution of animals and plants, man and his works, and the relationships of all of these elements. The word "geography" itself is derived from Greek words meaning "earth description."

Like other academic disciplines, geography has its own body of literature and its own peculiar ways of looking at the problems under investigation. As a science, geography dates back to antiquity, in fact, it is perhaps the oldest science of all. But scientific geography as we know it today dates back only to the end of the eighteenth century, when Kant, Humboldt, Peschel, Ratzel, and others defined the scope and content of geography, and dictated the methods of collecting, organizing, and presenting the material.

Primitive man has always been a keen observer of his own country and any he traveled through (even today Eskimos can give an extremely detailed description of an area which to the untrained and unfamiliar eye might otherwise be called featureless).

Geography was held in great esteem by the ancient Greeks, who traveled and accumulated facts, charted and mapped their world, and speculated about the knowledge they had gathered. The information they collected was of prime importance to their merchants, administrators, statesmen, and military.

Thales of Miletus (624–546 B.C.), thought to be one of the most talented men of all time, was one of the earliest geographers. In fact he founded Greek mathematics, astronomy, and physics, as well as geography. Thales realized that the surface of the earth was curved because of the different slant of the sun as one traveled north. He also noted that the slant of the sun's rays changed with the seasons, and he in-

vented the equator and the plane of the ecliptic. He also suggested that the earth could be divided by circles parallel to the equator and lines perpendicular to it, now known as lines of latitude and longitude.

Hecataeus (fl. 500 B.C.), sometimes called the father of geography, wrote about his travels to Egypt, Persia, Libya, Spain, and Italy; unfortunately only fragments of his narrative are extant. He considered the earth a flat disk surrounded by a river of ocean. His works were the first regional geography. His map was an extension of one made by Anaxemander who, along with Thales, Aristotle, and Eratosthenes, developed mathematical geography. They proved the earth to be a sphere; computed its size fairly accurately; established the latitude and longitude of many places; and began the practice of plotting maps on grids.

Homer, too, is sometimes referred to as the father of geography, as much of his poetry dealt with the geographical lore of the day, gleaned from the tales of ancient travelers.

A third claimant to this same title was Herodotus (ca. 485–428 B.C.), who was the first to designate Europe, Asia, and Africa as three distinct continents. Herodotus had traveled widely throughout the Near and Middle East, seeking out and questioning the intellectuals in each locality. He did not ascribe to the theory of a disk-shaped earth rimmed by a river of ocean. Instead he gave a detailed description of the world as he knew it as far east as India, west to the Pillars of Hercules, north to the forest boundary of the steppes, and south to the present Sudan. His work is distinguished by the excellent descriptions of town sites.

Theophrastes (ca. 370 B.C.) was the first to note the relationship between plants and climate, and so began the study of plant geography.

Eratosthenes (ca. 276–194 B.C.) was the curator of Ptolemy II's library in Alexandria, which contained some 40,000 books. He was reputed to be the most learned man of antiquity. His *Geographica* described the world as he knew it, summarizing the history and concepts of geography. He is credited with naming the subject, though he certainly did not invent it. Eratosthenes also calculated the circumference of the earth at 250,000 stadia (approximately 25,000 miles), coming very close to the actual figure.

Pomponius Mela (ca. A.D. 50) employed the concept of a world symmetrically divided into four by two narrow strips of ocean, despite the fact that realistic geographies had been written based on explorers' and travelers' reports. In his textbook, written in Latin (which made it influential in medieval times), he maintained that the unknown parts of the continents were not necessarily inhabited by people, and that those who lived at the "bottom" of the world were foot to foot with those at the "top," and so he called the former Antipodes (a term no longer used for a people, but rather for a place).

The Romans were not scientifically minded and so added little to geographic thought. Rather, they were concerned with more practical things such as the problems of commerce, administration, and military conquest. They did, however, contribute the *itinerarii* which were descriptions of their road systems—a kind of

map, without scale or projection. They were designed only as a convenience to travelers.

Strabo (63 B.C.–A.D. 36) was a Greek regional geographer living in Rome. He summarized (in 17 volumes) the geographical knowledge of his time in his *Geographica,* which has survived (*1*). Strabo relied heavily on other Greek authorities, but maintained that it was the geographer's task to describe the known world, to write about the different countries, and to discuss the differences between them. He used the reports of travelers and merchants, seamen's handbooks, and histories of Alexander's conquests as well as material relative to the Roman empire and its trade routes. Strabo's treatment of regional geography at the turn of the millenium is the most elaborate to survive. Since it was written in Greek and was not translated until a long time after, it did not have the influence that it deserved.

Ptolemy (Claudius Ptolemius) taught and studied in Alexandria from A.D. 127–151. His great general work *Geographike Syntaxis* dealt with map projections, included tables for latitude and longitude, and gave calculations for the length of day and night for various places depending on their distance from the equator. This work was far beyond the standard of its predecessors. It was translated into Arabic in A.D. 815 and much later (A.D. 1475) into Latin, thus becoming both a Christian and a Moslem authority.

Ptolemy considered *geography* as the description on mathematical principles of the whole world, *chorography* as a detailed account of a region, and *topography* as a minute account of a smaller area. The world, according to Ptolemy, stretched from Spain to China, and from Thule to south of the equator.

During the Middle Ages geography as a science almost disappeared. It was forbidden by the Christian Church as a pagan science; the theory of the spherical shape of the earth was denounced and the accepted concept was that of a flat disk with Jerusalem at the center. However, at this time geography was being encouraged by the Arabs. Their empire extended at its height over most of Europe, Asia, and Africa. In the eastern Mediterranean they came into contact with Greek learning and libraries. Because of Ptolemy's work, descriptive geography flourished. The continued existence of the Roman roads and the compulsory pilgrimages to Mecca encouraged people to travel throughout the empire, and so trade arose as a natural result; all of which had influence on geography. The Arabs made accurate calculations of latitude and longitude and the size of the earth, but they made no improvement in the science of cartography. Arab maps were often distorted because of their love of flourish and ornamentation. However, their sea charts based on a cylindrical projection were highly thought of by the explorer Vasco da Gama. Regional geographical handbooks were written for travelers, merchants, and administrators by ibn Haukal, Masudi, and Idrisi. These were not translated and so had no influence in the West.

Because of the relatively easy travel throughout the Arab empire, it was possible for Marco Polo (1254–1324) to travel overland to China. His account of his journey, and his return by sea has been a widely read story since it was first published. *The Book of Marco Polo* (1296–1299) is an attempt at systematic geography. He

was not writing from his own observation in every chapter, but assembled the best information that was available to him. This is particularly true of his chapter on the Indian Ocean. His adventures stimulated exploration in the Christian world, and though written in the thirteenth century it supplied Columbus at the end of the next century with considerable support to his theories.

About 1357 the spurious *Travels* of Sir John Mandeville (ca. 1300–1372) were published and, thought to be authentic, they were very popular. The book was based on real travelers' tales and tall stories, as well as on Pliny and Solinus. The author also noted the spherical shape of the earth.

Modern geography began when man became aware of the fact that there were lands still to be discovered. Numerous people went exploring—found new worlds, circumnavigated the earth, and returned home with detailed observations and maps of what they had seen. They were exercising a modern geographer's technique—that of gathering data in the field. Their notes were used by contemporary writers of books and compilers of atlases.

About 1418 Henry the Navigator (1394–1460) established a school of geographers. Though he did not travel himself, Henry sent out many exploring expeditions, notably Vasco da Gama's in 1498 which opened the way to the Indies via the Cape of Good Hope. About the same time Columbus discovered America, and so did Cabot. Vespucci discovered South America and in 1520–1521 Magellan sailed completely around the world, proving for once and for all the sphericity of the earth and the continuity of the oceans. The narratives of these great explorations took an important place in the literature of geography during the great age of discovery.

Editions of Ptolemy's works continued to appear, enlarged with new tables. Sebastian Münster's (1489–1552) *Cosmographia universalis* (2), a political and regional work based on Strabo, was the most complete attempt to rewrite the classics, and was most popular.

In 1570 Abraham Ortelius (1527–1598) published his *Theatrum Orbis Terrarum* (3) of regional and world maps. This was the first modern atlas. A few years before (1598) his friend Gerhard Kremer, better known as Mercator (1512–1594), had published his famous map projection for use in navigation, since known by his name.

Philipp Clüver (1580–1622), a German, published an *Introduction to Universal Geography* (4). This was a brief account of mathematical geography, with regional descriptions of the world. It was an excellent work, and set a standard for regional geography that was long unsurpassed.

By 1642, when the Dutch mariner Abel Tasman (1602 or 1603–1659) completed the delineation of Australia, the land masses of the world, except for the Antarctic, were fairly well known. The next 150 years saw further exploration.

Another Dutchman, Varenius (Bernhard Varen, 1622–ca. 1650) published in 1650 the most notable geographical textbook of the time: *Geographia Generalis* (5). This was the first book to include the new theory of the universe as set forth by Copernicus, Kepler, and Galileo. Varenius defined geography as a branch of mathematics, not wanting to limit it merely to the regional descriptions of countries. He included human geography only as a concession to custom. In 1672 his book was

reprinted in London at the insistence of Sir Isaac Newton who wished to have it as a text for his students at Cambridge. It was translated into English in 1732, but Varenius was considered a very difficult writer, and though his book, unfinished because of his early demise, was not expected to be read outside the universities, it was for centuries considered a standard text.

The English geographer Nathaniel Carpenter (fl. early seventeenth century) had some years before delineated geography in two books (*6*). His methods and sources were similar to Varenius's, and he came to the same conclusions. Many of Carpenter's themes were drawn from the French political theorist Jean Boden—especially in dividing the world into three climatic zones: torrid, temperate, and frigid; and attributing to the inhabitants of each region certain general characteristics. Carpenter was dogmatic on this aspect—men in colder climates were strong, tall and active; those of the warmer regions were languid; also people living in mountains or highlands were superior to those of the plains. He deemed Europe the most favored region in the world.

For a century after Varenius there was little geographical research; most interest was in the natural sciences. However, the unprecedented expansion of knowledge in these fields made it possible to give a more scientific description of the earth. By the early eighteenth century geography was taking its place as an independent science.

Though Jean Jacques Rousseau (1712–1779) was not a geographer, he made many interesting geographical observations. He noted that environment exercised influence on primitive man; the varieties of soils, climates and the seasons introduced differences in their manner of living. He accepted these differences between northerners and southerners without going into the matter to any degree. He was apt to select unique instances to support his geographical arguments. He realized that the relationship between geography and history was not as simple as generally supposed.

Anton Friedrich Büsching (1724-1793) in his *Neue Erdbeschreibung* (*7*) described the surface of the earth, being as accurate as possible, without trying to explain facts or relationships. A regional description was made by political units, and he insisted on a very high standard of accuracy and on the critical handling of his sources. Büsching opened a new era in the science of geography—for the next 150 years, up until the beginning of the twentieth century, geography became almost solely a German science, and the significant developments were made by German scholars.

Next came Johann Rheinhold Forster (1729–1798), and his son, Johann Georg. The elder Forster had a keen scientific mind and great powers of observation. He collected facts, classified them and compared them, made generalizations, and sought explanations. His works were noted also for their contribution to human geography. He was one of the first to try to explain the relationship between man and his environment.

Johann Georg Forster (1754–1779) was not as gifted as his father but, as is often the case, he was more honored in his lifetime. He translated his father's famous *Observations* (1778) (*8*); he was a friend of Humboldt, who had been stimulated by his *Voyage around the world* (1777) (*9*) (based on the elder Forster's travels), and by whom he was often quoted.

The philosopher Emmanuel Kant (1729–1804) stressed physical geography in

his lectures and writings, and he recognized its position in relation to the other natural sciences.

The nineteenth century saw the exploration of the interiors of the continents. The journals and diaries subsequently published by the explorers were an important contribution to regional geography, and later to historical geography. They described the country as they saw it, and in most cases, as it is no longer. In Canada there was Samuel Hearne, Sir Alexander Mackenzie, David Thompson, and Sir John Franklin; and later Sir John M'Clure, Sir Edward Parry, and others opened up the Canadian Arctic searching for Franklin's lost expedition. In the United States there were explorers such as Merriweather Lewis and William Clark, Zebulon Pike, Stephen Harriman Long, Benjamin Bonneville, and John C. Fremont.

In Africa there were such men as Mungo Park, David Livingstone, Stanley, Sir Richard Francis Burton, and John Hanning. In India Sir Francis Younghusband, Evariste Régis Huc, and Nikolai Przhevalsky. Sven Hedig and Sir Aurel Stein visited the interior of the Asian continent, and Ferdinand Baron von Richthoften made seven journeys into China. In Australia there was Captain Charles Stunt, Thomas Mitchell, Dr. Ludevig Leichhardt, Robert O'Hara Burke, and William John Wills.

The Antarctic continent did not come in for intensive exploration until the twentieth century when Robert Falcon Scott and Sir Douglas Mawson and others made their mark. At the beginning of the present century the Arctic also contributed some famous explorers: Robert E. Peary, Frederick Cook, Knud Rasmussen, Roald Amundsen, Fridtjof Nansen, Vilhjalmur Stefansson, and Otto Nordenskiöld.

It is generally agreed that modern geography was founded by two German masters of the subject: Alexander von Humboldt (1769–1859) and Karl Ritter (1779–1859). Humboldt was a great scientist and traveler. He traveled extensively throughout Latin America and Asia gathering data, mapping and sketching in the field, and returned home to write up his results. Ritter, on the other hand, was a historian who carefully considered and cataloged other researchers' data. Though these two scholars approached geography from different backgrounds, they both made such a significant contribution to the subject that the course they charted for the science of geography is still largely followed today.

Humboldt made his first foreign tour with J. R. Forster, whose methods of careful observation and treatment of facts, as well as his scientific description of landscapes, greatly impressed him. Humboldt spent 5 years in Latin America and the next 20 writing up his notes. His *Ansichten der Natur* (*10*), written when he returned from Mexico in 1808, gave a suggestion of a pattern of regularity on the earth's surface and received widespread attention. In 1829 he went to the Urals to study the ore-bearing regions, and eventually ended his career as chamberlain to the king of Germany.

Humboldt's *Kosmos* (11), published in five volumes, was a comprehensive survey of the universe. His was an empirical approach to research. He combined geography and astronomy in a classical fashion, but kept to the principle of the unity of nature.

Karl Ritter spent 20 years as tutor in a rich family and the rest of his life teaching

(he was professor of geography at the University of Berlin), writing, and directing the Gesellschaft für Erdekunde. His great work was his *Die Erdkunde, im Vertältnis zur Natur und zur Geschichte des Menschen, oder Allgemeine, Vergleichende Geographie* (*12*), a comparative regional geography of the world. It was never finished though twenty-one volumes were published on Asia and Africa. Ritter's approach, like Humboldt's, was empirical. He stressed comparison of phenomena in various regions rather than drawing conclusions from only one. His rule was to proceed from observation to observation and not from hypothesis or opinion to observation. Ritter's literary style was very difficult, often lacking clarity or precision of expression, and so he is frequently misunderstood. Though his books are considered today to be unreadable, his position as a father of geography has been established on the basis of the whole of his writings, and not on any one particular work.

The writings of the two great men were complementary. Humboldt gave method and form to systematic geography; Ritter founded regional geography. Unfortunately, they left no followers. Humboldt never taught, and Ritter's vacated chair was never filled. In their wake there was confusion and shifting points of view. Physical geography was stressed; there was a desire that it be considered a natural science. Human geography, thought to be unscientific, was treated only when necessary to the description of various regions.

One of the most notable geographical works of the nineteenth century was the *Physical geography* (1848) (*13*) by Mary Somerville (1780–1872). This book showed an interest in historical geography and a concern for its basic physical foundations, thus anticipating two popular trends of the twentieth century.

Arnold Henry Guyot (1807–1884), a Swiss and a follower of Ritter's, wrote *The Earth and Man* (*14*), which was translated into English in 1849. This book helped introduce German ideas to English-speaking geographers. Guyot set forth some of geography's significant problems and so helped define the limits of the new science. As professor of geography at Princeton he contributed to the advance of physical geography, stressing the study of structure, surface formations, and erosional processes.

Ritter's most successful pupil was Jean Jacques Elisée Reclus (1830–1905) whose *La Terre* (1867–1868) (*15*) was a systematic study in physical geography. His nineteen volume *Nouvelle géographie universelle* (1875–1894) (*16*) was another complete regional geography of the world. This work shows a wide knowledge and understanding of contemporary advances in the natural sciences, and it also demonstrates a deep appreciation of natural beauty.

Pièrre Guillaume Frédéric LePlay (1806–1822) studied environmental influences on man in urban and rural areas, and so laid the foundations for regional surveys such as town and country planning. His *Ouvriers européans* (1855) (*17*) in six volumes was based on carefully collected data, such as family budgets, a method which has since been used in many economic surveys.

Oscar Peschel (1826–1875) revolutionized morphological research. His work, systematic and empirical, tended to produce geomorphologists and climatologists

first, and geographers second [*Neue Probleme der Vergleichende Erdkunde als Versuch einer Morphologie der Erdoberflache* (1870) (*18*)].

Friedrich Ratzel (1844–1904) developed systematic and scientific human geography, though he also made contributions to physical geography, geology, zoology, and ethnology. His *Anthropogeographie* (1882) (*19*), a word he coined, attempted to show in the first volume that man's distribution on earth was more or less controlled by nature. In the second volume he described man's existing distribution, going over Ritter's ground and developing his ideas. However, Ratzel's work differed from Ritter's in that he treated human geography regionally rather than systematically. His *Politische Geographie* (1897) (*20*), another term he coined, reshaped an old subject. Ritter's last great work *Die Erde und das Leben* (1901–1902) (*21*) sought to discuss the earth as an integral whole.

Baron Ferdinand von Richthofen (1833–1905) taught geography at Leipzig where he stressed a unified geography based on the concepts of Humboldt and Ritter. Trained as a geologist, he developed scientific morphology in his studies of the loess regions of China. His *China. Ergebnisse eigener Reisen und darauf gegründeter Studien* (*22*) appeared in five volumes, partly posthumously, from 1877–1912, and set the seal on his reputation. A master of observation in the field, his first two volumes were immediately recognized as a great scientific work, and for them he received The Royal Geographical Society's Founders Medal. For many years von Richthofen was president of the Berlin Geographical Society and he founded the Oceanographical Institute of Berlin. He is still regarded as a dominant influence in modern German geography.

Paul Vidal de la Blache (1854–1922) was a distinguished scholar and the master of French geographers. Acknowledging his debt to Ritter who had strongly influenced him, he refashioned geography by his teaching and writing. Trained in history, geography, and the classics, and widely traveled, Vidal de la Blache united the study of sociology with geography, infusing the French school with a humane spirit which it has since retained. In 1902 he prepared for Lavisses' *Histoire de la France* a masterly paper, *Tableau Geographique* (*23*), which has become a classic in geographical literature and played a major role in developing the concept of regions. In it he analyzed and interpreted the "geographical personality" of France. Vidal de la Blache never completed a systematic work on human geography, but he expressed his views in many articles published in *Annales de Géographie*, which he founded. In his work he stressed three topics—physical geography, biogeography, and human geography. These were welded together to make up the territorial units within which flourished a distinctive way of life. He also believed that in seeking to understand a human region, history cannot be neglected; and so history and geography were joined together on a sounder basis than they were in the days of Carl Ritter. His most original and important work was *France de l'Est* (1917) (*24*), devoted to the study of the foundation of landscapes and rural societies in Alsace and Lorraine.

Jean Brunhes (1869–1930) was a pupil of Vidal de la Blache. His *La Géographie Humaine* (1910) (*25*) limited human geography to human phenomena which modify nature, and at the same time are modified or controlled by it, e.g., unproduc-

tive occupation (houses, settlements, roads); cultivation and stock raising; and destructive economy (mineral exploration, deforestation).

Another pupil, Albert Demangeon (1872–1940), studied the use of archives in establishing the past human geography of a region (*26*). His study of Picardy is a model of regional geography.

Alfred Hettner (1859–1941) contributed to the methodology of geography (*27*). To him geography was the study of the different characteristics of various regions, resulting from their soil types, plant cover, and the results of man's activity. Studying such phenomena on a worldwide scale enabled the geographer to establish a general comparative geography. In 1895 he founded the *Geographische Zeitschrift* as a forum for the general problems of geography.

Before Halford John Mackinder (1861–1947), British geography was largely centered on exploration. Geography did not become a "proper" subject until 1887 when Mackinder, at the age of 26, was appointed to Oxford University, half his salary being paid by the Royal Geographical Society. His great energy, and his gift for stimulating and brilliant generalizations were indelibly impressed on British geography.

In that same year he lectured to the Royal Geographical Society on the scope and methods of geography, defining it as "the science whose main function is to trace the interaction of man in society and as much of his environment as varies locally," and "the science of distribution, the science, that is, which traces the arrangement of things in general on the earth's surface." Mackinder's lectures, particularly those in historical geography, always drew large audiences (*28*). In 1902 he published *Britain and the British Seas* (*29*) which is now considered as a classic of British geography; it summarizes the fundamental concepts based on his wide reading and thought, followed by a summary of British history in relation to this background.

His paper "The Geographical Pivot of History" brought him unexpected fame. In this he stated that the maritime age had passed and that land powers would be decisive; that the greatest land area was in the Old World, the heart of which lies within continental or arctic drainage; ringing this "heartland" is an inner crescent of marginal states, with an outer crescent of overseas powers (Great Britain, the United States of America, and Japan). If the balance of power should favor the pivot state, it would then expand over the marginal lands of Eurasia, permitting the vast continental resources to be used for building fleets of ships, thus permitting a world empire. Because of this threat the overseas powers would be obliged to maintain bridgeheads, thus forcing the "pivot allies" to develop their land forces and preventing them from maintaining large fleets.

Mackinder developed his "heartland" theme in *Democratic Ideals and Reality* (1919) (*30*) in which he maintained that whoever rules eastern Europe commands the Heartland; whoever rules the Heartland commands the World Island; and whoever rules the World Island commands the World. This theory attracted little attention when it first appeared, but was later taken over by German geopoliticians. Mackinder's influence is still strong, and his ideas are still being developed.

William Morris Davis (1850–1934), a pioneer geomorphologist, laid solid foundations for the study of modern physical geography and established geography as a subject in American universities (*31*). His work exerted considerable influence on the subject, and he was the founder of the Association of American Geographers. In his studies of erosion cycles Davis did not forget the relationship of man's activities to various landforms. In this his influence was felt by other geographers. His emphasis on the time factor has since been established in the concept of "dynamic geography."

Davis's pupil Ellsworth Huntington (1876–1947) stressed the influence of climate on the life and activities of man and the relationships of the distribution of culture with the world's main climatic regions concluding, as did Carpenter, that western Europe was climatically the most favored region for human activities. Huntington trained originally as a geologist, but as a result of a trip to Tibet and central Asia changed to climatology. His hypotheses that central Asia would progressively break up as an influence in the historical and human geography of the continent caused much controversy. He wrote *The Pulse of Asia* (1907) (*32*), *Civilization and Climate* (1915) (*33*), and *The Mainsprings of Civilization* (1945) (*34*) which summarized much of his life's work.

Isaiah Bowman (1878–1950) is considered foremost among modern geographers. He began his career as a physiographer, and later was inspired and influenced by Davis. His first important publication, *Forest Physiography: Physiography of the United States and Principles of Soils in Relation to Forests* (1911) (*35*), constituted a sound basis for the study of North America's physical regions. *The New World: Problems in Political Geography* (1921) (*36*) is a valuable source of political and human geography as they were affected by the peace settlements made after World War I. Bowman was director of the American Geographical Society from 1915–1935, and was adviser to the American delegation to the Peace Conference at Versailles. He was always quick to seize opportunities to advance the status of geography in academic circles and the world of public affairs.

The foregoing gives only the barest outline of the history of the literature of geography up to the early years of the present century. Those geographers so briefly discussed were the giants, but there were numerous others who also contributed to the science with their field work, their theories, or both. To have given proper credit to all concerned would have necessitated a several volume work.

As an academic discipline geography has continued to grow and mature, to the extent that no one geographer can any longer be competent in all branches of the field, specialization being necessitated by the new scope of the old subject. Always a dynamic field, geography is continuously changing its methods and tools, striving to provide accurate and useful descriptions of our planet.

Since World War II when the position of geography was consolidated, geographers have greatly increased, as have university departments of geography and so, as a natural consequence, has the literature. Modern geographers, like their spiritual forbears, are great travelers, theorists, and writers. Some do write books, but gen-

erally important works appear as articles in geographical journals (which in turn are usually published by geographical societies).

The following is a list of thirty geographical serials* considered to be of "particularly broad international value and interest."

Annales de Géographie: Bulletin de la Société de Géographie, Paris, **1**–, 1891–, 6/yr.

Association of American Geographers. Annals, Washington D.C., **1**–, 1911–, 4/yr.

Australian Geographer, Geographical Society of New South Wales, Sydney, **1**–, 1928–, 2/yr.

Australian Geographical Studies, Institute of Australian geographers, Hobart, 1963–, 2/yr.

Cahiers d'Outre-mer; Revue de Géographie de Bordeaux, Université, Faculté des Lettres et Sciences Humaines. Institut de Géographie; Institut d'Outre-Mer de Bordeaux; Société de Géographie de Bordeaux. Bordeaux, **1**–, 1948–, 4/yr.

Canadian Geographer. Géographe Canadien, Canadian Association of Geographers. Toronto, **1**–, 1951–, 4/yr.

Economic Geography, Clark University, Worcester, Massachusetts, **1**–, 1925–, 4/yr.

Die Erde. Zeitschrift der Gesellschaft für Erdkunde zu Berlin, Berlin, **1**–, 1853–, 4/yr.

Erdkunde: Archiv für wissenschaftliche Geographie, Bonn, **1**–, 1947–, 4/yr.

Geoforum. Journal of Physical, Human, and Regional Geosciences, Braunschweig, Germany, **1**–, 1970–, 4/yr.

Geografiska Annaler. Series A, Physical Geography, Svenska Sällskapet för Antropologi och Geografi, Stockholm, **47**–, 1965–, 4/yr.

Geografiska Annaler. Series B, Human Geography, Svenska Sällskapet för Antropologi och Geografi, Stockholm, **47**–, 1965– 2/yr.

[The preceding two serials succeed *Geografiska annaler*, **1–46**, 1919–1964.]

Geographia Polonica, Polish Academy of Sciences, Institute of Geography, Warsaw, **1**–, 1964–, irregular.

Geographical Journal, Royal Geographical Society, London, **1**–, 1893–, 4/yr.

Geographical Magazine, London, **1**–, 1935–, 12/yr.

Geographical Review, American Geographical Society, New York, **1**–, 1916–, 4/yr.

Geographische Zeitschrift, **1–50**, 1895–1944; **51**–, 1963–, Wiesbaden, 4/yr.

Geography, Geographical Association, Sheffield, **1**–, 1901–, 4/yr.

Institute of British Geographers. Transactions, **1**–, 1935–, London, 3/yr.

Journal of Tropical Geography, Departments of Geography, University of Singapore and University of Malaya, Singapore, **1**–, 1953–, 2/yr.

Mediterranée; Revue Géographique des Pays Méditérranéens, Instituts de Géographie des Facultés des Lettres et Sciences Humanes d'Aix-en-Provence-Nice. Gap, **1–10**, 1960–1969; n.s., 1970–, 4/yr.

New Zealand Geographer, New Zealand Geographical Society, Christchurch, **1**–, 1945–, 2/yr.

Norois; Revue Géographique de l'Ouest et des Pays de l'Atlantique Nord, Universités de Caen, Nantes, Orléans-Tours, Poitiers, Rennes, Rouen, Brest, et Limoges. Poitiers, **1**–, 1954–, 4/yr.

Österreichische Geographische Gesellschaft. Mitteilungen, Vienna, **1**–, 1857–, 3/yr.

*From Chauncy D. Harris, *Annotated World List of Selected Current Geographical Serials in English, French, and German*, 3rd ed., Department of Geography, Univ. Chicago, Chicago, 1971 (Research paper no. 137).

Petermanns geographische Mitteilungen, Geographische Gesellschaft der Deutschen Demokratischen Republik, Gotha, **1**–, 1855–, 4/yr.

Revista Geográfica, Instituto Panamericano de Geografia e História. Comissão de Geografia, Rio de Janeiro, **1**–, 1941–, 2/yr.

Revue Géographique de l'Est, Instituts de géographie des Universités de Besançon, Dijon, Metz, Nancy, Reims, et Strasbourg, Nancy, **1**–, 1961–, 4/yr.

Soviet Geography: Review and Translation, American Geographical Society, New York, **1**–, 1960–, 10/yr.

Tijdschrift voor Economische en Sociale Geografie (Netherlands Journal of Economic and Social Geography), Koninklijk Nederlands Aardrijks-Kundig Genootschap, Rotterdam, **1**–, 1910–, 6/yr.

Zeitschrift für Geomorphologie. Annals of Geomorphology. Annales de Géomorphologie, Stuttgart, 1–11, 1925–1940; n.f. **1**, 1957–, 4/yr.

It is in publications such as these that the modern classics of geographical literature can be expected to be found.

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3. Abraham Ortelius, *Theatrum Orbis Terrarum; . . .*, apud Christophorum Plantinum, Antverpiae, 1584, 114 numbered leaves (112 double) incl. 112 col. maps.
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NORA T. CORLEY

GEOLOGICAL LIBRARIES AND COLLECTIONS

Geological Organizations

TRENDS IN NATIONAL DEVELOPMENT

Geological collections consist mainly of specimens, books, serials, and maps. Because of the importance of geological nomenclature, many geological organizations maintain extensive collections of minerals, fossils, and rocks so that the nomenclature and terminology may be better understood internationally. In addition, as geological theory developed by generalizations from field observations, it became important for an organization to have a library. Even from the earliest times, geological literature has retained its value for reference purposes, particularly in the establishment of an order of preference for naming fossils. It is a special feature of geology that specimen collections, data archives, and libraries are used together in research.

In 1922 J. L. Myers [quoted by Thornton and Tully (*1*)] suggested that societies developed in the following sequence:

1. Schools
2. Museums
3. Lyceums
4. Academies
5. Societies
6. Universities
7. Congresses

Thus museums have an early place in this evolution, and man was prone to collect unusual natural materials from the earliest days, either for practical purposes, such as stone axes, or as a sign of wealth, such as gold.

The founding of the Royal Society in 1662 was an important event in the development of geology, since *Philosophical Transactions of the Royal Society* published geological papers from its earliest days. The importance of the early part of the eighteenth century had not been fully appreciated until Eyles (*2*) drew attention to the role of the universities in promoting instruction and the diffused contributions to the literature by the staff. Universities continued this role into the nineteenth century and good relations often developed between them and national or regional geological surveys that were set up by governments as they became aware of the desirability of such bodies. By the beginning of the nineteenth century, geology had evolved sufficiently for societies to be founded to study the science of geology. Among the earliest societies were the Geological Society of London (1807), the Royal Geological Society of Cornwall (1814), and the Palaeontographical Society (1847); in 1888 the Geological Society of America was founded.

Local natural history societies developed, often building up valuable libraries and specimen collections. However, as geology became more of a profession and the

cost of maintaining large libraries and museums increased, there was often a redistribution of the collections to the national benefit. These activities resulted in a rapid growth of the literature, so that in 1840 Lyell (*3*), who was particularly knowledgeable about the literature, expressed his concern at the growth problem:

> I am still aware that there are a great variety of books of merit, especially on natural history, and of important facts communicated to the scientific world within the last four years, of which I remain ignorant; but the reader must accept as an apology the increasing difficulty of keeping pace with the rapid growth of Geology, and the various sciences which are so intimately connected with it.

Two kinds of organizations developed—those devoted to the study of the science and those devoted to the interests of the members; the latter were often called institutions. It was not until the middle of the present century that the next major development was seen—federalization. The American Geological Institute, founded in 1948, is a federation of eighteen societies. In the 1960s the Geological Society of London set up specialist groups, and other autonomous groups have become affiliated with the society.

GEOLOGICAL SURVEYS AND RELATED ORGANIZATIONS

1. The list which follows aims to give the most important sources of information on the geology of each country. Wherever a Geological Survey exists, this must be the primary source. However, some other organizations are cited, usually where a survey does not exist, but sometimes to supplement. In some countries, for instance, the geological institutes attached to the Academies of Science(s) are included because of the importance of the work of the academies in controlling research.

2. The list is alphabetically arranged, but not every small territory is named. Some dependencies appear with no following address but with a reference to the mother country as a source for information.

3. In some cases a note is added of the date on which the organization was formed, and its history, as a help in using the literature.

AFGHANISTAN

Afghanistan Geological Survey
Department of Mines and Geology
Ministry of Mines and Industry
Darulaman
Kabul, Afghanistan

(Established in 1918 for geological and mineralogical research and exploitation.)

ALBANIA

Ministry of Industry and Mining
Tirana, Albania

(Founded in 1957 and assumes some of the functions of a geological survey.)

Faculty of Geology
State University of Tirana
(Universiteti Shteteror i Tiranes)
Tirana, Albania

ALGERIA

Service Géologique de l'Algerie
Immeuble Mauretania - Agha
Boulevard Colonel Amirouche
Agha
Algiers, Algeria

(Established in 1883.)

Centre de Recherches sur les Zones Arides (CNRS)
Beni Abbes (La Saoura), Algeria
(Established in 1945.)

ANGOLA (Portuguese Territory)

Direccao Provincial dos Servicos de Geologia y Minas
Caixa Postal 1260-C
Luanda, Angola
(In existence since 1914.)

ANTARCTICA AND ARCTICA: See several organizations listed under NORWAY, UNION OF SOVIET SOCIALIST REPUBLICS, AND UNITED KINGDOM

ARAB REPUBLIC OF EGYPT: See EGYPT, ARAB REPUBLIC OF

ARGENTINA

Instituto Nacional de Geologia y Mineraria
Secretaria de Estado de Mineraria
Avda Juleo A, 10 Piso, Roca 651
Buenos Aires, Argentina

AUSTRALIA

Commonwealth Bureau of Mineral Resources, Geology and Geophysics
PO 378
Canberra City, Australia ACT2601
(Established 1946 to explore, investigate, and encourage development of mineral deposits. Organized in five branches: Operations, Mineral Resources, Geological, Geophysical, and Petroleum Exploration. Laboratories at Canberra and Darwin; Volcanological Observatory at Rabaul; various geophysical observatories.

New South Wales

Geological Survey of New South Wales
PO Box R216, Royal Exchange
Sydney, New South Wales, Australia
(Established in 1851.)

Northern Territory

Mines Branch
Northern Territory Administration
Darwin, Australia

Queensland

Geological Survey of Queensland
Department of Mines
Mineral House
2 Edward Street
Brisbane, Queensland 4000, Australia
(Established in 1868.)

South Australia

South Australia Geological Survey
Department of Mines and Geological Survey
Box 38
Rundle Street 169
Adelaide, South Australia 5000, Australia
(Established in 1892.)

Tasmania

Tasmania Geological Survey
Department of Mines
GPO Box 124B
Hobart, Tasmania
(Established in 1860.)

Victoria

Geological Branch
Department of Mines
107 Russell Street
Melbourne, Victoria C2, Australia

Western Australia

Geological Survey of Western Australia
Mineral House
66 Adelaide Terrace
East Perth, Western Australia 6000, Australia
(Established in 1896.)

AUSTRIA

Geologische Bundesanstalt
3 Rasumofskygasse 23
Vienna III/40, Austria
(Established in 1849.)

BAHAMAS (British Colonial Territory)

Geological Survey
Department of Lands and Surveys
Ministry of Development
PO Box 4055
Mosko Building
Mount Royal Avenue
Nassau, Bahamas

BAHRAIN (British Protectorate): See UNITED KINGDOM—IGS Overseas Division

BANGLADESH

Geological Survey
Dacca, Bangladesh

(Formerly the eastern office of Pakistan Geological Survey, q.v.)

BELGIUM

Service Geologique de Belgique
13 rue Jenner
Brussels 4, Belgium

BERMUDA (British Colonial Territory): See UNITED KINGDOM—IGS Overseas Division

BOLIVIA

Servicio Geologico de Bolivia
Federico Zuazo 1673
Casilla Cerreo 2729
La Paz, Bolivia

(Established as a national department in 1960; reorganized 1966.)

BORNEO: See MALAYSIA

BOTSWANA

Geological Survey Department
PO Box 94
Lobatsi, Botswana

BRAZIL

Divisao de Geologia e Mineralogia
Departamento Nacional do Producao Mineral
Avenida Pasteur 404, 2C-82
Praia Vermelha
Rio de Janeiro, GB, Brazil

(Established in 1907.)

BRITISH HONDURAS

Survey Department
Belize, British Honduras

BRUNEI

Geological Department
Brunei Town, Brunei

BULGARIA

Nachno-Isledovatelski Geolozhki Institut
Bul 9 Dimitrov 22
Sofia, Bulgaria

Geologicheskii Institut 'Strashmir Dimitrov' PRI BAN
Kv. Geo. Mikv
Sofia, Bulgaria

BURMA

Burma Geological Department
Ministry of Mines
226 Mahabandoola Street
PO Box 843
Rangoon, Burma

BURUNDI

Departement de Geologie et Mines du Burundi
Ministere de l'Economie
Bujumbura, Burundi

CAMBODIA (KHMER REPUBLIC)

Service National des Mines
Phnom Penh, Cambodia

Institut Technique Superieur de l'Amitié Khmero-Sovietique
Université Technique Royale
Boulevard URSS
Phnom Penh, Cambodia

(Specializes in mining.)

Institut Technique Superieur
Preah Sihanouk Raj
Phnom Penh, Cambodia

(Specializes in mining.)

CAMEROUN

Direction des Mines et de la Géologie du Cameroun
BP 70
Yaounde, Cameroun

Bureau de Recherches Géologiques et Minieres
BP 343
Yaounde, Cameroun

(Established 1959.)

CANADA

Geological Survey of Canada
Department of Energy, Mines and Resources
601 Booth Street
Ottawa, Ontario

(Established in 1842 for geological research and investigation throughout Canada.)

Geological Survey of Canada
Atlantic Geoscience Centre
Bedford Institute of Oceanography
Dartmouth, Nova Scotia

Geological Survey of Canada
Cordilleran Section
100 W. Pender Street
Vancouver, British Columbia

Department of Mines and Petroleum Resources
Douglas Building
Victoria, British Columbia

Department of Mines and Minerals
Natural Resources Building
Edmonton, Alberta

Mines Branch
Department of Mines and Natural Resources
901 Norquay Building
401 York Avenue
Winnipeg 1, Manitoba

Mines Branch
Department of Natural Resources
PO Box 758
Fredericton, New Brunswick

Department of Mines
PO Drawer 1087
Halifax, Nova Scotia

Mines Branch
Department of Mines, Agriculture and Resources
Confederation Building
St. Johns, Newfoundland

Oil and Mineral Division
Department of Indian Affairs and Northern Resources
400 W. Laurier Avenue
Ottawa, Ontario

Ontario Division of Mines
Ministry of Natural Resources
Parliament Buildings
Toronto, Ontario

Mines Branch
Department of Natural Resources
Quebec, PQ

Saskatchewan Department of Mineral Resources
Administration Building
Regina, Saskatchewan

CENTRAL AFRICAN REPUBLIC

Direction des Mines et de la Géologie
BP26
Bangui, Central African Republic

Office de la Récherche Scientifique et Technique Outre-Mer
Centre ORSTOM de Bangui
BP893
Bangui, Central African Republic

(Established in 1948, geology being one of the subjects of research.)

CEYLON (SRI LANKA)

Geological Survey Department
48 Sri Jinaratana Road
Colombo, 2 Ceylon

(Formed in 1939.)

CHAD

Service des Mines de la République de Tchad
BP 431
Fort Lamy, Chad

Bureau de Recherches Géologiques et Minières
BP 449
Fort Lamy, Chad

CHILE

Instituto de Investigaciones Geologicas (IIG)
Agustinas 785, 5 piso
Casilla 10465
Santiago, Chile

(Founded in 1957.)

CHINA, PEOPLE'S REPUBLIC

Chinese Ministry of Geology
Peking, China

Institute of Geology
Department of Geography and Geology
Chinese Academy of Science
Peking, China

Research Laboratory of Geology
Chinese Academy of Science
Chungchun Kirin, China

Hunan Institute of Geology
Chinese Academy of Science
Hunan, China

Lanchow Geological Research Laboratory
Chinese Academy of Science
Lanchow
Kansu, China

COLOMBIA

Instituto Nacional de Investigaciones Geologico Mineras
Ministerio de Minas y Petroleos
Bogota, Colombia

(From 1970—previously Servicio Geologico Nacional, Ministerio de Minas y Petroleos.)

CONGO PEOPLE'S REPUBLIC

Service des Mines et de la Geologie
BP 12
Brazzaville, Congo People's Republic

Bureau de Recherches Géologiques et Minières
BP 431
Brazzaville, Congo People's Republic

CONGO, DEMOCRATIC REPUBLIC: See ZAIRE

COSTA RICA

Ministry of Mining and Metallurgy
San Jose, Costa Rica

Geological Survey of Costa Rica
Geology Department
University of Costa Rica
San Pedro de Montes de Oca
San Jose, Costa Rica

CUBA

Instituto de Geologia
Academia de Ciencias de Cuba
Finca 'El Caney' Capdevila
Havana, Cuba

CYPRUS

Geological Survey Department
PO Box 809
Nicosia, Cyprus

CZECHOSLOVAKIA

Ustredni Ustav Geologicky CSSR
Malostranke Nam 19
Prague 1, Czechoslovakia

(Founded in 1919).

DAHOMEY

Service des Mines et de la Géologie
BP 249
Cotonou, Dahomey

(Attached to Ministry of Mines and Transport. Present organization from 1960 but functioning previously under French colonial administration.)

DENMARK

Danmarks Geologiske Undersogelse
31 Thoravej DK 2400
Copenhagen, NV, Denmark

(Established in 1888.)

DOMINICAN REPUBLIC

Instituto de Investigaciones Geografias y Geologicas
Universidad de Santo Domingo
Santo Domingo, Dominican Republic

Servicio de Mineria
Ministerio de Industria y Comercio
Santo Domingo, Dominican Republic

ECUADOR

Servicio Nacional de Geologia y Mineria
Ministerio de Industrias y Comercio
Casilla 23-A
Quito, Ecuador

(Formed in 1964.)

EGYPT, ARAB REPUBLIC OF

Egyptian Geological Survey and Mining Authority
Ministry of Industry, Petroleum and Mineral Resources
Abbassiya Post Office
Cairo, Egypt

(Founded 1898.)

EL SALVADOR

Centro de Estudios e Investigaciones Geotecnicas
PO Box 109
1-A Calla Poniente 925
San Salvador, El Salvador

(Reorganized in 1964 to comprise five departments including geological survey.)

ENGLAND: See UNITED KINGDOM

EQUATORIAL GUINEA

Ministry of Industry and Mines
Santa Isobel
Fernando Poo, Equatorial Guinea

ETHIOPIA

Geological Survey of Ethiopia
Ministry of Mines
POB 486
Addis Ababa, Ethiopia

(Established in 1968).

FALKLAND ISLANDS and FALKLAND DEPENDENCIES (British Colonial Territory): See UNITED KINGDOM

FIJI

Geological Surveys Department
PO Box 2020
Government Buildings
Suva, Fiji

FINLAND

Geologinen Tutkimuslaitos
(Geological Survey of Finland)
Otaniemi, Finland

(Founded in 1885, but previously—to 1971—entitled Commission Géologique de Finland.)

FRANCE

Bureau de Recherches Géologiques et Minières
714 Rue de la Federation
Paris 15, France

Bureau de Recherches Géologiques et Minières
Direction du Service Géologique et Departement de Documentation
45, Orleans-la-Source, France

(The bureau is organized in various departments several of which have other addresses throughout France. The Departement de Documentation includes the Service de la Carte Geologique de France. The Departement de la Guyane Francais and Departement de la Guadeloupe are also incorporated in the bureau.)

Service de la Carte Géologique d'Alsace et de Lorraine
1 Rue de Blessig
Strasbourg 67, France

Centre de Sedimentologie et de Géochimie de la Surface
1 Rue Blessig
Strasbourg 67, France

FRENCH GUIANA: See also under FRANCE

Bureau de Recherches Géologiques et Minières (BRGM)
BP 42
Cayenne, French Guiana

FRENCH POLYNESIA

Office de la Recherche Scientifique et Technique Outre-Mer, Centre ORSTOM de Papeete
BP 529
Papeete, French Polynesia

FRENCH SOMALILAND

Service des Travaux Publics de la Côte des Somalis
Djibouti, French Somaliland

GAMBIA

Ministry of Local Government, Lands and Mines
Bathurst, Gambia

GABON

Direction des Mines
BP 576
Libreville, Gabon

Bureau de Recherches Géologiques et Minières
BP 175
Libreville, Gabon

GERMANY—DEMOCRATIC REPUBLIC (DDR)

Staatliche Geologischen Kommission und Zentrales Geologisches Institut
Staatssekretariats für Geologie
Invalidenstrasse 34
Berlin 1054, Germany (DDR)

GERMANY—FEDERAL REPUBLIC (BRD)

Geologisches Staatsinstitut
Von-Melle-Park 11
2 Hamburg 13, Germany (BRD)

Bayerisches Geologisches Landesamt
Prinzregentenstrasse 28
8 Munich 22, Germany (BRD)

Geologisches Landesamt in Baden-Württemberg
Albertstrasse 5
78 Freiburg i Brg., Germany (BRD)

Geologisches Landesamt Hamburg
Oberstrasse 88
2 Hamburg 13, Germany (BRD)

Geologisches Landesamt Nordrhein-Westfalen
Westwall 124
415 Krefeld, Germany (BRD)

Geologisches Landesamt Rheinland-Pfaz
Flachsmarktstrasse 9
65 Mainz, Germany (BRD)

Geologisches Landesamt Schleswig-Holstein
Mecklenburgerstrasse 22/24
23 Kiel-Wik, Germany (BRD)

Geologisches Landesamt des Saarlandes
Flughafengebaude
6601 Ensheim uber Saarbrucken, Germany (BRD)

Hessisches Landesamt fur Bodenforschung
Leberberg 9-11
62 Wiesbaden, Germany (BRD)

Niedersachisches Landesamt fur Bodenforschung
Wiesenstrasse 1
3 Hannover, Germany (BRD)

GHANA

Geological Survey of Ghana
POB M80
Accra, Ghana

(Founded in 1913.)

GREECE

Institouton Geologhas kai Erevnon
Ypedhaphous
6 Amerikis Street
Athens, Greece

GREENLAND

Gronlands Geologiske Undersogelse
Ostervoldgade 10
Copenhagen K, Denmark

GUADALOUPE (French Overseas Department: See also under FRANCE)

Arrondissement Mineralogique de la Guyane
Boîte Postale 448
Pointe-à-Pitre, Guadaloupe

GUATEMALA

Seccion de Geologia
Direccion General de Cartographia
Avenida los Americos 5-76, Zona 13
Ciudad de Guatemala, Guatemala

Seccion de Geologia
Direccion General de Mineria e Hidrocarburos
10a Calle 11-46, Zona 1
Ciudad de Guatemala, Guatemala

GUINEA

Service des Mines et de la Géologie
(Ministry for Industry, Mines and Power)
Conakry, Guinea

GUYANA

Geological Survey of Guyana
Brickdam
Georgetown, Guyana

HAITI

Geological Survey
Department of Agriculture, Natural Resources and Rural Development
Damiens pres Port au Prince, Haiti

HOLLAND: See NETHERLANDS

HONDURAS REPUBLIC

Departamento des Mines
Direccion General de Recursos Naturales
Comayaquela DC, Honduras

Instituto Geografico Nacional (IGN)
Barrio La Bolsa
Tegucigalpa DC, Honduras

(Formed in 1966. Delineates natural and mineral resources, their evaluation and exploitation.)

HUNGARY

Magyar Allami Foldtani Intezet
Nepstadion ut 14
Budapest XIV, Hungary

(Hungarian Geological Institute. Founded in 1869.)

ICELAND

Rannsoknarad rikisins
Atvinnudeld haskolans
(Department of Geology and Geography, Museum of Natural History)
PO Box 532
Reykjavik, Iceland

INDIA

Geological Survey of India
27 Jawaharlal Nehru Road
Calcutta 13, India

(Formed in 1851.)

INDONESIA

Pusat djawatan Geologi
Direktorat Geologi
Djalan Diponegoro 57
Bandung, Indonesia

(Formed in 1950.)

IRAN

Ministry of Natural Resources
Teheran, Iran

IRAQ

Institute for Research on Natural Resources
Abu-Ghraib
Baghdad, Iraq

(Created in 1960.)

IRELAND, NORTHERN: See UNITED KINGDOM

IRELAND, REPUBLIC OF

Geological Survey
14 Hume Street
Dublin 2, Ireland

ISRAEL

Geological Institute, Ministry of Development
Malkhei Israel Street 30
Jerusalem, Israel

Institute for Petroleum Research and Geophysics
POB 269, 1 Hamashbir
Holon, Israel

(Founded in 1957 for exploration of petroleum, water, and mineral resources.)

ITALY

Servizio Geologico d'Italia
Ministero dell' Industria del Commercio e dell' Artigianato
Direzione Generale della Miniere
Largo di Santa Susanna 13
Rome, Italy

IVORY COAST

Service Géologique
Direction de la Géologie et de la Prospection Minière
Ministère de l'Economie et des Finances
République de Côte Ivoire
BP 1368
Abidjan, Ivory Coast

(The Service Géologique also has addresses at Bouake and Bouafle.)

Société pour le Développement
Minier de la Côte Ivoire (SODEMI)
BP 2816
Abidjan-Cocody, Ivory Coast

(Undertakes a program of geological exploration and mineral prospecting.)

JAMAICA

Geological Survey Department
Hope Gardens
Kingston 6, Jamaica

JAPAN

Geological Survey of Japan
135 Hisamoto-cho
Kawasaki City, Kanagawa-Ken, Japan

KENYA

Geological Survey of Kenya
Mines and Geological Department
Ministry of Natural Resources
Cathedral Road
PO Box 3009,
Nairobi, Kenya

(Organized in 1933 in six divisions.)

KHMER REPUBLIC: See CAMBODIA

KOREA, DEMOCRATIC PEOPLE'S REPUBLIC

Ministry of the Mining Industry
Pyong Yang, Korea (DR)

Geology and Geography Research Institute
Academy of Sciences
Mammoon-dong
Central District
Pyong Yang, Korea (DPR)

KOREA, REPUBLIC OF

Geological Survey of Korea
Ministry of Science and Technology
125 Namyong-dong
Seoul, Korea

(Formed, in 1918.)

KUWAIT

Ministry of Finance and Oil
Kuwait, Kuwait

Kuwait Institute for Scientific Research
Hilali Street
POB 12009
Kuwait, Kuwait

(The institute, founded in 1967, is organized in three divisions—arid zone; petroleum; agriculture and marine biology.)

LAOS

Mines Department
Ministry of National Economy and Planning
BP 46
Vientiane, Laos

LEBANON

Direction Générale des Travaux Publics
Ministry of Natural Resources and Water Power
Beirut, Lebanon

LESOTHO

Geological Survey Department
Department of Mines and Geology
POB 750
Maseru, Lesotho

LIBERIA

Geological Survey
Bureau of Natural Resources and Surveys
Camp Johnson Road
PO Box 145
Monrovia, Liberia

LIBYA

Geology Section
Ministry of Petroleum
Tripoli, Libya

Libyan National Oil Corporation (LINOCO)
POB 2655
Tripoli, Libya

LIECHTENSTEIN

Geological Survey of Liechtenstein
Vaduz, Liechtenstein

LUXEMBOURG

Service Géologique de Luxembourg
38 Boulevard de la Foire
Luxembourg, Luxembourg

MALAGASY REPUBLIC

Service Géologique
BP 280, Ampandrianomby
Tananarive, Malagasy

(Existing since 1926.)

Bureau de Recherches Géologiques et Minières
BP 548
Tananarive, Malagasy

MALAWI

Geological Survey of Malawi
Ministry of Agriculture and Natural Resources
POB 27
Liwonde Road
Zomba, Malawi

(Founded in 1921).

MALAYSIA

Geological Survey of Malaysia
Scrivenor Road
PO Box 1015
Ipoh, Perak, Malaysia

Geological Survey of Sabah
Kota, Kinabalu, Malaysia

Geological Survey Department
Borneo Region
Kuching, Sarawak, Malaysia

Government Geologist
Brunei Town, Malaysia

MALI

Laboratoire de Géologie
Ministère des Travaux Publics, de Telecommunications Energetiques
Bamako, Mali

SONAREM (Service de Documentation)
BP2
Kati, Mali

(In geology, mining, and technology. Founded in 1961.)

MARTINIQUE (French Overseas Department)

Arrondissement Mineralogique de la Guyane
Boite Postale 458
Fort-de-France, Martinique

MAURITANIA

Service Géologique
Direction des Mines et de l'Industrie
BP 199
Nouakchott, Mauritania

MAURITIUS

Ministry of Agriculture, Natural Resources and Co-operative Development
Port Louis, Mauritius

MEXICO

Instituto Geologico
Universidad Nacional Autonoma de Mexico
Ciudad Universitaria
Villa Obregon
Mexico City 20, Mexico

(Founded in 1891 following a Geological Commission established in 1886. In 1917 the institute became a department of the Ministry of Industry, but in 1929 was attached to the university.)

MONGOLIAN PEOPLE'S REPUBLIC

Institute of Geology
Academy of Sciences MPR
Ul. Lenina dom 2
Ulan Bator, Mongolian People's Republic

(Founded in 1921. Directs all scientific research in the republic.)

MOROCCO

Service Géologique du Maroc
Ministère du Commerce, de l'Industrie, et des Mines
Rabat-Chellah, Morocco

(Formed in 1921.)

MOZAMBIQUE (Portuguese Territory)

Direccao dos Servicos de Geologia y Minas
Lourenco Marques, Mozambique
(Formed in 1930.)

NAMIBIA: See SOUTHWEST AFRICA

NAURU REPUBLIC

Nauru Phosphate Corporation
Nauru, Central Pacific

NEPAL

Nepal Bureau of Mines
Lain Chaur
Katmandu, Nepal

NETHERLANDS

Rijks Geologische Dienst
Spaarne PO Box 157
Haarlem, Netherlands

(Formed in 1903. District offices also.)

Geologisch Bureau voor het Mijngebied
Akerstraat 86-88
Heerlen, Netherlands

(Founded in 1924. A part of Rijks Geologische Dienst, q.v.)

NEW CALEDONIA (French Overseas Territory)

Service des Mines et de la Géologie
RT No 1 BP 464
Noumea, New Caledonia

NEW GUINEA (Australia, External Territory)

(Geological surveys are undertaken by the Commonwealth Bureau of Mineral Resources, Geology and Geophysics, Canberra, Australia, q.v.)

NEW HEBRIDES (Anglo-French Condominium)

Geological Survey
c/o British Residency
Port Vila, New Hebrides

NEW ZEALAND (and Dependencies)

New Zealand Geological Survey
Department of Scientific and Industrial Research (NZ)
PO Box 30-368
Lower Hutt
Wellington, North Island

(Formed in 1865.)

NICARAGUA

Servicio Geologico Nacional
Apartado Postal 13-47
Managua DN, Nicaragua

(Existing since 1956.)

NIGER

Service des Mines et de la Géologie
Republique du Niger
Niamey, Niger

Bureau de Recherches Géologiques et Minières
BP 458
Niamey, Niger

NIGERIA

Geological Survey Division
Federal Ministry of Mines and Power
Private mail bag 12574
POB 20007
Lagos, Nigeria

(Established in 1930.)

NORWAY

Norges Geologiske Undersokelse
POB 3006
Leiv. Erikssonvei 39
Trondheim, Norway

Norsk Polarinstitut
Rolfstangveien 12
1335 Suaroya
Oslo 3, Norway

OMAN

Petroleum Development (OMAN)
Muscat, Oman

PAKISTAN (WEST)

Geological Survey of Pakistan
PB No. 15
Quetta, Pakistan

PAKISTAN, EAST: See BANGLADESH

PANAMA

Departamento de Recursos Minerales
Ministerio de Agriculture, Comercio e Industrias
Apartado Postal 1631
Panama, Panama

PAPUA (Australia, External Territory)

PARAGUAY

Direccion de la Produccion Mineral
Tacuaru 271
Asuncion, Paraguay

PERU

Servicio de Geologia Mineria
Paz Soldan 225
San Isidro Apdo 889
Lima, Peru

Succeeded the Instituto Nacional de Investigacion y Fomento Mineras, which was combined with the Comision de la Mapa Geologica Nacional in 1967.)

PHILIPPINES

Geological Survey
Bureau of Mines
Department of Agriculture and Natural Resources
PO Box 1595
Herran Street
Manila, Philippines

(Established in 1936.)

POLAND

Instytut Geologiczny
Centralny Urzad Geologii
Rakowiecka 4
Warsaw, Poland

(Formed in 1919; reorganized in 1953.)

Research Center for Geological Sciences
Zwirki i Wigury 93
Warsaw, Poland

(Formed in 1936).

POLAR REGIONS: See organizations listed under NORWAY, UNION OF SOVIET SOCIALIST REPUBLICS, and UNITED KINGDOM

PORTUGAL

Direccao Geral de Minas e Servicos Geologicas
Servicos Geologicos de Portugal
Ministerio da Economia
Rua da Academia das Ciencias 19-28, Dt
Lisbon, Portugal

(Established in 1917.)

Agrupamento Cientifico de Estudios de Geologia (ACEG)
Junta de Investigaciones do Ultramar (JIU)
Rua da Escola Politecnica
Lisbon 2, Portugal

Agrupamento Cientifico de Estudos Geologicos (ACEG-UC)
Junta de Investigaciones do Ultramar (JIU)
Faculdade de Ciencias, Universidade
Coimbra, Portugal

PUERTO RICO

Mineralogy and Geology Section, Industrial Laboratory
Economic Development Administration of Puerto Rico
PO Box 38
Roosevelt Station
Hato Rey, Puerto Rico 00929

QATAR (British Protectorate)

Qatar Petroleum Co.
Doha, Qatar

REUNION (French Overseas Department)

Service des Travaux Publics
St. Denis, Reunion

RHODESIA

Geological Survey of Rhodesia
Corner 4th Street and Selons Avenue
PO Box 8039, Causeway
Salisbury, Rhodesia

(Formed in 1910.)

ROMANIA

Comité Géologique de la RP Roumainie
Calea Grivititei 64
Bucharest, Romania

Institutul Geologic
Soseaua Kiseleff 55
Bucharest, Romania

(Founded in 1906 but reorganized in 1960. Attached to Ministry of Mining, Petroleum and Geology.)

RWANDA

Service Géologique du Rwanda
Ministère du Commerce des Mines et de l'Industrie
BP 15
Ruhengeri, Rwanda

(Established in 1962.)

SAUDI ARABIA

Ministry for Oil and Mineral Wealth
PO Box 345
Jeddah, Saudi Arabia

University of Petroleum and Minerals
Dhahran, Saudi Arabia

(Founded in 1964 as an independent institution, but administratively connected to the Ministry of Petroleum and Mineral Resources.)

General Petroleum and Mineral Organization (PETROMIN)
Riyadh, Saudi Arabia

SCOTLAND: See UNITED KINGDOM

SENEGAL

Direction des Mines et de la Géologie
Rue de l'Université-Fann
Dakar, Senegal

Bureau de Recherches Geologiques et Minieres
BP 268
Dakar, Senegal

SIERRA LEONE

Geological Survey Division
Ministry of Lands, Mines and Labour
New England
Freetown, Sierra Leone

(Formed in 1918.)

SOLOMON ISLANDS (British Protectorate)

Department of Geological Surveys
GPO Box 62
Honiara, Guadalcanal, Solomon Islands

SOMALIA

Geological Survey Department
Ministry of Industry and Commerce
POB 744
Mogadishu, Somalia

SOUTH AFRICA

Geological Survey of South Africa
Department of Mines
Private Bag 112
Pretoria, South Africa

(Established in 1912.)

SOUTHWEST AFRICA (Namibia)

Geological Survey
PO Box 2168
Windhoek, Southwest Africa

(Maintained by South African Geological Survey.)

SPAIN

Instituto Geologico y Minero de Espana
Rios Rosas 23
Madrid 3, Spain

Instituto Nacional de Geologia
Facultad de Ciencias
Universidad de Barcelona
Barcelona, Spain

Instituto de Investigaciones
Geologicas 'Lucas Mallada'
Paseo de la Castellana 84
Madrid, Spain

Instituto de Investigaciones
Geologicas 'Jaime Almera'
Facultad de Ciencias
Universidad de Barcelona
Barcelona, Spain

Departamento de Investigaciones
Geologicas, Patronato 'Alfonso El Sabio'
Universidad de Oviedo
Oviedo, Spain

Servicio Geologico
Ministerio de Obras Publicas
Direccion General de Obras Hidraulicas
Centralia, Ave. Portugal 81
Madrid, Spain

SPANISH SAHARA

Direccion General de Plaza y Provincias Africanas
Servicio Minero y Geologico
Castellana 5
Madrid 1, Spain

SRI LANKA: See CEYLON

SUDAN

Geological Survey Department
Ministry of Industry and Mining
PO Box 410
Khartoum, Sudan

SURINAM (Netherlands)

Geologisch Mijnbouwkundige Dienst
2-6 Klein Wasserstraat
Paramaribo, Surinam

SWAZILAND

Geological Survey and Mines Department
PO Box 9
Mbabane, Swaziland

(Formed in 1942.)

SWEDEN

Sveriges Geologiska Undersokning Frescati
S-104-05 Stockholm 50, Sweden

(Established in 1858).

SWITZERLAND

Schweizerische Geologische Kommission der Schweizerischen Naturforschenden Gesellschaft
Bernoullistrasse 32
Basel, Switzerland

(Formed in 1860.)

SYRIA

Directorate of Geological Research and Mineral Prospecting
Jisr al Abiad
Damascus, Syria

TAIWAN

Geological Survey of Taiwan
POB 31
Taipei, Taiwan

(Established 1946.)

TANZANIA

Mineral Resources Division
Ministry of Commerce and Industry and Mineral Resources
PO Box 903
Dodoma, Tanzania

(Established in 1925.)

TASMANIA: See AUSTRALIA

THAILAND

Department of Minerals
Ministry of National Development
Raman VI Road
Bangkok, Thailand

TOGO

Service Géologique Togolaise
Service des Mines du Togo
Lome, Togo

TRINIDAD AND TOBAGO

Ministry of Petroleum and Mines
PO Box 96
Port of Spain, Trinidad

TUNISIA

Service Géologique, Direction de Mines
195 Rue de la Kasbah
Tunis, Tunisia

(Formed in 1945.)

TURKEY

Maden Tetkik ve Arama Enstitusu
(Mineral Research and Exploration Institute of Turkey)
Posta Kutusu 116
Eskisehir Yolu
Ankara, Turkey

(Founded in 1935.)

UGANDA

Geological Survey and Mines Department
PO Box 9
Entebbe, Uganda

(Founded in 1919.)

UNION OF SOVIET SOCIALIST REPUBLICS (See also MONGOLIAN PEOPLE'S REPUBLIC)

Ministry of Geology and Conservation of Mineral Resources
Moscow, USSR

The following institutes are controlled by this ministry:

Vsesoynznyy Nauchno-Issledovatel'skiy Institut Mineral'nogo Syr'ya—VIMS (All-Union Scientific Research Institute, Mineral Raw Materials)
Pyzchevskiy Perevlok 7
Moscow, USSR

Gosudarstvennyy Nauchno-Issledovatel'skiy Institut Gornokhimicheskogo GIGKLS
Stantsiya Lynbertsy
Oktyabr'skiy Proyezd 259
Moscow, USSR

Vsesoynznyy Nauchno-Issledovatel'skiy Geologicheskiy Institut—VSEGEI (All-Union Scientific Research Geological Institute)
Vasil'yersky Ostrov
Sredniy Prospekt 72B
Leningrad, USSR

Naucho-Issledovatel'skiy Institut Geologii Arktiki—NIIGA (Scientific Research Institute of Arctic Geology)
Naverezhnaya Reki Moyki
Leningrad, USSR

As geological research is coordinated nationally by the Academy of Sciences (responsible directly to the Council of Ministers) the following are also relevant addresses for the geology of particular regions:

Academy of Sciences
Department of Geology, Geophysics and Geochemistry
Leninsky Prospekt 14
Moscow, USSR

Institute of Geology and Precambrian Geochronology
Nab. Makarova 2
Leningrad, USSR

(Attached to Academy of Sciences, Department of Geology.)

Institute of Geology (Order of the Red Banner of Labor)
Pyzhersky per. 7
Moscow, USSR

(Attached to Academy of Sciences, Department of Geology.)

Institute of Geological Sciences
Armenian SSR Academy of Sciences, Ul.
Barekamutyan 24
Erevan, USSR

IM Gubkin Institute of Geology
Azerbaijan SSR Academy of Sciences
Ul. Nizamy 67
Baku, USSR

Institute of Mining and Geology
Academy of Sciences USSR, Bashkir Branch
Byelorussian SSR Academy of Sciences
Leninsky Prospekt 66
Minsk, USSR

Institute of Geology
Yakutsk Branch of East Siberian Branch of Siberian Department
Academy of Sciences
Yakut, USSR

Estonian SSR Academy of Sciences
Ul. Kokhtu 6
Tallin, USSR

Far Eastern Institute of Geology
(attached to East Siberian Branch of Siberian Department, Academy of Sciences USSR)
Vladivostok, USSR

Geological Institute
(attached to Georgian SSR Academy of Sciences)
Ul. Z Rukhadze 1
Tbilisi, USSR

Institute of Geology
Karelian Branch of Sciences USSR
Pushinskaya ul. 11
Petrozavodsk, USSR

K. I. Satpaer Institute of Geological Sciences
(attached to Kazakh. SSR Academy of Science)
Ul. Kalinina 69A
Alma Ata, USSR

Kirghiz SSR Academy of Sciences
Ul. XXII Partsyezda 265-a
Frunze, USSR

Institute of Geology
Komi Branch of Academy of Sciences USSR
Ul. Kommunist, Cheskaya 24
Komi ASSR, USSR

Latvian SSR Academy of Sciences
Ul. Turgeneva 19
Riga, USSR

Lithuanian SSR Academy of Sciences
Prospekt Lenina 3
Vilnius, USSR

Moldavian SSR Academy of Sciences
Prospekt Lenina 1
Kishinev, USSR

Institute of Geology
SM Kirov Kola Branch Academy of Sciences USSR

Murmansk Region
Po Apatity
Akademgorodok, USSR

Academy of Sciences
Siberian Department
Prospekt Nauky 21
Novosibirsk, USR

Institute of Geology and Geophysics, Akademgorodok
Novosibirsk, USSR
(Attached to Siberian Department of Academy of Sciences USSR.)

Institute of Geology
Tajik SSR Academy of Sciences
Dushanbe, USSR

Institute of Geology and Geochemistry
Ural Branch of Academy of Sciences USSR
Ul. Pervomaiskaya 91
Sverdlosk-Oblastnoi, USSR

Turkmen SSR Academy of Sciences
Ul. Gogolya 15
Ashkhabad, USSR

Ukrainian SSR Academy of Sciences
Institute of Geological Sciences
Ul. Lenina 15
Kiev, USSR

UNITED ARAB REPUBLIC: See EGYPT, ARAB REPUBLIC OF

UNITED KINGDOM

Institute of Geological Sciences (Headquarters)
Geological Museum, Exhibition Road
London, SW7 2DE United Kingdom

Geological Survey of Northern Ireland
20 College Gardens
Belfast BT9 6BS, United Kingdom

I.G.S. Overseas Division
5 Princes Gate
London SW7 1QN, United Kingdom

British Antarctic Survey
Natural Environment Research Council
30 Gillingham Street
London SW1, United Kingdom

[In 1966 the institute was formed, incorporating the Geological Survey of Great Britain (founded 1835) and the Museum of Practical Geology and Overseas Geological Surveys (formerly Colonial Geological Surveys). There are regional offices at Exeter and Leeds and a Scottish office at 19 Grange Terrace, Edinburgh EH9 2LF. The Overseas Geological Surveys (dating from 1947) provide liaison with British territories overseas.]

UNITED STATES

U.S. Geological Survey (Headquarters) Department of the Interior
General Services Building
18th and F Streets NW
Washington, D.C. 20042

The various branches of the survey maintain offices throughout the United States, too numerous to list here. The various states also have their own surveys and the following are relevant addresses:

Alabama

Geological Survey of Alabama
243 E Club, Manor Drive
Mobile, Alabama 36608

Alaska

Geology Branch
Mines and Geology Division
Department of Natural Resources
Juneau, Alaska 99801

Alaskan Geology Branch
Box 580
College, Alaska 99735

(Integral unit of USGS.)

Arizona

Arizona Bureau of Mines
University of Arizona
Tucson, Arizona 85711

Arkansas

Arkansas Geological Commission
State Capital
Little Rock, Arkansas 72076

California

Division of Mines and Geology
Ferry Building
San Francisco, California 94111

Colorado

Colorado School of Mines
Golden, Colorado 80401

Connecticut

State Geological and Natural History Survey
Box 128
Wesleyan Station
Middletown, Connecticut 06457

Delaware

Delaware Geological Survey
University of Delaware
Newark, Delaware 19711

Florida

Florida Geological Survey
Florida Board of Conservation
PO Drawer 631
Tallahassee, Florida 32302

Georgia

Department of Mines, Mining and Geology
State Division of Conservation
Agriculture Laboratory Building
19 Hunter Street SW
Atlanta, Georgia 30334

Hawaii

Department of Land and Natural Resources
465 S. King Street
Honolulu, Hawaii 96813

Idaho

Idaho Bureau of Mines and Geology
Moscow, Idaho 83843

Illinois

Illinois State Geological Survey
University of Illinois
Natural Resources Building
Urbana, Illinois 61801

Indiana

Geological Survey
Department of Conservation
Geology Building
Bloomington, Indiana 47401

Iowa

Geological Survey
16 West Jefferson Street
Iowa City, Iowa 52240

Kansas

State Geological Survey
University of Kansas
Lawrence, Kansas 66044

Kentucky

Kentucky Geological Survey
University of Kentucky
307 Mineral Industries Building
120 Graham Avenue
Lexington, Kentucky 40506

Louisiana

Louisiana Geological Survey
Box 8847
University Station
Baton Rouge, Louisiana 70803

Maine

Maine Geological Survey
Department of Economic Development
State House
Augusta, Maine 04330

Maryland

State Geological Survey
Johns Hopkins University
Baltimore, Maryland 21218

Michigan

Geological Survey Division
Department of Natural Resources
Lansing, Michigan 48914

Minnesota

Minnesota Geological Survey
University of Minnesota
Minneapolis, Minnesota 55455

Mississippi

Mississippi Geological Economic and Topographical Survey
2525 Northwest Street
PO Box 4915
Jackson, Mississippi 39216

Missouri

Division of Geological Survey and Water Resources
Department of Business and Administration
PO Box 250
Buehler Park
Rolla, Missouri 65401

Montana

Montana Bureau of Mines and Geology
Montana School of Mines
203-B Main Hall
Butte, Montana 59701

Nebraska

Nebraska Geological Survey
Conservation and Survey Division
University of Nebraska
113 Nebraska Hall
Lincoln, Nebraska 68508

Nevada

Nevada Bureau of Mines
University of Nevada
Reno, Nevada 89507

New Hampshire

Department of Resources and Economic Development
State House Annex
Concord, New Hampshire 03301

New Jersey

Bureau of Geology and Topography
Department of Conservation and Economic Development
520 East State Street
Trenton, New Jersey 08625

New Mexico

State Bureau of Mines and Mineral Resources
New Mexico Institute of Mining and Technology
Campus Station
Socorro, New Mexico 87801

New York

New York State Museum and Science Service
Geological Survey
161½ Main Street (PO Box 236)
Wellsville, New York 14895

North Carolina

Division of Mineral Resources
Department of Conservation and Development
Raleigh, North Carolina 27602

North Dakota

North Dakota Geological Survey
University Station
Grand Forks, North Dakota 58201

Ohio

Division of Geological Survey
Department of Natural Resources
1207 Grand View
Ohio State University
Columbus, Ohio 43210

Oklahoma

Oklahoma Geological Survey
University of Oklahoma
Norman, Oklahoma 73069

Oregon

Department of Geology and Mineral Industries
1400 SW 5th
Portland, Oregon 97201

Pennsylvania

Pennsylvania Bureau of Topographic and Geological Survey
State Planning Board
300 Liberty Avenue
Pittsburgh, Pennsylvania 15222

Rhode Island

Rhode Island Development Council
Roger Williams Building
Hayes Street
Providence, Rhode Island 02902

(Cooperative agreement with USGS.)

South Carolina

Division of Geology
State Development Board
1321 Pendleton Street
Columbia, South Carolina 29208

South Dakota

State Geological Survey
Vermillion, South Dakota 57069

Tennessee

Division of Geology
Department of Conservation and Commerce
G-5 State Office Building
Nashville, Tennessee 37219

Texas

Bureau of Economic Geology
University of Texas
Geology Building
University Station
Austin, Texas 78756

Utah

Utah Geological and Mineralogical Survey
College of Mines and Mineral Industries
University of Utah
Salt Lake City, Utah 84112

Vermont

Vermont Geological Survey
Montpelier, Vermont 05602

Virginia

Division of Mineral Resources
Department of Conservation and Economic Development
Box 3667
University Station
Charlottesville, Virginia 22901

Washington

Division of Mines and Geology
Department of Conservation
335 General Administration Building
Olympia, Washington 98501

West Virginia

West Virginia Geological and Economic Survey
PO Box 879
Morgantown, West Virginia 26505

Wisconsin

Geological and Natural History Survey
University of Wisconsin
Madison, Wisconsin 53706

Wyoming

Geological Survey of Wyoming
PO Box 3008
University Station
Laramie, Wyoming 82070

UPPER VOLTA

Direction de la Geologie et des Mines
B. P. 601
Ouagadougou, Upper Volta

(Formed in 1961.)

URUGUAY

Instituto Geologico del Uruguay
Calle Julio Herrera y Obes 1239
Montevideo, Uruguay

(Established in 1912.)

VENEZUELA

Direccion de Geologia del Ministerio de Minas e Hidrocarburos
Torre Norte
Centro Simon Bolivar Piso 19
Caracas, Venezuela

(Founded in 1936.)

VIETNAM (NORTH)—DEMOCRATIC REPUBLIC

Geological Section
State Committee of Sciences
Hanoi, Vietnam (North)

VIETNAM (SOUTH)—REPUBLIC OF

Bo Kinh-Te
Nha Tai-Nguyen Thien-Nhien
So Dia Chat
59 Gia Long
Saigon, Vietnam (South)

(Service Geologique, Ministere de l'Economie, Direction des Ressources Naturelles.)

YEMEN—ARAB REPUBLIC

Office of Mineral Resources
Ministry of Public Works
Sara's Yemen

YUGOSLAVIA

Zavod za Geoloska i Geofizicka Istrazivanja (GEOZAVOD)
(Institute for Geological and Geophysical Research)
Karadordera 48
Belgrade, Yugoslavia

(The Institute for Geological and Geophysical Research was reorganized and became independent of the Ministry of Mines in 1948. It assumed its present title in 1950.)

Institut za Geoloskorudarska Istrazivanja i Ispitivanja Nuklearnih i Druglh Mineral Sirovina
Rovinjska 12
Belgrade, Yugoslavia

Geoloski Zavod
Dimiceva 16
61000 Ljubljana, Yugoslavia

(Formed in 1946, Socialist Republic of Slovenia.)

Institut za Geoloska Istrazivanja SRH
Kupska 2
Zagreb, Yugoslavia

(Formed in 1947, Socialist Republic of Croatia.)

ZAIRE

Service Géologique National de la République du Zaire
BP 898
44 Avenue des Huileries
Kinshasa 1, Zaire

(Established in 1939.)

ZAMBIA

Geological Survey of Zambia
PO Box RW 135, Ridgeway
Lusaka, Zambia

(Formed in 1951.)

ORGANIZATION OF INTERNATIONAL GEOSCIENCE

There are many international organizations playing a role in geoscience, and these have been summarized by Lea (*4*). The publications of international organizations lack bibliographical control, and efforts by the International Council of Scientific Unions Abstracting Board (ICSU-AB) have been largely ineffective in either documenting this literature or setting up realistic programs of international cooperation.

The *Geological Newsletter* (continuing *Circular Letters*) of the International Union of Geological Sciences (IUGS) has contained useful information in its geological documentation section. A specialized publication, *Geoscience Documentation*, was started by Geosystems in 1969. This bimonthly journal is the only publication specially devoted to the literature, history, documentation, and policy of geology. It contains news about information services, publications, and conferences. A unique feature is the *Review Locator* which indexes reviews of geological books. The *Geodoc Index* section is an annotated bibliography of literature pertaining to geological documentation and policy. *Geoserials* gives information about new serial publications. Original papers are also included.

The *Committee on Geological Documentation* of IUGS consists of an Executive Council and an Automation Board. The committee has recently attempted to coordinate data processing in geological documentation and to promote review articles. The committee is also responsible for the geological documentation section of the *Geological Newsletter*. Unfortunately the committee has not had effec-

tive communication with the largest documentation services in geology (Geosystems in London, and Viniti in Moscow) and so its work has been of limited value. The close relationship between the committee and ICSU-AB has not benefited the science, since working papers are not circulated publicly for comment before adoption, and are therefore not usually acceptable to the major services.

The International Union of Geological Sciences and other scientific unions are scientific members of the International Council of Scientific Unions. There are several Inter-Union Commissions and a panel of relevance to geology:

1. Inter-Union Commission on Solar-Terrestrial Physics (IUCSTP)
2. Inter-Union Commission on Geodynamics (IUCOG)
3. World Data Centres (WDC): an ICSU Panel, with data centers in Washington, Moscow, and Japan for the collection of geophysical and solar data

The International Geological Correlation Program is a joint project of IUGS and UNESCO. The aim of the program is to support and strengthen existing geological correlation activities, and consider problems which cannot at present be solved. The IGCP was described in *Nature and Resources*, 7(4), 4–9 (1971).

IUGS has five commissions, and the Commission on Stratigraphy has a considerable number of subcommissions, committees, and working groups. At the beginning of 1972 these were:

1. Commission for Marine Geology
2. Commission on Meteorites
3. Commission on Stratigraphy
   - Subcommission on Precambrian Stratigraphy
   - Subcommission on Cambrian Stratigraphy
   - Committee on Silurian-Devonian Boundary
   - Subcommission on Carboniferous Stratigraphy
   - Subcommission on Gondwana Stratigraphy
   - Subcommission on Jurassic Stratigraphy
   - Subcommission on Cretaceous Stratigraphy
   - Committee on Upper Cretaceous (Maastrichtian) Stratigraphy
   - Committee on Mediterranean Mesozoic Stratigraphy
   - Subcommission on Neogene Stratigraphy
   - Committee on Northern Neogene Stratigraphy
   - Committee on Mediterranean Neogene Stratigraphy
   - Subcommission on Quaternary Stratigraphy
   - Working Group for Correlation of Cretaceous and Cenozoic Marine Deposits
   - Working Group for the ECAFE Region
   - Subcommission for Stratigraphic Classification
   - Subcommission for Stratigraphical Lexicon
   - Subcommission on Geochronology
4. Commission on Petrology
   - Subcommission on the Nomenclature and Systematics of Igneous Rocks
   - Subcommission on Experimental Petrology at High Pressures and Temperatures
5. Commission on Structural Geology

IUGS also has five committees and an advisory board:

1. Committee for Geology Teaching at University Level
2. Committee on Geological Documentation
3. Committee on Storage, Automatic Processing and Retrieval of Geological Data (COGEODATA)
4. Committee on the History of Geological Sciences (INHIGEO)
5. Endowment Committee
6. Advisory Board for Publication

Thirteen organizations are affiliated with IUGS:

1. Association des Services Geologiques Africains (ASGA)
2. International Association of Hydrogeologists (IAH)
3. International Mineralogical Association (IMA)
4. International Palaeontological Association (IPA)
5. International Association of Sedimentologists (IAS)
6. Association Internationale pour l'Etude des Argiles (AIPEA)
7. International Federation of Societies of Economic Geologists (IFSEG)
8. Commission for the Geological Map of the World (CGMW)
9. International Association of Geochemistry and Cosmoschemistry (IAGC)
10. International Association on Engineering Geology (IAEG)
11. International Union for Quaternary Research (INQUA)
12. International Association for Mathematical Geology (IAMG)
13. International Association of Planetology (IAP)

Professional Aspects

GEOLOGICAL INFORMATION SCIENCE ACTIVITIES

Geology has a large data base and a rich literature. Most geologists collect specimens and make observations in the field, returning to the laboratory at the end of a field season to carry out further work there and write up results. Most of the data is not at present put into computerized retrieval systems; the reports may become formal papers, but many stay as internal documents. Only a very few geologists have become concerned with the information handling aspect of their science. This is seen in the lack, until recently, of any societies devoted to the study of geological information. Since geological information retains its value for considerable periods of time, this is an unfortunate situation; geologists would benefit from a more systematic approach to the gathering, storage, and retrieval of information.

The Geoscience Information Society (GIS) was founded in 1965, having as its basic objective the improvement of geoscience information exchange through the mutual cooperation of its members—geoscientists, librarians, documentalists, editors, and other information specialists. It has held annual meetings in conjunction with the Geological Society of America. *Proceedings* have been published for the

first annual meeting in 1966; the society also publishes a *Newsletter* which reports on the work of the members of the society and relevant current events. The work of the society was reviewed in *Nature*, **224**, 639 (1969). The GIS has principally been concerned with geological literature, paying special attention to the more difficult forms such as field book guides, theses, and maps.

The Geological Information Group (GIG) of the Geological Society of London is a constituted specialist group founded in 1971. The purpose of the group is to study "geological information (including data and literature) in all its aspects, including the principles of recording, indexing, collation, storage, dissemination and retrieval, editing and communication" by holding meetings, publication, and encouraging research and teaching. The GIG has held several meetings (reported in the *Circular* and *Proceedings*, subsequently the *Journal* and *Newsletter* of the society), and has an active program of work over a broad field of information science in geology.

The Society for the Bibliography of Natural History (United Kingdom) is concerned principally with the historical aspects; its *Journal* contains several useful papers.

An international federation, INFOTERRA, the International Association for Geoscience Information, has been proposed. The purpose of INFOTERRA would be to coordinate geoscience information activities internationally.

In addition, the International Association for Mathematical Geology has been active in the field of geological data. Results have been published in the *Journal of the International Association for Mathematical Geology*, and a review of a colloquium on the structure of geological information appeared in *Geoscience Documentation*, **2**(2), 33–40 (1970).

GEOLOGICAL AUTHORSHIP, EDITING, AND PUBLISHING

There are two principal works of use to the authors of geological papers: Blackadar (*5*) and *Suggestions to Authors of the Reports of the United States Geological Survey* (*6*); a third work is expected in 1972 edited by Hill (*7*). Much useful information is also contained in the *CBE Style Manual* (*8*). There is a joint project between two editors' associations to produce a handbook that will be of use to authors as wells as editors, but it is unlikely that this project will be completed until the mid-1970s.

Martinsson (*9*) discussed the formation and activities of the Association of Earth Science Editors (AESE) and the European Association of Earth Science Editors (EDITERRA). AESE was founded in October 1967; EDITERRA in December 1968. AESE is now a member society of the American Geological Institute and confines its activities to North America; EDITERRA was formed with UNESCO assistance. Both organizations have met annually and there is a joint coordinating council. Attempts are being made to form editors associations in other continents. One of the principal topics of discussion by EDITERRA has been an Editor's Handbook, and several working papers have been prepared and published in

EDITERRA *Circular Letters*. An annotated bibliography of geological writing, editing, and publishing [Lea et al. (*10*)] will summarize existing aids. It is expected that major attention will be initially paid to geological nomenclature, terminology, and standards.

AESE has concentrated on panel discussions of mutual problems, copyright investigations, and educational programs. In cooperation with the Council of Education in the Geological Sciences (CEGS), AESE is preparing an elementary manual [Hill (*7*)] for authors as a means of improving the quality of manuscripts submitted for publication.

Geological publishing differs from the more abstract sciences in that a substantial part is directly by the government—particularly geological surveys. Many small societies publish a journal; the number of copies distributed does not often exceed 1,000. In North America, page charges are common for societies. Societies are increasingly making joint arrangements with commercial publishers as the cost of publication increases. Most geological editors are honorary editors, and apart from the publishing houses and government surveys, only the largest societies can afford to pay editors. Alternatives to primary publication have been investigated, particularly in paleontology where costs are especially high as a result of illustration requirements; an additional problem is the need for formal publication to establish scientific precedence, although the papers may only be of interest to a handful of specialists.

MUSEUMS AND CURATORSHIP

Museums, in the formal sense, originated in Europe in the sixteenth century and housed private collections. These developed into modern, state-funded institutions. Robert Hooke realized the importance of geological collections in the latter part of the seventeenth century. The museums have not contributed a great deal to secondary services in geology, although mention must be made of the *Bibliography and Index of Micropaleontology* of the American Museum of Natural History (*11*) and a bibliography by Clapp, *Museum Publications Volume. 2. Publications in the Biological and Earth Sciences* (*12*), which lists 1966 publications in geology.

A disadvantage of many early collections is that they contain the finest specimens (since the localities were to a greater or lesser extent stripped of the more evident material)—yet the exact location and stratigraphic position may be imperfectly known. The better museums today have revised their exhibits to explain processes and demonstrate relationships. Museums are seen as communication systems for real things, using nonverbal language. In the museums of developing countries, emphasis is given to modern techniques rather than historical aspects. The more important museums exist primarily as places for teaching or research including the identification, classification, and description of fossils rocks and minerals. New fossils, rocks, and minerals are always being found, and space is often reserved to show new acquisitions. Type specimens on which animal and plant taxonomy is based are an important part of any collection. The preservation of these specimens is of great importance. The documentation of collections is via a catalog. Of partic-

ular note is the cost and storage space required to keep specimens and prevent their deterioration.

LIBRARIES AND LIBRARIANSHIP

As geologists have tended to use libraries more than many of their colleagues in other sciences, it is quite often found that organizations have departmental geology libraries in addition to a central library. Apart from considerations of physical convenience, there are advantages in having a geological library and museum close together physically. In time it will become important to have convenient access to computerized data and literature files. One study of geological library facilities by Paull (*13*) showed that a departmental library was much preferred.

Geological libraries tend to be arranged in rather unconventional ways, particularly in the case of older libraries. The most important factor appears to be the geographical arrangement of the regional serial and book literature. This enables geologists to consult all works pertaining to a region without difficulty. Older works that have become rare are still liable to be consulted quite frequently and although it is understandable that there is often restricted access to such works, it is desirable to shelve second copies or facsimile reproductions with the main collection. Specialist geological libraries do not usually arrange the stock by the Library of Congress or Universal Decimal Classification.

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2. V. A. Eyles, "The Extent of Geological Knowledge in the Eighteenth Century and the Methods by Which It Was Diffused," in *Toward a History of Geology* (C. J. Schneer, ed.), M.I.T. Press, Cambridge, Massachusetts, 1969, pp. 159–183.
3. C. Lyell, *Principles of Geology*, 7th ed., Murray, London, 1840, p. xiii.
4. G. Lea, "The Organization of International Geoscience," *Geoscience Doc.*, **2**, 110–113 (1970).
5. R. G. Blackadar, "Guide for Preparation of Geological Maps and Reports," *Miscellaneous Report Geological Survey of Canada*, Vol. 16, Ottawa, 1968, v + 147 pp.
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8. *CBE Style Manual*, 3rd ed., Committee on Form and Style of the Council of Biology Editors American Institute of Biological Sciences, Washington, D.C., 1972, 300 pp.
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11. American Museum of Natural History, *Bibliography and Index of Micropaleontology*, New York, 1972.

* See also the references at the end of the article on *Geological Literature*.

12. J. C Clapp, *Museum Publications Volume*, 2, *Publications in the Biological and Earth Sciences*, Scarecrow, New York, 1962.
13. R. A. Paull, "In Defense of Geological Libraries," *J. Geological Educ.*, **14**, 57–59 (1966).

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Chakraborty, A. R., "Geological Survey of India Library—A Profile," *IASLIC Bull.*, **13**, 283–288 (1968).

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Schneer, C. J., ed., *Toward a History of Geology*, M.I.T. Press, Cambridge, Massachusetts, 1969, xi + 469 pp.

Woodward, M. B., *The History of the Geological Society of London*, Geological Society, London, 1907, xix + 336 pp.

GRAHAM LEA
PHYLLIS M. BRIERS
ANTHONY P. HARVEY

GEOLOGICAL LITERATURE

Primary Literature

GEOLOGY DEFINED

> Geology is the science which investigates the successive changes that have taken place in the organic and inorganic kingdoms of nature: it inquires into the causes of these changes, and the influence which they have exerted in modifying the surface and external structure of our planet. Charles Lyell, *Principles of Geology*, 7th ed., John Murray, London, 1847, p. 1.

Geology as a modern inductive science may be said to have been founded at the end of the eighteenth century. James Hutton, one of the fathers of modern geology, had observed that it was no part of the province of geology to discuss the origin of things, his maxim being that in the materials from which geological evidence is to be compiled there can be found "no traces of a beginning, no prospect of an

end" (*Theory of the Earth*, Vols. 1 and 2, Cadell, Junior, and Davies, Edinburgh, 1795; Vol. 3, Geological Society of London, 1899). In 1807 the Geological Society was founded, devoting itself to the collection of facts instead of arguments about cosmology, which had characterized most earlier work in geology.

Various terms have been used for *geology* since the beginning of the last century. *Geognosy* was favored by Werner in Freiberg at the School of Mines; he used the term for "the natural position of minerals in particular rocks, together with the grouping of those rocks, their geographical distribution, and various relations"; however, *geognosy* has since been little used. Lea (*1*) discussed definitions in geology:

> The terms *geology (sensu structo)*, *geology (sensu lato)*, *geological science(s)* and *geonomy* all have a similar meaning in current practice. The Oxford Dictionary defines *geology*, in the modern sense, as "The science which has for its object the investigation of the earth's crust, of the strata which enter into its composition, with their mutual relations, and of the successive changes to which their present condition and positions are due." This is probably too restrictive for normal purposes and this definition should therefore perhaps be reserved for *geology (sensu stricto)*. *Geology (sensu lato)* can be regarded as being equivalent to *geological sciences*, and *geoscience* is really a contraction. These three broader terms would also include in their definition the core of the earth, the oceans, the atmosphere, and the earth as a planet. *Earth sciences* appears to be identical with *geological sciences*, and could be considered a simpler term. It is interesting to note that the North American *Directory of Geoscience Departments* (AGI, 1970) lists 288 Departments of Geology, 62 Departments of Earth Sciences, 33 Departments of Geological Sciences and 12 Departments of Geoscience. *Geonomy*, although favored by Manten [see Ref. 2], has been regarded critically in *Nature* ["Geonomists All," **224**(5223), 944 (1969)]: it is not used very extensively.

Lyell's definition of geology is still reasonably adequate today. Were it to be expanded, *geology* (*sensu lato*) would include the internal structure of the earth, which can now be investigated by geophysical methods that were not available to Lyell. The difficulty in any definition of geology is in applied geology. Petroleum geologists tend to become engineering and instrumentation orientated, and usually regard well log interpretation as part of geology, which is not accepted by many academic geologists. There is no satisfactory solution to such problems, but compromise can be reached by including in the definition the exploration for natural resources and the interpretation of results derived from equipment and instruments. For historical reasons, mineralogy and petrology may be separated from stratigraphy, and only the latter regarded as true geology. This is a narrow viewpoint, since nearly all geologists would receive instruction in these subjects. There is also a tendency to split oceanography from geology, because for administrative reasons the ocean is best studied as a whole, often from research vessels, by geologists, biologists, physicists, and others. However, philosophically, the ocean is as much a part of the upper part of the earth as the land, and the ocean floor is of considerable geological importance. Thus the geological aspects of oceanography belong within the geological sciences. Paleontology has also been treated as a separate subject.

and there is some tendency for specialists in different fossil groups to be zoologists rather than geologists. However, only a geologist can appreciate fully the importance of correlation using fossils (biostratigraphy) and for this reason most aspects of paleontology belong within geology. There is one subject area where most geologists would be inclined to make territorial concessions to other physical scientists: that is the atmosphere. Although the atmosphere is a geochemical continuum with the solid and liquid earth, most of the literature is concerned with dynamic and physical aspects, and is not therefore primarily geological. There are nevertheless important areas, such as the gases released into the atmosphere from volcanoes, the composition of the earth's surface, and the atmosphere as an agent of erosion. Moon rock poses an interesting problem of semantics since strictly the Greek prefix "geo-" means "earth." Thus "lunar geology" would be a contradiction, and so terms like "planetology," and "selenology," and "lunar studies" have been used. Few would dispute that such studies fall within the realm of geology.

In an opinion inquiry addressed to the world community of geologists, Krupicka (*3*) considered these and other problems.

Albritton et al. (*4*) have defined geoscience as

> a comprehensive term embracing all the sciences that concern the earth, including its atmosphere, hydrosphere, biosphere, and the spheres of the solid earth, insofar as these sciences treat of present and past configurations within the continuity of time. Successive configurations are reconstructed through chains of inference derived from patterns of changes now taking place, and prediction of future changes may be attempted by extrapolation of evolutionary trends.

This definition introduces an important statement by Albritton, Engelhardt, Harland, and McLaren entitled *Geoscience and Man*. The statement also identifies certain principles unifying and distinguishing the disciplines of geoscience.

GROWING IMPORTANCE OF GEOLOGY

Geology went through a golden age in the late eighteenth and first half of the nineteenth century; Bassett (*5*) cites several examples:

> On January 15th, 1851, for example, a fossil, believed at the time to be that of a serpent, was taken out of the Coal Measures at Kimle, the old workings on the Gnoll Estate at Neath. It caused such excitement in the town that for three days the fossil was publicly exhibited (at a charge of 1s for ladies and gentlemen, 6d for tradesmen, and 3d a head for the working class).
>
> There is ample evidence of this kind to show that after the main foundations had been laid during the period 1760–1820, the subject flourished and became, as described by one eminent historian of science, "the dominant and most brilliantly successful science of the first half of the century." Its impact can be judged from the fact that in the period following the Waverley novels, the general middle-class public purchased five times as many copies of an expensive work on geology as one of the most popular novels of the time. And again that at the British Association meeting at Newscastle in 1838, when Charles Lyell was president of

the geological section: "Enthusiasm was rampant. The daily attendance at the section was from 1000 to 1500; while 3000 . . . flocked to the sea shore to listen to the eloquence of Sedgwick, the professor of Geology at Cambridge University. Furthermore, a shop in the Strand, owned by a Mr. Tenant, was advertized as being " . . . attractive to all who pursued and desired to cultivate that favorite science of the day—Geology."

The subject appealed to all classes of society. A number of attractive introductory textbooks were produced, extension lectures were very popular and geology was well represented in local and national museums where the effect of text and figures could be reinforced by that of the actual specimens themselves.

It would seem that today geology is again entering a golden age. Increasing interest in the earth sciences from the early 1960s is the result of a number of coincidental factors:

1. The theory of continental drift—the movements of continents—assumed greater prominence with the development of plate tectonics, which seeks to explain how continents and continental fragments have moved relative to each other during geological time. Investigation of the dynamics of continental drift and the previous distribution of land masses has caused a fundamental reconsideration of other geological hypotheses.
2. The collecting of rock specimens from the moon has increased popular interest in geology.
3. Conservation and environmental pollution have become major topics of political and scientific discussion. Geology, and particularly that part of geochemistry concerned with water and atmosphere cycles, is important in the understanding and solution of problems relating to man's physical environment.
4. The media have, with educational programs, promoted popular interest in geology.
5. The public has become aware of major geological activities, such as JOIDES: [(U.S.) Joint Oceanographic Institutions Deep Earth Sampling project]; the feasibility of forecasting and controlling earthquakes (in California, for example); and the eruption of volcanoes (especially Surtsey off Iceland and Etna in Italy).
6. The shallow continental shelves with their oil, natural gas, and minerals have been divided up by international treaties. In time, procedures to divide the wealth of the ocean floor will be required, but at present it is not economic to recover minerals at water depths below about 300 meters.
7. There is an increasing demand for energy and materials; demand can be satisfied only if new resources are found at an increasing rate, and so exploration activity is intense. These factors have led to the development of a considerable new literature that is mainly popular. However, political developments have caused many legislative publications to refer more and more to aspects of geology.

SIZE AND GROWTH OF GEOLOGICAL LITERATURE

Relative Size

The ratio of geological literature to the total scientific and technical literature was determined by studying *Referativnyi Zhurnal* for 1956–1970 and *Bulletin Signalétique* for 1961–1970. These two series, both part of comprehensive, uniform

TABLE 1

Ratio of Geological Literature to Total Scientific and Technical Literature

Service	Shelf inches		% Geology
	Geology	Science and technology	
Bulletin Signalétique	40.9	556.5	7.4
Referativnyi Zhurnal	311.9	3368.4	9.2

abstracting series for science, were considered likely to have a constant proportion of geology. The definition of scientific and technical literature included pure and applied science, and engineering, but excluded medicine. The definition of geology was broad, and included geophysics. The shelf space occupied by uniformly printed and bound volumes of these two services was measured (Table 1.) It is not surprising that the Russian service shows a higher percentage of geology, since it is generally recognized that geology is more prominent in the USSR, and that *Referativnyi Zhurnal* has a disproportionately high coverage of the Russian literature.

Absolute Size

It is not possible to make an accurate estimate as to the absolute size of the geological literature. Secondary services are prone to assume that their coverage is complete, but all services find that the cost of increasing their coverage increases rapidly as they approach the theoretical maximum. In estimating size, it is important to define precisely what constitutes an item of literature—this is discussed in the section of Media of Geological Communication below. *Geotitles Weekly* includes the largest number of items (>70,000 items/year), followed by the various sections of *Referativyni Zhurnal* (~45,000 items/year). Based on a study of the rate of finding sources not previously included in *Geotitles Weekly* and a further study of sources known but not yet included in *Geotitles Weekly*, it is estimated that there will be 100,000 items of geological literature published in 1972.

Growth

There are a number of problems in trying to study the growth of geological literature. There is no single abstracting or indexing service that is either consistent or comprehensive over any significant period. In addition, the definition of geology has changed, both since 1900 when geology became distinguished from natural history and since 1950 when geology became more diversified. J. Diment of Geosystems has studied the growth of the literature cited by *Bulletin Signalétique* from 1961–1970. This service was considered to be the most uniform over the period studied. It was found that the model

$$\log_e y = ax + b$$

(where y is the volume of literature, in inches/year of uniformly printed volumes, and x is year of publication), gives a good approximation to both the growth of the geological literature and science literature in *Bulletin Signalétique*. For geological literature it was found that

$$\log_e y = 0.110x + 0.752$$

and that the growth of science literature is given by

$$\log_e y = 1.11x + 1.03$$

These results should be treated with caution, however, because there are several implicit assumptions. In particular, it would be essential to know whether the acquisition policy of the CNRS library (used by *Bulletin Signalétique*) has been consistent. It may be that its budget for new acquisitions has not kept pace with the publication of new journals; alternatively, geology may have been more favored or less favored than the rest of science. Furthermore, the number of items included in *Bulletin Signalétique* may not be directly related to the number received in the CNRS library.

The conclusions that can be drawn from this study must therefore be considered in the light of these problems. Nevertheless it is surprising to find that on this basis the number of geological and science items per annum in *Bulletin Signalétique* doubled between 1964 and 1970.

Geosystems has estimated the total literature being added to Geo-Archive, their computerized backlog file for geological literature (Table 2). It is estimated that the pre-1970 geological literature consists of 1.9 million items, and that during 1971 the two-millionth item would have been published.

TABLE 2

Growth of Geological Literature

Geo-Archive period	Estimated no. of items
1960–1969	700,000
1940–1959	500,000
1900–1939	400,000
Pre-1900	300,000
Pre-1970 total	1,900,000

LANGUAGE DISTRIBUTION OF THE GEOLOGICAL LITERATURE

Hawkes (6) sampled the 1961 geological literature using an alphabetical selection according to the surnames of senior authors. He tested several selections and finally chose the initial letters PE- and PF-, recognizing that this excluded oriental literature. His proportions of PE- and PF- names from large name lists are given in Table 3. Hawkes then took a PE- + PF- sample from twenty-two geological documentation services (presumably ignoring nongeological items from *Chemical*

TABLE 3

Hawkes' Samples of 1961 Geological Literature (*6*)

Language	List size (pages)	PE- + PF- (pages)	Sample factor (% PE- + PF-)
English	10,575.9	115.74	1.094
Russian	2,429.0	27.22	1.121
German	4,425.47	51.49	1.163
French	4,741.9	54.41	1.150
		Weighted mean	1.11

Abstracts and *Engineering Index*); this amounted to 340 items. The analysis of the results surprised many workers who were familiar with the literature. In particular, his analysis of the language distribution was unexpected.

Research by R. Charles of Geosystems has not confirmed this result. A 10% sample (1,300 items), randomly selected from the first 13,000 items included in the 1972 issues of *Geotitles Weekly*, has given a markedly different language in Table 3. Hawkes then took a PE- + PF- sample from twenty-two geological distribution (Table 4). The following observations may be made:

1. There is a difference of 10 years in the samples; it would be expected that the percentage of English language items had increased, but not 2.7 times.
2. Hawkes' sample is small (about 1%: 340 items) whereas the *Geotitle Weekly* sample is larger (10%: 1,300 items).
3. Although Geosystems' sample is drawn from one documentation service, *Geotitles Weekly* is now by far the largest geological documentation service in any language.
4. There is evidence that a very considerable part of the 1961 English language literature was not captured by any indexing service. *Referativnyi Zhurnal—Geologiya* had about 23,000 items in 1961, of which about 60% were in Cyrillic languages. The *Bibliography and Index of Geology Exclusive of North America* contained approximately 6,700 items, of which only about 7% were in Cyrillic languages. This immediately shows that the largest English-language service in 1961 was woefully incomplete in its coverage: in fact the Russian journal contained

TABLE 4

Language Distribution in Geological Literature According to Hawkes (*6*) and *Geotitles Weekly*

Language	Hawkes per cent	*Geotitles Weekly* per cent
Russian	30	15
English	27	73
French	11	3
German	11	4
Other European	11	1
Non-Russian Slovonic	9	3
Non-European	1	1

TABLE 5

Language Distribution of Serials Cited in *Geotitles Weekly*

Language	No. of serials	%
English	2230	62
German	280	8
French	276	8
Russian	160	4
Spanish	144	4
Italian	77	2
Polish	73	2
Japanese	63	2
Portuguese	59	2
Serbocroat/Bulgarian	39	
Hungarian	38	
Romanian	27	
Dutch	25	
Czech and Slovak	24	
Swedish	18	
Finnish	16	
Norwegian	15	
Danish	12	
Korean	6	
TOTAL	3582	94

more English language items than the total number of items in the American *Bibliography*.

5. It cannot be assumed that *Referativnyi Zhurnal—Geologiya* is complete in its coverage of English language items. A study of *Geotitles Weekly* and *Referativnyi Zhurnal—Geologiya* and *—Geofizika* for the first quarter of 1972 showed that the English service has about 2.4 times as many English language titles as the Russian service, and conversely the Russian service has 2.7 times as many Cyrillic titles as the English service; both services found that about 12% of items were in languages other than English or Cyrillic.

6. The language percentage figures from *Geotitles Weekly* can therefore be adjusted to allow for the additional Cyrillic language material found by the Russian service, to give the following result: 56% in English, 32% in Russian, and 12% in other languages.

R. Charles has also studied the distribution by language of 3,582 serials cited in *Geotitles Weekly*. The results are given in Table 5.

GEOGRAPHICAL DISTRIBUTION OF THE GEOLOGICAL LITERATURE

Hawkes (*6*) has also studied the geographical distribution, but for reasons given in the preceding section it is considered that his sample is biased.

The distribution of geological serials has been studied by R. Charles of Geosystems using *Geoserials* (included in *Geoscience Documentation*, 1969–1970) (Table 6).

TABLE 6

Geographical Distribution of Geological Serials

Region	Per cent (rounded) of geological serials
Western Europe	39
North America	27
Eastern Europe	9
Asia	8
Australasia and Oceania	5
USSR	4
South America	4
Africa	3

R. Charles used the same data base to study the city of publication of geological serials (Table 7).

TABLE 7

City of Publication of Geological Serials

Town	No. of Geoserials
London	180
Paris	89
Washington	81
Tokyo	57
Moscow	47
New York	42
Ottawa	38
Vienna	32
Warsaw	31
Stuttgart	30

DEVELOPMENT OF THE PRIMARY LITERATURE

Geology developed as a science mainly in Great Britain, with some important contributions from Germany. The earliest references are to be found in accounts of journeys, descriptions of specimens, and natural histories of regions, although there are numerous medieval references to coal, limestone, mining, etc. Examples of such early works are:

Leland, J., "The Itinerary of John Leland . . . Begunne about 1538," ms, London, 710 [Bodleian Library, Oxford].

Lister, M., "Concerning Petrify'd Shells," *Phil. Trans. Roy. Soc.*, **5**, 2281–2284 (1671).

Plot, R., *The Natural History of Oxfordshire*, Oxford, 1677.

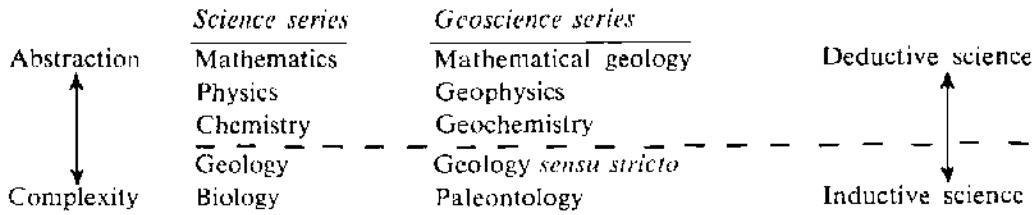
Most eighteenth century literature is published either in book form, in the *Philosophical Transactions of the Royal Society*, or in a few other journals of the period. In 1788 James Hutton's classic paper "Theory of the earth . . ." was published in the *Transactions of the Royal Society of Edinburgh*. Hutton is often called the founder of modern geology. A 1794 manuscript by William Smith ("Geological sections"), and a map prepared in 1799 ("Geological map of the country around Bath") mark the introduction of a significant form of geological literature—geological maps.

The nineteenth century saw a rapid development in the number of books and papers in journals. In 1811 the *Transactions of the Geological Society* (of London) was first published. In 1814 the Royal Geological Society of Cornwall was founded, and its *Transactions* was first published in 1818. In 1822 the *Transactions of the Cambridge Philosophical Society* started, soon to be followed by many other philosophical societies that became interested in geology. Henry Thomas de la Beche brought about the foundation of the Geological Survey in 1835, and contributed to the first publication in 1839, *Report on the geology of Cornwall, Devon, and West Somerset*, thus founding the famous *Memoir* series which gives systematic detail and geological maps of regions. The Paleontographical Society monographs started in 1848, the Geologists' Association was founded in 1858, and *Geological Magazine* began in 1864. The middle part of the nineteenth century was notable for the publication of major books by Roderick Impey Murchison (*Siluria*, London, 1854) and Adam Sedgwick (with F. M'Coy, *A Synopsis of the Classification of the British Palaeozoic Rocks with a Systematic Description of the Fossils*, Cambridge Univ. Press, 1855).

Charles Lyell's *Principles of Geology* was first published in 1830 (Murray, London) and ran to many editions; it is the most widely known general text of the nineteenth century and was consolidated in 1838 as *Elements of Geology* (some later editions being called *A Manual of Elementary Geology*). An American edition was published in 1837 (Philadelphia) from the fifth (and last) London edition of *Principles*. In the latter part of the nineteenth century many new journals were founded under the auspices of local natural history societies. The development pattern in other parts of the world usually followed the British style. The development of British geological literature has been reviewed by Challinor (7).

NATURE OF GEOLOGICAL INFORMATION

Geology *sensu stricto* occupies a position immediately below the deduction-induction boundary in an abstraction-complexity series:



Geologists often work with more than one hypothesis because deductive logic can rarely be used in geology. Griffiths (*8*) discusses some principles of experimental enquiry. Information is often incomplete because the earth's surface is not fully available to the geologist's hammer, or even to drilling rigs.

Geological data is obtained by observing rock outcrops, areas devoid of a vegetation cover, quarries, cliffs, and road and railway cuttings. In addition to this surface information, data can be derived from subsurface exploration—for example from oil wells, mines, and caves. A third category of information, and an increasingly important one, is remotely-sensed data from aerial surveys and space surveys; the form of this data is an image which may be sensed at a wide range of wavelengths, including radar, infrared, visible spectrum (photography), and ultraviolet.

The data may be recorded in field notebooks or be directly rendered into machine-processable form; for example, mark sensing (*9*) or with an IBM 1287 optical reader (*10*).

Specimens of minerals, rocks, fossils, water, etc. are important; the precise location for each specimen is noted (and often its attitude to its host materials), and these are then taken to the laboratory for further examination. Photographs may be taken of small-scale or large-scale features. Sometimes measurements of physical or chemical parameters are taken with instruments, such as a gravimeter to measure gravity, an electrical logging tool to record, for example, resistivity in a bore hole, or an instrument to measure the level of mercury in the atmosphere. Geologists are increasingly using instruments in the field and the laboratory; this has resulted in a growing literature that is widely scattered.

Geological data are now often entered into computerized storage and retrieval systems. These are being investigated by COGEODATA of the International Union of Geological Sciences. In addition, CODATA, a Committee of the International Council of Scientific Unions, now includes environmental data within its scope. Mathematical geologists are beginning to use these data archives for extensive analysis, the results being published in the *Journal of the International Association for Mathematical Geology;* new methodology is abstracted in *Geocom Bulletin.* Geological information also has a dimension—time—not possessed by most other forms of information. Methods of determining the absolute age of geological materials have been developed from the study of the radioactive decay of certain isotopes. Relative age is determined from the field relationships of the rocks.

Finally, geology knows no national boundaries. Consequently the literature is most widely distributed as physiographical features often cross national and linguistic boundaries. Thus papers on the geology of the Alps may be found in the publications of several national geological surveys and international journals, in English, German, French, and Italian.

MEDIA OF GEOLOGICAL COMMUNICATION

Geological information has lasting value and suggestions that it contains much ephemera are poorly founded. Brown (*11*, p. 106) has noted that "the citations

in its source journals are not so highly concentrated in volumes of serials published during the most recent decade as are similar citations in most of the other sciences. Only 42.3 per cent of the citations in geology [based on a sample from U.S.-published journals] are to volumes published in the last decade. This percentage compares with 75.6 in physics; 61.6 in physiology; and 58.1 in chemistry." It can be concluded that the decay rates of the physics, chemistry and geology literature confirm the abstraction-complexity series (see the preceding section): complex sciences have a low decay rate.

J. E. G. Craig (*12*) found in a study of 1960 and 1965 United States literature that 35% of references were to the previous 5 years, 72% to the previous 15 years, 83% to the previous 25 years, 88% to the previous 35 years, 92% to the previous 45 years, 94% to the previous 55 years, and 96% were to the previous 65 years (i.e, twentieth century).

G. Y. Craig (*13*) discussed the decay rates of geological data. He suggested the figures listed in Table 8.

TABLE 8

Decay Rates of Geological Data (*13*)

Kind of data	Useful life
Chemical analyses	15–20 years
Structural data, simple	Very long
sophisticated	15 years
Paleontological data	Until reworked (ideally 20–40 years)
Petrographical data, igneous	10–20 years
metamorphic	10 years
sedimentary	20 years
Borehole data	Very long

Geological data in unpublished form are assuming greater importance because more of it is now in machine-processable form. Data archives are being established by many organizations, particularly national geological surveys, oceanographical institutes, and exploration companies.

Geology has a report literature which does not differ greatly from other sciences except that reports tend to be confidential if they are concerned with exploration for natural resources. Geological reports of quality are usually published formally in the geological literature.

The geological serial literature is characterized by often being regional in its publication or aspect. There is also a particularly high proportion of government publications in the literature, mainly because of the activities of geological surveys. Many geological serials have very long runs back to the last century, although in some cases publication has been irregular. There appears to be evidence of a sudden, rapid increase in the number of geological serials that have started publication since 1968. It is too soon to quantify this increase, although it may be

observed that geology probably has a higher proportion than other sciences. It is also a reflection of increasing specialization along interdisciplinary lines.

It is estimated by Geosystems from a study of books included in *Geotitles Weekly* that there will be up to 2,000 books pertaining to geology published in 1972. Conference proceedings, books of collected papers, Festchriften, and sborniki will probably add another 500 items. Another verification of the abstraction-complexity series is seen in the number of geological conferences held each year: it appears that complex subjects give rise to more conference papers than abstract subjects. Geological conference papers are indexed in *Geotitles Weekly*.

Geological maps are a special form that pose problems beyond those of topographical maps. Some maps are published in series, especially if this is by a well-established geological survey. The Geological Survey of Great Britain set a pattern in geological map publishing by releasing a *Memoir* with each geological map; the *Memoir* describes the geology of the mapped area. The geological map editions may be described as "drift," meaning that the surficial geology is mapped; in a "solid" edition the bedrock geology is mapped. There is an increasing tendency toward the publication of thematic geological maps. Geological maps are usually superimposed on a topographical base map; geological sketch maps included with text in papers and books normally contain only essential topographical information. The value of a geological map remains very high until an area is re-mapped in more detail.

As geology is a complex subject, it is important that all available information is taken into account in any study. Of the abstracting and indexing services, only *Geotitles Weekly* attempts to cover all forms of geological literature.

NOMENCLATURE AND TERMINOLOGY

> "When *I* use a word" Humpty Dumpty said in rather a scornful tone, "it means just what I choose it to mean—neither more nor less."
>
> "The question is," said Alice, "whether you *can* make a word mean so many different things."
>
> "The question is" said Humpty Dumpty, "which is to be the master—that's all."
>
> (Lewis Carroll, *Alice Through the Looking Glass.*)

In the same decade that the Geological Society of London became concerned with indexing geological literature, G. Roberts published in 1834 *An Etymological and Explanatory Dictionary of the Terms and Language of Geology* (*14*). Another early work was David Page's *Handbook of Geological Terms and Geology* (*15*). His preface draws attention to the difficulty of geological nomenclature:

> Should it be asked why I publish this volume, I answer, along with many others, because I believe such a Handbook to be greatly needed; and under this conviction have done my best within moderate limits, to render it useful. Go where you will to the popular platform, the public lecture-room, or the private parlour—and you hear immense interest professed in the science of Geology; but the profession, for the most part, accompanied by the regret that its "hard words and

> forbidding technicalities" should render it so difficult of acquirement. Now, while deprecating, in the strongest manner, the introduction of unnecessary terms, it is quite evident that every science must have its own technicalities and modes of expression; new objects require new names; and new facts new phrases to express their relations. There is no avoiding this necessity in any progressive branch of human knowledge, and the only thing that can be done to lessen the difficulty—next to the rigid exclusion of whatever seems superfluous—is to explain these terms in brief and simple language. This I have endeavoured to do, chiefly with a view to the requirements of the general reader, at the same time appending such details as might render the volume an acceptable Handbook of Reference to the student and professed Geologist.

Page's *Handbook* contains "tabular schemes of the chemical, mineral, lithological, and vital aspects of the globe," followed by a glossary, termed a "dictionary of terms and technicalities employed by British and American geologists," and concludes with an "explanation of specific apellations, made use of by British and foreign palaeontologists."

A number of other geological glossaries of lesser importance were published during the last century, including W. Humble's *Dictionary of Geology and Mineralogy* (1840) (*16*), G. H. Kinahan's *A Handibook of Rock Names* (1873) (*17*), B. von Cotta's *Rocks Classified and Described* (translated by P. H. Lawrence) (*18*), and T. H. Oldhan's *Geological Glossary* (1879) (*19*).

The first major geological lexicon of the twentieth century was Loewinson-Lessing's *Lexique Petrographique* (1901) (*20*). Arthur Holmes remarked nearly 20 years later that "so luxuriant has been the growth of nomenclature during the last two decades that the *Lexique* no longer serves as an adequate guide through the somewhat tangled forest of names." Holmes' *The Nomenclature of Petrology* (*21*) was a standard work. It has recently been reprinted. It consists of a useful discussion, followed by a glossary of terms; the last part has appendices of French, German, Latin, and Greek petrographic terms, words, and prefixes, together with classification tables.

Paleontologists have used the zoologists' *International Code of Zoological Nomenclature* (*22*) which sets out strict rules for naming new genera, species, etc. The parallel work for fossil plants is the *International Code of Botanical Nomenclature* (*23*).

More severe problems of nomenclature exist in the field of stratigraphy. Fierce arguments were common during the last century and their tenor has diminished only slightly this century. It was in 1831 that Adam Sedgwick started work in North Wales, founding the Cambrian System. His famous contemporary, Roderick Impey Murchison, worked down the stratigraphic succession in the Welsh borderland, and established the Silurian System. As Sedgwick extended his work up the succession, and Murchison continued downward, it was found that their systems overlapped. This led to the best-known nomenclature controversy in the history of geology, one that continued even to the middle of this century. Thus Brinkmann (*24*), in a prominent work, divided the Ordovician and Silurian into the

Upper and Lower Silurian. However, in the 1960 English translation, the Ordovician was recognized.

In 1932 a joint committee of North American geologists devised a set of principles and rules for the classification and nomenclature of rock units (*25*). From 1942 the American Commission on Stratigraphic Nomenclature has published a series of "Notes" in the *Bulletin of the American Association of Petroleum Geologists*. An important publication was:

> *Code of Stratigraphic Nomenclature*, American Commission on Stratigraphic Nomenclature, American Association of Petroleum Geologists, Tulsa, 1970.

Also of note are Sylvester-Bradley (*26*) and review papers by Stormer (*27*) and Verwoerd (*28*). Van Eysinga (*29*) has summarized stratigraphic terminology, although some definitions are disputed; Truswell (*30*) reviewed terminology.

Work on stratigraphic classification and nomenclature is now coordinated internationally by the International Union of Geological Sciences Commission on Stratigraphy, although there is still no agreement about several important principles. National groups have prepared briefs; for example, the British *Recommendations*. Nevertheless, it is expected that the International Geological Correlation Program (IGCP), jointly sponsored by the International Union of Geological Sciences and UNESCO, will help in overcoming some problems. The *Lexique Stratigraphique International* started before the founding of the International Union of Geological Sciences; it was sponsored by the International Geological Congress Commission on Stratigraphy. It is published by the Centre National de la Recherche Scientifique, Paris, in eight volumes; these correspond with the continents, except that the last volume contains major stratigraphic terms. In 1972 publication was still in progress and second editions of some sections have been issued.

SERIAL RANKING

It may be reasonably expected that no two studies of serial rankings would yield the same result. The most common weakness of existing studies is their failure to make clear national bias in sampling. The best-based study is probably that by Snowball (*31*), who studied serial ranking for literature relating to the geology of Africa south of the Sahara. His sample of 697 papers from 160 journals was drawn from the 1966–August 1970 issues of *Bibliography and Index of Geology*, and excluded governmental and African-published serials. Snowball compared his ranking with five other studies of serial ranking (see Table 9). Snowball's conclusion from the comparison of rankings was that "rankings published in America are not a reliable guide to the relative importance of the serials cited in the study of African geology." Indeed, it is evident that extreme caution should be exercised by any librarian using geological serial rankings as a guide for purchasing.

TABLE 9

Comparison of Serial Rankings Versus a Ranking for the Literature Relating to the Geology of Africa South of the Sahara (*31*)

	Rank					
				Craig (*12*)		
	Snowball, 1964–1970 literature (*31*)	Fenner and Lloyd (*32*)	Woodford (*33*)	1956 literature	1960 literature	Brown, 1954 literature (*11*)
Nature	1	27	17	12	10	42
Economic Geology	2	—	8	3	4	5
American Mineralogist	3	13	3	9	10	4
Institution of Mining and Metallurgy, Transactions	4	—	—	—	—	—
Geological Society of London, Proceedings	4	29	—	—	—	—
Geological Magazine	6	—	22	—	—	36
Mineralogical Magazine	7	—	18	17	10	32
Beitrage zur Mineralogie und Petrologie	8	47	81	—	—	—
Geological Society of America, Special Paper	9	—	10	22	17	—
Earth and Planetary Science Letters	9	10	—	—	—	—
Geologische Rundschau	11	—	62	22	—	—
Geological Society of America, Bulletin	12	6	1	1	1	1
Eos	13	—	—	—	—	—
Science	14	34	9	7	10	12
Geochimica et Cosmochimica Acta	14	33	14	9	23	26
Journal of Geophysical Research	14	5	12	2	9	—
Bulletin Volcanique	17	—	95	—	—	—

Secondary Services

DEVELOPMENT OF SECONDARY SERVICES

The first major compilation having special reference to geology is:

> I. D. Reuss, *Repertorium Commentationum a Societatibus Litterariis Editorum*, Gottingae, 1801, iv + 604 pp., I Historia naturalist. generalis et zoologia. II Botanica et mineralogia.

The most complete coverage of nineteenth century literature is contained in:

> *Catalogue of Scientific Papers*, Royal Society, London, 1867–1925, 19 vols.

This covers the literature from 1800–1900 and has been reprinted.

Another notable work was the bibliography of works consulted by Louis Agassiz:

H. E. Strickland (editor), *Bibliographia Zoologiae et Geologiae: A General Catalogue of all Books, Tracts, and Memoirs on Zoology and Geology (compiled by Louis Agassiz)*, Ray Society, London, 1848–1854, 4 vols.

From 1900 the secondary services have been divided into language and country groupings with a minimum of cooperation between services. These services can best be described under three categories:

1. *General services* which aim at worldwide coverage of the whole literature of geology.
2. *National and regional services* which have as their objective the documentation of the geology of a region or a country.
3. *Specialized services* which cover the literature of a particular field of geology.

Attempts have been made to create an internationally operated service, the most successful being the Royal Society's *International Catalogue of Scientific Literature* which was published with international collaboration for the period 1901–1914. One interesting unanimous point of agreement by the international committee was their condemnation of the Dewey classification system. A paper by Tromp (*34*) spurred an attempt to found *Geological Abstracts* at the 20th International Geological Congress in 1960 at Copenhagen. This venture did not succeed, however. A further attempt was made by the American Geological Institute to include British and other input in the *Bibliography and Index of Geology*, but this has not been successful (*35*).

From 1967 to 1970 the American Geological Institute was funded by the National Science Foundation to look into the establishment of a national geoscience information program. This led to the establishment of a bibliographical reference center of the American Geological Institute, and the establishment of the Committee on Geoscience Information in 1969. However, at the end of 1971, three major United States abstracting and indexing services ceased publication—*Abstracts of North American Geology, Bibliography of North American Geology*, and *Geophysical Abstracts*. It is also apparent that the *Bibliography and Index of Geology* is not keeping pace with the literature expansion, and that the depth of indexing is decreasing.

The most recent service, as well as the largest and most comprehensive, is *Geotitles Weekly*, published by Geosystems in London from 1969. Unlike other services, Geosystems uses the resources of many libraries, and since the London libraries have stronger holdings of geology than any other region of the world, this is reflected in the coverage of *Geotitles Weekly*. A study by MacKay (*36*) indicated that the mean delay between the arrival of the primary journals and the receipt of *Geotitles Weekly* in a library was less than a month (the publication is distributed by airmail).

The increasing trend toward the use of the English language in geology precludes an international service being in any other language, and so the French,

German, Russian, and Japanese services will be used mainly by workers in these languages. National and regional services are usually more complete than the general services, but are usually several years behind them in publication. A logical development would be for the general services to supply information to the national and regional services, which would in turn inform the general services of missing sources. There has been debate about the desirability of abstracts, much of it regrettably ill-informed (*35, 37*). A study of the present situation shows that the general services cannot afford to abstract unless very heavily subsidized, and that it is the specialized and national abstracting services which provide abstracts that are appreciated. However, specialized abstracting services cannot achieve the coverage of the general indexing services, so there is a complementary role.

GENERAL SERVICES

The first general service was the German serial *Taschenbuch für die Gesamte Mineralogie* which started in 1807. British services could be said to start with the Royal Society's *Catalogue of Scientific Papers* which covers the literature from 1800, although the first volume was not published until 1867. A French service started in 1923, an American service in 1934, a Russian service in 1956, and finally a Japanese service in 1958.

Nevertheless it is doubtful whether a quarter of the total geological literature has yet been documented by all the general services combined. The documented and undocumented literature is being added to a computerized file, called Geo-Archive, by Geosystems, which is working first with the resources of the London libraries.

German Services

The main German service is published by E. Schweizerbart'sche Verlagsbuchhandlung (Nägele u Obermuller), Stuttgart. The service dates back to 1807:

1807–1824	*Taschenbuch für die Gesamte Mineralogie*
1825–1829	*Zeitschrift für Mineralogie, Taschenbuch*
1830–1832	*Jahrbuch für Mineralogie, Geognosie, Geologie und Petrefaktenkunde*
1833–1862	*Neues Jahrbuch für Mineralogie, Geognosie, Geologie und Petrefaktenkunde*
1863–1880	*Neues Jahrbuch für Mineralogie, Geologie und Paläontologie*
1881–1925	*Neues Jahrbuch für Mineralogie, Geologie und Paläontologie*
1926–1927	*Neues Jahrbuch für Mineralogie, Geologie und Paläontologie. Referate Abteilung A, Abteilung B*
1928–1942	*Neues Jahrbuch für Mineralogie, Geologie und Paläontologie Referate*
	Teil I Kristallographie
	Teil II Allgemeine Geologie, Petrographie, Lagerstättenkunde
	Teill III Historische und Regionale Geologie, Paläontologie
1943–1949	*Zentralblatt für Mineralogie, Geologie und Paläontologie Referate*
	Teil I Kristallographie
	Teil II Allgemeine Geologie, Petrographie, Lagerstättenkunde

Teil III Historische und Regionale Geologie und Paläontologie
Continues *Abteilung B: Paläontologisches Zentralblatt*
[no issues for 1943–1947]

1950– *Zentralblatt für Mineralogie*
Teil I Mineralogie: Kristallographie und Mineralogie [3 issues a year]
Teill II Petrographie, Technische Mineralogie, Geochimie und Lagerstättenkunde [6 issues a year]

1950– *Zentralblatt für Geologie und Paläontologie*
Teil I Allgemeine und Angewandte, Regional Geologie, Historische Geologie, varia [12 sisues a year]
Teil II Paläontologie: Allgemeine Paläontologie, Paläozoologie, Paläobotanik [6 issues a year]

A second service, *Geologisches Zentralblatt*, was published by Borntrager, Leipzig, from 1901–1942:

1901–1942 *Geologisches Zentralblatt*
Anzeiger für Geologie, Petrographie, Paläontologie und Verwandte Wissenschaften
From 1932–1942, Vols. 46–70: *Abteilung A: Geologie* [ceased publication 1942]. *Abteilung B: Paläontologisches Zentralblatt* [continued by *Zentralblatt für Mineralogie, Geologie und Paläontologie Referate, Teil III*]

Zentralblatt für Mineralogie and *Zentralblatt für Geologie und Paläontologie* are the current services and date back to 1950. Titles are arranged in accession number sequence. The information given consists of author, title, source (abridged), volume, year, and page. Plates, figures, tables, and the publisher of the original source are sometimes given. Titles are given in the original language with the exception of Cyrillic and oriental languages, which are given in German or English. Abstracts, which are not always present, may be in German or the original language (in which case they are the author's abstract); the abstracter's name is given, and the length of abstracts varies from twenty to several hundred words.

The indexes for *Zentralblatt für Geologie und Paläontologie* consist of author and subject indexes for each part of Teil I; Teil II has only the subject index in each part. *Zentralblatt für Mineralogie* has subject indexes in all parts of Teil I and Teil II. Both Zentralblatt series have annual author, subject, and geographical indexes. The coverage includes journals and books, but the relatively low number of entries (about 12,000/year for both parts in 1968) and the slow speed of publication (about 30 months behind primary publication) makes the service of restricted use. The principal advantage is for pre-1950 retrospective searching, because of the valuable cumulated indexes.

It has been announced that from 1972 *Zentralblatt für Geologie und Paläontologie* will include progress reports for individual branches of the geosciences, and that bibliographies and reviews of journal articles will be largely omitted; critical reviews of technical books in the geosciences will continue to be published.

Cumulated Indexes. Cumulated indexes have been published as *Repertorium zum Neuen Jahrbuch und Zentralblatt für Mineralogie, Geologie und Paläontologie*, 1830–1949. Indexes for 1950 onwards are reported as being in preparation. There are two indexes: Teil I Personenregister (Author Index) and Teil II Sachregister (Subject Index).

British Services

1800–1900 *Catalogue of Scientific Papers*

This was published by the Royal Society in four series and 19 volumes between 1867 and 1925. It is the most uniform work for this period, although entries are arranged only by author. It was succeeded by the *International Catalogue of Scientific Literature*. The *Catalogue of Scientific Papers* has been reprinted.

1851–1894 *Donations to the Library (with Bibliography)* [of the Geological Society of London]

In *Quarterly Journal of the Geological Society of London*, Proceedings section. Continued as:

1894–1934 *Geological Literature Added to the Geological Society's Library*

This is an annual bibliography arranged by author, with subject and geographical indexes.

1873 *List of Principal Additions to the Geological Society's Library*

1873–1952 In *Abstracts of the Proceedings of the Geological Society of London.*

1953–1971 Continued in *Circular Geological Society of London.*

1972– Continued in *Geological Society Newsletter.*

1874–1884 *Geological Record*

An annual bibliography from 1874–1879, with 2 volumes for the period 1880–1884.

1901–1914 *International Catalogue of Scientific Literature*

Published annually by the Royal Society, with international collaboration. It continued the *Catalogue of Scientific Papers*, 1800–1900. The sections of relevance were:

F Meteorology
G Mineralogy
H Geology
J Geography
K Paleontology

The classification was quite elaborate; it was devised by an international committee, and also given in German, French, and Spanish. The fullest development for Section H contained 75 classes.

1969– *Geotitles Weekly*

Published by Geosystems [a Division of Lea Associates Limited], PO Box 1024, Westminister, London SW1P 2JL, England. *Geotitles Weekly* is published as quarterly volumes, the first being for the third quarter of 1969. It is the largest and most comprehensive indexing service for geology, having between 50,000 and 75,000 items a year. Geosystems has devised a decimal classification system for geological literature which is known as Geosystems Decimal Classification (GDC). It covers a broad subject area; the latest version of the subject classification is given in Figure 1 (pages 330–332). At present, UDC auxiliaries of place are used for poli-

tical place names, stratigraphic divisions, and language, although Geosystems has announced that from 1973 their own system will be used. The extent of the classification will then be as shown in Figure 2.

There are four sections to each issue of *Geotitles Weekly* (see Figure 2).

1. *Yellow pages* for *Geo-News*, which is the only weekly news service covering the whole spectrum of geoscience. It includes exploration developments; expeditions; short-lived natural phenomena; geological discoveries (such as new minerals, rocks and fossils); news about the production of natural resources; geoscience policy; news from geoscience organizations; biographical items; announcements of important new publications; details of new products, services, and methods; summaries of world broadcasts; and a list of the more important items in weekly announcement journals such as *Nature*, *New Scientist*, *Science*, and *Mining Journal*.
2. *White pages* for the subject-classified list of items seen by Geosystems during the week preceding publication. The first part of this list (GDC 100/195) includes conference papers, books, and other publications that are more conveniently listed by form, such as standards, patents, annual reports, special publications, theses, and translations.

All titles are given in English, except unpublished conference papers, which are cited in the original language, or transliteration. There is extensive cross-reference between subject classes. The form of individual references is shown in Figure 2.

Geosystems distinguishes two kinds of key words: identifiers and descriptors. Identifiers have been indicated from January 1972, and descriptors are being added from January 1973. A preliminary thesaurus has been published (*Geosaurus: Geosystems' Thesaurus for Geoscience*). This thesaurus follows closely the UNESCO *Guidelines for the Establishment and Development of Monolingual Scientific and Technical Thesauri for Information Retrieval*. A multilingual version is in preparation, as well as a revised English version.

Geosaurus is being used by the Editors of *Geotitles Weekly* as a word association list for helping indexers. It is also expected that *Geosaurus* will prove of use to all geologists as a transformation of the natural language into the information language. The purpose of *Geosaurus* is to formalize the basic terminology of geoscience for information retrieval. It consists of a hierarchical structure superimposed on Version 10 of Geosystems Decimal Classification of geoscience. There are two principal forms to the thesaurus; Gesosaurus numerici presents the thesaurus as a systematical subject hierarchy, whereas Geosaurus alphabetici is an alphabetical list of terms. It is intended that *Geosaurus* will be used from 1973 to provide descriptors that supplement the titles and title extensions in *Geotitles Weekly*. Identifiers are distinguished and added from 1972 onwards. They consist of rock, mineral, and fossil names; geographical locations; stratigraphic names; names of organizations; trade names and equipment code numbers; acronyms; and abbreviations. Some identifiers are assigned category codes, some examples being:

*BIOG	Biography
*NGEN	New genus
*NMIN	New mineral
*NSPE	New species
*OBIT	Obituary
*PORT	Portrait or photograph

100 GENERAL PUBLICATIONS
110 Conferences
112 Conference abstracts
113 Conference preprints
115 Conference papers
118 Conference summaries
120 Conference proceedings
122 Field trip guides
130 Books
133 Collected papers
135 Book reviews
140 Intergovernmental publications
150 Legislative publications
160 Standards
165 Patents
170 Annual & periodic reports
180 Special publications
190 Theses
195 Translations

200 REGIONAL GEOLOGY
210 Topographic maps & data
215 Oceanographic maps & data
220 Geological maps
225 Regional maps & data
230 Paleogeographic maps & data
240 Ground geophysical surveys
250 Resource maps & surveys
270 Airborne surveys
280 Astronomical maps & data
290 Environmental surveys

300 APPLIED GEOLOGY
310 Specimen collecting

320 EQUIPMENT & INSTRUMENTATION
321 Exploration equipment
322 Laboratory equipment
323 Geochemical equipment
324 Geophysical equipment
325 Geosensing equipment
326 Geodetic equipment
327 Petroleum equipment
328 Mining equipment
329 Oceanography & hydrology equipment

330 EXPLORATION
332 Exploration geology
334 Exploration geophysics
336 Exploration geochemistry
338 Well logging

340 PRODUCTION
342 Petroleum production
346 Mining production

350 MANAGEMENT & CONTROL
351 Production management
353 Exploration management
355 Conservation
357 Environmental geology

360 ENGINEERING GEOLOGY
362 Soil mechanics
365 Rock mechanics
368 Ocean engineering

380 OCEANOLOGY
382 Sea water
383 Continental shelf
384 Ocean floor
386 Geophysical oceanology
388 Geochemical oceanology

390 NATURAL RESOURCES
392 Energy
395 Hydropower
398 Geothermal energy

400 PETROLEUM
404 Oil sands & shales
406 Natural gas
410 Coal
412 Nuclear power

415 MATERIALS
418 Ore genesis
420 Metallic deposits
421 Iron & manganese ores
422 Non-ferrous metallic ores
423 Gold & silver ores
425 Copper ores
426 Lead & zinc group ores
430 Tin ores
431 Chromium group ores
438 Cobalt & nickel ores
440 Platinum group ores
441 Aluminum ores & corundum
442 Rare earth ores
443 Titanium group ores
444 Radioactive ores
449 Other metallic deposits
450 Non-metallic deposits
451 Rock & stone
456 Clay
457 Sand & gravel
458 Evaporites
467 Phosphates
469 Sulphur deposits
470 Silicate mineral deposits
475 Alkaline earth deposits
481 Gemstones

FIGURE 1. *See page 332 for legend.*

490 WATER
491 Hydrology
492 Hydrogeochemistry
493 Groundwater
496 Surface water
498 Limnology

510 MINERALOGY
515 Crystallography
519 Organic minerals
520 Silicates
522 Ortho- & ring silicates
524 Chain silicates
526 Sheet silicates
527 Clay minerals
528 Framework silicates
530 Non-silicates
531 Native elements
532 Oxides
533 Hydroxides
534 Sulphides
535 Sulphates
536 Borates
537 Carbonates
538 Phosphates
539 Halides

540 PETROLOGY
541 Experimental petrology
542 Plutonism
543 Plutonic rocks
544 Plutonic structures
545 Plutonic processes
546 Volcanism
547 Volcanic rocks
548 Volcanic structures
549 Volcanic processes

550 SEDIMENTOLOGY
552 Sedimentary rocks
554 Sedimentary structures
556 Sedimentary processes
558 Experimental sedimentology

560 PALEONTOLOGY
561 Paleobiology
563 Paleobiochemistry
565 Paleoecology
567 Evolution
569 Taxonomy
570 Invertebrate paleontology
571 Porifera
572 Brachiopoda
573 Coelenterata
574 Bryozoa
575 Arthropoda
576 Mollusca
577 Echinodermata
578 Hemichordata
579 Other invertebrates
580 Micropalcontology
581 Protista
582 Foraminifera
583 Conodonta
584 Ostracoda
585 Other microfossils
588 Trace fossils & problematica
590 Paleobotany
593 Palynology
595 Vertebrate paleontology

610 PEDOLOGY

626 GLACIOLOGY

630 ATMOSPHERIC SCIENCE

640 PLANETOLOGY
641 Lunar studies
648 Meteorites

650 GEOCHRONOLOGY

660 GEOCHEMISTRY
665 Biogeochemistry
670 Isotope geochemistry

680 GEOPHYSICS
681 Seismology
683 Geomagnetism
685 Gravity
687 Geoelectricity
689 Geothermy

690 MATHEMATICAL GEOLOGY

700 GEOLOGY
705 Earth

710 GEOMORPHOLOGY
712 Geomorphological features
714 Geomorphological processes
718 Speleology

720 STRUCTURAL GEOLOGY
722 Structural features
724 Structural processes
735 Reefs

740 HISTORICAL GEOLOGY
741 Stratigraphy
743 Lithostratigraphy
745 Biostratigraphy
747 Chronostratigraphy
750 Paleogeography
751 Paleoclimatology
755 Paleomagnetism

FIGURE 1 *(continued). See page 332 for legend.*

760 GEODYNAMIC PROCESSES

800 METHODOLOGY
810 Methods
815 Field methods
820 Laboratory methods
822 Microscopy
823 Holography
830 Computer methods
832 Computer programs
840 Graphical methods

850 GEODESY & GEOSENSING
860 Geodesy
870 Surveying
880 Cartography
885 Military geology
590 Geosensing

900 GEOSCIENCE DOCUMENTATION
910 Guides to literature
916 Subject bibliographies & reviews
918 Area bibliographies & reviews
920 Directories
928 Dictionaries & classifications
931 Catalogues of collections
932 Biographical directories & lists
935 Special publications
939 Manuscripts & archives
940 History of geosciences
942 Biographical materials
946 Historical materials
950 Documentation studies
951 Publication theory & practice
953 Information centres
954 Information systems
955 Data processing
957 Classification & cataloguing
960 Geoscience organisations

970 GEOSCIENCE POLICY
971 Regional co-operation
972 International co-operation
973 General science policy
975 Educational policy
976 Research policy
977 Energy policy
978 Materials policy
979 Environmental policy

980 GEOLOGICAL EDUCATION

990 GEOSYSTEMS INDEXES

FIGURE 1 *(concluded). Geosystems Decimal Classification of Geoscience (GDC). Version 10.*

3. Green pages for indexes. At present there are weekly indexes of sources, abbreviations, and authors. Geosystems has announced that geographical, physiographical, and stratigraphic indexes are to be published. Cumulative indexes of sources have been issued. Cumulation of entries is computer-output microfilm (COM) and is called *Geotitles Repertorium.*

4. Grey pages for tables of stratigraphic, language, physiographical, geographical, and subject codes. Alphabetical indexes to these codes are given in the *Geotitles Users' Guide* which is supplied to all subscribers.

Sources and Source Codes. Geosystems' philosophy is to identify all sources having an information content pertaining to geoscience, without making any value judgment about the quality of the information, since in some circumstances even poor information can be of great value.

Sources are coded by a four or five letter code, called a GCODE (pronounced gee-code). Five letter codes are used for serials, and four letter codes (preceded by an asterisk) for nonserials. The initial letters of significant words of a serial title are used to form a GCODE; there are rules to determine the sequence of words in the title, for titles having less than five significant words, and for cases where two serials could have the same GCODE; these are dealt with in *Geotitles Users' Guide.* Some examples are:

TIMMA	= *Transactions of the Institution of Mining and Metallurgy. Section A*
BPDMH	= *Bulletin of the Peak District Mines Historical Society*
TUSES	= *Tin and Its Uses*
UHLIP	= *Uhli* (Prague)
SNEWS	= *Seis News*
SNEWW	= *Science News* (Washington)

Nonserial publications are given a GCODE that is descriptive of the publication form, e.g.,

*BOOK	= Book
*CPAP	= Conference paper
*FEST	= Festschrift
*MAPS	= Geological map
*PAMP	= Pamphlet
*PROC	= Proceedings volume
*SBOR	= Sbornik

Geosystems includes abbreviated serial titles following the *International List* abbreviation (*International List of Periodical Title Word Abbreviations;* the abbreviation rules are given in British Standard 4148—1969, and a list of abbreviations can be purchased from Chemical Abstracts Service, Columbus, Ohio.)

Geotitles Repertorium. Geotitles Weekly is cumulated on microfilm using computer output on microfilm (COM) techniques. This avoids the need to search many volume or annual indexes since the information is totally cumulated. It also avoids the need to refer from an index to the main entry, since entries are given in full in each COM index. The microfilm is 16mm and is available on open rolls or in cassettes. The indexes available are subject (including cross-references in full), author, geographical, physiographical, and stratigraphical. Special bibliographies on microfiche are available on any subject from the microfilm cumulation.

Geo-Archive. Geo-Archive is the computerized geoscience information file, available on magnetic tape. *Geotitles Weekly* is derived from Geo-Archive, which includes an increasing amount of backlog information. The backlog material is divided into four time periods:

I	1960 onward
II	1940–1959
III	1900–1939
IV	Pre-1900

It is expected that Geo-Archive will contain 2.5 million items when the routine part of the back-log project is completed.

Geo-Archive is available in any magnetic tape format, 7 or 9 track. The service is based on a dual Univac 1108 installation in London. Technical information about Geo-Archive is published in the *Geo-Archivist*—a newsletter for users and potential users of Geo-Archive.

The information fields that may be retrieved from Geo-Archive, in any combination, are:

GEOTITLES WEEKLY SPECIMEN ENTRY

660(575:3536:113):543*82 VORONTSOV, AE & SELIVANOVA, GI
Peculiarities in the behaviour of lead and zinc from the Lower Paleozoic granitoids of the east central Sayan Mountain Range
Geol Geofiz [Novosibirsk] *GGEOF(9)71p40-47*

660 = Geochemistry — main subject
(575) = Soviet Central Asia — geographical auxiliary
(3536) = Sayan Range — physiographical auxiliary
(113) = Paleozoic — stratigraphical auxiliary
:543 = Plutonic rocks — subject cross reference
*82 = Russian — language auxiliary

GEOSYSTEMS DECIMAL CLASSIFICATION CATEGORIES

*10 to *99	Language auxiliaries (UDC)
100 to 989	Geosystems subject classification (see back cover)
990 to 999	Geosystems indexes
(10 to 20)	Planets
(111 to 119.6)	Stratigraphical auxiliaries (UDC)
(4 to 999)	Geographical auxiliaries (UDC)
(1000 to 1999)	Conference sequence numbers (within year)
(3000 to 3999)	Mountains
(4000 to 4999)	Geologically-designated areas
(5000 to 5999)	Plateaux and plains
(6000 to 6999)	Oceans and seas
(7000 to 7999)	Ocean floor features
(8000 to 8999)	Physiographical basins
(9000 to 9999)	Paleogeographical features

FIGURE 2.

1. *Geotitles Weekly* issue number, if assigned.
2. *Geotitles Weekly* item number, if assigned.

Geosystems Decimal Classification (GDC)

3. Version of GDC
4. Main subject, by GDC
5. Physiographical auxiliaries, by GDC
6. Geographical auxiliaries, by GDC
7. Stratigraphical auxiliaries, GDC
8. Related subject, by GDC
9. Language of original, by GDC

Authors

10. Authors
11. Translator
12. Reviser
13. Corporate author

Title

14. Title
15. Title extension codes
16. Title extensions

Identifiers
17. Identifiers
Serial Source
18. Source code, by GCODE
19. Volume
20. Part
21. Report number
22. Year
23. Starting page
24. Ending page
25. Total pages (serial or nonserial)
26. Items 18–25 for the original work, if the item is a translation
27. Serial source abbreviation by *International List*
28. ISSN
29. Items 27 and 28 for the original work, if the item is a translation
Nonserial Source
30. Publisher of nonserial work
31. Town of publication
32. Year of publication
33. ISBN
Conferences
34. Year conference starts
35. Geosystems' conference sequence number
36. Geosystems' conference paper number
37. Month and day conference starts
38. Month and day conference ends
39. Conference title
40. Conference organizer
Geological Maps
41. Latitude (lower value) in degrees, minutes, and seconds, north or south
42. Latitude (higher value) in degrees, minutes, and seconds, north or south
43. Longitude (lower value) in degrees, minutes, and seconds, east or west
44. Longitude (higher value) in degrees, minutes, and seconds, east or west
45. Scale

Suitable retrieval programs for Geo-Archive include IBM's TEXT-PAC and the INQUIRE system of Infodata Systems Inc.

French Services

1923–1929 *Bibliographie des Sciences Géologiques*
Published quarterly by the Société Géologique de France with the collaboration of the Société Francaise de Mineralogie. The arrangement is by source, geographically. Subject and author indexes were issued.

1930–1947 *Bibliographie de Sciences Géologiques* (second series)
Published annually and divided into nineteen cross-referenced sections. There was an annual author index.

1948–1960 *Bibliographie des Sciences Géologiques*
The bibliography was a re-issue under the above title of the *Science de la Terre* section of *Bulletin Analytique/Bulletin Signalétique*.

1940–1955 *Bulletin Analytique*

Volumes 1–16. Part 1 includes earth sciences.

1956–1971 *Bulletin Signalétique* continuing *Bulletin Analytique*

From 1956–1960, volumes 17–21, the *Science de la Terre* section was divided into:

1. Généralités
2. Minéralogie
3. Géochimie
4. Pétrographie
5. Géologie
6. Paléontologie

From 1961–1968, Volumes 22–29, the earth sciences were separated into two sections:

Sciences de la Terre

Section 10: Minéralogie
Géochimie
Pétrographie

Section 11: Physique du Globe
Géologie
Paléontologie

From 1969–1971, Volumes 30–32, the sections were again reorganized into four:

Section 120. *Astronomie et Astrophysique, Rayons Cosmiques, Météorites, Géophysique:*

A Astronomie et Astrophysique
B Rayons Cosmiques
C Météorites
D Géophysique

Section 210. *Sciences de la Terre 1:*

A Minéralogie
B Géochimie
C Géochimie isotopique, géochronologie
D Cosmochimie, géologie extraterrestre
E Roches cristallines
F Roches sédimentaires
G Géologie marine

Section 214. *Sciences de la Terre 2:*

A Gîtologie
B Économie minière
C Hydrologie
D Formations superficielles
E Géologie de l'ingénieur

Section 216. *Sciences de la Terre 3:*

A Tectonique et tectonophysique
B Géologie générale
C Stratigraphie et géologie régionale
D Paléontologie

Each subsection is further subdivided; regional studies are specially divided where relevant.

1958–1968 *Fiches Bibliographiques—Sciences de la Terre* (Index cards)

75 × 125 mm cards were issued monthly; references were given, one to each card, together with an alphanumeric coding system for subject, geographical, and stratigraphical classification. The service could be used in conjunction with a card sorter. It was strong on European literature, especially paleontology.

1968–1971 *Bibliographie des Sciences de la Terre*

Volumes 1–4. This continues *Fiches Bibliographiques—Sciences de la Terre*. Each volume was divided into eight *cahiers*:

A Minéralogie, géochimie et géologie extra-terrestre
B Gîtologie et économie minière
C Roches cristallines
D Roches sédimentaires et géologie marine
E Stratigraphie, géologie régionale et généralités
F Tectonique et géophysique
G Hydrogéologie, géologie de l'ingénieur et formations superficielles
H Paléontologie

Each *cahier* is further divided into rubriques (except H Paléontologie), and these rubriques are subdivided. Each cahier is issued 12 times a year

A difficulty in using *Bibliographie des Sciences de la Terre* is that each rubique is separately indexed; this makes many very small indexes. There are some anomalies of translation—not all titles are given in French; some English, Spanish, Italian, and Romanian titles are given only in these languages, whereas Japanese is translated into English (probably because the contents pages of many Japanese journals are also given in English). A fundamental aspect of this bibliography is the subject indexing system, which is based on a list of keywords having about 2,000 entries (*Liste alphabetique des mots-clés et presentation sous forme de schémas fléchés*, BRGM).

There is a keyword-in-context (KWIC) index, but not for the original title, only for the keywords in combination. This index is in French. Geographical keywords are arranged in a hierarchical classification, with subject keywords repeated under each entry. The arrangement is first by continent, then country.

The Économie Minière rubrique has an index of organization names; the Mineralogie rubrique has an index of mineral names; the Stratigraphie et géologie régionale rubrique has a stratigraphic index; and the Paleontologie cahier has paleontological and stratigraphical indexes.

Indexes have been cumulated annually for each rubrique, with a consolidated list of bibliographical references for the year and a cumulated index with interclassification of the different indexes. The publication was produced from a computer line-printer, and is therefore only in upper case. The number of citations is approximately:

1969	33,000
1970	36,000

1972– *Bulletin Signalétique*

Bibliographie de Sciences de la Terre. Volume 33–. The two services combined from 1972, using the *Bibliographie des Sciences de la Terre* division into 8 *cahiers*:

220 Cahier A
221 Cahier B
222 Cahier C
223 Cahier D
224 Cahier E
225 Cahier F
226 Cahier G
227 Cahier H

Other sections with some geoscience content are:

161 Cristallographie
170 Chimie
380 Agronomie
522 Histoire des Sciences

Bulletin Signalétique is a monthly service published by the Centre Nationale de la Recherche Scientifique (CNRS), 26 rue Boyer, 75 Paris 20e, France. Entries are arranged by accession sequence within subject. All authors are given, and the author's affiliation, if known; the original title is quoted if in the Roman alphabet, followed by the French translation. The reference to the source document includes country, year, volume, part, page numbers, figures, graphs, tables, and plates. Entries may have brief indicative abstracts or some keywords, in French.

Only cumulated indexes of authors were prepared until 1961. Thereafter subject, geographical, and author indexes for each section are supplemented by indexes of mineral species and fossil names. The monthly indexes are cumulated annually. A controlled vocabulary is used for selecting the keywords. Since the combination of *Bulletin Signalétique* and *Bibliographie des Sciences de la Terre* an additional index of keywords appears for each rubrique, in a style similar to a keyword-in-context listing; the index is in French and consists of upper-case printout from a computer line-printer. The coverage includes serials, proceedings, patents, theses, and reports: the library source is identified in each case. As CNRS is reported to be indexing 8,500 serials for all the sciences, it is unlikely that the number of serials covered is more than 1,000 for the earth science sections. The coverage of French language publications is good, as is that for the Polish and Romanian literature, as a result of exchange agreements.

The number of citations is approximately:

1956 11,000 [includes physique du globe]
1961 18,000 [includes 22/10, 22/11, 22/2]
1970 36,000 [includes 210, 214, 216, part C&D of 120]

The issues for 1972 contained 21,995 entries. *Bulletin Signalétique* is now photo-typeset and the information is therefore in

machine-readable form from 1971. *Bulletin Signalétique* is academically biased and is not particularly strong in its coverage of English language material.

United States Services

1934–1965 *Bibliography and Index of Geology Exclusive of North America*

Published by the Geological Society of America, P.O. Box 1719, Boulder, Colorado 80302. This series consists of 30 volumes, with annual volumes from 1934–1940, biennial volumes from 1941–1946, and annual volumes 1947–1965. Each volume attempted to cover the literature of the preceding year, and included items missed in earlier volumes; in practice, the delay became 2 or 3 years, and the number of items did not keep pace with the literature. Most entries have an abstract, and arrangement is alphabetically by author, with cross-references from second and subsequently named authors to the main author. There are annual indexes following the system devised by F. B. Weeks and J. M. Nickles at the beginning of the century for the United States Geological Survey's *Bibliography of North American Geology*.

It is unfortunate that no volume was issued for the 1966 literature. When the American Geological Institute cooperated with the Geological Society of America in producing the *Bibliography* in a revised format, the delay was such that the 1966 literature was not published and is largely missing from the bibliography.

The number of items during this period is approximately:

1951	4,400
1957	6,500
1959	6,200
1961	6,700
1963	6,300
1965	5,900

1967–1968 *Bibliography and Index of Geology Exclusive of North America*

Volumes 31–32 in monthly parts. There were brief abstracts for many items. The monthly indexes consisted of an author index and a hierarchical subject index in the same style as the first 30 volumes. Annual cumulations were issued after 2-year delays, and have the entries re-arranged by author, with author and subject indexes. The monthly parts are classified into 20 sections:

1. Areal geology
2. Economic geology
3. Engineering geology
4. Extraterrestrial geology
5. Geochemistry
6. Geochronology
7. Geohydrology
8. Geomorphology
9. Igneous and metamorphic petrology
10. Marine geology
11. Mineralogy and crystallography

12. Miscellaneous
13. Paleobotany
14. Paleontology, general
15. Paleontology, invertebrate
16. Paleontology, vertebrate
17. Sedimentary petrology
18. Soils
19. Solid earth geophysics
20. Stratigraphy and historical geology

The number of items for 1967 and 1968 is approximately:

1967	11,500
1968	17,000

1969– *Bibliography and Index of Geology*

The title changed to reflect the inclusion of a certain number of North American references. Abstracts were no longer included, but short free-format remarks were given after many items. However, it was noted in a study of the June 1970, June 1971, and November 1971 issues that whereas 67% of the June 1970 items had some annotation, only 16% of the June 1971 and 14% of the November 1971 items were annotated. A reduction of UDC indexing depth from 4.2 terms per entry to 2.7 terms per entry was also observed in the same period. The number of entries, although considerably more than the pre-1965 totals, grew at too slow a pace to keep abreast of the literature growth. A study of the coverage shows that less than 1% of the items are nonserial (i.e., books, etc.). A curious anomaly is that unpublished conference papers and some lectures are cited (for example the Geological Society of America meetings and the Geologists' Association lectures), but other major conferences are not covered.

The number of items for 1969–1971 are approximately:

1969	27,500
1970	30,000
1971	34,500

In 1969 and 1970, approximately 1,100 serial sources were cited in the *Bibliography*.

Geo. Ref

Geo. Ref is a computerized geologic reference file that is used to produce the *Bibliography and Index of Geology*. It contained 100,000 items at the beginning of 1971, and consists mainly of bibliographical citations that have been published in the *Bibliography* since 1967. Each item is 'flagged' in 14 fields:

1. A unique identifying number
2. Full title in original, or transliterated language
3. Title, if foreign, in English translation
4. Senior author
5. Junior authors (limited to ten)
6. American National Standards Institute (ANSI) abbreviated journal title

7. Volume and Issue numbers, pages, content description (maps, illustrations, abstracts, etc.)
8. Year of issue
9. Abstracts or annotations
10. All subject index terms
11. UDC number
12. Language of paper
13. Serial, monograph, or conference report
14. Subdiscipline classification number

Russian Service

1956– *Referativnyi Zhurnal*

Referativnyi Zhurnal is the major Russian abstracting service. It is published by VINITI (the All-Union Institute of Scientific and Technical Information), and is available by annual subscription from v/o Mezhdunarodnaya Kniga, Moscow G-200, USSR. There are several parts of interest to geoscientists, including *Geology (Geologiya)*, *Geophysics (Geofizika)*, and *Mining (Gornoe Delo)*. These parts are issued monthly. It is available in small sections, or in major, indexed groups of sections. Some sections are included in more than one part because of their interdisciplinary nature.

The time between primary publication and the appearance of the abstract in *Referativny Zhurnal* varies from about 3 months upward, with the majority of items being abstracted within 6 months of primary publication. The author indexes appear about 3 months, and the subject indexes 9 months, after the end of the volume year.

1956– *Referativnyi Zhurnal—Geologiya*

The titles are arranged according to the subject classification (see Figure 3) in accession order. Each title includes UDC, which can easily be used by those who are not fluent in Russian; the original title follows the Russian translation, except in the case of oriental languages, and the source includes year, month, volume, part, and page numbers. The sources are abbreviated. The source journal abbreviations have been listed in 1968, Part 7, with supplementary lists in Part I of 1969, 1970, and 1971.

The abstracts are informative, all in Russian, and may include sketch maps, tables of results, etc. Only a minor proportion do not contain abstracts. The abstractor's name is given, and each section has an editor. The monthly parts do not have any indexes. There are two author indexes, one for the Cyrillic alphabet and one for the Roman alphabet. The subject index includes geological, geographical, and paleontological sections; all indexes are in Russian, except the index of taxa.

Figure 3 gives the contents of the Geology section; the five-digit numbers are the section numbers that may be ordered separately. It is expected that there will be 41,000 items in this section in 1972.

1958– *Referativnyi Zhurnal—Geofizika*

This section was included with the *Physics (Fizika)* section from 1956–1957. The form is similar to the *Geology (Geologiya)* section, except that the monthly parts have an author index. Figure 4 gives

71365 Geology, with author and subject indexes

71368 Geology, without indexes

71380 General geology
- General
- Lithology
- Tectonics
- Applications of geophysics to solution of problems of regional geology and tectonics
- Regional geology
- Nuclear energy and geological problems
- Mathematical methods in geology
- Planetology

71384 Stratigraphy. Palaeontology
- Stratigraphy
- Palaeontology

71324 Anthropogeny. Geomorphology of land and sea bottom
- Anthropogeny
- Neotectonics
- Geomorphology of land and sea bottom

71372 Geochemistry. Mineralogy. Petrography
- Geochemistry
- Mineralogy
- Petrography
- Experimental and technical mineralogy and petrography
- Laboratory methods of mineralogical, petrographical and geochemical research

71382 Ore deposits

71378 Nonmetalliferous deposits

71376 Mineral fuels deposits
- Coal, oil shales, peat
- Petroleum and natural gas

71370 Geological and geochemical methods of search for minerals. Exploration methods and valuation of mineral deposits. Exploration geophysics and logging
- General
- Geological and geochemical methods of search
- Exploration methods and valuation of mineral deposits
- Exploration geophysics
- Well logging

71386 Techniques of geological prospecting

71374 Hydrogeology. Engineering geology. Frost action research
- Hydrogeology
- Engineering geology
- Frost action research

FIGURE 3. Referativnyi Zhurnal—Geologiya. *Classification (with section ordering numbers).*

71392 Geophysics, with author and subject indexes
71394 Geophysics, without indexes
71396 Geomagnetism and the upper atmosphere
General section
The upper atmosphere and geomagnetism
Author index
71346 Meteorology and climatology
General section
Meteorological instruments, methods of observations and data processing
Physical meteorology
Dynamic and synoptic meteorology
Climatology
Applied meteorology and climatology
Author index
71350 Oceanology. Hydrology (inland waters). Glaciology
Oceanology
Hydrology
Glaciology
Author index
71398 Physics of the earth
General section
Physics of the interior part of the earth
Seismology
Gravimetry
Earth tides
Recent crustal movements
Author index
71370 Geological and geochemical methods of search for minerals. Exploration methods and valuation of mineral deposits. Exploration geophysics and logging
General section
Geological and geochemical methods of search
Exploration methods and valuation of mineral deposits
Exploration geophysics
Wells logging

FIGURE 4. Referativnyi Zhurnal—Geofizkia. *Classification (with section ordering numbers).*

the contents of the Geophysics section; the five-digit numbers are the section numbers that may be ordered separately.

A useful publication about the whole service is by Copley (*38*).

Japanese Service

1958– *Kagaku Gijutsu Bunken Sokuho* [Kinzoku Kogaku Kozan Kogaku Chikyu No Kagaku-Hen] (*Current bibliography on Science and Technology—Earth Sciences*)

Published by Japan Information Centre of Science and Technology, 1-1 2 Chome, Nagatotyo, Tuyoda-ku, Tokyo. Frequency: twice a month.

The service includes earth sciences, mining and metallurgy. The subject classification is in Japanese, and includes:

Engineering and technology—machinery and equipment
Metallurgy, metals, alloys
Geology, geological processes
Materials, energy
Paleontology and stratigraphy
Mineralogy and geochemistry
Petrology
Glaciology
Geophysics
Geosensing [remote sensing]
Geodesy
Atmospheric science
Geochronology

Titles are arranged by UDC. Each entry has an accession number, title, author, source, and includes keywords in Japanese, and a Japanese abstract for most items. Titles are cited in the original language. The indexes are annual, with subject, geographical, and author indexes in Japanese, and separate Roman alphabet indexes for authors and journals cited.

The earth sciences section covers about 1,500 journals. The following is the breakdown of place of publication.

33% Japan
21% United States
12% United Kingdom
10% Germany
5% USSR
5% France
14% Others

Report literature and conference summaries are included. In 1968 there were 35,000 items. The delay between primary and secondary publication is usually 6–12 months, rarely up to 2 years.

SDI services are available as the system is computerized. A thesaurus is being prepared.

NATIONAL AND REGIONAL SERVICES

Geology, as a branch of natural history, was founded upon observations in the field. The importance of this today is seen in the large number of regional bibliographies that cite work going back to the early nineteenth century. National bibliographies generally exist for countries having important mineral deposits, or undergoing exploration development.

Interesting exceptions are the major European countries and, since 1972, the United States. In view of the historical importance of Britain in the development of geology, it is interesting to note that there is no continuing service, although there have been various attempts, for example:

Annals of British Geology, 1890–1893
Abstracts of Papers on Geology of the United Kingdom, 1951–1952
British Geological Literature, 1964–1967

However, Geosystems has announced a new bibliography by country to be published from 1973.

Some examples of national services are given, followed by a selected list of regional compilations.

Belgium: Abstracts of Belgian Geology and Physical Geography

Published annually since 1967, and available by subscriptions from the Geological Institute, University of Ghent, Rozier 44, Ghent, Belgium. Abstracts are arranged alphabetically by author, with the title in the original language. A full bibliographical reference is given, including authors, source, page numbers, plates, figures, and tables. Most entries have abstracts, which are all in English, about seventy words in length. Each volume has a section Addenda Abstract, which includes abstracts from previous years. There are subject and geographical indexes for each volume.

The number of abstracts per year was:

1967	242
1968	377
1969	420

There is a 2-year publishing delay.

Turkey: Key to Turkish Science—Geology

Published since 1969, twice a year, by TURDOK (Turkish Scientific & Technical Documentation Centre), Gayirdit Sokak 33, Yenishehir Ankara, Turkey.

The classification by subject:

General geology
Stratigraphy
Structural geology
Geomorphology
Hydrology
Petrology
Economic geology and mineralogy
Geophysics—seismology
Geochemistry
Mining
Palaeontology
Palaezoology
Palaeobotany
Palaeostratigraphy

The presentation is by accession number, with the title in English and the original language. The number of references and the author's organization are given. The abstract is in English.

Each part has an author index and alphabetical subject index. There is an annual subject index, plus a list of sources and abbreviations in the second yearly part. Most entries are from Turkish journals. In 1970 there were sixty-four items.

United States: Bibliography of North American Geology

1732–1891 N. H. Darton, "Catalogue and Index of Contributions to North American Geology, 1732–1891." *USGS Bull.*, **127**, 1045 (1896).

1785–1918	J. M. Nickles, "Geologic Literature on North America 1785–1918," *USGS Bull.*, **746, 747** (1923).
1919–1970	"Bibliography of North American Geology," *USGS Bull.*, **823**– (1931–).
1953–1958	*Geological Abstracts.* Volume 1 was published by the American Geological Institute; Volumes 2–6 were published by the Geological Society of America.
1959–1966	*Geoscience Abstracts,* American Geological Institute, 1959–1966. A monthly publication with abstracts published in, or pertaining to, North America.
1967–1971	*Abstracts of North American Geology,* USGS. A monthly abstracting service, cumulated annually. This service ended in December 1971.

Thailand: Lists of Scientific and Technical Literature Relating to Thailand (Formerly Lists of Scientific Reports Relating to Thailand)

List 1, 1964
List 2, 1965
List 3, 1969

The *List* is prepared by the Applied Scientific Research Corporation of Thailand, Thai National Documentation Centre, Bangkok, Thailand. The arrangement is by subject classification:

Geology and the collateral science
Oceanography
Economic geology and mineralogy
Paleontology

The subject divisions correspond with UDC. Titles are given in English, with full bibliographical reference. The original language is indicated, as is the language of any abstracts.

There is a fairly detailed subject index. The coverage includes periodicals, books, conference proceedings, and technical reports. Items missed in previous *Lists* are included subsequently. There were 169 titles in the 1969 Geology section list.

South Africa: Bibliography and Subject Index of South African Geology

Published annually from 1957 by the Department of Mines, Geological Survey, Government Printer, Private Bag 85, Bosman Street, Pretoria, South Africa and available by subscription.

Entries are arranged alphabetically by author. The titles are given in the original language, with the abstracts in English. A full bibliographical reference is given. The abstracts are usually about fifty words long; the abstracter's name is given unless the author's abstract is used. Each volume has an alphabetically arranged subject index. The coverage of the national journals is good; it also covers international journals, conference proceedings, and theses. The number of entries was:

1961	185
1963	260
1968	199

There is a 2-year publishing delay.

Poland: Bibliografia Geologiczna Polski

Published annually from 1924 by the Instytut Geologiczny, Warsaw, Poland. The first number, published in 1922, covers the 1914–1920 literature.

The bibliography does not have abstracts; each item has the source, title, volume, year, and pages. The titles are given in the original language, including the Cyrillic alphabet. Sometimes there is a translation into Polish.

Each volume has a subject index in Polish, which is divided into sections. A list of journals covered by the bibliography is included in each volume—more than 150 in 1968—and the majority are Polish. There were more than 2,000 entries in 1968. The publishing delay is about 2 years.

Morocco: Bibliographie Analytique des Sciences de la Terre Maroc et Regions Limitrophes

This bibliography is published by the Division de la Géologie, Direction des Mines et de la Geologie, Rabat, Morocco in its *Notes et Mémoires, Service des Mines et de la Carte Géologique*, No. 182, I and II; No. 212.

The titles are arranged alphabetically by author, followed by anonymous publications. Most entries have indicative abstracts, in French. The bibliographical reference includes source, title, year, volume, part, and pages. Biographical information is interspersed alphabetically. The coverage includes serials, books, and maps. A list of journals published in Morocco (more than thirty) is given, together with a list or more than fifty foreign publications that have been searched systematically.

Nigeria: Abstracts of African Mining Geology and Metallurgy

This service started in 1964 and is published by the Nigerian Geological and Metallurgical Society, Ibadan, in their *Journal of the Nigerian Mining, Geological and Metallurgical Society*. It is published twice a year, and continues the two bibliographies produced by the Commission for Technical Co-operation in Africa South of the Sahara (1956).

The abstracts are arranged by subject:

Mineralogy and petrology
Paleontology
Physical geology
General geology
Structural geology

The bibliographical reference includes, author, title, source, volume, year, and page.

The coverage is not very extensive, with most references coming from major international journals. There were sixty-five abstracts in 1964; there is a 2-year publication delay, and Volumes 4–6 have not contained any abstracts (other than the papers read at the Annual Meeting of the Society).

Selected List of National and Regional Geology Compilations

1. "Abstracts of African Mining, Geology and Metallurgy," in *Journal of Mining and Geology*, 1964–.
2. *Abstracts of Belgian Geology and Physical Geography, 1967–*, Geological Institute of the University, Ghent, 1969–.

3. *Abstracts of Bulgarian Scientific Literature, Geology and Geography*, 1957–, Bulgarian Academy of Sciences, Sofia, 1959–.
4. *Annotated Bibliography and Index of the Geology of Zambia, 1962–1963–*, Geological Survey of Zambia, Lusaka, 1965–.
5. "Bibliographia Geologica Espanola, 1964–," in *Acta Geologica Hispanica*, 1967–.
6. *Bibliografia Geologiczna Polski*, Instytut Geologiczny, Warsaw, 1914–.
7. "Bibliografía e Indice da Geologica de Brazil, 1941–," in *Boletin Divisao de Geologia e Mineralogia*, 1943–.
8. *Bibliographie géologique de la Tunisie*, 1954–, Service Geologique, Tunis, 1954–.
9. *Bibliography and Subject Index of South African Geology 1957–*, Geological Survey South Africa, Pretoria, 1959–.
10. *Buletin de Informare Stiintifica, Geologie, Geografie*, Academia Republicii Socialiste Romania, Bucharest, 1964–.
11. *Geologicheskaya Literatura SSSR*, Leningrad 1934–1937 . . . 1949–1960.
12. "Geological Bibliography of the Netherlands, 1907–," in *Mededelingen Rijks Geologische Dienst NS*, 1922–.
13. "Geological Studies Concerning Greece, 1950–," in *Bulletin of the Geological Society of Greece*, 1953–.
14. "Geologische Literatur in Österreich 1951–," in *Verhandlungen der Geologischen Bundesanstalt*, 1952–.
15. "Die Geologische Literatur über Sachsen 1951–," in *Jahrbuch des Staatlichen Museums für Mineralogie und Geologie zu Dresden*, 1963–.
16. "Geologisches Schrifttum über Nordost-Bayern, 1945–," in *Geologische Blätter für Nordost Bayern*, 1951–.
17. "Hessisches Geologisches Schrifttum, 1928–," in *Notizblatt des Hessischen Landesamtes für Bodenforschung zu Wiesbaden*, 1931–.
18. "Liste des travaux ayant trait à la géologie du Rwanda et des régions limitrophes publiés en 1965 et complements pour la période 1960–1964–," in *Bulletin du Service Géologique*, 1966–.
19. "Litteraturfortegnelse Omfattende Skrifter af Geologisk eller Eignende Natur og Som Ved emne Forfatter eller Udgivelsessted er Knyttet til Danmark og Grønland (Samt Island), 1901," in *Bulletin of the Geological Society of Denmark* 1904–.
20. *Mineralogicke Geologická Bibliografie CSSR*, 1897–, Ustrendi Ustav Geologicky, Prague, 1934–.
21. "Recent Polar Literature, 1938–," in *The Polar Record*, 1939–.
22. "Repertoire bibliographique des publications du domaine des sciences geologiques en Hongrie," in *Foldtani Kozlony*, 1900–.
23. "Swedish Geological Literature, 1927–," in *Sveriges Geologiska Undersökning C*, 1968– (early parts were published in *Geologiska Söreningens Stockholm Förhandlingar*).

SPECIALIZED SERVICES

Nature of Specialized Services

The specialized services have a generally greater importance than the national and regional services because of their worldwide usefulness. Some services are annual bibliographies without abstracts, such as the *Exploration Geochemistry Bibliography*.

Others include abstracts, and several types of approach can be seen. For example, *Mineralogical Abstracts* is noted for informative abstracts containing a

concise summary of the author's new results. Other services use author's abstracts exclusively.

Some abstracting services, such as *Geocom Bulletin*, attempt to cover all literature of value to specialists. Other services accept that private communication is sufficiently well-developed and cover only the most important, central literature of the field.

Typically, the specialized abstracting and indexing services have a few hundred to a few thousand entries a year. It is usual for them to use their own classification systems which are probably more satisfactory than any previously existing classification, since the categories are designed for the classification of literature rather than knowledge.

Some examples of classification are:

1. Mineralogical Abstracts
   Age determination
   Apparatus and techniques
   Clay minerals
   Crystal structure
   Economic minerals and ore deposits
   Experimental mineralogy
   Gemstones
   Geochemistry
   Meteorites and tectites
   Mineral data
   New minerals
   Petrology
   Physical properties of rocks and minerals
   Topographical mineralogy
   Various

2. Geotechnical Abstracts
   This uses the new International Geotechnical Classification System developed by a committee of the International Society for Soil Mechanics and Foundation Engineering, a broad outline of which is:

   A General
   B Engineering geology
   C Site investigations
   D Soil properties: laboratory and field determination
   E Analysis of soil: engineering problems
   F Rock properties: laboratory and field determination
   G Analysis of rock engineering problems
   H Design, construction and behaviour of engineering works
   K Construction methods and equipment
   M Materials of construction
   S Snow and ice mechanics and engineering
   T Related disciplines

3. Geoscience Documentation

900 Geoscience documentation

910 Guides to the literature
- 914 Guides to atlases and maps
- 915 Subject reviews
- 916 Subject bibliographies
- 917 Area reviews
- 918 Area bibliographies

920 Directories
- 922 Guides to series
- 923 Guides to theses
- 924 Secondary services
- 925 Data files
- 926 Encyclopaedias
- 927 Guides to translations
- 928 Dictionaries
- 929 Classifications and nomenclators
- 930 Polyglot dictionaries and thesauri
- 931 Catalogues of libraries and collections
- 932 Biographical directories and lists
- 934 Organizational directories and lists

935 Special publications
- 936 Conference and proceedings
- 937 Field trip guides
- 938 Other special purpose publications

939 Manuscripts and archives

940 History of geoscience
- 942 Biographical materials
- 946 Historical materials

950 Documentation
- 951 Publication theory and practice
- 952 Communication and knowledge
- 953 Information centres
- 954 Literature information systems
- 955 Data systems
- 956 Epistemology
- 957 Classification
- 958 Characteristics and use of the literature
- 959 Professional activities

960 Geoscience organizations

970 Geoscience policy
- 971 Regional cooperation
- 972 International cooperation
- 973 General science policy
- 975 Educational policy
- 976 Research policy
- 977 Energy policy
- 978 Materials policy
- 979 Environmental policy

980 Geoscience education

It is increasingly common for international services to publish in English. The level of indexing varies, but there is a pleasing tendency to issue multiyear cumulative indexes which, of course, have a considerable advantage over annual indexes. Supporting services vary; for example, magnetic tapes are available for *Petroleum Abstracts* and the Geoserials section of *Geoscience Documentation;* a coordinate indexed card retrieval system—the Geodex Retrieval System—for *Geotechnical Abstracts.*

Specialized Services: A Selected List

1. *Annotated Bibliography of Economic Geology, 1928–*, Economic Geology Publishing Co., Urbana, Illinois, 1929–1971?
2. *Bibliography of Carboniferous Geology*, Geologisch Bureau voor het Mijngebied, Heerlen, 1959–.
3. "A Bibliography of the Family Fusulinidae, 1956–," in *Journal of Paleontology*, 1956–.
4. "Bibliography of Fossil Vertebrates, 1928–", in *Special Papers, Geological Society of* America **27** and **42**; *Memoirs Geological Society of America*, **37, 57, 86, 92,** and **117**–.
5. *Bibliography and Index of Micropaleontology*, American Museum of Natural History, New York, 1972–.
6. *Bibliography of Vertebrate Paleontology and Related Subjects, 1945–*, Society of Vetebrate Paleontology, New Haven, 1947.
7. *Boletin Bibliografico de Geofisico y Oceanografia Americanas,* Comite Panamericano para el ano Geofisico International y Comite de Oceanografia del Instituto Panamericano de Geografia e Historia, Mexico, 1958–
8. *Boletin Bibliografico Instituto Oceanografico Universidad de Oriente*, Instituto Oceanograficio, Cumana, Venezuela 1964–.
9. *Deep-Sea Research and Oceanographic Abstracts*, Pergamon, Oxford, 1953–.
10. *Exploration Geochemistry Bibliography*, Association of Exploration Geochemists, Golden, Colorado, 1972–.
11. *Geoabstracts, A&E*, Geoabstracts, Norwich, 1960–, 1972–.
12. *Geocom Bulletin*, Geosystems, London, 1969–.
13. *Geoscience Documentation*, Geosystems, London, 1969–.
14. *Geotechnical Abstracts*, Deutsche Gesellschaft für Erdund Grundbau, Essen, 1970–.
15. "Glaciological Literature," in *Journal of Glaciology*, 1947–.
16. *Hydata*, American Water Resources Association, Urbana, Illinois, 1965–. The companion annual volume is entitled *Hydor.*
17. "Hydrographische Bibliographie," in *Deutsche Hydrographische Zeitschrift.*
18. *IMM Abstracts*, Institution of Mining and Metallurgy, London, 1950–.
19. *Institute of Petroleum Abstracts*, The Institute of Petroleum, London, 1969– (previously in *Journal*, 1921–).
20. *International Hydrographic Review*, International Hydrographic Bureau, Monte Carlo, 1924–.
21. *Meteorological and Geoastrophysical Abstracts*, American Meteorological Society, Boston, 1950–.
22. *Mineralogical Abstracts*, 1920–, The Mineralogical Society, London, 1922–.
23. *Montanwissenschaftliche literaturberichte C. Geowissenschaften*, Bergakademie, Freiberg, 1954–.
24. *Oceanic Index*, Oceanic Information Center, La Jolla, California, 1964–.
25. *Petroleum Abstracts*, University of Tulsa, Tulsa, Oklahoma, 1961–.
26. "Recent Literature on Mesozoic Ammonites," in *Journal of Paleontology*, 1957–.

27. *Rock Mechanics Quarterly Abstract Bulletin*, American Institute of Mining, Metallurgic and Petroleum Engineers, New York, 1970–.
28. *Underwater Science and Technology Information Bulletin*, IPC Science and Technology Press, Guildford, 1969–.
29. *World Report on Palaeobotany*, 1950–54–, A. Oosthoek's Uitgeversmaatschappij, Utrecht, 1956–.
30. *Zoological Record*, London Zoological Society of London, 1864–.

Guides to the Literature and Reference Works

INTRODUCTION

Geology is a multidisciplinary subject; at the same time, many interesting lines of development are interdisciplinary. This has created a wide range of reference material, and requires that workers should have a good knowledge of the literature of other fields. Regrettably, geologists seem particularly ill-informed about their literature, although some adequate guides to it do exist.

For many years the standard work in the geological field was Pearl (*39*), but this is now seriously dated. However, there is a book for the geological sciences forthcoming in the Butterworth series *Information Sources for Research and Development*, edited by D. N. Wood, which will help to remedy the situation.

Meanwhile, there are a number of general guides to geological literature but they differ greatly in their treatment and approach. Such general works as A. J. Walford's *Guide to Reference Material, Vol. 1, Science and Technology* (Library Association, London, 1966) and C. Winchell's *Guide to Reference Books* (American Library Association, Chicago, 1967 and supplements) have useful sections on geology. Although older, L.-N. Malclès' *Les sources travail bibliographique* (Droz, Geneva, 1958) has valuable and extensive sections on the earth sciences in Vol. 3.

Among those confined strictly to geology, the one which comes nearest to the definition of a guide to the literature is the one by Ward (for this and other volumes mentioned here, see the list below). Novikov is, not unnaturally, strongly biased towards Russian sources. Although more restricted in its subject field, the oceanographic guide by Harvey includes a list of about 200 journals with details of titles, name and address of publisher, date of commencement, frequency, subscription rates, and details of contents. A continuing source of information on all geological reference material is *Geoscience Documentation*. It is evident therefore that the user should acquaint himself with all the major guides and then use them according to his needs.

Geology is well endowed with abstracting and indexing services. Many of these, however, remain unknown and therefore little used because they are issued as articles in journals, although some have been published regularly for more than 50 years. The information required in geology is so often of a regional nature that national geological bibliographies have a great importance. The large number which

exist and can be utilized in such searches is not fully realized. A selected list of reference aids is given below.

GENERAL GUIDES TO SOURCES OF GEOLOGICAL INFORMATION: A SELECTED LIST

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14. W. H. Matthews, *Selected References for Earth Science Courses*, Prentice-Hall, Englewood Cliffs, New Jersey, 1964, 33 pp., Earth Science Curriculum Project. Reference Series No. 2.
15. F. A. Novikov, *Putevoditel' po Geologicheskoi Literature Mira (Guide to the Geological Liteature of the World)*, Izdatel'stvo 'Nedra': Leningradskoe Otdelenie, Leningrad, 1971, 167 pp.
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17. R. C. Vetter, *Oceanography Information Sources 70*, National Academy of Sciences, Wasington, D.C., 1970, 51 pp.
18. D. C. Ward, *Geologic Reference Sources*, (University of Colorado Studies Series in Earth Sciences), Vol. 5, 1967 xii + 114 pp. (1967)
19. J. B Watkins, *Information Sources in the Earth Sciences*, Syracuse University Libraries, 196', 46 pp.

DICTIONARIES AND ENCYCLOPEDIAS

1. H. N. Andrews "Index of Generic Names of Fossil Plants 1820–1965," *Bulletin United States Geological Survey*, **1300** (1970), 354 pp.
2. A. Cagnacci-Schwicker, *International Dictionary of Metallurgy, Geology and the Mining and Oil Industries. English, French, German, Italian*, McGraw-Hill, Maidenhead, 1970, 1530 pp.
3. J. Challinor, *A Dictionary of Geology*, 3rd ed., University of Wales Press, Cardiff, 1967, xv + 298 pp.
4. J. G. Dennis, *International Tectonic Dictionary. English Terminology* (Memoir American Association of Petroleum Geologists), Vol. 7, 1967, xi + 196 pp.
5. F. W. Fairbridge, ed., *Encyclopedia of Earth Science Series*, I Oceanography, 1966, xiii + 1021 pp. II Atmospheric Sciences and Astrogeology, 1967, xv + 1200 pp. III Geomorphology, 1968, xvi + 1295 pp.
6. B. v. Fircks, *Fachwörterbuch-bibliographie Geowissenschaften. Ein- und mehrsprachige Wörterbucher und Lexika der Geowissenschaften von 1700–1968* (Veroffentlichungen der Bibliothek der Bergakademie Freiberg), Vol. 27, 1968, 40 pp.
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10. *Nomenclator Zoologicus*, Zoological Society of London, London, 1939–1940, 4 volumes and supplement. Supplements 1936–1945, 1950; 1946–1955, 1966 and in Section 20, List of New Genera and Subgenera of the *Zoological Record*.
11. S. K. Runcorn, ed., *International Dictionary of Geophysics*. Pergamon, Oxford, 1967, 3 vols.
12. A. A. G. Schieferdecker, ed., *Geological Nomenclature*, J. Noorduijn en Zoon NV, Gorinchem, 1959, xvi + 523 pp.
13. P. W. Thrush, *A Dictionary of Mining, Mineral and Related Terms*, United States Government Printing Office, Washington, D.C., 1968, 269 pp.
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Directories exist for both economically important aspects of geology and for workers in academic fields. They vary widely in form.

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3. *Directory of Geoscience Departments*, American Geological Institute, Washington, D.C., 1970, 224 pp.
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9. G. Lea, "The Organisation of International Geoscience," *Geoscience Documentation*, **2**, 110–113 (1970).
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12. J. P. North, *Annotated Acronyms and Abberviations of Marine Science Related International Organizations*, National Oceanographic Data Center, Washington, D.C., 1969, xv + 115 pp.
13. *Ocean Research Index*, Hodgson, Guernsey, 1970, 507 pp.
14. "Oceanology International—Offshore Technology Directory Issue," in *Oceanology International*, annually in the June issue.
15. R. C. Vetter, *A Directory of Oceanographers in the United States*, National Academy of Sciences, Washington, D.C., 1969, 72 pp.
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	Belgium	*Geological Newsletter*, Vol. 1969/4, p. 436
	Cyprus	*Geological Newsletter*, Vol. 1967/1, p. 63
	Czechoslovakia	*Geological Newsletter*, Vol. 1968/2, p. 109
	Denmark	*Geological Newsletter*, Vol. 1967/4, p. 129
	Faroe Islands	*Geological Newsletter*, Vol. 1971/1, p. 70

	Finland	*Geological Newsletter*, Vol. 1970/1, p. 124
	France	*Geological Newsletter*, Vol. 1968/3, p. 115
	Great Britain	*Geological Newsletter*, Vol. 1969/3, p. 288
	Greece	*Geological Newsletter*, Vol. 1969/2, p. 171
	Greenland	*Geological Newsletter*, Vol. 1971/2, p. 156
	Hungary	*Geological Newsletter*, Vol. 1969/1, p. 91
	Italy	*Geological Newsletter*, Vol. 1967/1, p. 64
	The Netherlands	*Geological Newsletter*, Vol. 1968/2, p. 107
	Norway	*Geological Newsletter*, Vol. 1968/4, p. 89
	Poland	*Geological Newsletter*, Vol. 1970/4, p. 427
	Portugal	*Geological Newsletter*, Vol. 1967/1, p. 66
	Roumania	*Geological Newsletter*, Vol. 1967/4, p. 127
	Sweden	*Geological Newsletter*, Vol. 1968/3, p. 123
	Switzerland	*Geological Newsletter*, Vol. 1968/1, p. 94
	West Germany (GFR)	*Geological Newsletter*, Vol. 1971/1, p. 70
Africa:	Burundi	*Geological Newsletter*, Vol. 1969/3, p. 297
	Congo	*Geological Newsletter*, Vol. 1969/3, p. 295
		Geological Newsletter, Vol. 1969/4, p. 443
	Kenya	*Geological Newsletter*, Vol. 1971/3, p. 230
	Morocco	*Geological Newsletter*, Vol. 1970/2, p. 217
	Nigeria	*Circular Letter*, No. 18, p. 77
	Rwanda	*Geological Newsletter*, Vol. 1969/3, p. 297
	South Africa	*Geological Newsletter*, Vol. 1969/4, p. 439
	Swaziland	*Geological Newsletter*, Vol. 1969/1, p. 95
	Tanzania	*Circular Letter*, No. 18, p. 71
	Tunisia	*Geological Newsletter*, Vol. 1968/1, p. 101
	Zambia	*Circular Letter*, No. 18, p. 74
Australia:	Exclusive of Western Australia	*Geological Newsletter*, Vol. 1967/1, p. 68
	Western Australia	*Circular Letter*, No. 18, p. 78
New Zealand:		*Geological Newsletter*, Vol. 1970/3, p. 305
North America:	U.S. General Maps	*Geological Newsletter*, Vol. 1970/3, p. 309
Central America:	Mexico	*Geological Newsletter*, Vol. 1971/3, p. 233
South America:	Argentina	*Geological Newsletter*, Vol. 1967/3, p. 92
	Chile	*Geological Newsletter*, Vol,. 1967/3, p. 90
	Columbia	*Geological Newsletter*, Vol. 1967/2, p. 103
	Ecuador	*Geological Newsletter*, Vol. 1967/2, p. 103
	Guyana	*Geological Newsletter*, Vol. 1967/2, p. 105
	Gyane Français	*Geological Newsletter*, Vol. 1967/2, p. 108
	Surinam	*Geological Newsletter*, Vol. 1967/2, p. 107
	Trinidad and Tobago	*Geological Newsletter*, Vol. 1967/2, p. 110
Middle East:	Israel	*Geological Newsletter*, Vol. 1969/2, p. 169
Far East:	Ceylon	*Geological Newsletter*, Vol. 1971/4, p. 320
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GEOLOGICAL ABBREVIATIONS: A SELECTED LIST

These abbreviations are restricted to organizations, committees, and programs connected with geology.

AAGS	Association of African Geological Surveys [= ASGA]
AAODC	American Association of Oilwell Drilling Contractors
AAPG	American Association of Petroleum Geologists [AGI member]
AASG	Association of American State Geologists [AGI member]
ABOI	Association of British Oceanological Industry
ACA	American Crystallographic Association
ACMRR	Advisory Committee on Marine Resources Research
AEG	Association of Engineering Geologists [AGI member]
AEG	Association of Exploration Geochemists
AESE	Association of Earth Science Editors (American) [AGI member]
AGA	American Gas Association
AGI	American Geological Institute
AGU	American Geophysical Union [AGI member]
AIDJEX	Arctic Ice Dynamics Joint Experiment
AIME	American Institute of Mining Engineers
AIME	American Institute of Mining, Metallurgical, and Petroleum Engineers
AIPEA	Association Internationale pour l'Étude des Argiles [= IACR]
AIPG	American Institute of Professional Geologists [AGI member]
ANGI	Association Nationale Geologi Italiani
API	American Petroleum Institute
ARTEP	Association de Recherche sur les Techniques de Forage et de Production
AESQUA	Association Sénégalaise pour l'Étude du Quaternaire de l'Ouest Africain
ASGA	Association des Services Géologiques Africains [= AAGS]
ASM	American Society for Metals
AWWA	American Waterworks Association
BNCOE	British National Committee for Ocean Engineering
BRGM	Bureau de Recherches Géologiques et Minières
BSRG	British Sedimentological Research Group
BSSS	British Society of Soil Science
CEGS	Council of Education in the Geological Sciences [U.S.]
CEMA	Centre d'Études Marines Avancées
CGLO	Commonwealth Geological Liaison Office [London]
CGMW	Commission for The Geological Map of the World
CIEPSA	Compañia de Investigación y Explotaciones Petrolíferas, SA
CIM	Canadian Institute of Mining and Metallurgy
CMG	Commission for Marine Geology [of IUGS]
CMT	Committee on Marine Technology [British]
CNEXO	Centre National pour l'Eploitation des Océans
CNRS	Centre National de la Recherche Scientifique
CODATA	Committee on Data for Science and Technology
COGEODATA	Committee on Storage, Automatic Processing, Storage and Retrieval of Geological Data [of IUGS]
COSPAR	Committee on Space Research
COSTED	Committee on Science and Technology in Developing Countries
COWAR	Scientific Committee on Water Research
CPA	Canadian Petroleum Association

CSMCRI	Central Salt and Marine Chemical Research Institute, Bhavnagar
CTS	Committee on the Teaching of Science
EAEG	European Association of Exploration Geophysicists
ECAFE	Economic Commission for Asia and the Far East [of UN]
ECOR	[Proposed] Engineering Committee on Oceanic Resources
EDITERRA	European Association of Earth Science Editors
ENI	Ente Nazionale Idrocarbon
ERAP	Entreprise de Recherches et d'Activitées Petrolière [France]
EROS	Earth Resources Observations Systems Program
ERTS	Earth Resources Technology Satellite
ESI	Environmental Studies Institute [Carnegie-Mellon University]
ESRIN	European Space Research Institute
FAGS	Federation of Astronomical and Geophysical Services
FAMOUS	French-American Mid Oceanic Underwater Survey
FPC	Federal Power Commission [U.S.]
GAC	Geological Association of Canada
GARP	Global Atmospheric Research Program
GCODE	Geosystems Code [for geological sources]
GDC	Geosystems Decimal Classification of Geoscience
GEOFOND	Czech State Geological Documentation Centre
GEOS	Geodetic Earth Orbiting Satellite
GIS	Geoscience Information Society [AGI member]
GS	Geochemical Society [AGI member]
GS	Geological Society [of London]
GSA	Geological Society of America [AGI member]
IABO	International Association of Biological Oceanography
IACR	International Association for Clay Research [= AIPEA]
IAEA	International Atomic Energy Agency
IAEG	International Association of Engineering Geology
IAG	International Association of Geodesy
IAGA	International Association of Geomagnetism and Aeronomy
IAGC	International Association of Geochemistry and Cosmochemistry
IAGOD	International Association for the Genesis of Ore Deposits [now part of IFSEG]
IAGS	Inter-American Geodetic Survey
IAH	International Association of Hydrologists
IAMAP	International Association of Meteorology and Atmospheric Physics
IAMG	International Association for Mathematical Geology
IAP	International Association for Planetology
IAPSO	International Association of Physical Sciences of the Ocean
IAS	International Association of Sedimentologists
IASH	International Association of Scientific Hydrology
IASPEI	International Association of Seismology and Physics of the Earth's Interior
IATAL	International Association of Theoretical and Applied Limnology
IAU	International Astronomical Union
IAVCEI	International Association of Volcanology and Chemistry of the Earth's Interior
ICA	International Cartographic Association
ICES	International Council for Exploration of the Seas
ICG	Inter-Union Commission on Geodynamics
ICSU	International Council of Scientific Unions
ICZN	International Commission for Zoological Nomenclature

IDOE	International Decade of Ocean Exploration
IFCE	L'Institut Francais des Combustibles et de l'Energie
IFI	International Field Institute
IFP	Institut Français du Pétrole
IFSEG	International Federation of Societies of Economic Geologists [includes IAGOD]
IFYGL	International Field Year of the Great Lakes
IGC	International Geological Congress
IGCP	International Geological Correlation Programme
IGOSS	Integrated Global Ocean Station System
IGS	Institute of Geological Sciences [London]
IGU	International Geographical Union
IGY	International Geophysical Year
IHB	International Hydrographic Bureau
IHD	International Hydrological Decade
IMA	International Mineralogical Association
IMM	Institution of Mining and Metallurgy [London]
INHIGEO	Committee on the History of Geological Sciences [of IUGS]
INQUA	International Union for Quaternary Research
IOC	Intergovernmental Oceanographic Commission
IP	Institute of Petroleum [London]
IPA	International Paleontological Association [formerly IPU]
IPU	International Paleontological Union [now the IPA]
ISSS	International Society of Soil Science
IUBS	International Union of Biological Sciences
IUC	International Union of Crystallography
IUCN	International Union for the Conservation of Nature and Natural Resources
IUCOG	Inter-Union Commission on Geodynamics
IUCSTP	Inter-Union Commission on Solar-Terrestrial Physics
IUGG	International Union of Geodesy and Geophysics
IUGS	International Union of Geological Sciences
IUMS	International Union of Marine Sciences
JOIDES	Joint Oceanographic Institutions for Deep Earth Sampling
MAGI	Magnetism and Gravity Interpretation System
MAREP	Marine Environmental Prediction
MATSU	Marine Technology Support Unit [U.K.]
MIRO	Mineral Industry Research Organisation
MSA	Mineralogical Society of America [AGI member]
MTRB	Marine Technology Requirements Board [U.K.]
NAGT	National Association of Geology Teachers [AGI member]
NAM	Nederlands Aardolie Maatschappij
NASA	National Aeronautics and Space Administration
NASDA	National Space Development Agency [Japan]
NAWDEX	National Water Data Exchange [U.S.]
NKGOK	Novokrworozlisk Mining and Concentration Combinat [USSR]
NOAA	National Ocean and Atmospheric Administration
NODC	National Oceanographic Data Center
NPC	National Petroleum Council
NYOSL	New York Ocean Science Laboratory
NZGS	New Zealand Geological Survey
OAPEC	Organisation of Arab Petroleum Exporting Countries
OCS	Outer Continental Shelf

ODM	Ontario Department of Mines and Northern Affairs
OPEC	Organisation of Petroleum Exporting Countries
OSO	Orbiting Solar Observatory
PES	Petroleum Exploration Society [London]
PHOSROCK	Phosphate Rock Export Association
PS	Paleontological Society [AGI member]
SCAR	Scientific Committee on Antarctic Research
SCOPE	Special Committee on Problems of the Environment
SCOR	Scientific Committee on Oceanic Research
SEACON	Seafloor Construction Experiment
SEG	Society of Economic Geologists [AGI member]
SEG	Society of Exploration Geophysicists [AGI member]
SEPM	Society of Economic Paleontologists and Mineralogists [AGI member]
SGA	Société de Géologie Appliquée
SIFET	Società Italiana di Fotogrammetra e Topographia
SME	Society of Mining Engineers [USA] of AIME [AGI member]
SOQUEM	Société Quebecoise d'Exploration Minière
SPE	Society of Petroleum Engineers [USA] of AIME
SPWLA	Society of Professional Well Log Analysts
SSA	Seismological Society of America [AGI member]
SUT	Society for Underwater Technology [U.K.]
SVP	Society of Vertebrate Paleonotology [AGI member]
UEG	Underwater Engineering Group [U.K.]
UKMMA	United Kingdom Metal Mining Association
UMC	Upper Mantle Committee
UMP	Upper Mantle Project
UNDP	United Nations Development Program
USGS	United States Geological Survey
WDC	World Data Centres
WHOI	Woods Hole Oceanographic Institution
WMO	World Meteorological Organization
WMS	World Magnetic Survey Board
WSL	Warren Spring Laboratory [U.K.]
YPFB	Yacimientos Petrolíferos Fiscales Bolivianos

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GRAHAM LEA
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GEORGE PEABODY COLLEGE, SCHOOL OF LIBRARY SCIENCE

To know the history of the Peabody School of Library Science—Peabody Library School, as it has been known through most of its history—is to know much of the development of education for librarianship in the South. George Peabody College for Teachers traces its roots back to 1785 when Tennessee was still a territory. It was first known as Davidson Academy, later as Cumberland College, then as the University of Nashville. In 1875 it became Peabody Normal College, named for the New England philanthropist George Peabody who had a strong interest in promoting education in the South and who, in 1875, established a special fund for this purpose. In 1909 the Normal College officially became George Peabody College for Teachers.

It was as an outstanding teacher-training institution that Peabody offered its first course for librarians in 1919 under the direction of Charles H. Stone, a Phi Beta Kappa graduate of the University of Georgia with a library science degree from the University of Illinois. The first course was a general introduction to library science, and by the second year courses in Reference, Library Methods, and Book Selection were offered. By 1921 Reference Books, Catalogs and Indexes, and School Library Administration were being offered, followed by Library Administration, Public Documents, and Advanced Classification and Cataloging. Interest in the needs of undergraduate students led to a course in the use of the library which was required of all freshmen, and in 1927 a course entitled Seminar in Library Science was required of all majors in the library science program.

Thus the program was well under way when the Library School was officially established in 1928, with an emphasis on the training of school librarians. Jackson Towne, a graduate of Harvard and the University of Illinois Library School, was named college librarian and director of instruction in library science.

The year 1930 saw the "great leap forward." An appropriation of $80,000 from the General Education Board for a period of 3 years made possible the expansion of the courses for school librarians, so that the second year, formerly offered only in successive summers, could be offered during the regular academic year as well. This grant also made possible the addition to the faculty of several full-time and part-time instructors, as well as an associate director, Miss Lucile Fargo, perhaps the greatest living authority on school library work at that time. In the summer of 1930 no less than 153 students were enrolled in library science courses. At that time, several schools in the South were offering work in library science, but Peabody was the only institution scheduling 2 years of work. In 1930 Peabody was provisionally accredited by the Board of Education for Librarianship of the American Library Association as an undergraduate library school for the training of school librarians, joining Emory University and Hampton Institute as the only accredited institutions in the South. It was during this period that the Julius Rosenwald fund helped the

Emory University Library School and the Carnegie Corporation assisted the Library School of the University of North Carolina; the grant to Peabody from the General Education Board assured strong initial support for this trio of schools whose influence in library education became strong and has endured.

The school was fully accredited by the American Library Association in February of 1932. Soon afterwards, the school was reorganized on a graduate basis, and the program leading to the Bachelor of Science in Library Science (B.S. in L.S.) was accredited in 1935. In 1940 the school was accredited for the training of public and college librarians as well as for school librarians. Since that time a large portion of its graduates, often the majority, has gone into college and university library work, although a substantial number have chosen school, public, and special libraries.

In 1933 Louis Shores was named director of Peabody Library School, marking the launching of a distinguished career in library education. Writer, editor, educator, Dr. Shores guided the school through the difficult depression years, expanding the curriculum (including the first audiovisual course offered by an accredited library school), developing an outstanding faculty, and generally maintaining the school as a national and international center for library education. Dr. Shores was called into the military service in 1943, after which the school was without a permanent director until 1948. In the meantime, under acting directors Robert R. Douglass, Ruby Ethel Cundiff, and Felix Robb, courses were offered in a second-year program leading to the master's degree. In 1948, the year of the appointment of William A. Fitzgerald as director, the Library School became a professional division of the Graduate School, which it remains still. The following year the curriculum of the Library School was expanded and strengthened and the M. A. was adopted as its basic degree program. In 1955 the master's degree program in library science received full accreditation from the Committee on Accreditation of the American Library Association.

During Dr. Fitzgerald's leaves of absence to serve as library consultant to the Republic of China and Hong Kong (1956–1958) and Libya, Liberia, and Sierra Leone (1961–1963), Frances Neel Cheney, who had joined the faculty in 1940, was named acting director, and in 1962 she was also named associate director, which she has remained to date. Mrs. Cheney was granted a leave of absence for the years 1951–1952 to teach in the Library School of Keio University in Japan. Among Mrs. Cheney's subsequent honors were the first Beta Phi Mu Award for Good Teaching in Librarianship (1959), the Isadore Gilbert Mudge Award for Outstanding Contribution to Reference Librarianship (1962), and the Outstanding Reference Librarian (1970) awarded by the Southeastern Library Association. In 1971 she was granted the newly established Award for Good Teaching by Peabody College.

In 1957 the Specialist in Education program, a sixth-year course of studies, was extended to include a major in library science. This advanced program has helped to serve as a stimulus to librarians to expand their professional training beyond the first year of professional graduate study. Ph.D. candidates in Peabody College may also minor in library science, provided they have the preliminary requirements in the area.

Robert L. Gitler, formerly executive secretary of the Library Education Division of ALA, as well as dean of the library schools of the University of Washington, Keio University, and SUNY at Geneseo, was named director in 1964, soon after which the fifth-year degree became the Master of Library Science (M.L.S.). Dr. Gitler initiated, in 1966, the C. C. Williamson Memorial Lectures, with Frank Bradway Rogers, first director of the National Library of Medicine, as the featured speaker. Subsequent speakers in this series have been Richard Dillon, Librarian, Sutro Library, San Francisco; David Diringer, Lecturer in Semitic Epigraphy, University of Cambridge; K. C. Harrison, Chief Librarian, Westminster Public Library, London; Allen Tate, poet, critic, and former editor of the *Sewanee Review;* and Louis Shores, former director of Peabody Library School and editor-in-chief of *Collier's Encyclopedia.*

In 1967 Edwin S. Gleaves was appointed director of the Library School. The Ed.S. degree program, which had been temporarily discontinued in 1965, was reinstated in 1968 as the faculty was strengthened and the offerings expanded. In January 1971 Dr. Cheney was called upon again to serve as acting director when Dr. Gleaves was appointed Technical Consultant for the Organization of American States to the Inter-American Library School, University of Antioquia (in Medellín, Colombia), and Fulbright Lecturer at the University of Costa Rica, returning to Peabody in January 1972.

The School of Library Science, as it has been called since 1970, has occupied since its beginning the top floor of the Peabody College Library. Although the building has been serviceable and susceptible to the necessary periodic renovations, the most recent of which was in 1968, more adequate quarters for the program have been needed for the last several years. The present quarters include all administrative and faculty offices, the library science library (consisting of over 12,000 carefully selected volumes and several hundred periodicals), the office of the library science librarian, and one classroom. Fortunately, however, the school is part of a complex of libraries and institutions that comprise the Joint University Libraries and the Nashville University Center which puts at the disposal of the Peabody student a wide range of facilities and services.

The Peabody College Library, with which the School of Library Science shares the building, contains approximately 250,000 volumes which emphasize those subjects taught primarily at Peabody; education, psychology, physical education, special education, art, geography, and others. The Peabody Music Library, located in the Social-Religious Building, is one of the superior graduate music libraries in the Southeast and contains more than 20,000 books, scores, and records. The Peabody Demonstration School Library, located in the Demonstration School across from the college campus, contains approximately 11,000 volumes and serves as the site for field work for many of the Library School students specializing in school libraries.

The General Library Building of the Joint University Libraries, located on the land owned by the system at the point where the campuses of Peabody College, Scarritt College, and Vanderbilt University intersect, was originally constructed in 1941. The recent completion of the H. Fort Flowers Graduate Wing to this building

has added shelving for an additional 350,000 volumes, 600 carrels for graduate students, and 80 faculty research studies. Of special interest to the Library School students are the libraries of the Vanderbilt Medical School, Divinity School, and Law School, as well as the new Graduate School of Management. The Library School also has a large classroom and cataloging laboratory in the General Building. The total holdings of the Joint University Libraries now exceeds 1,200,000 volumes, and provides in a single system one of the nation's finest library resources.

Moreover, Peabody is a member of the Nashville University Center which is composed of the three members of the Joint University Libraries plus Fisk University and Meharry Medical College. The five institutions, on nearby campuses, serve different areas of the educational field and have worked out a plan of cooperation which enables each institution to draw freely upon the resources and facilities of the others, but at the same time to remain independent in organization and administration. Students are encouraged to avail themselves of the opportunities made possible by this plan of cooperation.

Of special significance among the newer developments on the Peabody Campus is the Computer Center, established in 1968 with funds from the National Science Foundation (through the Southern Regional Education Board), the John F. Kennedy Center for Research on Education and Human Development (a major research division of the college), and Peabody College itself. The Computer Center currently houses an IBM 1130 with a high-speed printer and two magnetic disk drives, as well as adequate support equipment, all of which is designated primarily for instructional and research purposes. The establishment of the Computer Center, partially through the efforts of the Library School, has had a strong impact upon the curriculum of the college; at present about twenty courses are offered that deal directly with the computer, including two in library science. Through these courses library science students may obtain first-hand experience in the use of electronic data equipment and obtain knowledge of their potentialities and limitations for library applications and information storage and retrieval systems. In 1970 the students of the School of Library Science, assisted by R. Wilburn Clouse, director of the computer center and assistant professor of library science, organized a chapter of the American Society for Information Science (ASIS).

In the history of the School of Library Science over 4,000 students have enrolled for classes, of which some 3,300 have received the appropriate professional degree. A typical student body during the late 1960s would number 100–150 students during the regular academic year and about 200 during the summer session. A cosmopolitan atmosphere has always characterized the student body, with twenty to twenty-five states and five to ten foreign countries usually represented in any given semester. Accordingly, Peabody graduates are found in virtually every state and in many nations. In the early 1960s an unusually large group of Taiwanese students were admitted to the program, most of whom remained in this country after graduating. With the stiffening of the admission requirements of the Library School and the Graduate School as a whole in 1965 and 1966, including requiring the Test of English as a Foreign Language of all non-English-speaking applicants, the number

of Chinese students dropped significantly, though there was never any attempt on the part of the school to bar their admission. The new standards applied to all. In the first year after the implementation of the new admission standards, which included the Graduate Record Examination (GRE) for American students (aptitude section), the total number of students declined, but from 1966 to 1970 the enrollment increased 62%, with no relaxation of the admission standards. By 1971 the enrollment showed signs of leveling off, but 1972 showed another dramatic increase in enrollment.

The requirement of the GRE has probably served a good purpose in providing another dimension of an applicant's qualifications, but it remains only one of several measurements to be taken into account before admitting or rejecting a student. Cultural background, even within this country, can affect GRE scores radically; other factors are equally difficult to measure. Thus in 1971 the Graduate School, while still requiring the GRE, made allowance for special consideration of a limited number of students who do not meet the exact quantitative standards for admission. This is being done on an experimental basis, and subsequent studies and records of these students should reveal the relative success of these modifications.

The library science program at Peabody has been predominantly a graduate program, first in offering the B.S. in L.S., later the M.A., and now the M.L.S. and the Ed.S. Undergraduates may minor in library science, but those undergraduates who enroll in library science classes, usually with the intention of acquiring school library certification, rarely comprise more than 2 or 3% of the student body. The Ed.S. program has usually had five to ten students enrolled at a time, with others often in progress. To these may be added the few students who minor in library science, usually at the doctoral level. These students often have the master's degree in library science, either from Peabody or another institution, and have found advanced studies in this area compatible with their doctoral studies in related fields.

The M.L.S. program, in which the majority of the students are enrolled, consists basically of thirty-six semester hours of library science, a minimum of thirty of which must be at the graduate level. Peabody does not encourage extensive work in library science at the undergraduate level, preferring instead students with strong backgrounds in the various areas of the liberal arts. Thus a maximum of six semester hours of undergraduate work in library science is accepted toward the master's degree. As a general rule, most students take the required thirty-six hours at Peabody, all for graduate credit, and thus are able to select from among the total of forty courses and eighty-four hours presently offered by the school, plus a selection of courses offered by other departments which may count toward the M.L.S. degree. Students may elect one area of specialization related to academic, public, school, or special libraries, and in consultation with their advisors decide which courses are most appropriate to their chosen areas. The school does believe in the need for a "core" curriculum that will introduce students without previous professional training to the fundamental principles of librarianship through such courses as Foundations of Librarianship, Introductory Cataloging and Classification, Introduction to Bibliography, and Selection and Acquisition of Materials. Moreover, believing that

much of the content of library science as an intellectual discipline must eventually be found in bibliography and its related fields, the Library School has long emphasized information sources in the various fields, and it is probably in this area that Peabody graduates are most thoroughly grounded. Thus in addition to the basic course in bibliography, the Peabody student is required to take at least two advanced courses in bibliography, choosing from among Bibliography of the Humanities, the Social Sciences, and the Sciences. Other "materials" courses include Bibliography and Literary Research, Bibliography of Minority Cultures (both recent additions to the curriculum), Government Publications, Reading Interests, Books and Related Materials for Children, and Books and Related Materials for Youth, as well as other courses in related fields which may be taken for library science credit.

In addition to the two new courses mentioned above, the curriculum has been revised and expanded since 1967 to include the following courses: Special Libraries and Information Centers, Comparative Librarianship, Systems Analysis in Library and Information Science, the Library Media Center in the Elementary School (cross-listed with the Division of Education), Administration of Information Services (now Advanced Reference and Bibliography), Data Processing of Library Operations, Information Storage and Retrieval, Education for Librarianship, and Principles of Research. The latter two courses are designed almost exclusively for students at the Ed.S. level, with Principles of Research being required of all Ed.S. students prior to undertaking the Independent Study (thesis). Master's students may also specialize in music librarianship by following a course of study offered in cooperation with the Peabody School of Music, which includes, as part of a prescribed course of study in music and library science, a course in Music Bibliography offered by the music librarian for students in both fields of study.

At the master's level the school has tried to assure on the one hand, that each student receives a fundamental grounding in librarianship through requiring certain basic courses and, on the other hand, that the student has a wide range of choices among courses to provide some opportunity for specialization.

It is at the Ed.S. level, however, that the advanced student, usually with at least 2 years of library experience, may design a special course of study—suitable to his background and immediate needs. The Ed.S. program consists of thirty semester hours (which include Principles of Research and the Independent Study). Based on the various strengths at Peabody, both within and without the School of Library Science, several specializations are recommended to the Ed.S. student: education for librarianship, library administration and supervision, or specialization in one of several areas of library services, such as technical processes, bibliographical services, or information services. Each program of studies is designed to meet individual needs through student–faculty consultation, and each program is usually interdisciplinary, drawing on courses in areas such as education and psychology.

In the areas of faculty development and internal administration, significant progress has been made in recent years. The school has doubled its faculty during the last 5 years. Two appointments demonstrate the aspects of cooperation discussed earlier: Professor Clouse has filled a vital need in information science through co-

operation with the Computer Center and the Kennedy Center; Professor William V. Jackson, an authority in Latin American studies and university libraries, holds a joint appointment with the Department of Spanish and Portuguese of Vanderbilt University. The administration of the Library School has been improved with the assignment of a faculty advisor to every student and the appointment of an assistant to the director, J. Marion Kimbrough, who coordinates the advisee system and assists in numerous duties that previously were the responsibility of the director.

George Peabody College for Teachers is not a large institution, but it is a complex one with a variety of programs and resources to support these programs. The School of Library Science has thus taken full advantage of the multiple resources of the college, the Joint University Libraries, and the Nashville University Center. As a unit within the Graduate School of the college, it has cooperated with the Graduate School in evolving stringent but sensible admission standards, in revising and updating the curriculum, and eliminating duplication between programs when possible. The Graduate School, in turn, largely through the efforts of the graduate dean, has had a catalytic effect on the Library School both in continual self-study of its program and in search of sufficient institutional support in all areas to continue to offer a quality program. Although the budget has increased significantly in the last 5 years, substantial funding for new quarters remains in 1972 the most pressing need of the school.

Peabody College is not a young institution, but it has shown through the years not only that it can adapt to change but it can anticipate change and move accordingly. And just as recent years have seen various changes in the School of Library Science, the changing tides of the 1970s will require new methods, new skills, and new attitudes, traits of mind which should assure its continuance in the uncertain years to come.

EDWIN S. GLEAVES

THE GEORGE WASHINGTON UNIVERSITY, THE MEDICAL CENTER, BIOLOGICAL SCIENCES COMMUNICATION PROJECT

History and Mission

The establishment of the Biological Sciences Communication Project (BSCP) in October 1960 signaled the conversion of an idea into an organization. The concept for its formation was generated at the American Institute of Biological Sciences "to create an organization to meet the needs of the scientific community for information in the life sciences." The specific mission was, and remains, to "assemble, evaluate and communicate information on man, his environment and the life sciences." Its scope of activity would "relate the general theory and mechanics of communication to

the field of biology" (*1*). Initial support for the new organization was provided by a grant from the National Science Foundation.

Various symposia were planned, directed, and managed by the BSCP during its early years. From one of these, fundamental BSCP objectives were culled. The Biological Sciences Communication Seminar (*2*) was held at the American University in Washington, D.C., in December 1961, with the purpose "to identify and review problems associated with the flow of biological science information from scientist producer to scientist consumer." Ideas emerging from the seminar gave impetus to further development of the BSCP and helped in delineating the channels it would pursue.

A chief proponent in founding and implementing the organization, Dr. Charles W. Shilling has been its first and continuing director until July 1, 1972, when Dr. David C. Weeks became director of the BSCP. Dr. Shilling remains at the BSCP in the active capacity of senior scientific advisor.

Basically, the BSCP is concerned with research into the problems of scientific information—how it is generated and flows between and among individuals and groups, and the patterns of recourse that characterize the scientist's attempt to approach an unmanageable volume of literature. Another concern is that of applying both proven and experimental methods to processing scientific information on specific subjects with a view of lessening the problems.

The BSCP is supported by grants and contracts from various government agencies, societies, foundations, universities, and private industry. Under an early grant from the National Institutes of Health, the Biological Serial Record Center was activated in 1962 as "one phase of a continuing effort to improve the flow of information to the scientific community" (*3*). The center assembled previously scattered or inaccessible information, providing worldwide data useful for studies in-depth of the scientific serial literature in at least one subject discipline.

Another early effort of the BSCP centered around the subject of a most valuable experimental animal—the baboon. The effort involved preparation, compilation, and final publication in 1965 of *The BABOON—An Annotated Bibliography, 1607–1964*, with 595 entries and a permuted index (*4*). (This followed and replaced Part I issued in 1963.) The endeavor, begun in 1961 under a contract with The Southwest Foundation for Research and Education, has been ongoing continuously to the present (1972) with the provision of citations and informative abstracts on a monthly basis.

A precursor to the BSCP's later undertakings with international interest and objectives was a program initiated in 1961 to provide information for use by the United States biologist traveling abroad concerning the biological science activity of the country being visited. Information was collected on each country, and kept up to date, regarding research programs, laboratories, and scientists.

The BSCP became affiliated with The George Washington University in 1963 as an off-campus research project, reporting to the Office of Sponsored Research. During the period 1963–1968 it was able to retain and increase its needed contractual support, and gradually to expand the scope of work and the staff (*5*). In

1968 the BSCP became an integral part of the university as a unit within the Department of Medical and Public Affairs of the George Washington University Medical Center. The department, newly created in 1967 under the chairmanship of Dr. Murdock Head, has the essential mission to promote and disseminate biomedical information of public concern (environmental problems, drug abuse, and the like), through the production of films and other audiovisual materials as well as the scientific literature activity of BSCP.

The merging of the project with a medical department has been mutually advantageous. The BSCP offered a capability in science information handling that had reached an acknowledged level of merit. In turn it acquired access to full university facilities and orientation into the university community. Communication is maintained with four other (local) major universities, all members of the Consortium of Universities in the greater Washington, D.C., area. The BSCP is distinct among information support facilities because of its integration with a university medical center (*6*).

The highlight of BSCP capabilities is its research team, comprised of scientists and other professional men and women with advanced degrees, information specialists, skilled librarians, and a competent support staff. Their coordination of work assignments in various areas and disciplines results in effectual products. Adequate equipment for production includes an IBM MT/ST and composer operation.

Activities and Methods

BSCP programs, embracing a variety of research projects, focus on the improvement of communications in the life sciences, emphasizing literature analyses, abstracting and indexing, and developing information centers to process and disseminate biological information.

The tools of today are used, ranging from manual to machine searches, to collect, organize, and analyze information. The large general-purpose machine systems provide segments of the material needed for a single research project, each yielding material from different sources. These combined outputs are inadequate until supplemented by additional data; BSCP analytical information support is essential to augment the broad, "first cut" capability of a mechanized bibliographic reference system. In effect the BSCP effort begins with outputs of computer searches from such systems as MEDLARS, NASA, SIE, DDC, and NTIS.

A preliminary step in any analytical effort involves two essential tasks for BSCP staff: (1) to identify and procure additional literature, and (2) to eliminate (often major portions) material which does not directly relate to the needs and objectives of a research project.

Research programs generate new information, some assemble existing data, and others develop new services and systems for subject control and access to the technical literature in varied disciplines. Current BSCP programs include operation of a specialized space biology information center, monitoring applied science utilization

of space-devised equipment and methods for medicine and industry, bibliographic services (retrieval, abstracting, and indexing), current awareness services, literature analyses and evaluation tasks, design of information systems, preparation of thesauri, and critical reviews.

IMPLEMENTING SCIENCE INFORMATION

Bibliographies

The BSCP prepares bibliographies on special subjects upon request, using selected automated services and making detailed searches of local files and the current literature. In each case the Science Information Exchange (SIE) is queried to find out who is working on the particular subject, and contact with the scientists thus identified yields a large volume of additional citations. A great number of BSCP bibliographies, produced during an 11-year period, are in broad categories of behavioral sciences, biochemistry, environmental biology, information science, marine biology, microbiology, organic chemistry, pathology, plant life, planetary quarantine, primates, space science, and underwater data.

A number of bibliographies in space biology and medicine (and related categories) have been completed under NASA sponsorship in support of the United States space effort. Various literature surveys and listings of publications in traditional space biosciences, and perhaps more importantly, in their newer ancillary subdisciplines, have been of assistance to further basic and applied research. The major subjects of BSCP bibliographic work prepared for NASA include planetary quarantine, exobiology, behavioral biology, environmental biology, and physical biology.

A BSCP undertaking of considerable magnitude was the preparation and publication (in November 1971) of bibliographies on corn and wheat, each in three volumes, containing 20,462 and 22,315 items, respectively (*7,8*). The work involved a total search of the world's literature in these basic feed grain and food crops. More than 50,000 citations were checked and searched. The volumes are of worldwide usefulness, with special import for the developing nations (*9*), and represent the culmination of a project supported by the Rockfeller Foundation, commissioned by Dr. Dorothy Parker. [Previous volumes on rice (*10,11*), millet (*12*), and sorghum (*13*) were part of this series of agricultural publications.] Of particular value was a dual provision in the grant for specialized, advanced academic training for students from developing countries (see also the section entitled "Education and Training" below). It was stipulated that such students be willing to participate in work on the corn and wheat bibliographies.

Another major publication in 1971 was *An Annotated Bibliography on Diving and Submarine Medicine* (*14*). Preparation of this comprehensive volume, which contains over 1900 abstracts and complete citations, was supported by an Office of Naval Research contract. Work is in progress on a second volume.

Information Centers

The Bioresearch Information Center is a facility combining scientists, literature specialists, and the tools of their trade—document files, abstracts, and indexes. The process of converting data into information is accomplished by negotiation with the user as a means of specifying each requirement so that he receives only material that meets his needs. Outputs range from citations to critical reviews, prepared from comprehensive search, informed selection, and professional analysis.

The purpose of the NASA Information Center at the BSCP (under a contract with the agency) is to provide a consolidated source to generate information readily for programs in the Office of Life Sciences. The facility is not intended for wide dissemination of information, but only as a service to supply specific data as needed. The core of this structured information is a storehouse of data: a Termatrex into which cards are filed that contain citations and abstracts. Data are derived from the scientific literature which is searched for articles pertaining to space biology and medicine, including planetary quarantine. The Termatrex now contains references to some 28,000 articles. It is tapped as a basic step for NASA needs, but is usually augmented with other searches such as NASA Scientific and Technical Information Facility (STIF), MEDLARS, *Biological Abstracts*, and such manual searches as are required. Fulfilling NASA needs may be for two or three references, a short or long bibliography, a literature review, a chart showing sectors of ongoing NASA research, or various miscellaneous requests.

An information center with different end products is set up at the BSCP, styled to meet the needs of the Social and Rehabilitation Service (SRS) of the Department of Health, Education, and Welfare. This program functions as a clearinghouse to disseminate information to and among nineteen Rehabilitation Research and Training (RT) Centers, as well as to state rehabilitation agencies and SRS regional offices. The exchange of information enables each organization to know what is being done at the others. Information is stored in a Termatrex storage and retrieval system. Dissemination is accomplished through publication (prepared and produced by the BSCP) of an annual training directory (*15*) listing more than 400 projects, and an annual research directory (*16*) listing more than 600 projects. Each volume gives full information on all projects, with abstracts, and carries a permuted index. Eventually, directories of the centers' audiovisual aids material will also be published.

The BSCP also prepares, publishes, and circulates a quarterly newsletter, the *Informer*, for the SRS. It has proved an effective communication of all types of current activities in the special centers (RRT, SRS Regional Research Institutes, and the National Center for Deaf-Blind Youths and Adults). In addition to the publications, information is supplied to users upon request.

Prostaglandins, currently of major scientific interest, is the subject field of a new information center established at the BSCP under a subcontract with the Worcester Foundation for Experimental Biology. The central objective of the foundation's project, to determine the effects of prostaglandins on reproductive physiology, re-

quires access to the world literature. The BSCP is charged with developing such a repository, to furnish answers to questions on prostaglandins. A concept of the endeavor is to furnish material of a specific nature. For example, a researcher at the George Washington University Medical School might need information regarding his research project on the effects of prostaglandins on the term uterus. While most questions at present originate from Worcester, it is hoped that, in the future, the information center will be made available to worldwide requests for the literature.

World literature on the subject numbers about 2,000 documents at present and is growing at a rate of about 15 a week. More than 1,000 documents collected so far at the BSCP are in various stages of indexing. A bibliography will be compiled ultimately from the material in the information center, and probably will be published.

Current Awareness Service

To keep a designated contractor informed on the present flow of research in a given field, the BSCP current awareness service is successful in saving the recipient many hours of searching. This alerting service keeps the individual recipient informed on a regular and continuing basis.

Each month the appropriate literature is searched for pertinent articles; those selected are abstracted and a complete citation, abstract, and keywords are entered on 5 × 8 cards. These are mailed to various groups designated by the contractor. The service is being performed on a continuing basis in the subject areas of the baboon as a research animal (mentioned previously under the section entitled "History and Mission"), preservation of red blood cells, submarine medicine and deep sea diving, and drug abuse.

Critical Reviews

One of the most demanding and at the same time most important aspects of the transfer of information is in the preparation of a faithful critical review of the literature in a given subject field. The BSCP has prepared many such reviews during the past few years. Among them, to mention a few, are *Frozen Blood—A Review of the Literature 1949–1968 (17); Spatial Orientation, Navigation and Homing in Bats (18); Ornithology: The Effect of Light on Birds (19); Mammalian Burrows and Tunnels (20);* and *A Review of Basic Operant Behavior Research Methods and Their Application to Some Problems in Animal Orientation and Navigation (21).*

Specialized Services

Tasks to meet the requirements of special information problems are specifically and individually planned. The BSCP capabilities in researching scientific information and of compiling and communicating it are utilized. Each such information problem is approached with a view of using the most efficient methods that will result in a product to best serve the user.

One effort in the field of endocrinology is a study that coordinates and integrates all laboratory work in testing for endocrine functions to find a common denominator running through similar tests. Each test or group of tests (all taken under varying conditions) is critically evaluated to find a common thread. The world literature is being surveyed to find out how tests are conducted in different countries in order to assemble widely scattered information that should be useful to researchers. The effort, when completed, is intended to improve testing methods in endocrinology by comparing what has been done with what is still needed.

A comprehensive data book, dealing with the undersea environment, is in preparation under a U.S. Navy contract. The volume is to provide biomedical and human performance data with which to develop design criteria bearing on human productivity in the undersea environment. All available published literature and government reports are being screened. In addition, both commercial and military field operations will be examined for indispensable elements not available in the library or laboratory.

The Technology Application Group has, since 1965, supplied technical and analytical assistance to programs designed for more rapid and effective transfer of new technology to the public sector. The group is responsible for evaluating and analyzing research institutes organized into Biomedical and Public Sector Application Programs. Problems in clinical and diagnostic medical instruments and in rehabilitation are included in the biomedical program. Public sector problems are in law enforcement, transportation, fire safety, air and water pollution, and coal mine safety. In addition to the application effort, the Technology Application Group works in areas of systems design; program coordination, management, and assessment; and information processing.

Various specially designed library tools are necessary to the proper functioning of a library, which cannot depend on only books and journals. The BSCP has developed several such tools. A study of resources and major subject holdings available in United States federal libraries underscores their extensive or unique collections of research materials; 188 selected special libraries are described (*22*). A roster of federal libraries identifies each of more than 1,900 individual libraries serving many departments, committees, agencies, courts, and other organizational entities in the federal government (*23*). A bibliography was published on staffing criteria for libraries, information and information analysis centers, and technical and medical research libraries and information centers of the Department of the Army (*24*). Of widespread value to researchers and library science in general is the BSCP's updated listing of 426 libraries and reference facilities in the area of the District of Columbia (*25*).

In a study for the National Library of Medicine (NLM), data were collected regarding interlibrary loans for use in the Extramural Program in national program planning (*26*). The findings were to be used in planning the regional medical library program, to determine the number of loans that might be handled by a given library other than the NLM, and to delineate trends developed in the use of the library's facilities and services.

An editorial and production unit provides services in scientific writing and editing in various science communications. The staff processes material for publication in the journal *Environmental Biology and Medicine* (*27*); and prepares, edits, and produces in-house reports, articles, books, and other publications. It also has assignments from contractors for editing and preparing camera-ready copy for a variety of directories, brochures, and books.

Education and Training

It is the belief of the BSCP that the best attack on the explosive growth of scientific information is through education and training of science information specialists. It was in this frame of reference that early in 1962, a proposal was submitted to the National Institutes of Health (NIH) for support of a program to train four graduate-level students to become biomedical science information specialist administrators. A 2-year grant was awarded for intensive formal study at American University and on-the-job training at the BSCP.

The BSCP has maintained a major interest in education and practical training. In 1966, under a grant from NLM, the program developed further. Four trainees enrolled as fulltime graduate students at American University, and spent a minimum of 2 days per week in practical training on science information projects at the BSCP. All of the trainees completed Ph.D. course requirements, in the course of which two earned the M.S. degree, and one was awarded the Ph.D. in 1971.

The BSCP program was augmented by a grant from the Rockefeller Foundation in 1965 "to provide advanced training . . . in the general field of information science" (*28*). Support was provided for four students, three working toward the M.L.S., and one toward the Ph.D. One of the students was Japanese, another from Uganda, emphasizing the international aspect requested by the Rockfeller Foundation. Later participants were from Far East countries.

Course work was pursued at American University and the Catholic University of America. For practical training at the BSCP, the students worked on the bibliographies of worldwide literature on rice, corn, wheat, millet, and sorghum (previously cited).

Since 1966, twelve specialists under the program have pursued advanced study in the technology of biomedical information handling; all of them have been selected for important and useful professional careers.

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REBECCA R. WISE

GEORGIA INSTITUTE OF TECHNOLOGY, SCHOOL OF INFORMATION AND COMPUTER SCIENCE

The decision by the Georgia Institute of Technology in early 1962 to establish an unprecedented graduate program in "information science" was an unequivocal indication that the nationwide concern with management and use of information and knowledge reached the community of science educators. The development and implementation of nontraditional approaches to optimize the management and utilization of information clearly demanded the establishment and training of new manpower categories.

The long-standing interest of the science and engineering faculties of the Georgia Institute of Technology, a technological university of 8,000 students, in knowledge transmission and communication prompted the National Science Foundation to organize at the institute two national Conferences on Training Science Information Specialists. The October 1961 and April 1962 Conferences brought together representatives from the government, industry, and universities. Subsequent to these meetings several key faculty members and administrators of the Georgia Institute of Technology, who had conducted a worldwide survey of education for science information personnel, proceeded to design and formally propose to the institute an academic program of education leading to graduate degrees in a designated new discipline, information science. Those principally responsible for this pioneering effort were Mrs. J. Henley Crosland, Director of Price Gilbert Memorial Library; Dr. William F. Atchison, Head of the Rich Electronic Computer Center; Dr. Vernon Crawford, Professor of Physics; Dr. Paul Weber, Dean of Faculties; and Dr. Waldemar T. Ziegler, Regents' Professor of Chemical Engineering. The resulting milestone in education for science information work is primarily due to the unceasing enthusiasm of Mrs. Crosland, and to the encouragement and support of Dr. Burton W. Adkinson, then Head of the NSF Office of Science Information Service.

The objectives of the new graduate program, as stated in the 1962 proposal to the Graduate Council of the Georgia Institute of Technology, were "to develop and evaluate graduate curricula on the Master's and doctoral levels for the successful preparation of personnel for professional practice and research in the emerging field of information science." The new School of Information Science formally opened in fall 1963, under the interim direction of Dr. William F. Atchison; the first

Director of the School, Dr. Vladimir Slamecka, was appointed in October 1964. In December 1964 the school awarded the first degree of Master of Science in Information Science to Miss Joanne Butterworth. The doctoral program of the school was approved by the Board of Regents of the University System of Georgia in July 1967; Jesse H. Poore, Jr. was the first candidate to earn, in September 1970, the degree of Doctor of Philosophy (Information Science). In that year the regents also authorized a change in the name of the school and in the designation of its degrees to "Information and Computer Science."

Since 1970 the School of Information and Computer Science has been the largest graduate degree granting department of the Georgia Institute of Technology in terms of registered and graduated students. By summer 1972, altogether 310 students had been awarded advanced degrees in information and computer science; the total number of degree students participating in the program has been 890; and thousands of undergraduates have taken courses offered by the school.

The development of educational objectives for the academic programs offered by the School of Information and Computer Science reflects the progress in the philosophy of education of the discipline during the past decade, as well as trends in the expected capabilities of information processing professions.

The structure and contents of the educational programs of the school are given by two types of need: the societal requirement for individuals educated or trained to perform specific functions, and the intrinsic need of a science to assure its own development and growth. The school perceived that its graduate programs must include a strong component concerned with the development of a theoretical base of the information-based professions; and it was equally clear that these programs must not ignore the social mandate to supply professional personnel and effective methods capable of improving the functions and processes of information management, transfer, and use. Thus both theoretical and professional programs were indicated and implemented in the following four main categories of the profession.

1. *Information Systems Engineering.* This profession encompasses the intellectual skills relating to the formalization of information-based processes in purposeful human organizations. Functionally, the profession is concerned with the analysis, description, modeling, and optimization of human and mechanized processes and systems, and with their design into purposeful machine-aided systems which augment the problem solving and decision-making functions of humans.

2. *Computer Systems Engineering.* This profession encompasses the intellectual skills necessary for the design and operation of computer systems comprising hardware, software, people and their objectives. It is expert in the information processing hardware including communications; the software including programs, programming systems, and languages; and it assumes the technical and managerial accountability for the overall performance of these facilities.

3. *Information Science.* This scientific profession comprises the intellectual skills necessary to study and manage information as an individual, national, and social resource. Functionally, it is concerned with the theory of the discipline, and with the development and application of social, legal, economic, and technical criteria for the prudent utilization and management of information and knowledge.

4. *Computer Science.* This scientific profession comprises the intellectual skills necessary to study the design and behavior of information processing automata. It is concerned principally with the theory and properties and procedures (algorithms), formal languages, and with the theory and design of automata.

The various curricula offered for education in these four professional categories are of two types. The doctoral program has as its objective the education of individuals for research and academic careers, and hence its content is relatively theoretical, emphasizing a deep research involvement. In contrast the objective of the applied Master's curricula is to educate advanced professionals competent in the engineering design of information processing systems. The latter curricula emphasize the common foundations of the information processing systems for science, management, command and control, process control, health care, and education, viewing these systems as devices intended to amplify the ability of men and their organizations to solve problems. One of the curricular options available, a Graduate Program in Biomedical Information and Computer Science offered jointly with the Emory University School of Medicine, is indicative of the trend of development of professional education in information and computer systems design.

In recognition of the relevance of mathematical and engineering disciplines to the new science and its professions, the educational programs have a quantitative character, in turn requiring substantial undergraduate preparation in the mathematical sciences and in computer use. As a result of such admission requirements, the profile of the school's student body is analogous to that normally found in departments of engineering and mathematics.

With the graduate degree programs firmly established, more recently the school began to extend its educational activities to undergraduate education, and even into high school education. Comprehensive service courses to the Undergraduate Division have existed for several years, and a formal baccalaureate degree program in the information, computer, and systems sciences was introduced in 1972. This program, together with a high school curriculum in information and computer science which the school designed and has already introduced into secondary education jointly with the Atlanta Public Schools, completes the nation's first structured system of coordinated programs of education in information and computer science, extending from the secondary school through the doctorate at university level.

The objective underlying the research program of the School of Information and Computer Science is to contribute to the development of a scientific foundation of the discipline, especially to the theory of information and its processes. The domain of research encompasses investigations of information carriers (signs and sign systems) and their properties, as elements in the direction of explicating, describing, and controlling information processes in automata and humans. The research program extends into design-oriented studies, the guiding goal of which is a significant optimization of the effectiveness and efficiency of information management and utilization. The contents and results of the school's research are described summarily in its annual research reports.

A significant event in the development of the School of Information and Computer Science was the establishment in it in 1967 of a Science Information Research Center. Supported in part by the National Science Foundation, the center embodies a research management approach seeking to establish bases for multidisciplinary attacks on significant problems in the management and communication of science information, and to do so in an environment which simultaneously provides for training of science information researchers.

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VLADIMIR SLAMECKA

GEORGIA LIBRARY ASSOCIATION

The Georgia Library Association, first known as the Georgia Library Club, was organized May 31, 1897, at the Young Men's Library of Atlanta, located at 101 Marietta Street in the old Markham mansion. The meeting was called by Miss Anne Wallace, host librarian.

In 1895, during the Cotton States and International Exposition, she had convened a conference of women librarians whose object was to stimulate library growth in the South and to discuss practical problems of library economy. It was hoped that this meeting would be the means of forming state associations after the plan of the American Library Association, and plans for a Georgia association were discussed. It was not until 1897, however, that the work was completed.

Miss Wallace was elected the first president. Vice Presidents were Mrs. Moses Wadley, Augusta; Mrs. J. K. Ottley, Atlanta; Chancellor Boggs of the University of Georgia, Athens; Harris Chappell, Milledgeville; Mrs. J. C. Printup, Rome; S. A. Reid, Macon, and Price Gilbert, Columbus. Charles W. Hubner, Atlanta, was secretary and Miss L. A. Field, Decatur, treasurer. There were thirteen charter members.

Formed to stimulate library interests in the state, to encourage cooperation among libraries, and to promote the modern library spirit, the Georgia Library Club held its first annual meeting at Macon in the Public Library building, October 28–29, 1897. Invitations stated that this library contained some valuable matters on Georgia history and archives which would be of interest to all librarians who made a speciality of local and state history.

Some notes from the program of that meeting follow.

> The field of library work in the South is a broad one, and offers a brilliant opportunity for development.
>
> It is the purpose of the Georgia Library Club to create a public sentiment which will support the idea of taxation for educational purposes. The modern library movement is pre-eminently educational and the public library is an adjunct to the public school. It is literary extension for the masses; the aristocracy of libraries has been revolutionized into a democracy.
>
> It is hoped that the Club will receive the support of the Trustees and Directors of the Libraries.
>
> It has hitherto been impossible for many of the Georgia Librarians to attend the annual meeting of the American Library Association. That the State Association will in part supply that spirit of cooperation and mutual aid which so characterizes the national meetings, is to be expected.

The first constitution stipulated that its object was to awaken interest in libraries throughout the state and give encouragement, aid and information to all libraries. Any librarian, library assistant, or director could become a member upon payment of annual dues of 50 cents. Other persons interested in library work could become members with the consent of the Executive Committee on the same terms. Annual meetings were to be held on the last Tuesday of October. The officers consisted of a president, six vice presidents (seven were listed in the first program), a secretary, and a treasurer.

Anne Wallace, who was president for the first 3 years, also served as secretary–treasurer for 8 years. Chancellor Walter B. Hill of the University of Georgia succeeded her in 1900 and continued for the next seven terms. Mrs. Eugene B. Heard, Middleton, a charter member, was appointed to fill his last year on May 16, 1906.

The name was changed to the Georgia Library Association (GLA) at the second meeting in Atlanta, October 27–28, 1898. Topics discussed were special training for librarians, municipal aid to libraries, and library legislation. It was here that Mrs. Eugene Heard read a paper which told the story of the Seaboard Air Line's libraries, traveling via baggage car out from Middleton and through several states. The Georgia Library Commission also held its first meeting at this conference.

Athens was the site of the third meeting in October 1899, while the fourth was not held until the association met in Atlanta on November 5–6, 1902, and the fifth again there, December 8–9, 1905. There was no meeting in 1906.

Atlanta also hosted annual conferences in 1907, 1908, 1910, 1911, and 1913. No meetings were held in 1909, 1912, and from 1914 to 1919.

From 1923 until 1941 the association met every biennium. Because of World War II no meetings were held until March 1944. Albany was chosen as the site for March 1947. Since that time regular biennial meetings have been held.

In the interim between biennial conferences the work of the association is handled by the Executive Board, which meets at the call of the president and immediately before and after each conference.

The Executive Board is composed of the president, the two vice presidents, the treasurer and the executive secretary. Other members are the chairmen of each of the eight sections of the association, the editor of the *Georgia Librarian*, a member of the Library Department of the State Department of Education, the ALA Chapter Councilor, the immediate past president and the advisor to the president. Committee chairmen are frequently asked to attend these meetings.

The sections include Children's and Young People, College and University, Education for Librarianship, Georgia Library Trustees Association, Public Library, Resources and Technical Services, Special Libraries, and Reference sections.

There are currently ten standing and fifteen special committees, each with its own task. Examples are Intellectual Freedom, Governmental Relations, Librarianship as a Career, Awards, Library Development, and Scholarship. The association has representatives on the Georgia Committee on Children and Youth and also the Committee on Mental Health Affairs.

GLA is a chapter member of the American Library Association and elects an ALA Councilor who serves a 4-year term. Members of the Association frequently serve as councilors-at-large and as members of ALA committees and boards. GLA also has a representative on the Executive Board of the Southeastern Library Association and most of the members are also members of SELA.

Today, after 74 years of service to Georgia libraries and librarians, the association has approximately 1,000 members. The current constitution lists the following objectives:

(1) To develop an understanding of the place that libraries should take in advancing the educational, cultural, and economic life of the state.
(2) To promote the expansion and improvement of library service.
(3) To stimulate activities toward these ends.

Membership in the association is open to persons engaged in library work and others interested in its objectives. They may become members upon the payment of dues which are $4.00 annually. Types of members are regular, student, retired librarians, and honorary. There are presently fifteen honorary members.

The official organ of the Association is the *Georgia Librarian*, begun in 1964 and published biannually since that time.

In 1960 the Hubbard Scholarship Fund, in memory of the late Dr. C. S. Hubbard, who was for many years the director of the Division of Instructional Materials and Library Services of the State Department of Education, was created by his family and friends. The association, through its Scholarship Committee, now awards an annual Hubbard Scholarship in the amount of $1,000 to a qualified candidate. A number of

years earlier Miss Ola Wyeth, former GLA President and distinguished Savannah librarian, gave a scholarship.

An outstanding honor of the GLA is the Nix-Jones Award, given biennially by the Awards Committee for distinguished service to Georgia librarianship. It jointly honors the late Miss Lucille Nix and Miss Sarah Jones, two of GLA's most outstanding members. The objectives of this award are to recognize unusual contribution such as stimulation of library development. The first winner was Miss Sarah Hightower in 1969.

Among honors bestowed on the association and its members are (1) the Grolier Award, won by Miss Sarah Jones in 1965, (2) the Joseph W. Lippincott Award, won by Miss Lucille Nix in 1968; and (3) the Distinguished Service Award for School Administrators, won by Dr. Paul D. West in 1971.

DAVID E. ESTES

GERMAN UNION CATALOGS

History

The union catalog is one of the most evident and necessary forms of library cooperation. In Germany the need for such cooperation was recognized as early as 1798 when Goethe proposed a scheme for a union catalog of the libraries of Weimar, and later, in 1884, when the proposals which eventually led to the creation of the Prussian Union Catalog (*Preussischer Gesamtkatalog*) were put forward by the historian Heinrich von Treitschke (*1*). These early suggestions eventually took shape in a scheme credited to Fritz Milkau. In 1895 it was decided that a union catalog would be created for the major Prussian university libraries and the Prussian State Library. Thus Germany— i.e., Prussia—became the first country in Europe to initiate a union catalog within the current framework of the term. Formal notice of this decision was issued by the Prussian Ministry of Education and the catalog was established in the Staatsbibliothek Berlin. Since it was the intention to print the catalog in book form, it was compiled as a semibibliographical catalog. The *Prussian Instructions* (*Instruktionen für die alphabetischen Kataloge der Preussischen Bibliotheken*) were, incidentally, designed for this purpose and the catalogs of participating libraries were revised according to them. The catalog represented, in alphabetical author order, books found in the cooperating libraries which had been printed before 1898. The catalog entries conformed as closely as possible to the second edition (1899) of the *Prussian Instructions* and a summary of these rules for entry was eventually included in Volume 1 of the published *Gesamtkatalog*. By 1922 the collation of cards from the original eleven participating libraries had been completed and the catalog was being supplemented by the *Berliner Titeldrucke* which, since 1898, had acted as a printed accessions list for the libraries.

FIGURE 1. Hessen Central Catalog, *Frankfurt*. (*Reproduced by permission of Foto Boese, Neu Isenburg.*)

The printed *Gesamtkatalog* was originally expected to replace individual library catalogs, but it served that purpose in only a few institutions and remained chiefly a bibliographical and reference tool. To accommodate those libraries planning to use it as a catalog, however, there appeared, in addition to the two-column edition, a one-column edition which was designed to enable the libraries to enter call numbers and other supplementary data in the margins. The holdings of the ten Prussian university libraries and the Prussian State Library were kept up to date and other libraries were added to the consortium. By 1929 when the printed union catalog was closed, it listed all books published before January 1, 1930, which were in possession of the following libraries: Preussische Staatsbibliothek; Staats- und Universitätsbibliothek Breslau; Universitätsbibliothek Halle; Universitätsbibliothek Marburg; Universitätsbibliothek Bonn; Universitätsbibliothek Münster; Universitätsbibliothek Göttingen; Universitätsbibliothek Kiel; Universitätsbibliothek Greifswald; Staats- und Universitätsbibliothek Königsberg; Universitätsbibliothek Berlin; Bayerische Staatsbibliothek München; Bibliothek der Technischen Hochschule Aachen; Bibliothek der Technischen Hochschule Berlin; Bibliothek der Technischen Hochschule Breslau; Bibliothek der Technischen Hochschule Hannover; Bibliothek der staatlichen Akademie Braunsberg; and Nationalbibilothek Wien (2). Since this list included the Nationalbibliothek Wien, the venture can be called an international union catalog. The decision to begin publication in 1930 had twofold implications: one, the system of cataloging used by Prussian libraries was badly in need of reform and, with the implementation of the *Prussian Instructions*, could be improved and put on a new level; and two, the interlibrary loan system that had been steadily growing in importance to scholarly endeavors in Germany and elsewhere almost demanded the publication of the catalog (3).

After 1929 and until World War II, a card union catalog—containing entries from other libraries in Germany and Austria, as well as the original participants—extended the endeavor into a more comprehensive union catalog. This project as was mentioned before was carried on through the *Berliner Titeldrucke*, maintained through the Auskunftsbureau in Berlin. From the letter B onward, the printed catalog was expanded into a German Union Catalog (*Deutscher Gesamtkatalog*) reflecting the extended coverage.

The project became even more of an international effort in 1933 when the Rockefeller Foundation provided funding for accelerated work on the printed catalog. Fourteen volumes were published before the war. However, printing stopped during the war and the manuscript card catalog was removed from air-raided Berlin to the countryside. By 1947 it became clear that the manuscript had been lost. For the years of its active growth this national union catalog had been the leader and an example of the best executed method of the national type, and it was the best illustration of a catalog that attempted to locate all copies of all books (*4*). A more complete history of the *Gesamtkatalog* can be found in Pafford (*5*).

With no prospect of ever seeing the series of printed volumes completed, new thinking about union-cataloging began after World War II. Good reasons were put forward for building up regional union catalogs both in East and West Germany, instead of one national union catalog. Not only did constitutional considerations point in this direction–the various Länder being sovereign in the field of cultural policy–but library cooperation as well. If every region of the interlibrary loan system had its own regional union catalog to rely on, the loan service could be run according to necessary standards. Developments proceeded along these lines. Unlike developments in the United States, most regional union catalogs in Germany have developed through careful planning of their location, function, and coverage (*6*). Several techniques were investigated to produce the regional catalogs which were developing. For example, the Bauhuis advocacy of a microfilmed catalog received favorable reaction in some sectors and was accepted for some regional catalogs (*7*). Most of the union catalogs in existence in East and West Germany today are regional in their approach. However, two other types are in existence and are mentioned under the heading of Special Subject Union Catalogs (e.g., Orientalia) and Special Type Union Catalogs (e.g., maps, manuscripts, and periodicals—these sometimes being referred to as union lists). Since both union lists and union catalogs are published or unpublished, on card or in other format, limited or unlimited in scope, usually kept current by supplements and reflect the holdings of participating libraries, no further distinction is made between them in this article, except as the distinction becomes evident in the description of each.

Regional Catalogs

After the war there was some thought of reviving the German Union Catalog but, because the manuscript of the publication had been lost and because many of the

titles in it were no longer in the listed libraries, the idea was dropped. What actually materialized were several regional union catalogs. These are used mainly for interlibrary lending, and each catalog is responsible for one particular region within the Federal Republic of Germany (BRD) or the German Democratic Republic (DDR). Certain types of materials are not listed in the majority of these catalogs; for example, dissertations since 1885, maps, music, periodicals which are listed in other catalogs, and rare works which are known to be held in specific libraries (*8*).

Two important regional catalogs were begun soon after the war. In the DDR the University and State Library Halle/Saale was the first to create a regional central catalog—others are in various stages of development (*9*). Two years earlier, in 1946, work began in the BRD on the *Frankfurter Sammelkatalog*, which was later expanded to the *Hessen Central Catalog*. Later a regional catalog was established in Cologne for the Nordrhein-Westfalen region; and Hamburg and Berlin each established metropolitan catalogs. In 1956 other regional catalogs materialized: in the Munich State Library a Bavarian Central Catalog was created; in the Stuttgart State Library one was established for the Baden-Württemberg region; and in Göttingen a catalog was established for Lower Saxony—which, unlike most of the other catalogs, includes dissertations. Later the Hamburg Catalog was expanded into a Northwest German Catalog for Hamburg, Bremen, and Schleswig-Holstein. Most of these catalogs were started anew; only the Hessen one was able to draw on the existing *Frankfurter Sammelkatalog* as a basis (*10*). Because of its unique historical background, the *Hessen Central Catalog* deserves special mention here. It was originally a private venture of Dr. Christian W. Berghoeffer, which he began in 1891 under the title of *Der Sammelkatalog wissenschaftlicher Bibliotheken des deutschen Sprachgebiets bei der Freiherrlich Carl von Rothschild Öffentlichen Bibliothek, Frankfurt-a. M.*, commonly known as the *Frankfurt Sammelkatalog*. It was started when neither the International Bibliographic Institute nor the *Gesamtkatalog* existed. Dr. Berghoeffer had used printed catalogs for the compilation of the catalog, with the purpose of gathering as many different titles as possible from as many printed catalogs as possible of libraries specializing in some field or other all over Germany, Austria, and German-speaking Switzerland (*11*). By 1938 it comprised some 4 million titles from those countries and the Netherlands. It was not as bibliographically accurate as the *Gesamtkatalog*, and much of its original value was diminished by the destruction of many libraries represented by entries in the catalog. After the war, however, it was revived and lives today in the form of the *Hessen Central Catalog*.

The first phase of building up the regional catalogs from the catalogs of the participating libraries in the BRD is largely completed. New acquisitions are constantly being registered at the central catalogs and plans are currently being made to include special collections, which until now have been excluded, in the central catalogs (*12*). These regional central catalogs have all been established through a unified plan coordinated by the Committee on Union Catalogs of the Association of Academic Libraries (*13*). All of this has been made possible through the encouragement and financial support of the German Research Association.

TABLE 1
Regional Central Catalogs in Germany

Title of catalog	City	Location
Federal Republic of Germany (Bundesrepublik Deutschland)		
Central Catalog Baden-Württemberg (Zentralkatalog Baden-Württemberg)	Stuttgart*	Landesbibliothek
Barvarian Central Catalog (Bayerischer Zentralkatalog)	Munich	Staatsbibliothek
Hessen Central Catalog (Hessischer Zentralkatalog)	Frankfurt*	Universitätsbibliothek
Niedersachsen Central Catalog (Niedersächsischer Zentralkatalog)	Göttingen	Universitätsbibliothek
North German Central Catalog (Norddeutscher Zentralkatalog für Hamburg, Bremen und Schleswig-Holstein)	Hamburg	Universitätsbibliothek
Central Catalog for North Rhein and Westfalen (Zentralkatalog Nordrhein-Westfalen)	Cologne*	Universität- und Staatsbibliothek
Berlin Union Catalog for West Berlin (Berliner Gesamtkatalog für West-Berlin)	Berlin	Freie Universitäts-bibliothek
German Democratic Republic (Deutsche Demokratische Republik)		
Central Catalog of Berlin and the Region Potsdam-Frankfurt/O. (Zentralkatalog Berlin, Bezirke Potsdam und Frankfurt/Oder)	Berlin	Universitätsbibliothek
Central Catalog of the Region Dresden, Karl-Marx-Stadt, Cottbus (Zentralkatalog Bezirke Dresden, Karl-Marx-Stadt, Cottbus)	Dresden	Sächsische Landesbibliothek
Central Catalog of the Region Halle, Magdeburg (Zentralkatalog Bezirke Halle, Magdeburg)	Halle/Saale	Universitäts-u. Landes-bibliothek Sachsen-Anhalt
Central Catalog of the Region Erfurt, Gera, Suhl (Zentralkatalog Bezirke Erfurt, Gera, Suhl)	Jena	Universitätsbibliothek
Central Catalog of the Region Leipzig (Zentralkatalog Bezirke Leipzig)	Leipzig	Universitätsbibliothek
Central Catalog of the Region Rostock, Schwerin, Neubrandenburg (Zentralkatalog Bezirke Rostock, Schwerin, Neubrandenburg)	Rostock	Universitätsbibliothek

* The libraries of the states of Rheinland-Pfalz and Saarland are connected to the catalogs in Stuttgart, Frankfurt, and Cologne (*10*).

It was not until the 1959–1965 plan, however, that a network of regional central catalogs, including all areas of the DDR, began to develop. Now there are over 1,200 libraries participating in the effort (*14*).

In 1971, regional central catalogs existed in the two Germanies as shown in Table 1.

Besides those listed in Table 1, many local union catalogs exist in universities, such as the one in Berlin at the Free University which is a special catalog of

institute libraries' holdings. Other examples are found at Marburg University and in the Tübingen University Library. Local union catalogs are also developing in some municipal libraries such as the ones at the Bücherei Zentralen Flensburg and Rendsburg, which include the holdings of all connected municipal libraries–city libraries not included (*16*). Since all of these are for individual universities, technical colleges, or public libraries in local areas, they have not been enumerated here.

Special Types of Union Catalogs Lists

The majority of these catalogs contain total holdings of academic libraries in either the BRD or the DDR.

PERIODICALS AND OTHER SERIALS

Two early ventures in the area of special types of catalogs were the *Union Catalog of Periodicals* (*Gesamt Zeitschriften Verzeichnis*, GZV), which was a list of both domestic and foreign periodicals in about 300 German libraries as of 1914, and the *Union Catalog of Foreign Periodicals* (*Gesamtverzeichnis der ausländischen Zeitschriften*, GAZ), first issued in 1921 with a second edition, which contained a list of foreign periodicals in some 1,500 German libraries, appeared in 1929. This edition contained a subject index to the materials listed (*15*). After the war the Staatsbibliothek Preussischer Kulturbesitz, with financing from the German Research Association, undertook a revival of it under the title of the *Union Catalog of Foreign Periodicals and Series* (*Gesamtverzeichnis ausländischner Zeitschriften and Serien*, GAZS). The main volume of the current work, 1939–1958, contains about 53,000 different periodical and series listings. It lists all foreign periodicals subscribed to by about 130 academic libraries in the Federal Republic (*12*). A supplement for the years 1959–1970 is in preparation and will show the holdings of approximately 180 libraries in the Federal Republic. The Information Bureau of the Deutsche Staatsbibliothek Berlin in the DDR also undertook a new edition of GAZ for the academic libraries in that country. This was begun in 1949 and lists publications acquired since that date in the libraries of the DDR. Published in 1961, it contains approximately 25,000 titles of holdings in about 200 libraries of the DDR (*16*).

A *Union Catalog of German Periodicals* (*Gesamtverzeichnis deutscher Zeitschriften*) is currently in preparation in the Federal Republic. It, again, is being prepared by the Staatsbibliothek Presusischer Kulturbesitz and is being supported by the German Research Association.

The *Index to Periodical and Serial Holdings in the Fields of Technology, Natural Sciences, Medicine, Economics, Law and Social Sciences* (*Verzeichnis von Zeitschriftenbeständen und Serienwerken aus den Gebieten: Technik, Naturwissenschaften, Medizin, Wirtschafts-Rechts und Staatswissenschaften*, TWZ), issued in six volumes and covering the period 1951–1955, was a union list of periodicals prepared by the Council of Technological–Scientific Libraries. It included most of the holdings,

acquired since 1900, of the participating libraries in the Federal Republic. Unfortunately, this catalog is not being continued.

The *Union Catalog of Russian and Soviet Periodicals and Series* (*Gesamtverzeichnis russischer und sowjetischer Periodika und Serienwerke*, GRP) is an effort of the East European Institute of the Free University of Berlin. With the support of the German Research Association the institute had compiled a list of holdings of some 305 libraries in the Federal Republic of Germany (*12*).

NEWSPAPERS

The Committee for Newspapers of the Association of German Libraries in the Federal Republic has, since 1965, been working on a *Selection Location Index of German Newspapers* (*Auswählendes Standortverzeichnis deutscher Zeitungen*). The catalog includes the years 1700–1969 and is limited to important newspapers—inclusion being based upon place of publication. The project, supported by the German Research Association, is coordinated at the National Library in Bremen (*12*).

The *Central Catalog of Newspaper Holdings* (*Zentralkatalog der Zeitungsbestände in den Berliner Bibliotheken*, ZZBB) includes about 2,400 titles of daily newspapers. The project is maintained on punched cards by the Information Bureau of the German Democratic Republic Libraries in the Deutsche Staatsbibliothek Berlin.

OTHER TYPES OF MATERIALS

The *Central Catalog of Foreign Literature* (*Zentralkatalog der ausländische literatur*, ZKA) was begun in 1948 to indicate holdings in DDR libraries which were published after 1939. This catalog contains monographs only. About 150 libraries contributed to the ZKA (*16*). A corresponding catalog in the Federal Republic was the *Central Catalog of Foreign Publications* (*Zentralkatalog der ausländischen Literatur*, ZKA) established at the Göttingen University Library in 1947. Its intent was to cover non-German materials published after 1939. The original catalog was issued in four volumes with a supplement prepared by Cologne University. A second edition, covering the years 1951–1954, was issued in 1955. A monthly catalog, published from 1950 until it ceased in 1959, was arranged by subject and supplemented by annual alphabetical indices which, in turn, cumulated every three years (*17*). This project was funded by the German Research Association in the Federal Republic.

The *Union Catalog of Incunabula* (*Gesamtkatalog der Wiegendrucke*, GW) is now produced by the Deutsche Staatsbibliothek Berlin in the DDR. It was originally prepared by a special commission which had been formed in 1904. Its purpose was to list all known incunabula, giving locations in libraries all over the world. The first volume was published in 1925, and in the years 1925 to 1940 eight volumes were published (*16*). Work on it stopped during the war, but soon after the war it was revived and in the part of the alphabet which has been published—"A" to

"Fredericis"—are contained 9,727 titles of incunabula. It will probably contain about 40,000 titles when it is completed (*18*).

The *Index of Handwritten, Posthumous Works in German Archives and Libraries* (*Verzeichnis der schriftlichen Nachlässe in deutschen Archiven und Bibliotheken*), financed by the German Research Association, is a joint effort of the Keepers of Archives and librarians. It lists handwritten literary remains which are in archives and libraries in the Federal Republic. Holdings of archives are listed in Volume 1, and holdings of libraries in Volume 2. The index is being supplemented by a card index of all single autographs, which also include authors of letters found in literary remains collections. This *Central Card Catalog of Autographs* (*Zentralkartei der Autographen*) is currently being compiled at the Staatsbibliothek Preussischer Kulturbesitz with the help of the German Research Association (*19*). Finally, two other special types of catalogs, both being prepared in the Deutsche Staatsbibliothek Berlin for libraries in the DDR, are the *Central Catalog of All Printed and Manuscript Musical Compositions of Theory and Practice* (*Zentralkatalog aller gedruckten und handschriftlichen Musikwerke theoretischer und praktischer Art*) which is prepared in the Music Department of the library and which lists all materials published before 1800 of this nature in libraries, opera houses, institutes, museums, and archives in the DDR; and the *Central Catalog of Foreign Maps and Atlases* (*Zentralkatalog der ausländischen Karten und Atlanten*) which has been maintained by the Maps Department of the library since 1962. It contains those foreign maps, map volumes, map series, and general and special atlases which have been acquired by any one of the forty participating libraries in the DDR (*20*). Other less comprehensive ventures have been started by libraries in both countries.

Subject Union Catalogs

Many specialized subject catalogs are housed in the central libraries of various universities, technical colleges, and trade schools, as well as in public libraries; e.g., since 1966 the Bibliothek des Weltwirtschaftsinstituts Kiel has been considered to be the Federal Republic's central library of economics with emphasis on world economics and political economy. Its catalog has been printed by Hall in 105 volumes, and additional subject and title catalogs are still to be printed (*28*). Other examples would be the catalogs of the Mining Academy at Freiberg and the Traffic College in Dresden, both in the DDR (*22*).

Four good examples of special subject union catalogs should be mentioned here. The *Central Catalog of Literature and History of Socialism and the German and International Labor Movement* (*Zentralkatalog der Literatur zur Geschichte des Sozialismus und der deutschen und internationalen Arbeiterbewegung*) includes materials, published after 1945, owned by the sixteen participating libraries—about 10,000 titles. This catalog, in card format, is housed in both the Deutsche Staatsbibliothek Berlin and in the Deutsche Bücherei Leipzig. The *Central Catalog of Orientalia* (*Zentralkatalog der Orientalia*, ZKO), started in 1959 by the Orientalia

Department of the Deutsche Staatsbibliothek Berlin, contains about 7,500 entries from twelve participating libraries (*22*). Both of these catalogs are of libraries in the DDR. A similar catalog, the *Central Catalog of Orientalia* (*Zentralkatalog der Orientalia*, ZKO) of the Federal Republic was begun in 1957 at the University of Mainz, moved in 1964 to the University of Giessen, then in 1968 to the State Library in Marburg, and finally to the Staatsbibliothek Berlin. As of July 1968 it contained about 51,000 cards, about half of which pertain to the Islamic languages (*23*).

A current project, being published by the Kunstbibliothek Berlin, is the *Periodical Index of West-German Art Libraries* (*Zeitschriftenverzeichnis westdeutscher Kunstbibliotheken*). This catalog, supported by the German Research Association, lists complete holdings of art historical periodicals in approximately forty libraries in the Federal Republic (*17*).

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ROBERT D. STUEART

GERMANY, LIBRARIES AND INFORMATION CENTERS IN

Introduction

The events of World War II led to the formation of two German states: the Bundesrepublik Deutschland (BRD) and Deutsche Demokratische Republik (DDR). In order to do justice to this situation, the following organization is employed: the development of German libraries up to the end of World War II is presented by collaborators from the BRD; the ensuing developments in libraries as well as in the important official organizations for information and documentation follow, presented separately by contributors from the BRD and DDR.

There is no one sequence that could be followed to present the articles for each of the two sections. However, some sequence was needed—the following being the best compromise the editor could manage:

E. H. ERICH PIETSCH

Historical Survey of German Library Development up to the Present Time

In order to survey the structure of the academic library system in the Federal Republic of Germany, the libraries should be considered in certain groupings; however, this is not always practical in reality. A few possibilities for grouping the libraries are: according to kind and size of holdings (general and special libraries); the manner of usage (reference and lending libraries); the extent of their usage (public, restricted, free, and private libraries); financial support (state,

community, and private libraries); and, above all, by function. A grouping by name would be of little use, since names usually have historical meaning and might identify similar libraries by different names and different libraries by similar names.

The most sensible grouping would appear to be according to function, or rather areas, for which the different groups supply public and technical services. Accordingly, there are three groups of libraries, serving primarily a region (state, country, city, or community), a school (university, technical, or other type of college), or a certain subject area (economy, art, technology, medicine, etc.). Since no library is capable of containing the complete German and foreign academic literature, today's efforts are directed toward the creation of a library network, with a mutual supplement of holdings and cooperation of these three library categories. This would make it possible for the interested population to take part in the cultural property of humanity and the intellectual movements of the times. The public libraries would act in an important supplementary function.

To the first group belong all libraries—national, state, and scholarly municipal libraries—serving specific geographical areas with scholarly publications. Their holdings are primarily of a universal nature, i.e., they try to collect the basic works in all branches of knowledge. They differ only in volume and degree of consideration for foreign literature and journals.

A national library, in a true sense, was never realized in Germany. The functions of such a centralized general library, entrusted with duties for the entire library system, are today divided among three institutions in the Federal Republic of Germany:

1. The Deutsche Bibliothek in Frankfurt a.M. was created in 1946 by agreement of the City of Frankfurt, the West German Book Traders Association, and the British and American Military Authorities. In 1969 it was converted into a legal federal institution with claim to deposit copies from the entire area of the Federal Republic. Its aim is the same as that of the Deutsche Bücherei in Leipzig. It has the duty to collect as completely as possible the literature in German and other languages, published in Germany, as well as publications in German from foreign countries since 1945. Recently it has made an effort to acquire foreign literature about Germany and translations of German works into foreign languages. Beyond that, it is the central agency for the registration of new publications. This is done in the *Deutsche Bibliographie* which, since 1966, has successfully used electronic data processing to speed up and simplify its production. Its holdings have passed the 2 million volume mark.
2. The Staatsbibliothek Preussischer Kulturbesitz in Berlin was established in 1947 under the name of Westdeutsche Bibliothek through a decree of the Allied Kontrollrat in Marburg on the Lahn. Following the founding of the Stiftung Preussischer Kulturbesitz in 1964, it was incorporated therein and has carried the new name since then. In 1967 the foundation for a grandiose modern building was laid in West Berlin, and the different departments are to be shifted there gradually. The manuscripts stored in the former Preussische Staatsbibliothek, which were in the area of French occupation, were moved to the Tübingen University Library. The basic holdings included about 1.7 million volumes which had been shifted from the former Preussische Staatsbibliothek

to the western part of Germany during the war. Its holdings today, not counting the large and valuable special collections, amount to approximately 2.5 million volumes. Great quantities of material in the arts and natural sciences have been added. Current emphasis is on native and foreign journals including, at this date, 20,000 active newspapers, government publications, publications of parliament, and Oriental, East-Asian, and East-European literature. It collects primarily journals in the areas of medicine, technology, and agriculture, for which central special libraries have since been created. Through these responsibilities for collecting and the special departments (manuscripts, music, maps) it has continued the tradition of the former Prussian State Library as well as taking over central duties.

3. The Bayrische Staatsbibliothek in Munich is still considered to be the central library of Bavaria—it is headquarters for the board of directors of the Bavarian State libraries—and is, with its approximately 3 million volumes and a unique "musealen" holding of manuscripts, incunabula, and other treasures, currently the largest library of the Federal Republic. It receives deposit copies from all of Bavaria. Its main emphasis, aside from the increase of its "musealen" holdings, is the acquisition of German and foreign magazines and literature of the fine arts and of the Orient. Since 1965 it has been housed in an old structure, built by the architect F. von Gärtner, which had been largely destroyed during the war and consequently rebuilt and enlarged in modern style. Unique for the Federal Republic is its Institut fur Buch- und Handschriftenrestaurierung (Institute for the Restoration of Books and Manuscripts). It is particularly interested in international relations; its first director after the war, Gustav Hofmann, was president of IFLA in 1958–1962.

The remaining state libraries, with names such as province, government, region, etc., range in size from relatively small, but capable of being built up as a part of a library network, to important representative collections. Their primary responsibility is to provide for certain regions corresponding to the federal structure of the Federal Republic and the administrative division of the states, and they represent an important center for culture and knowledge—only recently made accessible through regional central catalogs—of the Federal Republic. Along with this overlapping responsibility—aiming toward providing its region with library resources and contributing to a larger library network—most of these libraries have special jobs to carry out, which result from the peculiarities of the political and cultural regions in which they are located. Of all these responsibilities, attention here is given only to the collection and, as far as possible, to the bibliographical registration of local or regional literature. The smaller ones among them primarily collect German scholarly publications; in many cases local publications are received as depository copies. In order to effectively relieve and supplement the remaining libraries, however, they should also collect foreign scholarly publications and, above all, the native and foreign technical periodicals to a larger extent than is now being done. Since most of them have grown out of former court libraries, they occasionally have a sizable collection of historical manuscripts, incunabula, and other rare works. The following libraries stand out among them in size: Göttingen, Hamburg, and Darmstadt—which are, according to their names, also university

libraries—as well as the Württembergische Landesbibliothek in Stuttgart and the Badische Landesbibliothek in Karlsruhe.

A few of the older scholarly municipal libraries come close to the state libraries in volume and type of collections. They serve primarily to supply the surrounding district with library materials and should, therefore, have at their disposal subject collections corresponding to those of the state libraries. Three of them, Frankfurt a.M., Hamburg, and Cologne, have now taken on the functions of a university library; others are now the core of a municipal library system. Their large collections of manuscripts and incunabula often go back centuries to the beginning of local history.

The second group includes the libraries of universities and technical colleges. These libraries represent a rather exclusive type. Among the college libraries are included primarily the technical colleges or technical universities, which have for years developed from specialized libraries to academic general libraries with emphasis on natural science and technology. The libraries of other colleges, such as the ecclesiastical, veterinarian, agricultural, pedagogical, economic, and trade colleges, and of the schools of mining and of forestry are, according to their holdings, closer to the specialized libraries, but many of them are engaged in enlarging their collection to become more universal. Actually, the libraries of technical, trade, and other schools could be included in this group; however, except for a few large technical school libraries, they should probably be considered under the community or regional library system.

Immediately following the end of the war, three new university libraries, whose basic collections are nearly completed now, were established in Berlin, Mainz, and Saarbrücken. The increasing number of students led (in the 1960s) to further new establishments, in Bielefeld, Bochum, Bremen, Dortmund, Konstanz, Regensburg, and Ulm among others. Some of these are still in initial stages of development or being planned. Altogether there are, with these new establishments, forty-two university libraries. Twelve of them have about 1 million or more printed volumes. The largest of these, Göttingen, has almost 2 million volumes. The seven libraries of technical colleges range between 250,000 and 400,000 volumes. Details about the newly-founded university libraries, which are often structured differently and grow quickly, are not enumerated here.

The primary responsibility of all these libraries, however diverse in volume and make-up they may be, is the processing and servicing of library materials for members of a certain college. They are, of course, also accessible to other serious scholars of large surrounding areas of cities and states. As libraries of academic colleges, they primarily collect scholarly publications as the basis for all academic pursuits carried out at the college. Considering the general educational purpose of the colleges which led, for example, to the creation of Studenten- oder Bildungsbüchereien (Student or Educational Libraries), and considering the increasing specialization of academic areas which awaken the student's desire to orient himself in neighboring or other areas through factual but easily understood literature, the libraries also buy general library materials. In spite of these collection respon-

sibilities, i.e., development in all areas of knowledge, they have to consider primarily the faculty and professorial chairs of their college. The principle of "Schwerpunktbildung" (concentration on special subject collection areas) increasingly took the place of equal consideration for all areas of knowledge in these college libraries.

The library system of the older German universities and a few colleges is characterized by the existence of a centralized general lending library (Zentralbibliothek) and a large number of specialized reference libraries at the institutes, seminaries, and clinics (Institutsbibliotheken), which are completely uncoordinated in their efforts. These institute libraries, created originally as working collections, in many cases quickly developed into efficient special libraries which, in many universities, received larger appropriations than the central library. This dual system of supplying universities with library materials has long been the subject of heated discussions, but it can not be completely eliminated at the older colleges except through rational cooperation, discussions over acquisitions, catalogs which record the complete holdings of the university, and centralization of acquisition and cataloging. The situation is different at the new universities built or planned in recent years. Efforts are now being made to direct the system into one channel. The structural plans developed for this are directed either toward strong centralization, which leaves the institute libraries with only their original purpose as working collections, or toward a just as pronounced decentralization, which assigns all holdings to the institute libraries and gives the central library only certain administrative functions, such as the central acquisition largely according to requests by professors, central cataloging, and centralized interlibrary loans. Which of these two systems will prevail depends upon further developments.

The third group of libraries is the special libraries which vary the most according to volumes as well as according to narrowness or depth of subject concentration. They are united only through their responsibility of processing and servicing collections in a certain subject area or for certain groups of people in science, politics, or administration. Actually, they owe their establishment to the increasing flood of literary publications and the strong specialization in science. Their common features are: the strong consideration for current and foreign publications; efforts toward a more efficient usage policy by employing all available technical and mechanical aids; a more intensive concentration on selection, classification, and dissemination of information; and the consideration of publications which generally are not a part of library collections, i.e., business reports not appearing on the market, reports which give the latest developments in research, patents, statistics, judgments or verdicts, house organs, and, to the largest extent, microfilm and photocopies. Because they limit themselves to a specific subject area, they are usually able to collect comprehensively in that area even though, for financial reasons, they often have to confine themselves to recent and current documentary materials. Above all they collect scientific literature, but in many cases they also collect elementary subject materials for the layman. Principally they are reference libraries. Their circle of users is limited because of their structure, although they are increasingly making their collections available for interlibrary loan.

The number of special libraries in West Germany is estimated at approximately 1,500 [see *Verzeichnis der Spezialbibliotheken in der Bundesrepublik, einschliesslich West-Berlin* (*Index of Special Libraries in the BRD, including West-Berlin*), compiled by Fritz Meyen, Braunschweig, 1970]. In addition to the libraries of the technical colleges or universities (Aachen, Berlin, Braunschweig, Clausthal-Zellerfeld, Darmstadt, Hanover, Karlsruhe, Munich, Stuttgart), the agricultural and forestry colleges (Bonn-Poppelsdorf, Hanover, Stuttgart-Hohenheim, Hann.-Münden, Munich-Weihenstephan), and other specialized colleges, the libraries of smaller and larger research centers and institutes—such as the libraries of the "Max-Planck-Gesellschaft" institutes, those of the former "Kaiser Wilhelm-Gesellschaft" [survey in *Jahrbuch der Max-Planck-Gesellschaft zur Förderung der Wissenschaften* (*Yearbook of the Max-Planck-Society for the Promotion of the Sciences*), Munich, 1952], of the nuclear research installations (Jülich, Karlsruhe), and those of the Battelle-Institut in Frankfurt a.M.—belong to this category. Other important groups are comprised of the parliamentary and government libraries [survey in *Vorläufiges Verzeichnis der Parlaments- und Behördenbibliotheken* (*Preliminary Index of Parliamentary and Government Libraries*), compiled in the library of the German Bundestag, Bonn, 1958]. The libraries of the municipal, state, and federal governments [among others the German Bundestag, the Bundesgerichtshof (Federal Court), the Bundesverfassungsgericht (Federal Constitutional Court) in Karlsruhe, the Bundesarbeitsgericht (Federal Court of Labor) and Bundessozialgericht (Federal Court of Welfare) in Kassel, the Bundesverwaltungsgericht (Federal Administrative Court) and Bundesversicherungsanstalt (Federal Insurance Agency) in Berlin, the Deutscher Patentamt (Patent Office) in Munich, The Statistiches Bundesamt (Federal Office of Statistics) in Wiesbaden], the various federal agencies [among them those for agriculture and forestry, for lumber and timber, for dairy farming, or meteorology, the Deutsches Hydrographisches Institut und Seewetterdienst (German Hydrographic Institute and Ocean Weather Service), the Institut für Landeskunde und Raumforschung (Institute for Geography and of Country Planning), Physikalisch-technische Bundesantalt (Federal Agency of Physics and Technology), Bundesanstalt fur Materialienprüfung (Federal Testing Agency), the German Railroad, German Federal Post Office with Central Telephone Exchange, the Bundeswehr (Armed Forces), the Landesgewerbeämter (Country Trade Offices), the Industrie- und Handelskammern (Chambers of Industry and Commerce)], and the large museum libraries (among others the Deutsches Museum in Munich, Staatliche Museen Preuss Kulturbesitz in Berlin, Germanisches Nationalmuseum in Nürnberg) are also part of this group. Another large group is composed of the libraries of academic associations and societies, of churches, commercial associations, and establishments [among them the Ibero-American Library in Berlin, the Library of the Senckenberg Natural Science Research Association/Senckenberg Library Frankfurt a.M., Kekulé Library in Leverkusen, the libraries of the Höchst Paint Company and the Badische Anilin- und Soda-Fabrik (Aniline and Alkali Works), the Adolf von Baeyer Library of the Gesellschaft Deutscher Chemiker (Association of German Chemists), the libraries of the Gmelin-, Beilstein-, and Dechema Institutes,

the Mining Industry Library, libraries of the Westfälische Berggewerkschaftskasse (Westphalian Mining Union Treasury), the Verein Deutscher Eisenhüttenleute (Association of German Iron Workers), the Krupp Factories, the Verein Deutscher Ingenieure (Association of German Engineers), and the Deutsche Glastechnische Gesellschaft (Association of German Glass Factory Workers)].

Some of these libraries perform a transregional service in their areas of specialization. This applies especially to those central special libraries suggested and promoted by the German Research Association such as the Technische Informationsbibliothek, TIB (Technical Information Library) in Hannover, the Zentralbibliothek der Landbauwissenschaft (Central Library for Agriculture) in Bonn (1962), the Zentralbibliothek der Medizin (Central Library for Medicine) in Cologne (1968), and the Zentralbibliothek der Wirtschaftswissenschaften (Central Library for Economics) in Kiel (1966); other special libraries of this kind are in the planning stages. Their goal is to have complete collections in their respective fields. They also collect those publications with which the libraries of the special colleges cannot concern themselves; for example, publications which are hard to get or which are written in languages difficult to handle, such as reports, documents, and information materials; in some cases these libraries have their own translating service.

Also belonging to this type of library are a few institutions located in foreign countries and specializing in the areas of archeology, history, art history, and Oriental studies, such as the seven branch offices of the Deutsches Archäologisches Institut in Athens, Baghdad, Istanbul, Cairo, Madrid, Rome, and Teheran; those of the Kunsthistorisches Institut in Florence; the Bibliotheca Hertziana in Rome; the Orient-Institut in Beirut, as well as the Deutsches Historisches Institut in Rome.

In reality these strict divisions are impractical, and overlapping of responsibilities frequently occurs. Therefore some college libraries, according to their function, are also state or national libraries, although their name does not always indicate this. The patrons of the state and municipal libraries are also users of the college libraries. They may be students on their semester break or scholars who obtain needed materials through interlibrary loans. Some of the large academic municipal libraries constitute the nucleus of a larger city's library system. Even the special libraries operate beyond their internal commitments and are of great importance for complete service in their respective subject areas. The groups are rather fluid and the name of each institute does not say much about its actual function.

As a result of the strong decentralization of library materials in Germany, the libraries and library groups are dependent upon each other for mutual help. A series of cooperative endeavors, among them the German and international interlibrary loan, the German Research Institute's plan for special collection areas, the expansion of regional union catalogs, the *Gesamtverzeichnis der ausländischen Zeitschriften and Serien*, GAZS (*Union Catalog of Foreign Periodicals and Series*), the *Gesamtverzeichnis der Zeitschriften and Serien*, GZS (*Union Catalog of Periodcals and Series*), and the Study Center of Library Techniques, active in Berlin since 1969, and many others, have been created as an expression of this interdependence.

THE LEGAL SITUATION OF THE RESEARCH LIBRARIES AND MANNER OF THEIR SUPPORT

The public libraries are without exception Anstalten oder Stiftungen des öffentlichen Rechts (institutions or foundations of public law). The deciding factor of whether a library is public in the legal sense is not the fact that everybody may use it, the so-called Gebrauchsöffentlichkeit (public usage), but that it is supported by a state or other public legal institution. Therefore its relationship with its users is of a public–legal nature. In the privately owned libraries, on the other hand, the relationship is determined by the system of civil rights; public usage is, therefore, not actually excluded. Among the largest private libraries are primarily those of industry, trade unions, political parties, and clubs. Large libraries privately owned by scholars or collectors, except for those of a few aristocratic houses, hardly exist in Germany today.

Only a few public libraries are selbständige Anstalten oder Stiftungen mit eigener Rechtspersönlichkeit (independent institutions or foundations with their own corporate bodies), such as the Deutsche Bibliothek in Frankfurt a.M. Most are dependent on and subordinate to a legal body, for example a municipality, a state, a university, or a foundation. The latter applies, for example, to the Staatsbibliothek Preussischer Kulturbesitz, which is legally tied to the Stiftung Preussischer Kulturbesitz. Only the independent institutions are actually owners of the books they have collected and are managing. Collections of the other institutions are owned by the governing body which decides the kind and extent of usage, establishes the usage regulations, takes care of the library's legal disputes, etc.

Whereas public law is applied to usage, the principle of civil rights, especially regulations concerning contracts, is generally applied to the acquisition of books. The library acts in the same capacity as every private individual when dealing with book dealers, exchange partners, or donors. Only the legal deposit is received on the basis of public law.

Among the different financial supporters, the government of the Bundesrepublik primarily supports a system of government and parliament libraries.

The states of the Federal Republic, including the City of West Berlin, support the general research libraries. In addition they support the less significant libraries of the state parliaments and governments as well as the state-supported colleges. The states also maintain most of the schools for the training of librarians in the different civil service ranks at research libraries. These schools currently exist in Berlin, Frankfurt a.M., Hamburg, Hanover, Cologne, Munich, and Stuttgart. Furthermore most of the states contribute—according to the Königsteiner Abkommen of March 24, 1949—to the support of a few libraries not geographically limited to a specific area. To this category belong, for example, the libraries of the Max-Planck-Gesellschaft Institutes.

Besides other public bodies, such as the Industrie- und Handelskammern (Chambers of Industry and Commerce), the churches also maintain an extensive library system. Training librarians especially for ecclesiastical purposes takes place, among

others, at the Bibliothekar-Schrinstitut of the Borromäusverein in Bonn and at the Evangelisches Bibliothekar-Lehrinstitut in Göttingen; both schools are state recognized.

THE MANAGEMENT AND PERSONNEL STRUCTURE OF THE RESEARCH LIBRARIES

The creation of independent departments for certain functions was unknown in the libraries of earlier times. All library business lay in the hands of the librarian who had, at best, a few helpers. This situation still exists in the smaller special libraries. Over the course of time the larger libraries, however, have developed a definite business routine which more or less regulates the flow of books through the various processing departments.

These departments fall into two groups: those which serve the user and those which serve to make the books available to the patron as quickly and easily as possible. The Benutzungsdienst (public service) has to be distinguished from the so-called vorbereitende Dienststellen (technical services). The acquisition and cataloging departments belong to the group of technical services; the third large department is the binding department. In addition there are also several minor departments: the duplicating department, which is responsible for duplication of cataloging cards and frequently the printing of forms, preprints, etc.; the marking department, which takes care of pasting labels on the backs of books and placing ownership stamps on the books; and, finally, the department which gives the shelf-ready book a last scrutiny, and the photocopying department, as far as it is needed to restore defects in books or similar jobs. Most libraries also have their own bindery.

The loan department, which is responsible for lending and interlibrary loans, the reading rooms with their various usage possibilities and forms, the photocopying department—if used mainly to make copies for patrons—and certainly not least important the information service, are all public service departments.

Between these two groups there is the shelving service, which shelves new acquisitions according to jacket labels and, as part of the public services, sends requested books to the loan department and reshelves them after they are returned. Each library also has a business department which takes care of general administration and manages the budget. According to their individual duties or collections, the larger libraries have special departments for historical manuscripts, incunabula, printed music, maps, and other special collections, such as Orientalia and Slavica, which definitely require the service of specialists. In larger institutions these special departments actually form separate libraries with separate acquisition and cataloging as well as their own reading rooms and stacks.

The number and organization of personnel is determined by the duties of the library. At the head of the organization is its leader, with the title of Direktor and, in a few cases like Berlin and Munich, of Generaldirektor. He has the decision in all situations pertaining to the duties of the library so far as these decisions are not made by a higher authority. He represents the library to the outside and has

total charge of its administration. He determines the guidelines for acquisition (Erwerbungspolitik) and usage as well as personnel policy; he is responsible for the library's contribution to the academic and cultural life through publications, lectures, exhibitions, etc. In his official function he is aided by the assistant director, department heads, section heads, etc., to whom he delegates some authority.

The Höherer Dienst (academic librarian) makes the selection of acquisitions, with the final decision resting with the director of the library. He keeps the subject catalogs and supplies information on academic subjects. He has a decided part in interpreting the collections, through exhibitions and lectures, working out bibliographical lists, etc. In his duties he has the help of other professionals or nonprofessionals.

The bulk of the daily routine jobs is done by the Diplombibliothekar im gehobenen Dienst (certified librarian in the higher service rank). Among his duties are primarily the technical aspects of acquisition and shelf lists, making out alphabetical catalogs, and work in the bindery and the circulation department. In the information service he is responsible for advising the patrons about the usage possibilities of the library and about the use of the catalogs and bibliographies. He also performs a few duties which are actually the responsibility of the academic librarian.

The fact that there are a few duties of the certified librarian which actually do not require professional training, plus the fact that there is a noticeable scarcity of certified librarians, has led to repeated thoughts of creating a Mittlerer Dienst (upper and lower technical services rank). Clerks and secretaries have long been indispensable in the libraries. There is also talk of using personnel with Volksschulbilding (primary education) and additional library training who could be given simple tasks of filing and assistance. Thus a new career would be created, that of library assistant or library technician.

All of these jobs require special library training, although in different degrees. However, the personnel of the shelving department require no such training. Besides the professionals, all libraries have manual duties of office and organization for different degrees of skill, administrative, and even commercial duties. These are primarily delegated to the Bibliothekstechniker (library technician).

TRAINING THE LIBRARIAN

The library training for the Höherer Dienst (academic librarian) begins after a college education, which is generally completed with a state examination in any academic subject area and graduation. A subject Bibliothekswissenschaft (library science) does exist in a few universities, but so far only in the sense of a historical auxiliary science. Most states still insist on both examinations; this demand is, however, being challenged. The Wissenschaftsrat (academic committee), for example, recommends only one examination. Admissions requirements and the course of further training are regulated by training and examination rules of the individual states. Except where new regulations have been set (Bavaria, Hessen) the old Preussische Prüfungs ordnung of 1928 together with the Reichsordnung of 1938

are still being used. With admission to library training the candidate receives the title Bibliotheksreferendar and usually a maintenance allowance. Training lasts 2 years and is divided into a practical course, which is done at a state recognized Ausbildungsbibliothek (training library) and a theoretical course, for which there are currently training places in Cologne, Frankfurt a.M., Hamburg, and Munich. The contents of the theoretical lessons and the corresponding examination subjects are objects of lively discussions today. It has been suggested repeatedly that theoretical training in the college curriculum be included in the subject of library science and that the practical training be shortened. After passing the examination the candidate receives the title Bibliotheksassessor and generally embarks on a fixed civil service career, which leads to the positions of Bibliotheksrat and Bibliotheksdirektor.

Special libraries are very often satisfied with professional personnel who have completed a subject major and have participated in a training course on documents. The following training centers currently exist in the form of special technical schools: in Berlin the Institut für Bibliothekarausbildung (Institute for Training Librarians) at the Free University Berlin (for certified librarians and service at public libraries); in Bonn the nationally recognized Bibliothekar-Lehrinstitut (Librarian Training Institute) of the Borromäus-Verein (for certified librarians and service at public libraries); in Frankfurt a.M. the Bibliotheksschule (Library School) (for academic librarians and certified librarians); in Göttingen the Evangelische Bibliotheksschule (Protestant Library School) (for certified librarians and service at public libraries); in Hamburg the Bibliothekarsschule der Freien and Hansestadt Hamburg (Librarian School of the Free Hanseatic City of Hamburg) (for academic librarians, certified librarians, and service at public libraries); in Hanover the Niedersächsische Bibliotheksschule (Library School) (for certified librarians and upper service ranks); in Cologne the Bibliothekar-Lehrinstitut (Librarian Training Institute) of the state of Nordrhein-Westfalen (for academic librarians, certified librarians, and service at public libraries); in Munich the Bibliotheksschule (Library School) of the Bavarian State Library (for academic librarians, certified librarians, and upper service ranks); and in Stuttgart the Süddeutsches Bibliothekar-Lehrinstitut (Librarian Training Institute of Southern Germany) (for service at public libraries only).

Most of the federal states have issued their own training and examination regulations (after 1945) for candidates of the Gehobener Dienst (certified librarian). Requirement for admission is generally a high school diploma. However, exceptions are possible; in Hessen the Obersekunda (upper-fifth-form) is sufficient. Knowledge of Latin and two other foreign languages is also required. As in the Höherer Dienst, training is divided into a practical and a theoretical course, the duration and division of which are regulated differently in the various states (usually 3 years). The theoretical training is carried out at a library school; efforts are being made to give these schools a college or technical college character. There is talk of the Gehobener Dienst training including specialization in certain subject areas or for certain library types, rather than the basic training in library administration, cataloging, and bibliography which has been in use up to now. Following the

certificate examination the candidate has the title Diplombibliothekar für den gehobenen Dienst an wissenschaftlichen Bibliotheken (certified librarian for the upper service rank at research libraries). The Gehobener Dienst does not have the same civil service status as the Höherer Dienst, the certified librarian begins his career as civil servant with the title of 'Bibliotheksinspektor" (supervisor) and can rise to the position of Bibliotheksoberamtmann (magistrate). Promotion to the Höherer Dienst is possible in special cases. The certified librarian is often the only professional librarian in institute or small special libraries.

A special training program and regular career for the upper technical service in research libraries exists thus far only in Bavaria (1964) and Baden-Württemberg (1966) although it has long been practiced in all of the larger libraries in the form of library assistants.

LIBRARY ASSOCIATIONS

The German Federal Republic does not have a large association including all library branches; however, the existing individual associations keep close contact with each other. The Deutsche Bibliothekskonferenz established in 1963 serves to bring the chairmen of the associations together at least twice a year. The first cooperative venture which resulted from their meetings was the establishment of the Bibliothekarische Auslandstelle which serves to intensify and coordinate the work abroad, especially the preparation and realization of study and work trips of German and foreign librarians.

The oldest German library association is the Verein Deutscher Bibliothekare, a personnel association founded in 1900 whose members are academically trained German librarians and candidates for the academic librarian positions. It considers its duty to be the promotion of personnel-occupational and library-related concerns. Its technical duties are carried out primarily by its committees of which there are currently fourteen: alphabetical cataloging, government publications, training, building, usage, professional, bibliographical, binding, dissertations, manuscripts, binding-cataloging, incunabula, legal questions, and periodicals and union catalogs. A restructuring of the association in the interest of the better handling of professional duties is being discussed. Because of its character as a personnel association, a sufficient financial subsidy is difficult to obtain. The association does not have its own office or library. Its headquarters are always in the library whose director is the elected chairman for the current 2-year term. Library conferences are held annually, usually in the Whitsuntide week. They give reports on the plenary session of the members, the deliberations of the committees, and attention to important topics through lectures and reports before the full assembly. The journal of the association, the *Zeitschrift für Bibliothekswesen und Bibliographie* (since 1954) contains detailed reports about the meetings. The association also compiles the *Jahrbuch der Deutschen Bibliotheken* (since 1901) which is published at 2-year intervals. The association has approximately 680 members currently.

Since the Verein Deutscher Bibliothekare is restricted to academic librarians,

the certified librarians founded (in 1948) their Verein der Diplom-Bibliothekare an wissenschaftlichen Bibliotheken, which pursues similar goals. It has about 1,500 members today. The associations hold their conventions jointly, the *Zeitschrift für Bibliothekswesen und Bibliographie* serves both organizations, and members of both associations are represented on the committees.

The only organization to which all library types belong is the Verband der Bibliotheken des Landes Nordrhein-Westfalen (since 1949). The *Mitteilungsblatt,* which it publishes, is an important library science publication. The activities of this organization are stimulating and fruitful for the whole West-German library system.

Arbeitsgemeinschaften (study groups) exist for a few types of research libraries. The Arbeitsgemeinschaft der Spezialbibliotheken (study group for special libraries), created in 1946, deserves special mention in the interest of this increasingly important library type. It holds its own biennial conventions and publishes separate convention reports. The Arbeitsgemeinschaft der Parlaments- und Behördenbibliotheken (study group for parliament and government libraries), the Arbeitsgemeinschaft der Kunstbibliotheken (study group for art libraries), the Arbeitsgemeinschaft der Medizinbibliotheken (study group for medical libraries), and the Arbeitsgemeinschaft der juristischen Bibliotheken (study group for legal libraries) should also be mentioned. Library matters in a few federal states are handled by Beiräte or Direktorenkonferenzen, whose duties are primarily to advise and report to the respective ministries.

A central institution for the exclusive promotion of the academic library system does not exist in the Bundesrepublik. However, the activities of the Deutscher Wissenschaftsrat and the Deutsche Forschungsgemeinschaft play a role in this. The second part of the Empfehlungen (recommendations) of the Wissenschaftsrat (1964) which offers suggestions for the improvement of the general structure of the library system and its cooperation, along with recommendations for individual libraries, has special significance for library development. The Forschungsgemeinschaft has included the promotion of libraries in the sense of an indirect research program. Joint planning in the area of library systems is also being supported by the Ständige Konferenz der Kultusminister der Länder (conferences of the states' ministers of education), in existence since 1948. It has issued recommendations in the training of library candidates, interlibrary loans regulations, and other problems.

International cooperation has been promoted since 1927 by the Internationaler Verband der Bibliothekarvereine (IFLA), which has a Ständiger Ausschuss (permanent committee) meeting annually and periodically organizes world congresses. Since World War II UNESCO has also made efforts to promote library systems in the whole world. German libraries and librarians are adequately represented in both organizations.

THE PRACTICAL WORK OF THE RESEARCH LIBRARIES

The practical work in the libraries, particularly in those established prior to 1950, generally runs along traditional lines established before World War II. Aside

from changes in small details, only the tendency to mutual cooperation and the impact of technology and scientific management have increased. The supporting agencies also show increasing attention to the library systems, whose significance for the intellectual-cultural life and progress in all areas is increasingly noticeable.

COLLECTION DEVELOPMENT

The director of a library is principally responsible for drawing up the budget and putting through requests for financial support and personnel. The Bibliothekskommissionen or similar boards, formerly appointed at the universities to settle questions of finances or acquisitions, no longer have any significance in this respect. In the more recent establishments, however, structural planning provides for more influence by the professors in these questions. Certain other agencies help to strengthen the director's demands for financial support and help him with drawing up the budget. Requests are made to these groups from time to time to inform the supporting agencies of materials needed and to create approximate standards. Along with estimates and budget models and norms, which are worked out by the library committee of the German Research Association, special significance goes to the detailed "recommendations" of the Wissenschaftsrat. These recommendations have, however, never been completely realized anywhere. Nevertheless, they have led to significant personnel and budget increases.

Aside from the normal budget materials, contributions from a third source play an important role in the library budget. Along with the gifts from the German Research Association there are the donations of the associations of the Freunde der Universität (friends of the university) and other similar boards, in existence almost everywhere, as well as donations from private foundations, such as the Fritz-Thyssen Stiftung, established 1959, the Stiftung Volkswagenwerk (1961), the Gemeinnützige Vermögensverwaltung Robert Bosch GmbH, and others. Their common characteristic is not to take over the responsibility of the main financial supporter, but only to give aid to definite individual projects or, if necessary, as a starting contribution. Such projects were, for example, the building of reading-room reference collections, textbook collections, and adult Bildungsbüchereien.

Dividing the total funds available for the collection development into the different subject areas is the responsibility of the director. He is assisted by the Fachreferenten (subject specialists) of the höherer Dienst in book selections. Each of these specialists is responsible for one or more subject areas or, in the more exotic languages, for the literature in that particular language. Special importance is given to the subject specialists in the libraries who have the responsibility to select the German and foreign publications in a specific subject area within the framework of the Sondersammelgebietsplan of the German Research Association. In the very difficult area of acquiring foreign periodicals, the *Verzeichnis ausgewählter wissenschaftlicher Zeitschriften des Auslands* (*Index of Selected Foreign Scholarly Periodicals*)—published in 1957 and 1969 by the Research Association—gives criteria; similar criteria for German periodicals is pro-

vided by the selected *Verzeichnis deutscher wissenschaftlicher Zeitschriften* (*Index of German Scholarly Periodicals*), compiled since 1965 by the Deutsche Bibliothek (7th ed., 1968).

Great importance in collection development is still given to the legal deposit copies. The Deutsche Bibliothek in Frankfurt receives the original depository copy of all German publications. The legal deposit system also requires that a second copy be available on a regional level. Corresponding regulations have been issued in all the federal states as part of the general printing laws during the last few years. The exchange of scholarly publications also plays an important role in the acquisition for those libraries with suitable exchange material available. The libraries' own publications; publications of academies, associations, or clubs in the same city or in the same geographical area; college publications, above all dissertations; and duplicates are suitable as exchange materials. Initiation of an exchange program is the responsibility of each individual library. Information about qualified institutions is given in the *Handbook on the International Exchange of Publications*, published in 1964 by UNESCO (3rd ed.). The Bibliotheksreferat of the German Research Association serves as the information agency about exchange possibilities and as the central agency for the forwarding of German exchange shipments to foreign countries and vice versa. As far as exchanges of government and parliament publications are concerned, there are the independently operated exchange associations of the government and parliament libraries as well as the Internationaler Amtlicher Schriftenaustausch (International Exchange of Government Publications) at the Staatsbibliothek Preussischer Kulturbesitz in Berlin, which serves as a central agency. It has connections with thirty foreign countries through mutual government agreements and exchange contracts. The official publications of the Federal Republic and of the individual states are available as exchange items. Besides the Staatsbibliothek, the library of the Bundestag in Bonn, the Bayerische Staatsbibliothek, and the Deutsche Bibliothek also receive the complete publications of the German government. Receipt is regulated by the legal deposit system on the state level and to other libraries.

The use of electronic data processing in acquisition has been introduced as an experiment in two libraries: for monographs at the Bochum University Library, and for periodicals at the Low Saxonian State and University Library in Göttingen.

CATALOGING

Every library probably has at least one alphabetical catalog which generally lists author and anonymous publications alphabetically on cards. In a few libraries it is contained in two copies as Verwaltungskatalog (administrative catalog) and as Publikumskatalog (public catalog); the latter is usually carried only as a selection catalog. The basis for cataloging and organizing titles is still regulated by the Preussische Instruktionen. Because these came under strong criticism after the war, the cataloging committee of the Verein Deutscher Bibliothekare (Association of German Librarians) attempted a reorganization of the rules. Taking the

recommendations of the Internationale Konferenz für Grundsätze der alphabetischen Katalogisierung (International Conference for Alphabetical Cataloging Rules, Paris, 1961) into consideration, it differs—aside from a few details in listing the author names—from the original practice in two important principles. These are the organization of word sequence in the title and the recognition of corporate authorship. The new rules under which all German-speaking countries will operate already exist. Those libraries which plan to use electronic data processing in making up their catalogs (Bochum, Konstanz, Regensburg, and Ulm for the total collection; Göttingen, Frankfurt, and other libraries at this time only for periodicals) have adopted the new principles for cataloging, and so has the Deutsche Bibliothek (since 1966) for its bibliographical publications. As a result, cumulative catalogs in book form have to be published at regular intervals and in several copies. The reaction of older libraries once these new rules have been established (discontinuing old catalogs and reorganizing existing catalogs) cannot be predicted at this time. Central cataloging, such as was being done until the end of the war by the Berliner Titeldrucke, and the card printing (Zetteldrucke) of the Deutsche Bücherei no longer exist.

The research libraries as a rule also have one or more subject catalogs, either classified or as an alphabetical subject catalog. In a few cases the alphabetic subject catalog is made available to patrons along with the classified catalog. The importance of a good subject catalog for reflecting the collection to the public is recognized everywhere today. A uniform system has not succeeded thus far; however, the newly established university libraries are primarily striving toward the creation of a model system in which the collection would be shelved to correspond to the catalog. The remaining libraries are increasingly using decimal classification for the entire collection or, in specific subjects, the classification system with the Schlüsselung (encoding) developed for the Mainz City Library by H. W. Eppelsheimer in 1929, or the pluralistic system introduced in 1924 by W. Gülich at the Library of the Institut für Weltwirtschaft (Institute for World Economics) in Kiel. The so-called "dictionary catalog" has only isolated use in Germany.

Since the separation of shelving in the stacks from the classified catalog, the shelf list now has only internal significance for shelving (revision) and for giving the call number. Shelving today is done primarily according to order or accession (numerus currens)—in this case the shelf list is often replaced by the inventory list—or in groups, and within these groups again in order of accession. The immediate access to the stacks has lost much of its attraction through these shelving methods introduced—often because of lack of space or personnel—mainly during the first few years after the end of the war. Only the newest establishments tend to use the classified arrangement.

As a result of the initiative of the German Research Association and its financial support, manuscript cataloging has experienced new progress during the last decade.

USAGE

Libraries today are no longer an end in themselves but exist for service to the user. Usage in the academic general libraries is traditionally divided into two

categories: home lending the total collection which is listed in the catalogs and for the most part shelved in the stacks; and certain materials, which are indispensable, heavily used, or irreplaceable (manuscripts and incunabula), kept in the rooms of the library. The heavily used material, which has to be constantly kept up to date, is in the reference library of the reading rooms and can only be duplicated to make extra circulating copies available when the financial possibility exists. Usage has experienced a strong impetus through the making of films, photocopies, and Xerox copies because the copyright law of 1965 has settled the question of making copies for personal use.

After World War II usage experienced a further development in two important ways. (1) By introducing Sofortausleihe (immediate lending) in place of the traditional written advance request on more or less standard forms. This process generally took more than 24 hours, so that the user was obliged to appear at the library twice. Because the process of immediate lending, in which the patron is served within a short waiting period, presupposes certain personnel and technical provisions, the German Research Association in many cases gave financial help to initiate this program. (2) The more efficient organization and dispatch of the so-called Leihverkehr, i.e., obtaining literature not available at the library but accessible to the user through lending from library to library. This has been settled for the time being through the regulation (1966) governing interlibrary loan in the Federal Republic of Germany.

Electronic data processing is of great importance. The Technische Universität Library in Berlin and the University Libraries of Bochum and Bielefeld handle the charging of books and overdue notices in this manner, but with different methods. The library of the Technische Hochschule in Aachen is planning the same, whereas the library of the Kernforschungsanlage Jülich (Nuclear Research Installation at Jülich) and the Münster University Library (still in the planning state) are still combining this with requests from the stacks. Hamburg still uses a mechanical punch-card system. The goal of these efforts is to simplify the traditional charging systems.

REFERENCE WORK

The readiness to aid the user with advice and information has always been remarkable in German libraries; during the last few years even more emphasis has been put on this duty. Whereas information was formerly always given in the circulation department, it has today shifted to the reading rooms and above all to the public catalog. Generally it is not yet carried out centrally; however, the larger libraries are tending toward independent reference departments. The holdings of the library are the primary basis for the information given. The most important resources are, aside from the catalogs, indexes of general and specific bibliographies, union catalogs of periodicals and serials, as well as various reference works, such as encyclopedias and handbooks. Usually these resources, when they are not available in the reading rooms, are concentrated in a special bibliographischer Apparat as accessible as possible. If the largest part of the question concerns the availability of books and simple bibliographical information, the responsibility

for giving this information rests primarily with specially qualified certified librarians. Scientific subject information, however, is given by the academic librarian in the specific field. Answering written or telephone questions is a matter of course. Only the question of how far reference work can and should go is disputed. At the general libraries the rule is to help the inquirer only up to the point that he can help himself further; this is especially true for students at the colleges who are still learning the techniques of academic work. Special libraries and information and documentation centers go further. Part of their job is to make literature compilations and analyzations.

Encouragement for adequate personnel and building up the bibliographical apparatus has been a matter for the German Research Association in a few cases, much as the Recommendations of the Wissenschaftsrat have given particular attention to these library duties. A central reference department for the Bundesrepublik does not exist; however, for limited duties there is the Deutsche Bibliothek in Frankfurt for German publications since 1945, or the central special libraries for publications in their respective subject areas.

ORGANIZATION OF LIBRARY DUTIES

The creation of an effective work organization, the efficient use of library resources, and the introduction of modern technical aids is entirely up to each individual library. Without doubt the larger libraries have always accepted this responsibility seriously and with great success, if only to satisfactorily carry out the administrative duties connected with growing collections and an increasing number of users. This applies not only to the introduction of modern office equipment and machines and the installation of technical innovations in the older and newly-built libraries, but also for the improvement of photocopying and reproduction apparatus available in most libraries.

However, in order to store effectively the total materials needed for research and teaching, and to make needed items available as quickly and reliably as possible, libraries during the last few years have begun to make use of electronic technology with the introduction of electronic data processing. So-called computers are today being employed in various library activities—particularly in the areas of circulation and cataloging—in some of the older but primarily in the newer libraries. This has been described in the section on library practice. The goal is the introduction of a so-called Integriertes System, i.e., use of computers for gathering and making available all resources of the libraries. The Bochum University Library today has come closest to realizing this goal, and has been a pioneer in this respect. Only a few libraries have their own installations; others make use of the computers available at other centers, such as the computer centers of institutions of higher learning, government agencies, the Deutsches Rechenzentrum (German Computer Center) in Darmstadt, or the Zentralstelle für Maschinelle Dokumentation (Central Agency for Mechanized Documentation) in Frankfurt a.M.

Since the rationalization and mechanization of the system is of general concern

for all libraries, the German Research Association continually finances large and expensive ventures and studies in the significant areas and gives suggestions for further development. In its 1964 recommendations the Academic Advisory Board suggested the creation of a central institute for library techniques to act as a coordinating center for all efforts toward work simplification in the libraries. Since 1969 this center has been in the process of being established in Berlin at the Staatsbibliothek Preussischer Kulturbesitz; it goes under the name Arbeitsstelle für Bibliothekstechnik (Study Center for Library Technology) and is subsidized by the German Research Association.

To conclude, a short description of the tendencies which today determine the internal and external construction of the library building is given. Most significant has been the turning away from the traditional strict separation of book, administration, and usage rooms, which finally led to the situation where the patron—apart from the reference collection in the usually much too small reading room—had only indirect contact with books through the catalogs. Admission to the stacks was only permitted to privileged patrons who made less use of this privilege after the order of shelving books according to their accession was introduced. Following the contact several German librarians had with American library building styles after the war and the resulting suggestions and discussions of significant theoretical problems, the German librarians abandoned or at least relaxed the principle of the tripartite division in many new and remodeled buildings. The library buildings of the last 20 years are characterized by greater flexibility of room division and an effort to bring books and people together; however, thus far no uniform system has resulted. A few years ago the Association of German Librarians created a Kommission für Baufragen (building committee) which intends to help with a collection of building designs and plans for those libraries which thus far have had to rely on their librarians and architects when planning a new building. In cooperation with the Technische Universität in Berlin, the committee plans to create a record office for library buildings.

The general tendency is toward dissolving the central reading room into several subject reading rooms with corresponding extensive reference collections. In a few cases open access stacks with large holdings of current circulating materials divided by subject are connected to these reading rooms, which have up-to-date reference collections. In this concept the closed stacks have only limited significance for the storing of special literature or little-used materials. The newly established college libraries want to go one step further in this direction and shelve the complete holdings in classified order in reference, faculty, or subject libraries and in stacks open to all members of the college. Where the stacks are retained as a separate building concept, they are usually in the form of a book tower or at least as a tower-like high structure with a large foundation, or sometimes as a subterranean level storage area. With modern technical inventions such as pneumatic tubes, book paternosters, conveyor belts, conveyor baskets, light signals, and speaker systems, improved transportation and efficient connections between offices have been realized. Individual work areas in cubicles (carrels) exist in several

new buildings, but not yet inside the closed stacks. Because of the changes in the reading room, the number of available work areas has greatly increased over earlier times, and the reference collections have increased considerably in volume.

To the special periodical reading rooms have been added more rooms with special purposes, such as single rooms for the use of typewriters or dictating machines, microform reading and photocopying rooms, and listening rooms. Many colleges have provided for suitable areas to arrange Lehrbüchsammlungen (collections of textbooks) in which the most used textbooks are available in several copies, as well as the so-called Bildungsbüchereien (collections concerned with adult education). The arrangement of the reading and other rooms has become more modern and efficient.

Only a few buildings can be cited as characteristic examples, such as the libraries of the Technical Information Library in Hanover, the libraries of the technical colleges (Technische Hochschulen) in Stuttgart and Karlsruhe, the city and university library and the Deutsche Bibliothek in Frankfurt a.M., the university libraries in Berlin, Bonn, Giessen, Kiel, Mainz, Marburg, and Saarbrücken, the state and university library in Hamburg, and, above all, the Staatsbibliothek Preussischer Kulturbesitz in Berlin (still under construction). Almost all new university library buildings have a building site near the main building of the college; the national, state, and city libraries that were destroyed have usually been rebuilt at their original locations. Those buildings that survived the war have generally been completely remodeled, at least on the inside (such as at the Herzog-August-Bibliothek in Wolfenbüttel), or a new wing has been added (such as at the Tübingen University Library). Others, in spite of having been severely damaged, had to be restored—for reasons determined by the municipal building authority—but received extensive new additions in their reconstruction (such as the Bavarian National Library in Munich). In many cases it was possible to employ famous architects for the library buildings.

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German Library System of the Present—Federal Republic of Germany

BEGINNINGS (SEVENTH AND EIGHTH CENTURIES)

The beginning of a library system in German territory is connected with the founding of monasteries by the Irish and Anglo-Saxon monks who came to the continent during the seventh and eighth centuries. While the Irish worked mainly in France and southern Germany, the Anglo-Saxons carried out their missionary activities in northern and central Germany. Best known among the Anglo-Saxons are Willibrord (739), Winifred, better known as Boniface (754), and Lullus (754–786). The monasteries of Echternach, Fulda, Prüm, Kornelimünster, and Weissenburg in the west; Münster in Westfalia; Werden on the Ruhr; and Korvey and Hersfeld in central Germany were all founded by the Anglo-Saxons. Monks from the monastery of Luxeuil, which had been founded by the Irish, preached in Bavaria. The monasteries of Reichenau (724), Murbach (727), Niederaltaich (731), and Lorsch on the Bergstrasse were created by West-Frankish monks. Monks from St. Gallen which had been founded by the Irishman Gallus in 613, roamed through southern Germany, and the beginning of ecclesiastical life in Freising (722), Regensburg (around 740), and Salzburg is closely connected with their work.

Church, school, and library were all integral parts of each monastery. A certain number of books were necessary for the life and activities of monks, and they brought those most needed with them. Furthermore, the monasteries on the continent were constantly being supplied with books by the monasteries of the mother country. Connected to these libraries were writing chambers (scriptoria), some of which became quite famous. Only a few volumes, now considered to be the greatest treasures of other libraries, remain from these earliest libraries. Soon libraries at the bishopries, whose cathedral schools were responsible for the education of the clergy, appeared alongside these monastery libraries. The oldest among them are the cathedral libraries in Cologne, Mainz, Trier, Konstanz, and Würzburg.

THE EARLY MEDIEVAL MONASTERY LIBRARIES (NINTH AND TENTH CENTURIES)

In the following centuries the monastery and cathedral libraries flourished, especially under the protection and care of the Carolingian emperors. The palace school and library created by Charlemagne at his court were examples which influenced the whole library system. He supported the work of the monastery scriptoria and set high standards for the execution of their manuscripts. Credit for the idea of the splendidly illuminated manuscripts goes to him and his heirs.

In the ninth century the center of the monastic library system was in western Germany. We know something of the holdings of these monastery libraries from a few book catalogs which first appeared during this time. The monastery libraries on the Island Reichenau in the Bodensee and at Fulda enjoyed special significance along with the library and scriptorium of St. Gallen. Texts of the Bible, of the

church fathers, and of various theological and religious literature were collected and copied repeatedly along with classical scripts in Latin and German. Fulda was foremost in the copying of classical texts. An important part of old high-German literature, such as Hildebrandslied and Merseburger Zaubersprüche, is contained in manuscripts which also originated at Fulda. The monastic libraries maintained close contact with each other. Their writings were handed back and forth as gifts and exchanges, for copying and borrowing. After a period of decline in the wake of invasions by the Normans and Hungarians, during which many monasteries were destroyed and plundered, a new flourishing under emperor Otto I and his heirs followed. Support of art and literature was traditional with this family, and their influence was highly beneficial for the libraries. Several new stimulating patterns which originated mainly in Italy emerged. Theophano, mother of Otto III, exerted a strong Byzantine influence. The Ottos presented many gifts in the shape of beautifully executed manuscripts to the monastery and church libraries. Evidence of their support were the many commissions given to the monastic scriptoria by the Saxon emperors and some of the greats of the empire. The most famous of the scriptoria was at the Abbey of Reichenau, and many of its works still survive.

While the greatest flourishing of the monasteries during the time of the Carolingians took place in the Rhine Valley, the center of ecclesiastical life now shifted to the heart of the Ottos' empire, Bavaria and Saxony. In Bavaria, monastic and cathedral libraries flourished in Freising, Passau, Augsburg, and, above all, Tegernsee and St. Emmeram in Regensburg; and in Saxony at the cathedral libraries of Magdeburg, Hildesheim, and Paderborn as well as the Abbey of Korvey.

THE REFORMING OF MONASTERIES AND THE RISE OF THE NEW ORDERS (ELEVENTH AND TWELFTH CENTURIES)

A period of political disputes between ecclesiastical and secular authority under the rule of the Salians and Staufer in the eleventh and twelfth centuries developed. These, along with the battles for the unity of the empire, exhausted the strength of the reign. The emperors' interest in the libraries was mainly limited to the commissioning of magnificent manuscripts of liturgical content, which were presented to churches. These manuscripts were created mainly in the well-known monastery scriptoria of Reichenau, Echternach, and Tegernsee. During this same time the monasteries turned away from the worldliness and variety of literary life, and theology took the place of the keen cultivation of profane knowledge. Even the decoration of manuscripts with illustrations and precious bindings conflicted with the new ascetic world-view of the times. These changes originated in the new orders of the Cluniacs, the Cistercians, the Carthusians, and the Premonstratensians, which had developed out of the reform movement.

The monastic reform, as such, favored books; the book was indispensable. Writing activity in the monasteries was no less enthusiastic than before, but the content of the manuscripts was almost purely theological, with a tone of controversial journalism expressing current religious–political disputes. This led to a

diminishing in the libraries' holdings and the literary output. Profane literature and the classics moved into the background; the reformers scorned the decoration of books and only reluctantly tolerated it in books used for worship.

Monasteries newly created in the eleventh and twelfth centuries are numerous but their significance is not equal to their number. The so-called Scottish monasteries, again founded by Irish monks, appeared in southern Germany, as in Regensburg (1076), Würzburg, and Konstanz. A brisk writing activity is attributed to them. The new orders of the Cistercians and Premonstratensians found their main activity in colonizing the northern and eastern border areas. The former are credited with founding the monasteries of Zinna, Chorin, Lehnin, and Neuzelle, which only achieved fame through their book holdings in the fifteenth century. The records of the Teutonic Order also give evidence of book collections, but books and libraries played no important role in this knightly order.

Just as the eleventh century stood entirely under the influence of monastic reform, the twelfth century brought a new change. The deepening of religious life had led to a penetrating search into the foundation of faith and thus the creation of a new theological discipline—scholasticism. The scholarly method reached its full bloom in France and spread to the German monasteries during the twelfth century. Study at the French educational institutions was their most important activity, and this practice became fashionable in twelfth century Germany. Books streaming in from France during the waning of the Middle Ages established Germany in the front ranks of intellectual life.

HOUSING AND FURNISHING THE MEDIEVAL LIBRARIES

Because of their small size, the church libraries of the early Middle Ages presented no structural problems. As a rule a simple cupboard sufficed, usually placed in the church near the altar or the sacristy. Not much is known about housing the somewhat larger monastery libraries. In the early days a separate building or even chamber was not necessary, particularly since the manuscripts were usually kept in the same place where they were used. But as early as 820 a two-story building, housing the scriptorium downstairs and the library on the upper floor, was included in the architectural plans for St. Gallen. Occasionally the library was accommodated by the cloister walk's wall niches.

The libraries were of modest size. Rarely were there more than 1,000 manuscripts. In physical form they were mostly parchment codices, ranging from liturgical books to Bible texts, Bible commentaries, and the writings of the Church Fathers. The ancient classical authors were copied chiefly for the teaching of Latin and the seven liberal arts. Medical care, dictated by the statutes of the orders, required knowledge of medicine and therefore medical texts, but scientific and technical literature was almost completely lacking. The librarian (armarius) usually a highly educated monk, was also responsible for the scriptorium. It was his job to give out the books to the monks and monastery students and draw up inventories of holdings. The value of these manuscripts was well appreciated

by the monks. Statutes of most orders included strict regulations concerning the librarian's position; however, each abbot set individual rules for his monastery. Holdings were increased mostly through copying, and many monasteries employed a rather large number of scribes for this task. The devotional books were copied with particular care and splendidly decorated with illustrations and precious bindings. Frequently other monasteries and churches borrowed the models for these transcripts. Gifts from the mother abbeys or from princes and greats of the empire were frequent. Only rarely were collections increased by purchases. The use of the monastery library was not restricted to its members, for surviving lending lists give proof that manuscripts were lent to other people and other monasteries.

DECLINE OF THE MONASTIC LIBRARIES AND THE RISE OF NEW LIBRARY SYSTEMS (THIRTEENTH AND FOURTEENTH CENTURY)

The height of monastic libraries came to an end with the twelfth century. The often uneducated monks neglected their inheritance, completely suspended the transcribing, or called in paid scribes. In the beginning of the thirteenth century the expanding orders of the mendicants, or beggar monks, the Franciscans (created 1209), and the Dominicians (created 1216) dedicated themselves above all to the worldly care of souls and showed little interest in book knowledge. Although this attitude eventually changed with increasing interest in learning, the books written by the Franciscans are poorly executed. They were created on the cheaper paper which slowly replaced parchment, and unreliable transcripts with excessive use of abbreviations were made. The Dominicans were considered an intellectual order, but even they scorned the adornment of books. They preferred to buy completed transcripts or to commission scribes to do the work. Their libraries contained purely theological works, with special allowance for literature needed in the practice of spiritual care and the fight against heresy.

Toward the end of this period the Brothers of the Common Life, founded by Gerrit de Groote (1340–1384), displayed a much more friendly attitude toward the book, and included well-stocked libraries in their first establishments at Münster, Hildesheim, and Cologne. They aimed at a renewal of religious life through books and earned their living by creating carefully written and attractively executed books. After the introduction of printing they installed numerous printing presses in their establishments.

In southern Germany the movement of the Benedictines of Melk and in Northern Germany the Bursfelder Congregation of Benedictine monasteries, instigated by the Abbot Johann von Rode in Trier (1358–1439), strove toward a revival in writing activity and the library system in the old monasteries. They reorganized and recataloged their libraries and revitalized the former writing activity. In St. Ulrich and Afra at Augsburg the first German monastic printing works were opened in 1466. However, this second blossoming of monastic libraries were short lived.

In the thirteenth and fourteenth centuries, while the old sacred libraries as signs of a united Christian-medieval culture came to a standstill, progress in the library

system was being made at the universities and court libraries and through private collections. Libraries at the universities and courts, which began at this time, continued without exception and formed the foundations on which modern academic libraries are built. The private libraries, on the other hand, were short lived. An increase in the demand for books proportionate to the increasing intellectual activity could no longer be satisfied by the usual production methods. Parchment was therefore replaced with cheaper paper. The guild of lay or hired scribes provided lively competition for the monks' writing activity. Finally, the invention or printing put an end to the medieval books. However, the contents and the collection development of libraries were not, at first, significantly altered.

The Beginnings of University Libraries

After the decline of the cathedral and monastery schools as single transmitter of knowledge and their libraries as sole collections of sacred and secular writings, the universities became the pillar of scientific life and research. The teachers, who detached themselves more and more from their monastic ties, created a new standard for the scholar. Their program broke through the clergy's monopoly over education because they admitted laymen to study and encouraged secular fields of knowledge to be taught along with theology, the most important among them being jurisprudence and medicine. Initially only individual colleges, where teachers and students of special subject areas gathered, had small book collections. These gradually combined into faculty libraries and eventually developed into the academic libraries as we know them today.

Universities, modeled after the Parisian example, were not founded in Germany until the middle of the fourteenth century: Prague 1348; the Collegium Carolinum 1366, which had already been richly furnished with books at its creation by Charles IV; Heidelberg 1386, where faculty libraries existed very early; Cologne 1388, the stronghold of the Dominican scholars; and Erfurt 1392. In Germany the university library, which included all areas of knowledge, replaced the college and faculty collections earlier than in the Romance countries. However, these university libraries initially were no competition to their foreign examples, neither through holdings nor through liberal policies of usage.

The learning activity demanded a different kind of accommodation for the book in the college libraries. They were housed in special rooms, lying, or later standing, on desks, to which they were chained. The desks stood squarely in the room and were identified by numbers. In the larger institutions a distinction was usually made between the most important manuscripts, which were not lent, and circulating ones; for example, the libraria magna and the libraria parva at the Sorbonne in the thirteenth century. This "lectern system" was adopted by some monastic libraries during the fifteenth century; the only example on German soil is a medieval library chamber of desks and chained volumes which existed in the church in Goldberg, Silesia, until World War I. Usage was restricted in most university libraries to teachers and graduates. An exception was Erfurt, where the librarians were allowed to lend to students.

The First Court Libraries

Princes in Germany were frequent donors of single manuscripts and collections of manuscripts to churches and monasteries, but rarely were they collectors. Not until the fourteenth century did the love of books infiltrate the German princely courts. Emperor Charles IV (1348–1378) brought magnificient books from Paris and Avignon, which he gave to the university, churches, and monasteries of Prague.

The Private Libraries

Simultaneously with the establishment of university and court libraries, private collections developed into an independent library system. However, individual book collections were scarce during the waning of the Middle Ages.

The Council Libraries of the Cities

The final type of library system, the so-called town-hall libraries of the cities, now developed. At first these were only a few small collections of learned subjects for the needs of the council and its officials, the town clerk, the city physician, and those interested in the history of public affairs, but above all books of law, medicine, and history. Through purchases and especially through donations from wealthy citizens, these libraries slowly gained significance and were usually accessible to all interested persons with knowledge of Latin. These council libraries provided the germ cell for the city (public) libraries.

THE LIBRARIES IN THE AGE OF HUMANISM (1400–1520)

During the Renaissance and the Age of Humanism the revival of interest in the antiquity and classical art and literature created a new secular scholarly profession with an aesthetic craving to study the writings of antiquity for more than scholarly purposes. Through this movement the book achieved a definite significance as a transmitter of tradition. At the same time a new ideal of scholarship and education arose which advocated going back to the source rather than to the traditional scholastic principle, and placed the independent absorption of knowledge above the acceptance of authority. Humanism, the literary aspect of the Renaissance, spread from Italy—where these ideals were already in evidence during the fourteenth century, and especially under the influence of the reform councils of Konstanz (1414–1418) and Basel (1431–1445)—to Germany beginning in 1450 and there experienced its greatest flowering until about 1530.

The private libraries of learned humanists of this time were numerous in Germany but only a few have been essentially preserved, such as those belonging to Beatus Rhenanus (1485–1547) in Schlettstadt and Nicolaus Cusanus (1401–1464) in Cues. We know of others from records, such as those of Hartmann Schedel, Willibald Pirckheimer, and Konrad Peutinger, and remains of these collections still survive in a few modern libraries.

The court libraries of this time had a more fortunate fate. Most of them survived the storms of the times and continue their existence in modern state, national, and occasionally university libraries. While they had originally been gathered for their princes' private collections, partly in the interest of learning, partly as prestige symbols, and had been promoted or neglected according to the reigning prince's attitude, these court libraries eventually turned into public libraries; that is, into institutions which more or less served the public. The Electors of the Palatinate, residing in Heidelberg, showed an exceptional interest in building up a library. The so-called "Palatina" experienced its climax under the Elector Ottheinrich (1502–1559), who primarily collected writings of medieval German literature as well as the works of the reformers. While still Count Palatine of Pfalz-Neuberg he gathered a valuable collection of manuscripts and printings, the world-famous "Ottheinrich volumes," bound in brown calf leather. Frederick the Wise, Elector of Saxony (1486–1525), founder of the Wittenberg Court Library (1512), must also be mentioned here. The establishment of two court libraries still in existence today, the Fürstlich-Fürstenberg Library of Donaueschingen (around 1500) and the Oettingen-Wallerstein Library in Maihingen, falls into this era.

During the Age of Humanism the university libraries experienced significant progress, partly through the concentrated efforts of some of the older colleges, and partly through the beginning, at the newly created universities, of book collections which embraced all areas of knowledge. Heidelberg developed into the most outstanding German university library before the Reformation. As early as 1461 it included 1,600 works in 841 volumes. However, its fame is credited to its merging with the court library and the receipt of Ulrich Fugger's (1584) collection. The newly founded universities, such as Greifswald (1456), Ingolstadt (1472), and Rostock (1419), at first received only faculty libraries. The voluminous collections bequeathed to the universities by professors and rectors were characteristic of the humanistic spirit of the times; the collection of the first rector Marsilius von Inghen, who died in 1396, went to Heidelberg; the one belonging to Mayor Heinrich von Rubenow went to the University of Greifswald, which he had founded; that of the physician and theologian Amplonius went to Erfurt.

Through the initiative of the Bursfelder and Melker congregations, many church and monastery libraries recovered from their decline in the fifteenth century. Due to the scholarship of the monks and the size of their libraries during this time, particular fame was enjoyed by the Carthusian monasteries. For example, Basel, Mainz, Cologne, and Erfurt achieved a size unusual for medieval circumstances. Unfortunately, except for a few exceptions (Basel, Mainz) they were scattered, and only sizable catalogs have survived their ruin.

A surviving lending register from Basel gives evidence that the collections were often circulated. As a consequence of the large increase in volumes and the use of their libraries, the Carthusians gave special attention to the technical aspects of library administration. Thus a beginning of cataloging grew out of the inventories which formerly served only as evidence of holdings, and consideration was given to the arrangement of collections. For the laymen among the users, the German

manuscripts were usually shelved separately. The amalgamation of collecting and creating manuscripts, so characteristic of the Middle Ages, was entirely lost. Nevertheless, valuable manuscripts were still considered preferred items and printed books were slow to infiltrate libraries. However, printing made it possible to distribute literature, particularly current works, in large quantities.

The fact that the idea of the public library—that is, one universally accessible, which had been entirely forgotten with the fall of the Holy Roman Empire—now slowly gained widespread acceptance, and is characteristic of the spirit of the Renaissance and Humanism. This was true not only of private collections but also of a few court libraries. The Heidelberg Castle Library, for instance, was made expressly available for the use of the university. The same was done at the Castle Library at Wittenberg and the Castle Library at Koenigsberg, the latter having been established by the last Grand Master of the Teutonic Order, Albrecht of Brandenburg. Church libraries for public use were also created in Germany through foundations from clergy and wealthy citizens. Due to private initiative a few city libraries go back to the fifteenth century. Book donations to a city's council, with the conditions that they be made available to the public, were numerous.

THE GERMAN LIBRARY SYSTEM IN MODERN TIMES

From the Reformation to the Beginning of the Enlightenment (1520–1700)

The Reformation, with its climax in the year 1517–1525, had a conflicting effect on the German library system which had developed so beautifully in the Age of Humanism. On the one hand, the ideological conflict naturally awakened a remarkably increased interest in books and libraries. The founding of numerous city (public) libraries in Madgeburg (1525), Hamburg (1529), Augsburg (1532), Lübeck (1616), and others, as well as school and church libraries, are attributed to the encouragement of leading reformers. On the other hand, intellectual life was in danger of being suppressed by the dominating battle over the new doctrine. Many of the monastery libraries, which had ruled over intellectual life of the Middle Ages and whose influences had reached into the sixteenth century, at least through their rich book treasures, fell victim to the secularization in the Protestant areas; often the new establishments were fed with their holdings. The revolutionary movements of the Peasant Wars (1524–1525) and of the Anabaptists (Wiedertäufer) in Westphalia also inflicted heavy damage on the church libraries. In numerous monasteries the holdings were destroyed along with the furnishings.

On the other hand universities and their libraries, under the increasing care of the princes, experienced a substantial stimulus. Several of the universities which had existed before the Reformation now received a centralized university library in place of the former college or faculty libraries, as in Tübingen, Leipzig, Rostock, and Greifswald. Almost all of the universities newly created in the wake of the Reformation were furnished with central book collections right from the start: Marburg (1527), Jena (1558), and Helmstedt (1575). In other instances castle

libraries took on the function of the university libraries, as in Heidelberg and Koenigsberg; Wittenberg, for example, did not establish its own library until the castle library was moved to Jena in 1549.

The strong interest which the reformers had for the book was matched by that of the Catholic Church and those sovereigns who had remained true to the faith. New universities were founded in Würzburg, Innsbruck, and Breslau whose libraries, in spite of modest means, showed carefully selected holdings. This also applied to the numerous libraries of the colleges founded by the Jesuits, the actual carriers of the Counter Reformation.

The conflicts and wars caused by the Reformation and Counter-Reformation reached their climax and conclusion with the Thirty Years' War (1618–1648). It rocked the foundations of the German Empire and heavily involved the library system. Actually, the German library system lost its leading position to foreign countries during this time. The fate of the Palatina in Heidelberg, the most significant of the German court libraries, is well known: As Tilly's war spoils it went first to Munich and from there to Rome. Among the book treasures carried off to Sweden by Gustav Adolf and his generals were the cathedral library of Frauenberg; the collections of the Episcopal palace, the university, and Jesuit College in Würzburg; and, along with many others, the libraries of the university and Jesuit College in Mainz, which sunk into the Baltic Sea on its way to Sweden. The increasing power of the territorial princes may perhaps be given credit for the fact that learning and books did not entirely succumb during this time. They found a home at the courts which also offered the possibility of further profitable development. The university libraries, on the other hand, which had gained important ground in the sixteenth century through the impact of the idea for a centralized establishment, slowly paralyzed. Although the focus on the territorial principle led to the founding of numerous new universities in the Protestant countries, Rinteln (1621), Altdorf (1622), Duisburg (1655), Kiel (1665), etc., the close atmosphere of the small states turned most of them into antiquated institutions before the end of the century. The University of Halle, founded 1694, finally opened the doors to the German university system for modern philosophy and thought. Development of the universities was closely connected with that of their libraries. The University of Halle Library included approximately 13,000 volumes in 1730.

The court collections surpassed the university libraries in the abundance of their holdings and the generosity with which they made their treasures available to interested persons. The court libraries therefore determined the image of the German library system in the seventeenth century.

After the conversion of the Teutonic Order territory into a worldly duchy, the last Grand Master of the Teutonic Order, Duke Albert of Prussia, created (1525) a castle library in Koenigsberg as a prerequisite to the university planned by him; there was also the duke's private library, the so-called "Kammerbibliothek." A part of this chamber library included spendid silver bindings, for which it was called the "Silver Library." The castle library was turned into a public library in 1540 and was incorporated into the University Library of Koenigsberg in 1827.

Repeated mention has been made of the fate of the famous Palatinate Library in Heidelberg. It had the same meaning for Protestantism as the Munich Court Library, today the Bavarian State Library, had for German Catholicism. It owes its establishment to the friendship of Duke Albert V (1528–1579) with the merchant Hans Jakob Fugger, one of the first connoisseurs and collectors of books during that time. At his suggestion the duke founded (1558) the Ducal Library in Munich, which was housed in a special annex of the castle. One of his heirs, Duke—later Elector—Maximilian I (1597–1651) was especially solicitous of the library's welfare, in 1607 he personally worked out instructions for the job of its librarian. The economic situation following the war made any noteworthy support impossible. Under the Elector Ferdinand Maria (1636–1679) the library did get the right to receive a depository copy (1663), but on the whole there followed a period of stagnation and decline.

Among the newly created court libraries in the Protestant countries, the Berlin Electoral Library deserves special mention because the largest German library, the Prussian State Library, emerged from it. Its creation (1659) followed an edict of the Great Elector Frederick William (1640–1688), but its opening was delayed until 1661 after the end of the Nordic War. The holdings already collected from secularized Brandenburg and Westphalian monasteries were thereby considerably increased. At the death of the Great Elector the library, which was housed in the apothecary wing of the castle, had grown to 20,000 printed volumes and 1,600 manuscripts. Under the first Prussian king, Frederick I, the library received (1693) an actual regulation for its use; the year 1699 brought *an edict* for a duty-bound deposit of new publications, which was, however, rarely heeded by the booksellers. Soon after its establishment the library was open daily. At the death of the Soldier King Frederick William I (1713–1740) the Berlin Library had 70,000 volumes and therefore ranked among the leading libraries at home and abroad.

The Electoral Library in Dresden, now the Saxony State Library, goes back to a private collection of the Elector August I (1526–1586) on the Annaberg near Torgau, which his heir Christian I (1560–1591) moved to Dresden. In spite of the well-known love for luxury of the electors of Saxony, the library conditions in Dresden were initially anything but exemplary. It finally won an influence over the intellectual life of the city of Dresden during the reign of Frederick August the Strong (1694–1733).

The library of the dukes of Brunswick in Wolfenbüttel enjoyed a special reputation. Even before his accession to the throne, the art and book loving Duke August the Younger (1579–1666) had gathered at his Castle Hitzacker an import collection which provided the basis for the so-called "Augusta," founded in 1644 in Wolfenbüttel. The earlier so-called "Julia," created by Duke Julius 1528–1589), had been combined with the Helmstedt University Library by his son. Duke August acted as his own librarian and producer of a systematically organized subject catalog. Under his guidance the Augusta, open daily to the public, developed in quantity as well as quality into one of the most significant libraries of its time. At the duke's death it included 28,000 volumes, among them 2,000 manuscripts.

A second establishment of the dukes of Brunswick was the Electoral Library in Hanover. It was created by Duke Johann Friedrich of Kalenberg-Grubenhagen (1629–1679) at his Castle Herrenhausen, and was initially closed to the public. Additional new foundings of this time, which achieved their significance mostly in the next century, include the library created by Count George I the Pious (1576–1596) in Darmstadt, today the Hessian Country and Academic Library; the Ducal Library in Weimar, established 1690 by Duke Wilhelm Ernst of Saxe-Weimar (1662–1728); the Library in Gotha, created by Duke Ernst I (1601–1675) from family estate and war spoils brought home from the Thirty Years' War; and finally the library founded in 1580 by Count William IV the Wise (1532–1592) in Kassel.

After the end of the Thirty Years' War the city libraries experienced a new impetus through the peoples' growing interest in the new scientific discoveries, especially in the natural sciences. Alongside the older collections in Nürnberg, Hamburg, Lüneburg, Magdeburg, Augsburg, and Koenigsberg appeared a large number of new libraries, as in Zwickau, Danzig, Breslau (1645), Bremen (1660), Frankfurt a. M. (1668), and Leipzig (1677). Most of them later achieved great significance.

In the second half of the seventeenth century new life was felt in the Protestant church and school libraries in connection with Pietism (Marien Library in Halle, Cathedral Library in Zeitz, etc.) and with the rise of the so-called sovereign or state schools, for instance, in Pforta, Meissen, and Grimma. Catholic intellectual life was completely dominated by the Jesuits, whose colleges and libraries had, of course, also suffered grievously during the Thirty Years' War. Emphasis must be given to the statutes of this order, which carefully regulated the administration and liberal use of these libraries. A fixed annual budget was their rule. Private collections moved almost entirely into the background during this time. Among the most noteworthy was the Wallenrodt Family Library in Koenigsberg which was opened to the public in 1650 and incorporated into the Koenigsberg University Library in 1909, as well as the Rehdiger Family Library, created by the Breslau patrician Thomas Rehdiger (1576), which constituted the foundation of the Breslau City (public) Library.

In summary, it may be said that the open type of public library, which had been created primarily in Italy during the Renaissance, prevailed in Germany in the sixteenth and seventeenth century. The administration, cataloging, and use varied from library to library. A fixed, regular budget, lacking almost everywhere, made systematic expansion virtually impossible. Even the question of housing was by no means solved satisfactorily for any library. Starting in the middle of the sixteenth or at the beginning of the seventeenth century, a large number of theoretical arguments dealing with purchases, regulations, increase, and use of the libraries appeared. Among them the "Bibliotheca universalis" by Zurich's Konrad Gesner (1516–1565), "Advis pour dresser une bibliothèque" by Gabriel Naudé (1600–1653), and "Bibliothecarius quadripartitus" by Johann Heinrich Hottinger (1620–1667) were particularly fruitful in their effect.

A good impression of the actual appearance of these libraries can be gotten

from a few travelogs. Although some things were naturally looked upon very subjectively, the overall impression is hardly anywhere satisfactory. The diary kept by Zacharias Konrad Uffenbach and his brother Johann Friedrich Armand Uffenbach during a library trip in 1709–1711 is an important record. They blamed the widespread confusion which they observed on the totally inadequate accommodations. The librarians, whom they generally held in low esteem, were usually professors at the universities; ecclesiastical and secular officials on secondary appointment; or, especially at the court libraries, scholars or literary men who were also active as historians and tutors for the princes. They frequently made critical remarks about the catalogs of the libraries they visited; they considered the alphabetical catalog as more important for larger, constantly increasing holdings. No less interesting than the notes of the brothers Uffenbach is a 1727–1731 report, so far only partly published, by a Koenigsberg professor of physics, Christian Gabriel Fischer. His opinion of the libraries he visited is even more critical than that of the Uffenbachs. Fortunately it can be noted that, according to Fischer, the accessibility of the libraries had made some progress; he was also far kinder than the Uffenbachs in his remarks about the helpfulness and knowledge of the librarians. In his opinion the catalogs still had more the character of inventories than of a guide to books, so that the visitor could usually get reliable information about the holdings only by going directly to the shelves, even where a subject catalog corresponding to the arrangement and an author catalog were available. Housing of the libraries had greatly improved since the Uffenbachs' travels, and in many cases he noted the creation of large pretentious rooms to accommodate the main collection.

From the Enlightenment to the Classic Era of German Scholarship (1700–1789)

The low point of the public library system at the beginning of the eighteenth century can only be explained by the fact that there was such an abundance of large private collections, some of which contained from 10,000 to more than 30,000 volumes. Unfortunately, they were short-lived. As evidence we have the numerous auction catalogs from this time, which luckily permit us to reconstruct somewhat the contents of these collections, only parts of which made their way into public libraries. Only a few isolated public libraries were fortunate enough to possess the extraordinary means to acquire these scholarly collections, which would then determine the image of a library. Occasionally large private collections were bestowed upon public institutions in the form of legacies, sometimes even laying the foundation for a library. Collectors were usually members of the higher professions—administrative officials, judges, physicians, etc.—the great bibliographers of the time, outstanding scholars, and above all, members of the courts and the aristocracy. The most distinguished examples are the libraries of Count Heinrich von Bünau at the castle of Nöthnitz, for which Johann Michael Francke (1717–1775) created a much admired systematic catalog, and of Count Heinrich von Brühl in Dresden; both later became part of the Dresden Castle Library. The Dresden war counsellor Johann August von Ponickau presented his collection to the Wittenberg University Library in 1789. Among the court libraries deserving mention are those of King

Frederick I of Prussia, who actually maintained eight small but carefully selected collections, as well, as the libraries of Duchess Anna Amalia of Weimar and Margravine Wilhelmine of Bayreuth. There was no lasting distinction between the court libraries and those of a public figure, since their maintenance was carried partly by the personal cash of the prince and partly by the state treasury.

The fact that many cities, small towns, and university towns organized reading societies, certainly not solely for entertainment, speaks for the meager collections of the public academic libraries. The societies' holdings of scholarly newspapers and journals, even from abroad, certainly surpassed those of the university libraries. Their accessability and accommodation were universally superb. They served the general enlightenment and represented one of the roots for the specialized academic libraries and the public libraries. Similarly, the societies which were formed in the eighteenth century for the encouragement of theoretical and practical enlightenment in special areas were equipped with selected book collections. The most significant collection of medical and natural science books in the eighteenth century was that of the Senckenbergische Medizinische Institute in Frankfurt am Main, founded in 1763 by Johann Christian Senckenberg, which was converted to public use in 1907 and today includes more than 400,000 volumes. In Hamburg the Commerzbibliothek, serving the merchants of the Hanseatic towns, was established in 1735; before its destruction in World War II it included 200,000 volumes.

Under the influence of the Enlightenment the libraries of the Jesuits lost much of their importance. In Freiburg i. Br. a university library was actually established with the additions from the libraries of dissolved Jesuit colleges. In contrast, the monastic libraries of the older orders, above all the Benedictine in southern Germany, experienced a last flowering in the eighteenth century, and a brisk scholarly activity prevailed in them. St. Blasien was a center for the cultivation of knowledge under the Prince-Abbot Martin Gerbert (1793). During this time numerous monastic libraries were created in sumptuous baroque style. In most monastic libraries, however, the situation was far less fortunate. After a brief blossoming under the influence of Pietism, the Protestant church and school libraries sank into total oblivion. Their only remaining worth was in their possession of fifteenth and sixteenth century printings, which were of special interest to bibliographers. However, the eighteenth century was not lacking new establishments of some importance, foremost among them the library (created 1701) of the Franke's Orphanage Foundation in Halle. Its storage-type building with crosswise racks is of interest in the history of library buildings.

Small importance was attached to the university libraries as late as the end of the eighteenth century. Their size, demonstrating only in rare exceptions the systematic acquisition of new publications, remained modest. Around 1790 collections with 20,000 volumes were considered exceptional. Their rooms were usually inadequate and neglected. Only in Würzburg were rooms befitting a library created (1724, by Balthasar Neumann). Means for acquisitions were usually modest, and rarely could the libraries depend on them. Receipt of depository copies, the right given for the first time in 1615 to the Leipzig University Library, was fragementary,

particularly since the libraries had no way of enforcing their demands. Along with additions resulting from the dissolving of ecclesiastical property, as in Freiburg i. Br., are those from scholars' estates. Examples are the collection of the Nürnberg Councillor Trew for the University Altdorf, which is today in Erlangen; the foundation of Baron Renatus Karl von Senckenberg for Giessen; as well as the estate of the Göttingen Professor, Christian Wilhelm Büttner, which was acquired for Jena (1783) by Duke Karl August of Weimar. The accessability of the libraries was particularly bad in the Protestant north, whereas the Catholic libraries made their holdings available to the largest possible extent. For instance, Würzburg was open for 35 hours a week as early as 1729, while Giessen was only open for students on Saturday afternoons. For ten winters Marburg was closed to any use because there were no heated rooms. In Leipzig students were completely excluded around 1711. On the other hand, Protestant libraries were more liberal in lending books to take home; this was even possible for students if a professor vouched for them. The directors were usually professors of philosophy in a subsidiary appointment, assisted in times of increased use and long opening periods by younger colleagues who were assured candidacy to this position by this activity. A few capable librarians, for example Johann Karl Dähnert (1747–1785) in Greifswald, who published (1775–1776) an alphabetical subject catalog, and Jeremias David Reuss (1750–1837) in Tübingen, did not change the picture very much.

Of the new establishments in the eighteenth century (Erlangen 1743, Freiburg i Br. 1773), the Göttingen University Library quickly moved into first place. It was created in 1737, simultaneously with the university, by the first minister of Hannover, Gerlach Adolf Baron von Münchhausen (1688–1770). Its connection with the Königliche Sozietät der Wissenschaften (Royal Society of Sciences), created in 1752, and its publication, the *Göttingische Zeitung von gelehrten Sachen* (*Journal of Learning*), were particularly profitable. Under the energetic and detailed leadership of Münchhausen, who was its first curator, the directorship went successively to two professors of classical philosophy, who were among the founders of the New Humanism, Johann Matthias Gesner (1736–1761) and Christian Gottlob Heyne (1763–1812). The following features contributed to the importance of the Göttingen Library: a sufficient running budget for systematic acquisition of new publications, planned buying at auctions and from antiquarian book dealers' catalogs; liberal usage regulations, which provided for daily opening and lending to students; exemplary cataloging through an alphabetical catalog of the complete holdings and a good official catalog, which was credited above all to the librarian Georg Matthiae; and the introduction of a solid link between shelf arrangement and the catalog through labels, which facilitated an easy flow of volumes through the library, and is credited to the librarian Jeremias David Reuss (1837) who had come from Tübingen in 1782. Around 1800 the Göttingen Library included approximately 180,000 volumes and was the most significant European library in the field of modern works. In the following years it exerted a strong influence on the development of the usable academic library.

The great court libraries were still the most important kind of library of this

period, although it was to be a long time until they were gradually relieved of their private character and gained public significance. With their generaly valuable antique possessions, and occasionally blessed with the means to acquire complete collections, they were more archival in nature than progressive working libraries. This is not the place to enumerate their development; it was a constant up and down, ruled by the princes' interest or perhaps the desire for pomp and prestige, and often by the personality of their librarians. One page of glory in the history of libraries is the association with leading men of the Enlightenment and the New Humanism. The court libraries had for their appointed librarians such men as Gottfried Wilhelm Leibnitz (1646–1716), who was librarian at the Hannover Library from 1676 on and then also received an honorary appointment to Wolfenbüttel in 1690, and Gotthold Ephraim Lessing as librarian in Wolfenbüttel (1770–1781). Both thoroughly understood the library system. Leibnitz in particular repeatedly emphasized the importance of a sufficient fixed budget and demanded careful cataloging as well as extended opening hours. Other than at Göttingen, Leibnitz' innovations had little influence on general library practice. Special attention should be called to the librarianship of Andreas Felix von Oefele (1746–1778) at the Munich Court Library, who gave particular attention to catalogs of printed and written manuscripts; and Johann Michael Francke's activity in Dresden, who arranged the library according to the classified-topographical system devised by him, and thus made the library the best organized of its time despite the lack of a catalog, which was later created by Johann Christoph Adelung (1732–1806).

The arrangement of the library rooms also experienced a change in the eighteenth century. Aside from the famous baroque rooms of the monasteries in southern Germany, the court libraries were again the first to replace the medieval lectern system with the Saalbauten (buildings with a large hall), whose focal point was a large hall serving simultaneously as exhibition and work room. The first self-contained library building following the principle of the Saalbibliothek was the much admired Ducal Library in Wolfenbüttel, built in 1706–1711. In 1774 a new building for the Royal Library in Berlin was built according to plans drawn up by the younger Fischer of Erlach; well-known as the Kommode (chest of drawers), it housed the library for 130 years. Other libraries received fitting accommodations by at least being moved into new rooms. The Dresden Library moved into the Japanische Palais in 1786, and the Weimar Library into the Grüne Schloss. The library, founded in 1775 by Duke Karl Eugen at the Ludwigsburg Castle, was moved to Stuttgart in 1776 and at the same time made available to public use. The Darmstadt Court Library was first made available to court officials in 1778. The court library in Mannheim, created in 1756 by the Elector Karl Theodor, experienced an unusual rise; its approximately 100,000 volumes were, however, incorporated into the Munich Court Library in 1804.

From the French Revolution to the Franco-German War (1789–1870)

The invasions of French revolutionary armies and of Napoleon inflicted heavy damage on numerous German libraries. The revolutionary armies were followed

by government officials who carried off valuable library properties to France, and at times they were guided in their abductions by lists carefully prepared in advance. Especially affected were the libraries on the left banks of the Rhine (Mainz, Trier, Metz, Cologne, etc.); outside the Rhine area particularly Nürnberg; and in northern Germany Wolfenbüttel. Timely evacuations saved some things from the grasp of the French, but even these caused serious losses. At the Peace of Vienna in 1815 it was agreed the stolen goods were to be returned, but this agreement was only partially carried out. Wolfenbüttel, at least, received back the greatest part of its manuscripts. Furthermore, thirty-eight of the Old German manuscripts which had been part of the Palatina in Heidelberg and carried off to Rome during the Thirty Years' War and from there to Paris under Napoleon were also returned. Another 847 manuscripts of the Palatina were returned to Heidelberg (1816) by the pope out of gratitude to the king of Prussia.

An enormous upheaval was brought about by the Reichsdeputationshauptschluss of 1803 (decision by the Empire's last deputation to compensate German princes for territories on the left bank of the Rhine, granted to France at the Lunnéville Treaty of 1801, with territories on the right banks of the Rhine) through the dissolving of estates, cities, principalities, monasteries, and religious establishments, which, having been subject to the emperor, were now put under the jurisdiction of the new territorial princes. The numerous libraries which were changing hands became the property of territorial princes or, in isolated cases, city property. In this way much was squandered or even sold as scrap paper. In Bavaria, Baden, and Württemberg the secularization took on the largest dimensions. The enormous treasures of the Bavarian monasteries ended up in the Munich Court Library, which thus came into possession of its unique collection of manuscripts and incunabula. Breslau, Darmstadt, Karlsruhe, Stuttgart, and other libraries also received valuable additions through secularization. Only a few of the private libraries belonging to princes, who were subject to the emperor, remained in the hands of their owners, among them the Fürstenbergische in Donaueschingen, the Oettingen-Wallersteinsche in Maihingen, and the Stolberg collections in Stolberg and Wernigerode. Special regional book depots, which later developed into province or district libraries, were created in Prussia and Bavaria in the course of this shifting. Only a few of them achieved any great significance, such as the district and city library of Augsburg; the district libraries of Passau, Regensburg, and Eichstätt; as well as the Düsseldorf and Wiesbaden Land Libraries. The cities showed only slight interest in the library system.

After the wars of independence almost all of the larger and smaller state libraries, some of the province and city libraries and, above all, the university libraries made significant progress. Almost all of them were now serving primarily as public academic libraries, and in this aspect underwent internal and external reorganization. The example of the Göttingen University Library was exceptionally influential. Leading in size and quality of holdings was Munich, followed by the Royal Library in Berlin, which did not move into first place until the end of the century. Fixed acquisitions budgets and legal deposit laws (1817 Würt-

temberg, 1824 the Old Prussian provinces, 1836 Hessen, 1865 Bavaria) plus exchange and sale of duplicates provided for constant increases. Even though the financial endowment was generally not too generous, the most important new publications could usually be purchased. A rapid increase in the number of volumes was the result. However, spatial accommodations still remained mostly inadequate.

The states lavished special care on the university libraries. This occurred simultaneously with the prosperity of the universities. A number of smaller universities were dissolved and their libraries went to neighboring university libraries (Trier 1798, Cologne soon after 1800, Rinteln 1809, Helmstedt and Frankfurt an der Oder 1810, Erfurt 1816, Wittenberg and Herborn 1817, Duisburg 1818). The three newly founded Prussian universities of Berlin, Bonn, and Breslau were immediately furnished with suitable libraries. The university libraries were usually directed by professors in a subsidiary appointment. A few of them made exceptional achievements, e.g., Friedrich Ritschl in Bonn (1854–1865) and Robert Mohl in Tübingen (1836–1844). Some of the appointed librarians also distinguished themselves with their performance: Friedrich Adolf Ebert in Wolfenbüttel (1823–1825) and at the Dresden Court Library (1825–1834); and his more practically inclined antipode Martin Schrettinger at the Munich Court Library (1802–1851). As far as catalogs were concerned, the Göttingen cataloging system (alphabetical and location-corresponding classified catalog) was being used in the north, while in southern Germany the system of arranging in subject groups according to entry, which Schrettinger had first introduced at the Munich Court Library, became customary. Special attention was given everywhere to the cataloging of manuscripts and incunabula, as in Munich by Johann Andreas Schmeller (1852). The alphabetical catalog, which included the total collection of the Royal Library in Berlin, executed by Philipp Buttmann in 1811–1837; the Berlin classified catalog, begun by Julius Schrader in 1842; the system of subject catalog created by Andreas Schleiermacher for the Grand Ducal Library in Darmstadt (1787–1858); and the Franckesche system of arrangement further developed in Dresden by Ebert; all were exemplary developments.

In the beginning of the nineteenth century the first Volksbüchereien (free libraries) made their appearance. In 1797 Heinrich Stephani had demanded Volksleseanstalten (free reading institutions). In 1828 the City Library Grossenhain in Saxony, intended as a popular education center, was established by the treasury magistrate Karl Preusker. The historian Friedrich von Raumer, who became acquainted with American educational libraries during a trip to the United States in 1841, made an endowment (1850) as an incentive for building the first German Volksbücherei in Berlin.

Toward the end of this era a few special libraries moved into the limelight. Foremost among the flourishing government libraries was the book collection (created 1798) of the Foreign Office in Berlin. In 1852 the library of the Germanic National Museum, which collected mainly German history and the history of civilization, was created in Nürnberg. Here the Reichsbibliothek, established in 1848 through voluntary gifts from publishers at the instigation of Heinrich Wilhelm Hahn, found a

temporary home; however, it never developed beyond the initial stage and is kept today in the Deutsche Bücherei at Leipzig.

From the Creation of the German Empire to the End of World War II (1871–1950)

The responsibility for the public libraries lay chiefly in the hands of the territorial states and the municipalities. The result was a great variety of library systems and a vast scattering of book possessions, each with its own method of description. A national library in the true sense of the word was never realized; however, since the turn of the century increasing tendencies toward unification and collaboration had been noticeable, especially in the training of librarians, in catalog systems, and in usage. Leading the innovations was the Royal Library in Berlin—later the Prussian State Library (1919)—particularly under the directorship of August Wilmanns (1886–1905), Adolf von Harnack (1906–1921), Fritz Milkau (1921–1926), and Hugo Andres Krüss (1926–1945). The Munich Court Library developed more into a quiet scholarly library, until World War I, and it did not move into the center of the Bavarian library system until the directorship of Hans Schnorr von Carolsfeld (1909–1929). The Verein Deutscher Bibliothekare (Association of German Librarians, established 1900) also became strongly involved in these mutual endeavors. Following the professional journals which had started in the middle of the nineteenth century—*Serapeum,* published by the Leipzig city librarian, Robert Naumann, 1840–1870; and the *Anzeiger für Literatur der Bibliothekswissenschaft,* managed by the bibliographer Julius Petzholdt, 1840–1886—the journal *Zentralblatt für Bibliothekswesen,* established in 1884 by Otto Hartwig, became the leading professional publication. In addition to the earlier library types, the specialized and free libraries became prominent in this era. Finally, the establishment of the Deutsche Bücherei in Leipzig (1912) must be mentioned as an outstanding event.

The perfection of the modern usable library, which came to its conclusion in this era, would not have been possible without the rise of the professional librarian as library director. Anton Klett, author of a brochure on "die Selbständigkeit des bibliothekarischen Berufs" (the independence of the library profession), was appointed to Jena in 1870; in Prussia the first official librarian Karl Dziatzko served (1872–1886) as director of the Breslau University Library and then succeeded August Wilmanns in Göttingen, who in 1886 assumed the direction of the Royal Library in Berlin. Otto Hartwig, active in Halle since 1876, and Friedrich Althoff, counsellor and later head of the Prussian Ministry of Public Education (1882–1906), must be mentioned as most important advocates of the Prussian library reforms. These reforms in Prussia, which set an example, included the training of successors and the creation of the Prussian Beirat für Bibliotheksangelegenheiten (Council on Library Affairs).

The general progress of German libraries suffered a grievous interruption during World War I (1914–1918) and the following currency depreciation. Most affected was the procurement of foreign literature; the serious consequences could only be

mitigated through the intervention of the Notgemeinschaft der Deutschen Wissenschaft (Emergency Association of German Scholars), through the creation of the Deutscher Leihverkehr (Interlibrary Loan) in 1924, and generally through the increasing emphasis on economic planning in libraries. After 1933 efforts were made to achieve a nationally unified library administration: in 1936 the Reichsbeirat (National Council) was founded; a decree for the unification of rules pertaining to training and to examining for higher library positions was issued in 1938; and a similar decree for intermediate positions was issued in 1940. The still existing gaps in the legal deposit were largely eliminated (1934 Hamburg, 1936 Thuringia and Baden, 1938 Saxony).

World War II (1939–1945) had an even more devastating effect on German libraries: enormous losses of book possessions—alleviated only slightly through timely evacuations—and buildings, renewed obstacles in the acquisition of foreign literature, termination of international library relations, etc.

Only the most important of the combined library ventures on a national level can be mentioned: in 1817 the establishment of the Akademischer Tauschverein (Academic Exchange Association), which led (1913) to the general exchange of university publications—since 1885 the *Jahresverzeichnis der Hochschulschriften* (*Annual Register for University Publications*), which was taken over by the Deutsche Bücherei in 1937; in 1899 the creation of the *Preussische Instruktionen,* which were subsequently introduced in almost all of the German libraries, as well as the *Berliner Titeldrucke* (*Berlin Card Prints*), established 1892 in Berlin and since 1909 appearing as *Zetteldrucke;* in 1903 the beginning of the *Preussicher Gesamtkatalog* (*Union Catalog of Prussian Libraries*), which had appeared in print since 1931 and was extended into the *Deutscher Gesamtkatalog* (*German Union Catalog*) in 1935 but, as a result of the war, was not continued beyond the 14th volume; in 1905 the establishment of the "Auskunftsbureau der Deutschen Bibliotheken" in Berlin for the informative evaluation of the *Union Catalog,* which published several general indexes of journals (1914:GZV, 1927–1929: GAZ), the collection of government publications, first in Berlin, then Bavaria, Baden, and Württemberg followed; in 1928 the *Monatliches Verzeichnis der reichsdeutchen amtlichen Druckschriften* (*Monthly Catalog of German Government Publications*), published by the Deutsche Bücherei; and many others.

On the international level the exchange of dissertations between German and French libraries since 1881 must be emphasized; this was followed by agreements with other countries. In 1904 the Preussische Kommission für den Gesamtkatalog der Wiegendrucke (Prussian Commission for the Union Catalog of Incunabula) was established. Its office was in the Royal Library in Berlin, and it published the first volume of the *Union Catalog* in 1925. In 1927 the Internationaler Verband de Bibliothekarvereine (IFLA) was founded, of which the Verein Deutscher Bibliothekare was a charter member.

The modern functional library, which achieved international recognition, became a reality in Germany through the strong mutual influence of other countries. The Saalbauten moved into the background in library construction. Their place in Ger-

many was taken by libraries with strict separation of reading rooms and book stacks. Modern storage structures with low galleries and book cases squarely set in rows as close together as possible were requirements for this type of building. Construction was simplified with the installation of the Lipman Regal made of steel (1889), the introduction of electric lights, and modern building systems using concrete. This style of modern storage building made its initial impact in Karlsruhe and Rostock. Later several of these new buildings were erected primarily in Prussia: Halle (1878–1880), Greifswald (1880–1882), Kiel (1881–1883), Göttinger Erweiterungsbau (1878–1883), and Marburg (1897). Representative of this new style were the Munich Court Library (built in 1843 by Friedrich von Gärtner), the new building of the Royal Library in Berlin "Unter den Linden" (1914), and the Tübingen University Library (1921). Eighteen of the twenty-four university libraries had received new buildings before World War II. As a result of the storage-type library development it was necessary to create separate reading rooms; these were primarily central rooms, patterned, particularly in Berlin, after the English model of the great domed hall. Under American influence, however, a change was soon made to rooms with low, flat ceilings, as those in the Deutsche Bücherei in Leipzig (1916) and Tübingen; the floor plan of the reading room became rectangular. This arrangement demanded a special reference library, introduced in Breslau (1872) by Dziatzko. In Berlin a special magazine reading room next to the large reading room existed as early as 1819, 1840 in Munich, 1878 in Göttingen, and by 1900 almost everywhere in Germany. Until World War II development was directed toward the "three-part library" with separation of book, usage, and administrative rooms.

Of particular importance to the internal solidification of the library profession and the libraries' increase in output proved to be the creation of a regular training program and examination for the professional candidates. A library subject examination which was a prerequisite for admission to the academic examination for certificate and graduation, and, theoretically, is still required today, was introduced in Prussia in 1893. However the actual library training varied: in 1928 the Bibliothekswissenschaftliches Institut (Institute of Library Science) was established in Berlin, and in 1909 there was created a nonacademic profession varying in civil service rank, the so-called Diplombibliothekare, which to this day requires a high school diploma. Special library schools for the training of these "certified librarians" were eventually created. Other states, especially Bavaria and Saxony, followed the example of Prussia.

Acquisition was improved through fixed budgets and careful selection of material, and at the larger institutions with the help of subject specialists. The legal deposit was more strictly enforced. The Deutsche Bücherei served as a central collection agency for national literature, initially through voluntary deposits from publishers, but, since 1940, through legal deposits. The national and international book exchange was actively encouraged, especially with the creation (1926) of the Reichstauschstelle (National Exchange Center) of the Notgemeinschaft (incorporated in 1934 into the Prussian State Library). The arrangement of books was not uni-

form; in Prussia the classified arrangement was prevalent, in southern Germany widespread use was made of subject groupings. Admission to the storage libraries was generally limited to certain user groups.

The catalogs underwent a change corresponding to the enormous increase in volume. Separation of the user from immediate access to the books resulted in increased attention to the catalogs. Rules for alphabetical cataloging were established and unified according to Dziatzko's rules in Breslau (1884) and the *Preussische Instruktionen* (1899). The most important libraries to create their own rules were Munich (1922) and Tübingen. Adherence to the international regulations (filing rules according to word sequence, recognition of corporate authorship) were rejected by most German libraries in 1911–1912. In subject cataloging the traditional classed catalogs were usually continued. Between the two World Wars an effort was made to create a unified system. Lively discussions were held regarding the introduction of the alphabetical subject catalog; however, it found little support and enjoyed increased popularity only as a supplementary selected subject catalog. In spite of strong propaganda, decimal classification found almost no support in Germany initially. The widespread conversion of the subject catalog from standortgebunden (corresponding to order of shelving) to standortfrei (separated from order of shelving) was significant and came after Georg Leyh's attack against the "Dogma von der systematischen Aufstellung" (classified arrangement dogma) in 1912–1913. There was also a change from a handwritten volume to a printed card catalog. The *Berliner Titeldrucke* (*Berlin Card Prints*), 1911–1945, which recorded German and foreign literature, as well as the card catalog of the Deutsche Bücherei for entry of German literature (since 1921), created widespread support for the centralized cataloging of new acquisitions.

Two types of libraries with different utilization policies developed, the nonlending Präsenzbibliothek (reference library), represented primarily by the Deutsche Bücherei and most of the specialized libraries, and the lending libraries. A loan system for the mutual supplement of holdings developed between the lending libraries. In 1936 an international interlibrary loan was initiated. Use of the libraries increased in a manner never before imagined. Demands for regular and extended opening hours were generally successful.

The Deutsche Bücherei in Leipzig, founded (1912) jointly by the Börsenverein of the German Booksellers, the City of Leipzig, and the State of Saxony, represents a library of particular interest. During the inflation period following World War I the German Reich joined in its support; in 1940 it became a public institution. Since 1913 it has collected all German language literature publications—with the exception of printed music (until 1943) which went to the Deutsche Musiksammlung, established 1906 and incorporated into the Royal Library in Berlin in 1914—and after 1921 it developed into the central agency for the German State Library. In accordance with its archival nature, it is a reference library and very rarely lends its work.

Along with the many different academic libraries, toward the end of the nineteenth century there developed an independent public library system which became,

under English and American influence, the Lesehallenbewegung (reading room movement). Its strong supporters were, among others, Constantin Nörrenberg in Kiel and Gottlob Fritz in Berlin-Charlottenburg. Out of this movement grew the public libraries in Charlottenburg and Hamburg (1899), Duisburg (1901), Stettin and Elberfeld (1902), and others, as well as, in the form of private endowments, the Lesehalle der Zeiss-Stiftung in Jena (1895) and the Kruppsche Bücherhalle in Essen (1899).

These public libraries, usually supported by the cities, were accessible to everyone and carried only first-rate literature, mostly belles-lettres. In time the state exerted its influence on the movement: in 1909 the examination of the professional candidates became a civil examination in Prussia; and in 1910 the first government library advisory board was created in several of the larger cities. Shortly before World War I, Walter Hofmann created an exemplary municipal public library system in Leipzig, connected with an Institut für Leser- und Schrifttumskunde (Institute for Reading and Literature). In contrast to Hofmann's Leipziger Richtung with its pedagogical theory (suggestion for selection and advice to the reader across the counter), the Stettiner Richtung of Erwin Ackerknecht strictly rejected any influence on the reader by the librarian until after the 1930s.

Supplying the low lands proved to be particularly difficult. It was done partly through traveling libraries and partly through permanent libraries and centralized supplementary libraries with an extensive interlibrary loan system. Along Germany's border areas the rural library system was strongly promoted by the state. The first children's libraries did not appear until after 1900 in Berlin and Munich. World War II meant a deep caesura for the public libraries. During the Nazi era their holdings were directed toward the ideas of national socialism, much more so than in the academic libraries.

The development of the German library system, which had been a rather shining success in the first half of the twentieth century, came to an abrupt end during the general collapse of Germany in 1945. Years of painstaking reconstruction followed. As far as the general devastation permitted, reparation had to be made for book losses of around 70 million volumes, partially or completely destroyed buildings, and losses of catalogs. Acquisitions were severely hindered until 1951 because of currency restrictions. The division of Germany into two states occurred during these years. As a result of their different governmental systems, the library system was also torn into two distinctly different structures.

In the West the uniting of the occupied zones and the creation of the Federal Republic of Germany in 1949, together with economic progress, initiated a period of positive development, which was identified primarily with plans for increased library cooperation and technical perfection of individual libraries. The activity of the Verein Deutscher Bibliothekare and the guidance and financial support of libraries by the Deutsche Forschungsgemeinschaft contributed considerably to revitalizing the library system and to preserving the cooperation of the libraries in the first years following the war.

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Public Libraries in the Federal Republic of Germany

It is difficult to define the German term "Öffentliche Bibliotheken" and give it a clear and comprehensive meaning. If the term is to be compared to the Anglo-American "public library," a few words must be said about library development in Germany. The concept of a public library as, for example, in the United States, in Great Britain, or in the Scandinavian countries, did not prevail in Germany until after World War II. Actually, the remarkable growth of public libraries in the Federal Republic during the last two decades must be attributed to the conversion of the former "Volksbücherei" into the public library. Thus the public library became more relevant for a democratic state and at the same time met the social needs of a modern industrial country. Although the Volksbüchereien—with their strongly educational aim, carefully chosen and consciously limited holdings, a closed access system, and an attentive readers' advisory service now and then appearing to be oversolicitous—have by now been replaced by the public libraries—with liberal selection policies and expanded holdings, free access to the stacks, descreet readers' advisory work, and now also reference and information service—there still remain differences between the effectiveness of the public libraries in Germany and that of the large Anglo-American ones. In a few cities there are still "learned" municipal libraries which have no connection to the public library system with its central library and branch libraries. However, the tendency now is either to combine these "learned" municipal libraries with the central libraries, to convert them to legitimate state libraries with regional functions, or to turn them into local university libraries of which quite a number have recently been created or planned. Such a development acknowledges the fact that increasing demands on each of the three library types—central municipal, state, and university—will not in the future allow cities to continue to maintain two parallel systems nor their existing libraries to function also as state or university ones. Even the responsibility of collecting and making accessible highly specialized material of local significance is generally not performed by the public libraries but by the "learned" municipal libraries, or in many cases by the city archives.

A comparison of public libraries in the Federal Republic with those of other countries must also consider the fact that the two large churches, Catholic and Protestant, maintain a few thousand small libraries. These are as a matter of principle open to everyone, and they supplement the service of the public libraries or, in a few communities which do not have their own public library, actually take

its place. The focus of this article, however, is on the public library service maintained by the local authorities.

In the early 1940s, before the destruction of World War II, the national-socialist government—as part of its library program—brought the number of Volksbibliotheken in what was then German territory, up to 20,000. These were, as the large number indicates, mostly small libraries. For political as well as organizational reasons they had largely uniform holdings. Most of the collections and buildings were destroyed during the war. The remaining collections had to be sorted, and national-socialist and military publications weeded out. It was a new beginning. After the division of the country into one eastern and three western occupation zones, followed by the creation of the current Deutsche Demokratische Republik, DDR (German Democratic Republic) and the Bundesrepublik Deutschland, BRD (Federal Republic of Germany), with West Berlin de facto though not de jure affiliated to the BRD as a city-state, an initial inventory for the year 1949/1950 revealed that 77% of the communities with 41% of the population had no public libraries. In 1968, barely 20 years later, almost 80% of the population lived in communities with public libraries. The public libraries by then had more than 30 million volumes and reported almost 80 million lendings. When applied to the 60 million inhabitants of the BRD, including West Berlin, these statistics reveal how much still needs to be done in this country to achieve an efficient public library service. When compared to the past it is noticeable that the losses have been more than compensated for, and that the development from the Volksbibliothek (free library) to the modern public library has met with unprecedented success.

As in other countries, one of the most important requirements is to balance the tremendous differences which still exist between library service in the cities and in the rural areas.

PUBLIC LIBRARIES IN THE TOWNS

A number of large towns are building up a central library of their public library system and at the same time continue to maintain their "learned" municipal libraries. This necessarily reduces their importance and limits the financial support to each. However, it is primarily the financial support of the cities and larger towns which enabled them to develop a relatively efficient public library service in the first place. The towns are beginning more and more to look upon public libraries as a necessity of life for their citizens. In a country where most financial support for cultural establishments has traditionally gone to city operas, theatres, and museums, this is especially important. It is also significant in view of the fact that no library legislation had been passed when this trend began which might have created an obligation or even a motive to maintain and build up public libraries.

Criteria for performance and concepts for the organization of public libraries in towns with more than 10,000 inhabitants were set jointly by librarians and specialists of the public authorities as members of an advisory committee of the Kommunale Gemeinschaftsstelle für Verwaltungsvereinfachung (Joint Municipal

Center for Administrative Simplification) and were published in 1964. These criteria have proven to be of great value, although their goal of one volume per inhabitant is only gradually being realized. In 1971 a new committee was appointed to prepare a revised edition in the light of past achievements and new developments.

Along with central and branch libraries (with their own children's departments and occasionally a young adults' division), the municipal library systems have a few special libraries: separate youth libraries, libraries in schools or trade schools, hospital libraries, libraries in homes for the elderly, libraries for the blind, music libraries.

West Berlin has an unusual situation in that its twelve districts have their own library systems. The West Berlin Central Library (American Memorial Library) takes over the coordination of the loan system and makes special materials available (see Figure 1). Other than that it has no authority over the district libraries. Hamburg has only quite recently developed a central library for its system of the Hamburger Öffentliche Bücherhallen (Hamburg Public Libraries) (see Figure 2).

More recent is the development toward a three-stage municipal library system with a central library, district or regional libraries with permanent branch libraries (composed of at least 10,000 volumes), and Autobüchereinen (bookmobiles). The branch libraries and bookmobiles are attached to the regional libraries. In a few towns the bookmobiles are dispatched from central bases.

Libraries on wheels have gained much importance in the last few years. They mostly serve sparsely populated areas of the towns where a permanent branch library would serve less than 10,000 people. However, bookmobiles are also used in more densely populated areas if it is not possible to locate a permanent library

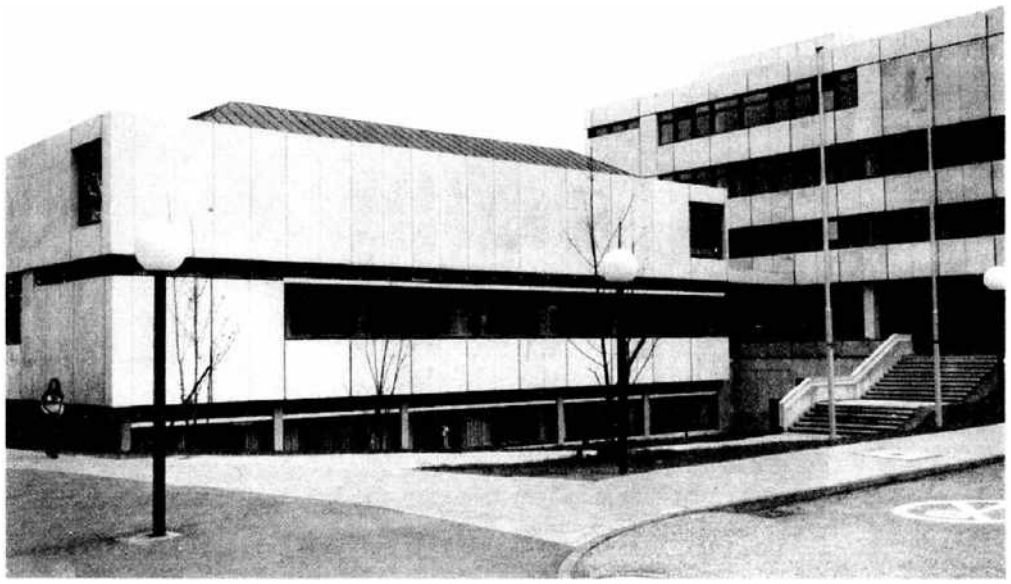

FIGURE 1. *American Memorial Library, Berlin.*

FIGURE 2. *Public Library, Hamburg-Eppendorf.*

there. The advantage of bookmobiles—as compared to very small branch libraries—are their numerous possibilities for service which allow them to adjust quickly to structural changes within the city. The larger bookmobiles each carry 4,000 to 6,000 volumes and, according to local criteria, have a reserve of at least 10,000 volumes; this compares quite favorably to a very small branch library. Generally the bookmobiles are supervised by librarians who help the patron to make the most use of holdings and the loan system. It is also important that the library card which authorizes use of the bookmobile is also valid for all other libraries of the system, and that books and magazines can be taken out and returned anywhere.

In 1957 there were fourteen bookmobiles in the Federal Republic of Germany, 10 years later there were seventy-five. Today, out of over eighty mobile libraries, sixty-four are operating in forty-one cities; in Hanover and in the West Berlin district of Spandau there are three each, Cologne has four, and Munich has six.

Circulating statistics in towns and communities with more than 20,000 inhabitants are recorded in the *Schnellstatistik kommunaler Öffentlicher Bibliotheken* (*Express Statistics of Municipal Public Libraries*). Some of the latest holdings and lending statistics in different size towns might give an indication of developments. Of the three cities with more than a million inhabitants, West Berlin (2.13 million people) with its central library and twelve district library systems reached book holdings of 2,181,082 volumes and 7,902,761 lendings in 1969. Hamburg Public Libraries reported, for 1.8 million people, 1,192,640 volumes and 4,821,136 lendings. Munich, with 1.36 million residents, reached holdings of 698,980 volumes and 3,999,689 lendings.

In 1969 there were eleven cities in the BRD with a population of between 400,000

and 1,000,000 people. The public library service of the cities of Hanover (525,000 residents, 775,008 volumes, 2,401,011 lendings) and Duisburg (460,000 residents, 414,743 volumes, and 1,802,562 lendings) was outstanding.

There were forty-seven cities with populations of between 100,000 and 400,000. The relatively highest performance was achieved by Ludwigshafen (176,000 residents, 195,202 volumes, 816,679 lendings) and Koblenz (107,000 residents, 181,318 volumes, 478,613 lendings).

The sixty-one cities with more than 100,000 residents reported that 14.8% of the public libraries lent more than three volumes per resident, 32.8% lent two to three volumes, 50.8% one to two volumes, and 1.4% less than one volume.

There are fifty-two cities with 50,000 to 100,000 inhabitants, among them. Wolfsburg (92,000 residents, 99,387 volumes, 381,181 lendings). Of the public libraries in these cities, 5.3% lent more than three volumes per resident, 31.6% two to three volumes, 49.1% one to two volumes, and 14% less than one volume.

Communities with a population of 20,000 to 50,000 numbered 164. Rosenheim (37,000 residents, 27,600 volumes, 156,053 lendings) and Uelzen (24,000 residents, 27,438 volumes and 119,356 lendings) are among these. In communities of this size 8% reached lending statistics of more than three volumes per resident, 24.6% lent two to three volumes, 33.7% one to two, and 33.7% less than one volume per resident.

These statistics show the differences that exist among the different size communities as well as the various cities. For the future, emphasis must be placed on upgrading efficiency everywhere and expanding services. The libraries of the larger cities have an increasing obligation to coordinate all libraries within the city and to act as a central agency for the surrounding areas. Their services are already available for residents in the outskirts of the city and in the surrounding region who can receive information and borrow books in the library or through the interlibrary loan service. Librarians as well as the cities have demonstrated great cooperation. For future undertakings, which will go beyond their immediate locality, however, they will have to demand support from the federal states.

PUBLIC LIBRARIES IN RURAL AREAS

Smaller cities generally have smaller revenues, and today it is universally accepted that communities of a certain size can only support an efficient public library in exceptional cases. On the other hand, in Germany it has traditionally been the privilege of even the smallest community to maintain its own library. As a result, of the 23,300 local authorities in the BRD, 8,800 are currently maintaining permanent local libraries. Seven hundred communities are served by bookmobiles which are either maintained by several communities with support from rural districts (Landkreise) or entirely by one or more rural districts (see Figure 3). Currently 413 rural districts with their 23,492 communities—as opposed to 137 independent cities (not part of a rural authority)—assume for their communities certain self-governing as well as administrative functions on behalf of their states.

FIGURE 3. *Extendable bookmobile of the Rural District of Bamberg.*

It is significant for the current situation, however, that only in a few exceptional cases are the rural districts actually maintaining a public service. Although by today's standards the existing rural districts still do not have a large enough administration to maintain efficient library systems, they could offer a better basis for library service than the many small communities which currently have their own local libraries. Current reforms in administration would reduce the number of rural districts and create Grosskreise (larger districts). Many hopes and efforts to also reform the public library system in the rural areas are connected to this administrative reform. The rural authorities are currently engaged in the promotion and support of local libraries, in some cases on a contractual basis.

In addition to a number of mobile libraries, several rural districts are maintaining and supporting Kreisergänzungsbüchereien (supplementary district libraries) and Kreisbüchereien (district libraries). Supplementary district libraries lend part of their holdings or individual books to libraries and readers in their district. District libraries combine the function of the supplementary district library and the local library of the main town in the district.

The necessity to adjust the tremendous difference between library service in the cities and in the rural areas is intensified by the general change in the makeup of rural populations. Industry is penetrating deeper and deeper into the rural areas, and residents of small towns often commute to the cities to their jobs. New production and marketing methods demand technical knowledge of those still engaged in farming. New highways and more cars diminish the distance between city and country. Modern mass media, such as radio and television, enable people in rural settings to participate in the rapid changes in their environment by giving intellectual stimulus. All of this leads to considerably higher demands for library service, both in quality and quantity, to an extent which many small and independent libraries are unable to satisfy. Their number is already decreasing because of the closing of small schools whose teachers had hitherto served as part-time librarians.

Instead, in the larger towns central schools are now being developed which are eligible for larger libraries. Moreover, the very small libraries in towns with fewer than 1,000 to 2,000 residents are being replaced by bookmobiles.

Aside from the well-known advantages which mobile libraries have demonstrated in city use, the variable size and construction of these vehicles permits them to adjust well to the services of rural areas, which usually vary in size and housing development from district to district, or even from town to town. One can therefore observe in the BRD—particularly in the northern state of Schleswig-Holstein —a number of different types of vehicles which have special construction for certain services. One of the bookmobiles of the Flensburg library system is equipped with pneumatic book supports which have proved to be extremely advantageous during short stops and frequent changes of location. The Rendsburg library system is experimenting—very successfully—with the use of three different sized large Überlandbüchereien (overland libraries) with 3,000, 2,000 and 1,000 volumes, respectively, which are used in the same communities in rotation. The "overland library 3,000"—some slightly modified versions of this type are also being used in other regions of the BRD—has received considerable attention in other countries. Its construction permits the sides of the vehicle to be expanded to a width of 4.40 meters (about 14½ feet). At a stop the bookmobile then has an exceptionally large usable area of over 30 square meters, which permits reading areas to be set up in the center. This vehicle is especially suitable for larger villages with a village center where a stop of at least 1 hour is justified. Communities in 15 rural districts of the BRD are presently served by mobile libraries. According to current plans, their number will be increased considerably, especially in the states of Schleswig-Holstein and Bavaria.

STATE AGENCIES FOR PUBLIC LIBRARIES

All plans for a structural reform of the public library system depend on much stronger interest and support from the rural districts and the federal states. Similar to the United States Constitution, the so-called Grundgesetz der Bundesrepublik (Basic Law of the Federal Republic of Germany) entrusts the federal states with the responsibility for education and cultural affairs. The individual states have carried out their responsibility for the public library system differently and without being under any legal obligation. They subsidize local libraries and organizations for a variety of projects; they promote the further education of librarians; some are supporters of state library schools; and all of them—with the exception of the city-states of Berlin and Bremen—maintain, in one form or another, state agencies for public libraries. These establishments—a total of 30—have different names and are, according to the size of the particular states, responsible for the whole area or for certain administrative districts.

Since the Grundgesetz emphasizes municipal self-government, the responsibilities of the state agencies for public libraries toward the local libraries were usually fairly curtailed. This applies to their responsibility toward libraries in cities and towns

with a certain population as well as to their various functions, which are mostly of an advisory nature. Nevertheless, their responsibilities are numerous. The library authorities as well as the directors of the libraries are consulted on problems of creating new libraries as well as about organizational and administrative questions. Especially important is the advice in book selection given to the lay directors of smaller libraries—the final decision always remaining with the directors. All state agencies publish lists of recommended material for this purpose. In some states these take the form of collective indexes, some of which are printed in the professional journal published by the respective state agencies. Since 1968 cooperative select indexes have been regularly published by the state agencies. A specific form of consultation is the further training of library directors, especially during conventions. The individual state agencies are also training library assistants. The professional journals, produced by the state agencies of the various states, publish internal technical library information in addition to other articles.

Similarly to the rural districts, the state agencies maintain central supplementary libraries as a backup for interlibrary loans and as a basis for lending part of the holdings to local libraries on a limited time basis. The state agencies play an important role—strictly regulated by regional codes—as agents of the interlibrary loan system for the smaller libraries. A number of state agencies maintain central catalogs for the holdings of public libraries in their area of activity. Among others these are the library centers in Rendsburg and Flensburg, which employ modern technological means to keep their central catalogs up to date and make the most effective use of them.

In view of the fact that the directors of the public libraries in rural areas are almost always on honorary or part-time appointments, it is important to acquire and process the materials selected by the libraries centrally. This function was largely removed from the state agencies after 1945 because the states were of the opinion that this was going beyond state responsibility. Alternate solutions were sought. The Einkaufszentrale für Öffentliche Büchereien, EKZ (Purchasing Agency for Public Libraries) in Reutlingen established exhibit and supply depots at the state agencies and thereby facilitated the acquisition of materials which they supply ready for circulation, including cards. Some state agencies created associations which were able to maintain processing centers, which in turn were able to work with the EKZ. In the two divisions of Schleswig-Holstein especially active associations were established with very efficient library centers in Flensburg and Rendsburg, which expanded the range of their state agencies. They even established the commerical licensing provision necessary to enable them to take book buying into their own hands. Lately a few states have come to the realization that processing books in cooperation with the EKZ represents an important practical aid for the local public libraries, an activity which could also be taken over directly by the state agencies.

One of the best ways of participating in the development of public libraries is available to the state agencies through the distribution of state funds to individual public libraries or for special projects. Due to a lack of library legislation, regula-

tions established by the individual states dictate the rules for subsidizing the expansion of holdings or for the construction and furnishing of libraries. It must be noted, however, that in most states the financial support would have to be increased considerably to achieve the desired goals.

In order to ensure the efficiency of established libraries and of those in the planning stages, Schleswig-Holstein has for some time now had contracts between the responsible library center, the rural districts, and the communities. These contracts primarily determine the continuous financial obligations of the three partners. Different regulations apply to libraries with a part-time director and to those with a full-time director. In many cases this is determined by the size and financial power of the library's authority as well as its book and personnel budget. All funds are administered by the library centers, which also receive subsidies from the state and are obligated to perform additional centralized duties in return. The subsidies to the library centers are made in proportion to the expenses and therefore to the development of the member libraries.

Aside from the state agencies in Flensburg and Rendsburg, with their library centers, the library agencies are generally not sufficiently endowed materially or financially to fulfill their obligations. Although the areas for which they are responsible vary a great deal, the twenty-nine individual library agencies in the territorial states—with approximately 350 librarians and other employees—were, in 1970, responsible for more than 23,000 communities with around 40 million inhabitants—with 19,500 public libraries in about 9,000 library communities with 27 million inhabitants.

The Fachkonferenz der Staatlichen Büchereistellen (Conference of State Agencies for Public Libraries) provides opportunities for cooperation and exchange of ideas among the different states. It meets once a year and also provides an agency for contacts and connections with other establishments of the library system.

COOPERATION; REGIONAL PLANNING; LIBRARY LEGISLATION

Cooperation among the public libraries and other library branches takes place on a national as well as on a state level. An important step in this direction was the founding of an association which was the first after the war to unite public library authorities and promoters—foremost among them the towns and rural districts. The Deutscher Büchereiverband (German Public Library Association), in view of the general development of public libraries, assumed a great part of the responsibility which had until then been carried by the Verein der Bibliothekare an Öffentlichen Büchereien (Association of Librarians at Public Libraries, formerly the Verein Deutscher Volksbibliothekare). Since it has not been possible to date to establish an association which will unite libraries and librarians of all branches, both associations work together in the Arbeitsgemeinschaft Öffentliche Büchereien and with the association of the academic library system in the Deutsche Bibliothekskonferenz (German Library Conference).

Besides representing the interests of the public libraries, the German Public

Library Association also has as an objective the promotion of library science in this field. In 1958 a professionally independent Arbeitsstelle für das Büchereiwesen (Study Center for Public Libraries) was established for this purpose, supported by the German Public Library Association with subsidies from the federal government, the federal states, and the Purchasing Agency for Public Libraries (EKZ). This study center collects all relevant materials, gives information and advice, conducts investigations, and publishes materials which are of interest to the public libraries: in addition to individual publications there is the periodical *Bibliothekdienst* with supplements and a number of important regular publications such as the annual statistics of the public libraries, the *Handbuch der Öffentlichen Büchereien* (*Directory of Public Libraries*), and bibliographical publications, among them the *Fachbibliographischer Dienst: Bibliothekswesen*, a special indexing service for library science. The study center, which is located in West Berlin in the same office as the German Public Library Association, bases its many activities on working parties and committees, on which representatives of libraries and institutions as well as individually appointed members serve. They are concerned with certain institutions (for example, hospital libraries and bookmobiles) and with special problems (for example, information service, library buildings, and audiovisual media). Through the use of working parties and committees, the activities of the study center are to be expanded, and local and regional work experience is to be considered. This is particularly important as the study center has a strictly advisory and clearinghouse function and no authority to give orders. A coordinating agreement with the newly established Arbeitsstelle für Bibliothekstechnik (Study Center for Library Technology), which is located at the Staatsbibliothek Preussischer Kulturbesitz, delegates the electronic data processing to the Study Center for Library Technology, whereas the Study Center for Public Libraries concentrates on conventional library techniques and aids.

The Deutscher Büchereiverband (German Library Association) and the Verein der Bibliothekare an Öffentlichen Büchereien (Association of Librarians at Public Libraries) hold their annual meetings together, and their state associations also work closely with each other. Both associations have common interests in the promotion of public library service and in professional education and continuing professional education. The personnel association naturally is more interested in advancing the profession; in cooperation with the unions it has contributed much to improve the job situation of librarians in public libraries. Their publishing house Buch und Bibliothek (Book and Library) in Reutlingen publishes, among other things, a journal by the same name (from 1948 to 1970 entitled *Bücherei und Bildung*), which includes professional articles and book reviews. Another central establishment of the public library system, Einkaufszentrale für Öffentliche Büchereien GmbH (Purchasing Agency for Public Libraries) in Reutlingen, grew out of the collaboration of cities, rural districts, and states which participate as shareholders. This firm, working according to economic principles, supplies public and other libraries with large numbers of books in special library bindings. Most of the books are accompanied by catalog cards. The EKZ also publishes a review service

under the title *Buchanzeiger* as well as an information service in card form. Beyond this, libraries can get all their materials from the EKZ, including the EKZ-Folie for plastic book covers, and various pieces and sets of furniture which are designed and built especially for library use.

A very important kind of cooperation among the public libraries and with other library branches has developed with the many different interlibrary loan systems. Regional systems—as for example the Kommunaler Leihring (Municipal Lending Circle) in Nordrhein-Westfalen, which is supported by the Sondersammelgebietsschema (Program of Special Collection Fields) for the larger public libraries in this, or the Bayerischer Leihverkehr (Bavarian Interlibrary Loan System)—exist alongside the traditional Leihverkehr der Deutschen Bibliotheken (Interlibrary Loan System of the German Libraries), which also represents the connection to the international interlibrary loan system. Many, but by no means all, of the public libraries participate in the Interlibrary Loan System of the German Libraries. In a few areas gaps still have to be filled by the services of interlibrary loan systems. This is one of the goals of regional library planning, conceived and drafted in the last few years for the whole BRD by the Deutscher Büchereiverband (German Library Association) and its Arbeitsstelle für das Büchereiwesen (Study Center for the Public Libraries).

The Ständige Konferenz der Kultusminister der Länder (Standing Conference of the States' Education Ministers) commissioned the Arbeitsstelle für das Büchereiwesen to draw up model proposals for the creation of a structured public library system. As a result the Grundlagen für die Bibliothekarische Regional-Planung (Fundamentals for Regional Library Planning) were published in 1966. After further panel discussions, this was followed in 1969 by the first draft of the Bibliotheksplan (Library Plan). The first part of this plan emphasizes the necessity for an efficient library system for cities and rural areas. The second part contains the plan and the appendices, consisting of documentation on the library system of the BRD as a whole and of the individual states, as well as a number of supporting documents, such as standards, models, and cost estimates.

The actual plan provides for three functional types of public libraries:

1. Libraries of the first grade (Bibliotheken 1. Stufe) with a bookstock of one volume per inhabitant or a minimum of 10,000 volumes, are considered to be the smallest unit and are to be managed by professionally trained full-time employees. Libraries which do not come up to the various standards are required to be enlarged and improved with financial aid from the envisaged future authorities, as well as from the districts and states or they are to be replaced by bookmobiles.
2. For such functions as book selection, book processing, information service, and interlibrary loan, however, libraries must be attached to libraries of the 2nd grade (Bibliotheken 2. Stufe). These are the library systems which have been created by the large cities or towns together with rural districts as "functional networks" (funktionale Verbundnetze) of an area. The central services of such a library system, which have to be supported by an efficient central library, are contracted for an extended period and financed for the most part by the member communities and the rural districts.

3. The states, of course, should also make financial contributions. Above all, they are expected to finance the libraries of the 3rd grade (Bibliotheken 3. Stufe). According to the functional structure of the library plan, these would be the national and state libraries, a few university libraries, and other exceptional libraries in those library regions which might correspond to the states or to the interlibrary loan regions of the Leihverkehr der Deutschen Bibliotheken (Interlibrary Loan System of the German Libraries). The libraries of the 3rd grade would coordinate the cooperation within the region and also establish contact with the special libraries and documentation centers which are not directly included in the network. In cooperation with the seven union catalogs they would guarantee the access of all libraries in the region to the German and international interlibrary loan system. They would also be expected to perform central services in the areas of bibliographical documentation, information service, and electronic data processing. The state agencies for public libraries are considered to be among the transregional institutions which contribute to the development of such a library network.

Although only a relatively short time has gone by since the appearance of the Library Plan, it may already be said that it has made an impression and that it has the approval, in principle, of the states, the local authorities, and the library boards. Discussions will continue, above all, in the German Library Conference. Increasing emphasis will be placed on the interests and reservations of academic libraries. A second draft would then actually create a legitimate basis for the development of this planned library network to go hand in hand with efforts toward a better educational system and a more efficient public administration based on larger units.

The efforts to create an efficient network of general public libraries have stimulated structural planning in the individual states and have revived the question of state legislation to promote public libraries. It seems possible today that laws will be enacted in the near future which will provide financial incentive to build up existing libraries and promote cooperation among the various systems and regions. It should not be overlooked, however, that the communities will resist any efforts to change into a state-supervised responsibility their present voluntary commitment to maintaining a public library service. As a result, in 1970 a joint committee of the German Library Association and the Association of Librarians at Public Libraries presented some principles and standards for library legislation in the states.

Hope for a federal law to promote public libraries, such as the very successful Library Services and Construction Act in the United States, is still very small; although in view of the latest agreements between the federal government and the states such future developments in the Federal Republic of Germany are conceivable in the long run.

ADMINISTRATION; SERVICES

In spite of all efforts to unite the small independent libraries in the various regions into systems, or to offer them central services in one form or another, the solidly established public library systems of the large cities naturally have achieved

the highest level of efficient centralization. Today part of the generally accepted services to all branch and special libraries is to take over their acquititions, cataloging, processing, and interlibrary loan by a central department. In the larger cities positions for so-called Lektorate have been created. These are—similarly to the subject specialists in academic libraries—responsible as specialists in certain subject areas. In some cities they are simultaneously the director of the corresponding subject department in the central library. The Lektoren make decisions on selections and eliminations. They take part in developing the collections in the systems' libraries, to a varying degree, in different cities—the influence of the individual branch library, for example, varies from influencing book selection or suggesting acquisitions to independent disposal of a certain share of the budget. Efforts are directed toward speedy acquisition of important and current publications by following the decision of the Lektorate or the acquisitions policy of the library system on the one hand, and taking the special needs of the users of each individual library into consideration on the other. The relatively careful selection of titles is in no way based merely on any long-standing German tradition but on acquisition budgets which remain, in spite of many increases, very limited. Nonetheless, it may be said today that the long-disputed standards of "upper and lower limit" have been expanded considerably. Acquisition of nonfiction has increased correspondingly with its increase in lending. Scholarly, though not purely research, materials are also acquired. The requests of the public are always considered in selecting fiction, although very light reading is still sparsely represented and, as a result, the holdings of public libraries in this country differ markedly from those of commercial lending libraries. There are several aids available for building up collections. Among them are: *Deutsche Bibliographie* (*German Bibliography*); book reviews in newspapers and periodicals; the book reviews written by librarians and published in the professional journal *Buch und Bibliothek* (*Book and Library*) and in the *Buchanzeiger* (*Book Review*) of the EKZ; and selection lists of the state agencies for public libraries. Another service for quick book selection is provided by the EKZ information service, printed in card form, and the catalog cards—available on subscription—which are supplied through the Amerika-Gedenkbibliothek (American Memorial Library) in Berlin, as a title selection service of the German Library Association. Many libraries in large cities also depend on books sent to them for approval by local bookstores. They can do this because, traditionally, the book trade in Germany is very efficient. On the other hand, the legal situation in the BRD does not permit them to order books directly from the publisher. Also, the municipal libraries are supposed to support the local book trade. For this reason, and not only because the EKZ stock is limited, they give only part of their orders to the EKZ.

The entries in the *German Bibliography* and the catalog cards of the American Memorial Library are, for many public libraries, a welcome support for their descriptive cataloging. Many libraries, especially the smaller ones, take advantage of the catalog cards supplied by the EKZ or of the services offered by the states' library agencies or other library processing centers maintained by associations.

The cataloging rules present one difficulty: in addition to the old Preussische Instruktionen (Prussian Instructions) used primarily by the academic libraries, there are simplified instructions for public libraries. Lately the new international cataloging rules are beginning to prevail, although many libraries have not been able to change over.

Classification presents another unsolved problem. Although there has been a Allgemeine Systematik für Büchereien (General Classification for Libraries) for 20 years, which is used by the EKZ and most state agencies for public libraries, these rules have not prevailed in many of the large public libraries. For many libraries, which converted their holdings to open access soon after World War II, these rules came too late—many others did not find them satisfactory. Therefore, many individual classification schemes exist. There is a plan to develop a standard classification system for German libraries, one which will fit requirements of electronic data processing. This arouses new hopes but also some uncertainty.

Most public libraries do not maintain a subject catalog along with their alphabetical and classified card catalogs, but might have, instead, a subject index to their classified catalog. Fiction is usually listed in title catalogs or by broad subject areas (Stoffkreisführer) in which novels and stories are listed according to contents—for example, medical novels, family novels, mysteries, science fiction. The focal point of service remains the readers' advisory service which is still expected by many of the older patrons, especially for fiction, but emphasis is shifting more and more to nonfiction. With increasing use of open-access shelving, the librarians can expect more self-reliance on the part of their patrons. In smaller branches of municipal libraries the scarcity of qualified personnel and the more intensive communication within the library systems is leading to the use of library assistants.

In the newer central libraries of the large cities, the principle of subject departments (Fachabteilung)—taken from the United States—has prevailed. These subject departments are taking over the information service which, along with the bibliographical readers' advisory service, has only lately been recognized as an important service in public libraries. The system of dividing public libraries into two branches, reference library and a lending library—which is used in Great Britain, for example—has not taken hold here because the relatively small holdings of the former Volksbibliothek gave no basis for such division. The reading rooms, on the other hand, lacking any type of information service, were the subject of great controversy for a long time and have only recently regained any significance. Another important area, the use of audiovisual media, has only lately attracted notice. Considerable record collections, although usually not circulating, have existed for many years in music libraries or music departments of libraries. Actually, even in this area, the meager funds forced a limitation of books and periodicals. One can nonetheless hope that in the future these media will be strongly represented in libraries and that a coordination with the Bildstellen (Audiovisual Centers) of cities and states will follow in the same manner as is currently being done with schools and various other groups, primarily through film service. As already mentioned, evaluation or organization and management of municipal libraries (1964) dealt

in great detail with the administration and service of public libraries. It offered a great deal of help by presenting standards and recommendations for expedient forms of organization, work performance, and desirable services, and also presented the city administration with new criteria for evaluating the libraries they maintain.

LIBRARIES FOR VARIOUS GROUPS AND SPECIAL INTERESTS

Among the general public libraries which are maintained by the local authorities there are, along with the predominant number of those which offer a representative collection of literature for adults and children in all subject areas, individual libraries which provide for a certain group of readers or for certain subject areas. These include special libraries for young people, in schools, for the aged, for the blind, for prisoners, and the independent music libraries.

Considerable emphasis is given to the library service for children and young people. The youth division is often given space in the same area as the adult division in public libraries. This is to give children and young people an opportunity to refer to the whole book collection if they need to and to facilitate the transition to the adult division at any age when they are ready. Many people consider the division into a children's library and a library for young people, as practiced in the American Memorial Library, to be exemplary. If this system is not realized everywhere, it is usually to avoid a partial duplication of the holdings and an increase in personnel. More often, the books for young people between the ages of 14 to 16 or 18 are placed in a special area of the adult division. The independent youth libraries in a few cities, with their own location and organization, are perhaps emergency or chance solutions, or they may be the result of planned cooperation with schools or youth centers. A comprehensive plan is the basis for a network of independent youth libraries of the Bremen municipal library; they also serve as school libraries and each contain holdings of 5,000 to 6,000 volumes. A few other cities have established youth libraries in their schools. Cooperation between schools and public libraries will receive greater emphasis as more efforts to improve the school system and create large comprehensive schools are made. Since there are hardly any librarians in the schools, the librarians in public libraries will meet a great future responsibility here. Currently most schools maintain totally inadequate central and classroom collections. They are tended by teachers who are not trained for this job.

The Internationale Jugendbibliothek (International Youth Library) in Munich must be mentioned here. It is not a public library in the general sense, but it does represent a unique study and information center. It collects children's and young people's books in all languages. In addition, related literature on the theory, history, and history of illustrations of children's and juvenile books is collected. This library has more than 10,000 volumes. A circulating collection in four languages is included in the study library on an experimental basis. The information service is used by scholars and publishers all over the world.

Whereas library service for children and young people is an important and

obvious part of the public library system, blind people, hospital patients, and prisoners are rarely served by public libraries. There are a few libraries for the blind which are special divisions of municipal library systems. The large libraries for the blind, however, serve an extensive geographical area. Along with the braille collections, some Blindenhörbüchereien (listening libraries) have been established and their significance is steadily increasing. Their work is being coordinated by the Arbeitsgemeinschaft Deutscher Blindenhörbüchereien (Association of Listening Libraries for the Blind in Germany).

Only a small number of hospitals have patient libraries. Except for a few cases these libraries have neither adequate holdings nor space, not to mention their own professionally trained library personnel. Among those municipal library systems which maintain one or more hospital libraries, Munich has created the most efficient services. In the last few years this area of service has received considerable attention, not only from physicians and hospitals but also from the library profession. Resulting from the work done by one of the working parties of the Arbeitsstelle für das Büchereiwesen (Study Center for Public Libraries), some Richtlinien für Krankenhausbüchereien (Guidelines for Hospital Libraries) were created, taking into consideration the situation in Germany as well as international standards.

Prisons, with their libraries, are under the jurisdiction of the states' ministries of justice. The libraries are of different, but seldom adequate, size and quality. Cooperation with the public library agencies of the individual states hardly exists and only very few public libraries have any connection with prison libraries. A promising beginning was made in the city-state Hamburg where, a short time ago, the Hamburg Public Libraries took over the unified reorganization of existing establishments, incorporation into the interlibrary loan system, and processing of new acquisitions.

The libraries of the Armed Forces (Bundswehr), divided into military research libraries and troop libraries for the soldiers, have a very limited connection with public library services via the state agencies for public libraries. The Truppenbüchereien (Troop Libraries) are maintained under the responsibility of battalions or similar military units. The deficiencies resulting from this system have lately increased the demand for stronger cooperation with the states' library agencies and the public libraries.

Besides the general public libraries, there are two groups of related libraries which are not to be overlooked in the library services to the population. Since the middle of the last century there have been Werkbüchereien (Factory or Industrial Libraries) which serve the vocational training, general education, and recreation of the workers and employees in businesses of various types and sizes, but mostly in industry. The holdings of these libraries are, on the average, not very large. A few of these libraries, however, have considerable collections as well as qualified personnel. Under favorable conditions they are able to reach up to 80% of the work force; their close proximity to the work area does, of course, contribute to this. Close cooperation between the industrial libraries and public libraries is rare. The increasing improvement of public libraries has recently caused a few factories

to give up their own libraries. Since 1956 an Arbeitsgemeinschaft Werkbüchereien für des Bundesgebiet und West-Berlin (Association for Industrial Libraries in the BRD and West Berlin), with individual state chapters, has made special efforts towards further training of the employees in these libraries. They publish their own information bulletin *Werkbüchereiarbeit (Industrial Library Work)*.

Far more important than these industrial libraries are the already mentioned Kirchliche Öffentliche Büchereien (Denominational Public Libraries). These are maintained by Protestant and Catholic church communities and offer general fiction and popular nonfiction with a more or less pronounced emphasis on religious education. The denominational libraries have, since the nineteenth century, developed parallel to the general public libraries. Under the rule of national socialism and during the time of World War II they suffered considerable setbacks, but they have subsequently achieved a size which surpasses their former situation.

The volume of such libraries varies a great deal from region to region. According to the latest statistics, there were 7,188 Catholic Public Libraries in 1968, which counted 13,168,662 lendings from collections of 10,824,174 volumes. The 2,298 Protestant Public Libraries with 1,737,758 volumes had 1,979,126 loans during 1968. With a few exceptions these usually very small libraries rely on help from people on honorary or part-time appointments. For their guidance, instruction, and training both churches maintain central or regional study centers with professional library personnel who also give valuable practical help and publish reviews. Three central associations with advisory boards make up the Arbeitsgemeinschaft der Kirchlichen Büchereiverbände Deutschlands (Association of the German Denominational Library Associations). They are: Deutscher Verein Evangelischer Büchereien (German Association of Protestant Libraries) and the Catholic "St. Michaelsbund"—for Bavaria—and "Borromäusverein."

The relationship between the general and the denominational public libraries have entered a new phase since the Tutzinger Erklärung (Tutzingen Declaration) of 1964. In spite of continued local and regional competition, the general acceptance of specific obligations in the various establishments laid a basis for long-term cooperation. This is becoming evident in the mutual planning of regional library structures and legislation. A permanent coordinating board on a national level was established with the Essener Gesprächskreis für Büchereiarbeit (Essen Discussion Group for Public Library Work) which was created jointly by the Arbeitsgeneinschaft Öffentliche Bücherei and the Arbeitsgemeinschaft der kirchlichen Büchereiverbände Deutschlands.

PERSONNEL AND LIBRARY EDUCATION

Because of the long-standing emphasis on the independence of the public library's responsibilities and services, this eventually led to a separation of the training and examinations for the German public library service. Only lately have there been any efforts to recreate a unified basic library education which is to include specialized training for the demands of certain types of libraries. The current shortage

of personnel in all types of libraries simplifies, in practice, the change from one type of library position to another.

The same personnel grouping as in the academic libraries is becoming more and more evident in the public library field. Based on the general personnel structure of public administration and determined by areas of work and responsibilities, there are different service categories of library workers: the höherer Dienst (academic librarian), the gehobener Dienst (the diploma librarian), the mittlerer Dienst (clerical grade), and the einfacher Dienst (ancillary staff). Any further distinction between civil servants, who are usually on a life-time appointment, employees, and other workers is only touched on in this article. This division into categories could very possibly be replaced, in the not too distant future, by a unified public service (öffentlicher Dienst) since the differences have almost disappeared during the last few years. Currently the education programs for service in public libraries do not correspond to the division into four service ranks. Other than the courses for service in academic libraries, there is no special training for the höherer Dienst. In practice most public librarians reach this rank through additional university study before or after their library diploma (Diplom-Bibliothekar) or based on many years' experience and achievements. The core of professional education for the public library service is, therefore, the six-semester theoretical training course leading to a "Diplom-Bibliothekar." This may be taken at one of the state or state-recognized library training institutes in Berlin, Bonn, Cologne, Göttingen, Hamburg, or Stuttgart. Practical orientation periods at libraries of different types is to be taken during semester breaks. Prerequisite for admission to the program is generally the Abitur, the examination at the end of school (i.e., secondary school, high school, to be compared to the junior college level in the United States), which also qualifies for entrance to a university. Nevertheless, the library training institutes—except the one in West Berlin—are currently not university institutions. Such a possibility does, however, exist for the future as part of a general educational systems reform. Other efforts are directed toward a training program for the most senior rank in the public libraries, analogous to the training for service in the academic libraries.

With the increasing professional training qualifications of librarians and the chronic lack of personnel, the necessity to train library assistants for the clerical grade becomes more and more obvious. They would relieve the librarians in various areas and free them for more professional work. In practice, many suitable employees are already entrusted with appropriate tasks, even though the position of library assistant is not yet generally recognized. In this situation a few public libraries have resorted to self-help and have begun an internal training program. Another attempt is currently the regional retraining programs for members of other vocations. In the future it may be expected that a library assistant who has had regular training and examinations will work alongside the professional librarian. On the other hand, none of the plans for the future training of library personnel include a central training program for ancillary library personnel. These employees will continue to be instructed and trained at the individual libraries. Perhaps some

results will come from the examples of a few of the larger public libraries which prepare those leaving school to become ancillary personnel with a proper apprenticeship leading up to an examination.

Regardless of which training levels will be accepted, there is a general desire that all employees of the libraries will advance—according to accomplishments and qualifications—into the higher ranks. The further development of training programs for library education will be determined by the total development of the library system as well as by the general reform of the educational system.

PUBLIC LIBRARY BUILDINGS

The destruction of World War II as well as the very concentrated efforts to improve the public library system have led to an impressive number of new buildings in Germany. This has contributed considerably to the increased use of the public libraries. A completely new field was opened for architects as well as librarians in the planning of modern open-access libraries. Although in detail different methods were used, a few general statements may be made. Whenever possible, the new libraries are open and inviting even for a passerby. In addition to the open-access shelves, there are reading and study areas, here and there separate reading rooms for adults and children, periodicals and newspaper rooms, as well as meeting rooms. Library furniture enhances the overall impression. A number of firms, though primarily the EKZ, developed complete programs of shelves, catalog cabinets, and furniture for charging systems, book carts, baggage lockers, exhibit furniture, and picture-book cradles with matching stools for small children. These supplies have had a positive effect on the functional and attractive furnishing of libraries.

All over Germany there are opportunities to see exemplary buildings for public libraries, in many ways comparable to buildings in other countries and interesting for foreign visitors. It must be admitted, however, that few buildings compare in size to the central libraries in the cities of North America or Great Britain. But a new phase is developing which promises—in addition to the central libraries of West Berlin, Duisburg, and Hamburg—the existence of large central libraries in Bremen, Cologne, Düsseldorf, Frankfurt, Hanover, and Munich within a few years. These new plans follow the principle of subject departmentalization used in the American Memorial Library in West Berlin and the central library in Duisburg, and like these the plan is to install open-access shelving for a hundred thousand or several hundred thousand volumes. Facilities for applying audiovisual media play an important part in this planning. The large cities also have numerous new district libraries, and larger and smaller branch libraries. A visit to Bremen (see Figure 4), Duisburg, Hanover, Hamburg and West Berlin would be especially worthwhile in this respect. But other large towns, medium-sized towns, small towns, and villages have also built noteworthy buildings for their public libraries in the last few years. Small communities often receive excellent advice from the state agencies for public libraries. The Rendsburg library agency employs a resident

FIGURE 4. *Lending area of the Bremen Public Library district library at Vegesack.*

architect for interior decoration for this purpose, and in the Hamburg Public Libraries the position of library building specialist has been created with the responsibility for planning and construction.

Public libraries were established in well-preserved or renovated historical buildings in a few special cases. In most cases the style of the building was successfully preserved without neglecting functional demands. A perfect example is the central library of Stuttgart, which is located in the rebuilt Wilhelmspalais (see Figure 5). A few other structural combinations of public libraries with other institutions of adult-education deserve mention here, for example, the municipal library of Wolfsburg in the cultural center built by Alvar Aalto or, more recently, the municipal library of Ludwigsburg which is housed in the same building as the Volkshochschule (Adult Education School) and the Haus der Jugend (House of Youth) (see Figure 6).

The Study Center for Public Libraries maintains its own buildings committee and archives. It has also promoted development in this sphere by means of exhibitions and publications and by issuing detailed studies on the area requirements of public and music libraries and of centers for bookmobiles.

FURTHER READING

In view of the large number of publications which give information about the public library system in the BRD, only a few references will be made here to

FIGURE 5. *Stuttgart Central Public Library, located at the historic Wilhelmspalais.*

reference works and a *few of the publications* which will facilitate further study in either German or English.

The *Fachbibliografischer Dienst: Bibliothekswesen (Special Indexing Service: Librarianship)* (Deutscher Büchereiverband Berlin), has since 1965 listed virtually the complete current professional literature in German and also important publications of foreign countries, including separately published writings as well as articles in professional journals. It is supplemented retrospectively by a selected bibliography by Jürgen Busch—completed by Ursula von Dietze from the author's literary estate —*Bibliographie zum Bibliotheks- und Büchereiewesen* (Harrassowitz, Wiesbaden, 1966).

A standard work whose publication is not completed and which contains detailed and basic articles is the *Handbuch des Büchereiwesens (Manual of Public Librarianship)* (Harrassowitz, Wiesbaden, 1965 ff.) by Johannes Langfeldt.

Das Bibliothekswesen der Bundesrepublik Deutschland (Libraries in the Federal Republic of German) by Gisela von Busse and Horst Ernestus attempted for the first time to present the whole library system of the BRD and to give background information for studies in comparative librarianship. The German edition (Harrassowitz, Wiesbaden, 1968) will be followed by an enlarged and up-to-date English edition in 1972. Both editions contain practical references to publication, information and contact agencies, and suggestions for library study trips.

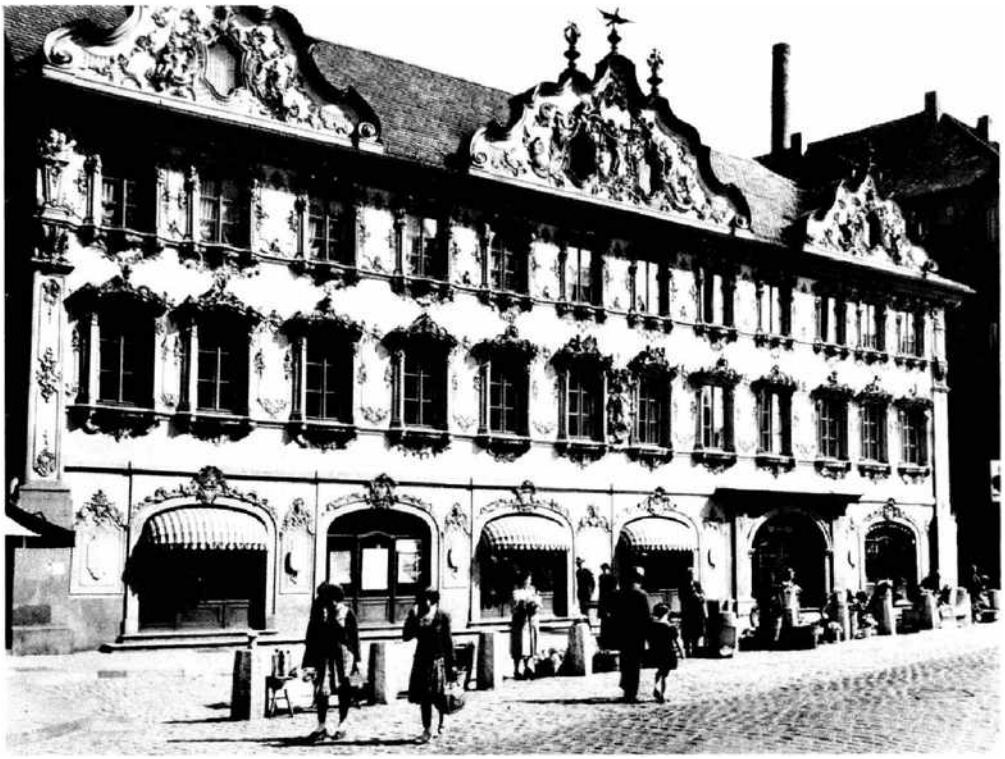

FIGURE 6. *Example of a public library in a historic building: Würzburg Public Library in the historic "Haus zum Falken."*

A general survey is given by Horst Ernestus in *Developing Public Library Services. A German Outlook* (University of Toronto School of Library Science, Toronto, 1969).

The fundamental guidelines and standards for public libraries of cities with more than 10,000 inhabitants are contained in the report *Kommunale Öffentliche Bücherei* (*Municipal Public Library*) (Kommunale Gemeinschaftsstelle für Verwaltungsvereinfachung, Cologne, 1964).

Guidelines and documents for the structural planning of the public library system were recently presented in the *Bibliotheksplan. 1. Entwurf für ein umfassendes Netz allgemeiner Öffentlicher Bibliotheken und Büchereien*" (*Library Plan. First Outline for a Comprehensive Network of General Public Libraries*) (Deutscher Büchereiverband, Berlin, 1969).

An important current directory with a wealth of information about individual public libraries and establishments of the public library system is the *Handbuch der Öffentlichen Büchereien* (*Directory of Public Libraries*), published every 2 years (Deutscher Büchereiverband, Berlin).

Among the statistical publications on the general public libraries, the following must be mentioned: *Schnellstatistik kommunaler Öffentlicher Bibliotheken and Büchereien and Gesamtstatistik der kommunalen Öffentlichen Büchereien der Bundesrepublik*. Both works are published annually by the German Library Association

(Deutscher Büchereiverband) in Berlin. In 1965, and then again in 1968, there was published the *Statistik der kirchlichen Öffentlichen Büchereien* (*Statistics of the Denominational Public Libraries*) (Arbeitsgemeinschaft der kirchlichen Büchereiverbände Deutschlands, Bonn).

Two of the more important professional journals—in addition to regional periodicals—report on public library developments in the BRD; they are *Bibliotheksdienst* (*Library Service*), published monthly by the Deutscher Büchereiverband in Berlin, and the monthly publication *Buch und Bibliothek* (*Book and Library*), formerly *Bücherei und Bildung* of the Verein der Bibliothekare an Öffentlichen Büchereien.

HORST ERNESTUS
(Translated by Marie-Luise Stucart)

Cooperative Responsibilities and Ventures of the Academic Libraries in the Federal Republic of Germany

In contrast to most other European countries, the German Federal Republic is a federal state constructed in such a manner that communities, states, and federation are independent corporate bodies with their own rights and incomes. The administration is decentralized as far as possible.

This constitutional principle has influenced the division of responsibility for higher education and therefore the academic and research library system. The individual states support the universities and colleges, the academies of science, and most of the remaining academic institutions. However, the federal government partly subsidizes—upon recommendation by the Science Council (Wissenschaftsrat)—the essential building costs of the universities. It also has a special responsibility for large-scale research and development, particularly as they relate to future needs. Institutions such as the Max Planck Society and the German Research Society (Deutsche Forschungsmeinschaft, DFG) receive their budgets jointly from the federal government, individual states, and business.

Given the current situation, it is understandable why no national office for the administration of libraries exists. Instead the eleven federal states are responsible for most of the academic libraries, especially the college and state libraries. Some libraries are supported by their communities. The Federal Republic is currently responsible only for the Deutsche Bibliothek Frankfurt and for those libraries which are a part of federal government offices or federal research institutions. Several central establishments of the academic library system, such as the Staatsbibliothek Preussischer Kulturbesitz or the central special libraries in the areas of technology, economics, agriculture, and medicine, are supported by their respective states in cooperation with other states, the federal government, or the German Research Society.

This diffused division of authority undoubtedly impedes the planning and executing of uniform measures, without which the library system of a modern

country cannot adequately serve the growing needs for information. Nevertheless, it has resulted in the successful cooperation of German libraries in a number of joint projects, including acquisition policies, central cataloging, and organization of the interlibrary loan system.

ACADEMIC LIBRARIES IN THE NATIONAL LIBRARY SYSTEM

Cooperation among libraries has grown out of the realization that the individual library is no longer able to cope with the continuous spiraling growth of scholarly publications, even if more funds were available. On the other hand—and this is ultimately the goal of this combined effort—the scholar must be assured of getting the desired material within a reasonable time. In order to achieve this end the academic libraries of the Federal Republic of Germany must see themselves as part of a horizontally and vertically structured national system; they must have as their common goal the easy access to scholarly publications of the world as far as they are, or could become, significant for research, teaching, or practice.

In order to be effective and current with new developments, this voluntary cooperation depends heavily upon centralized planning and guidance. The Association of German Librarians (Verein Deutscher Bibliothekare, VDB) and the German Research Society are primarily engaged in this endeavor (see also the article "German Research Society"). The activities of the VDB are limited to making recommendations and to requesting the governments of the individual states to issue the necessary regulations, for example for the interlibrary loan system. DFG, on the other hand, has its own funds, which are used to promote joint efforts, central organization, and new technological developments in the academic libraries. Funds are primarily used to aid libraries which have—besides their normal duties—taken on extra-heavy burdens for the benefit of all. Participation in a union catalog or interlibrary loan is not, however, considered an "extra-heavy burden."

In retrospect it may be said that this system of financial aid has been effective and has contributed substantially to the efficiency of academic libraries. A few important combined library projects are described below.

COORDINATION OF ACQUISITION: PLAN OF "SPECIAL COLLECTION FIELDS," AND CENTRALIZED SPECIAL LIBRARIES

The first effort to coordinate effectively the transregional acquisitions in BRD was the Plan of Special Collection Fields (Sondersammelgebietsplan) of the German Research Society. Created in 1949, its primary goal was to make recent foreign publications available in the Federal Republic of Germany in order to alleviate the situation resulting from enormous war losses, limited budgets, and insufficient currencies. The fact that funds were not concentrated in one particular library—which theoretically would have been entirely possible—can be explained: After 1945 no library existed intact which might have become the backbone of a national library service. Instead, the system of Special Collection Fields at twenty-five state and college librar-

ies offered the advantage that the limited funds of DFG could achieve a greater effect.

The fields of knowledge were divided along subject lines into 105 individual areas; each of the participating libraries assumed one or more of these as their area(s) of priorities. The financing was originally arranged in such a manner that DFG, in accordance with established guidelines, carried all costs for the acquisition of foreign research publications; whereas the libraries had to use their own funds for the acquisition of corresponding German publications, nonscholarly publications, costs of binding, and all expenditures for processing. The nucleus of the plan was the periodicals program which comprises not only current subscriptions but also the filling of gaps in the collections back to 1930.

DFG distinguished between the basic foreign periodicals (Group A), which should be available at all universities and large research libraries, and special periodicals (Group B), of which one complete set should at least be available in the library which is responsible for that particular subject within the program. The titles of all A and B periodicals were published in 1957 in an *Index of Selected Research Periodicals of Foreign Countries* (*Verzeichnis ausgewählter wissenschaftlicher Zeitschriften des Auslandes*, VAZ); a new edition of list A was published in 1969. The selection of the periodicals, currently about 10,000 titles, was (until 1970) handled by a committee of DFG, using sample issues and recommendations submitted by the libraries. At present, however, the libraries themselves are responsible for the acquisition of periodicals, as they have always been in the case of monographs, and the difference between Groups A and B has been abandoned.

As a whole the Plan of Special Collection Fields shows two significant differences from the Farmington Plan: first, the German system relates equally to periodicals as well as monographic publications, and second, a large portion of the cost is borne by a central agency—DFG. In spite of considerable increase, these contributions have been limited since 1967 to the special publications (former category B). This supports the current concept that these Special Collection Fields should supplement the local and regional library resources wherever these are not sufficient.

The question of whether the Plan of Special Collection Fields still serves its purpose under the current conditions was answered by the Library Committee of DFG in a different manner for the various academic subjects. Consideration of the adequacy of subject concentration in the universal libraries to meet the highly specialized demands of scholarship played an important role. Because of the fact that these libraries cultivate all areas of knowledge, they are perforce limited in their capacity and organization even where the fields of Special Collections are concerned. This applies to acquisitions, which essentially have to be limited to current scholarly publications; to their catalogs, which list only monographic publications and titles of serials; and finally to their personnel, which is neither adequate in number nor sufficiently trained for a special reference and information service.

The deliberations of the Library Committee of DFG were therefore aimed at supplementing the existing system with libraries which are able to concentrate on one subject more intensively. Thus, in the last decade, a development program for central special libraries with a large subsidy from DFG was created: Technische Informationsbibliothek, Hannover, 1959 (technology); Zentralbibliothek der Landbauwissenschaften, Bonn, 1962 (agriculture); Zentralbibliothek der Wirtschaftswissenschaften, Kiel, 1966 (economics); Zentralbibliothek für Medizin, Cologne, 1968/1969 (medicine). Although these libraries do not compare in size to corresponding institutions in the United States (for example, the National Library of Medicine), they have, however, contributed significantly to an improvement of the situation in their particular subject areas. The same applies to a number of efficient and generally accessible special libraries which have taken on transregional responsibilities (for example, in the areas of geology, oceanography, nuclear science, meteorology, and law). Currently these measures are supplemented by programs to collect the type of materials which previously had been systematically acquired only in specific subject areas (for example, American dissertations on microfilm or publications of nonacademic but practical value). Finally, all requests which cannot be satisfied by the interlibrary loan system because the publication in question is not available in the Federal Republic of Germany, have (since 1969) been systematically collected by a central agency at the Staatsbibliothek Preussischer Kulturbesitz and passed on to the libraries responsible for the individual subject areas. These libraries try to acquire at least part of the requested publications. DFG has made additional funds available for this project. It is hoped that in this manner the number of publications not available—in spite of joint efforts by the Special Collection Fields and the special libraries—will be reduced considerably.

UNION CATALOGS

The availability of a catalog to indicate which particular library has a certain publication becomes even more important as the likelihood increases that one cannot expect to find all pertinent materials at even one or a few libraries. Following World War II, West Germany no longer had a large central library because the Prussian State Library had been divided up and the Bavarian State Library had been largely destroyed. The manuscript of the *German Union Catalog* (*Deutscher Gesamtkatalog*), in print only up to "Be," was also destroyed, and most earlier catalogs of individual libraries and other well-known data of special collections simply did not correspond to reality because of the war losses. It was urgent, therefore, to provide interlibrary loan service with a catalog listing of what was still available and also to indicate the holdings of smaller, less-used libraries. For practical reasons it was decided not to aim for another all-inclusive national union catalog but instead to create several regional central catalogs (Regionale Zentralkataloge). This was done between 1946 and 1956. It was hoped above all that these catalogs would remain of comprehensive size, become operational relatively fast, and enable an expedient and regional control of the inter-

library loan system. Furthermore the individul states were more easily persuaded toward such a solution.

As a result there are today seven regional central catalogs in Munich, Stuttgart, Frankfurt, Cologne, Göttingen, Hamburg, and West-Berlin, whose listings cover the whole territory of the Federal Republic of Germany and jointly contain about 30,000,000 title cards. They indicate the holdings of all research libraries which are connected to the interlibrary loan system or at least generally accessible to a certain extent. Whereas the entries of older catalogs have been made available to the union catalogs after filming and enlarging and through painstaking revising, newly acquired books and periodicals are continuously reported by the libraries on standard title cards.

The participating states are responsible for financing the catalogs. However, DFG has frequently made additional funds available to speed up development.

Since the regional central catalogs list periodicals only by titles and not by complete holdings available in the various libraries, special indexes are needed to give this information. In continuing an older tradition the *Union Catalog of Foreign Periodicals and Serials* (*Gesamtverzeichnis ausländischer Zeitschriften und Serien*, GAZS) was created; it is compiled by the Staatsbibliothek Preussischer Kulturbesitz and was strongly supported by DFG for a long period. It lists the holdings of 55,000 different foreign periodicals of the years 1939–1958. A supplement for the years 1959–1970 is in preparation. One hundred and eighty libraries are directly and continuously participating in this venture, and rarer periodicals from many other libraries are being included through the utilization of local indexes.

Since 1968 work has been done on a parallel undertaking, the *Union Catalog of German Periodicals and Serials* (*Gesamtverzeichnis Deutscher Zeitschriften und Serien*), which will list holdings as far back as the seventeenth century. Three hundred and fifty libraries are being invited to participate, again by listing the holdings in a prepared title index and reporting subsequent acquisitions. The Staatsbibliothek Preussischer Kulturbesitz is again handling the editing, and DFG makes large contributions to the cost. Plans for the future include the continuation of both periodical indexes with the use of electronic data processing.

A few other union catalogs are the *Union Catalog of Russian and Soviet Periodicals and Serials* (*Gesamtverzeichnis Russischer und Sowjetischer Periodika und Serienwerke*), compiled in the Osteuropa-Institut in Berlin, published in 1962–1968; the *Periodicals Index of the Art Libraries* (*Zeitschriftenverzeichnis der Kunstbibliotheken*), compiled in the Kunstbibliothek Berlin, in print; and the *Location Index of German Newspapers 1700–1969* (*Standortverzeichnis Deutscher Zeitungen 1700–1969*), compiled at the Staatsbibliothek Bremen, printed manuscript completed.

INTERLIBRARY LOAN SYSTEM

Mutual lending among libraries, often over great distances, is one of the earliest examples of library cooperation. Regulations were first set up for Prussia (1892);

today the interlibrary loan system is one of the most important instruments of library service. The new Regulation for Interlibrary Loan (Leihverkehrsordnung) of 1966, which was worked out according to criteria set by VDB and almost simultaneously effected in all eleven federal states, is currently responsible for the working system. A commentary, also worked out by VDB, interprets the text. Main participants of the interlibrary loan service are the large public libraries with predominantly academic holdings (such as national, state, and city libraries), university libraries, and central specialist and special libraries. Several community libraries are also participating as well as a few outstanding institute and industrial libraries, for a total of about 500 institutions. The state authorities generally permit the smaller libraries to participate only if no large public library in the area provides interlibrary loan service. Participation in the interlibrary loan system is voluntary, but the obligation to lend out the library's own holdings is understood.

The main problem of the interlibrary loan system has always been to fill all requests as quickly and as accurately as possible. As far as printed transregional location indexes are available (e.g., GAZS for the more recent foreign periodicals), they are being utilized as reference tools. According to the new interlibrary loan regulation, however, the bulk of the requests go first to the geographically appropriate central catalog. Current statistics indicate about 60% of these book requests are filled within the own region, i.e., from relatively close libraries. The remaining requests are forwarded to other central catalogs or—in the case of special works—to libraries that are known or presumed to have the needed material. This last regulation was included in view of the special collection fields and special libraries promoted by DFG since they, as part of a cooperative acquisitions policy, are responsible for making sure that the scholar can get materials not immediately available to him from another library as quickly and directly as possible.

Currently an estimated 1 million requests annually go through the interlibrary loan service in the Federal Republic of Germany; approximately half of these are processed through the regional central catalogs. A frequent cause for complaints is the long time needed to fill the orders, although in a thorough statistical investigation the situation does not appear to be quite so bad.

Two technical improvements promoted by DFG have contributed considerably to increased efficiency. Between 1965 and 1967 more than DM 400,000 were invested in an experiment to provide scholars with free copies of individual periodical articles through the interlibrary loan system. After filling 240,000 requests with 1,840,000 copies, a cost analysis revealed that—economically speaking—shipping of original volumes both ways would have cost almost as much. An additional advantage is that the original material remains at its location while the out-of-town user keeps the copied text. Presently all large libraries are using this method, although many of those with above average usage have to raise additional funds.

The other project concerns the regular scheduled transport of library materials by trucks—owned by the libraries—rather than by mail. Three trucks, traveling several times a week, were experimentally put into service (1967) in three states.

The success surpassed all expectations; loan service was not only faster but also cheaper. In the meantime the service has been extended to most of the country.

CATALOGING OF HANDWRITTEN MANUSCRIPTS AND EARLY PRINTINGS

Through the initiative of DFG and its financial subsidy of about 1 million DM annually, the cataloging of manuscripts was intensified about 10 years ago. For the oriental languages a standardized catalog dividing the languages into groups was created under the title *Index of Oriental Manuscripts in Germany* (*Verzeichnis der orientalischen Handschriften in Deutschland*). It lists all available holdings of Federal Republic of Germany and the German Democratic Republic (DDR). Twenty-five volumes have been published thus far.

For the occidental manuscripts, however, the German tradition of listing the holdings at their respective libraries was followed. Nonetheless this might be considered a cooperative venture because a certain uniformity in the description of manuscripts has been achieved due to precise directions, constant control of the job by authorities of DFG, and regular colloquia of the catalogers. Catalogs of medieval and newer codices will as a rule be printed (thirty-three volumes had either been published or were in print by the middle of 1971); on the other hand, the more recent posthumous works and autographs will simply be listed in card catalogs. They are also included in two other cooperative efforts: in the *Index of Handwritten Posthumous Works in German Archives and Libraries* (*Verzeichnis der schriftlichen Nachlässe in deutschen Archiven und Bibliotheken*), and the *Central Catalog of Autographs* (*Zentralkartei der Autographen*), listing the location of single autographs. The Staatsbibliothek Preussischer Kulturbesitz has been working on these for 3 years. In 1969 an *Index of 16th Century Printings Published in German* (*Verzeichnis der im deutschen Sprachbereich erschienenen Drucke des 16. Jahrhunderts*) was begun. By including already existing collections, bibliographies, and catalogs, it will initially list the holdings of eight large libraries. The Bavarian State Library in Munich is editing the index.

PROCESSING AND DOCUMENTATION

In the Federal Republic of Germany the responsibility for planning and promoting documentation rests with the Institute for Documentation (Institut für Dokumentationswesen). The services are in the hands of specialized documentation institutes, some of which are connected to special libraries. There are, however, only a few documentation projects which are strictly library ventures. It could be said that a step in this direction is being taken with the program—supported by DFG—to catalog current periodical articles in English, Germanic, and Romance languages, which is being done by the university libraries of Frankfurt and Marburg. Only periodicals available at almost all colleges and therefore of the most immediate

use are being considered. The result is a subject catalog, available on subscription, which supplements the usual library catalogs.

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DIETER OERTEL
(*Translated by Marie-Luise Stueart*)

German Research Society (DFG)

The German Research Society (Deutsche Forschungsgemeinschaft, DFG) is a centralized self-governing organization of German scholarship; it continues the tradition of the Emergency Society of German Science (Notgemeinschaft der Deutschen Wissenschaft) founded in 1920. Members are the institutions of higher education of the Federal Republic of Germany, the academies of science (Akademien der Wissenschaften), and a number of other scholarly associations and institutions.

The primary concern of DFG is financing research in all disciplines. Special emphasis is placed on the collaboration of research and the encouragement of young scholars. Besides the projects which are promoted at the request of individual

scholars, the programs created by DFG itself, such as the supraregional priority research programs in important academic disciplines and the special research areas established at several universities, play an important role. DFG further advises parliaments and governments on academic problems and encourages interaction between German and foreign research. Most of the subsidies for these activities of DFG—380 million DM in 1971—come from the federal government and the states, with 5% contributed by industry (see Figure 1). It is important to note that DFG receives all these funds without obligation to use them for any one particular project. The various agencies of the DFG, primarily the Main Committee (Hauptausschuss), make decisions about financing individual projects based on the pertinency of the topic. The financial supporters are represented in the Main Committee but do not have the majority of votes. All decisions of the Main Committee are based on the judgment of experts on an honorary appointment, who are elected by the independent scholars for the various academic disciplines. At the head of the DFG is its president; the office, located in Bonn-Bad Godesberg (5300 Bonn-Bad Godesberg, Kennedyallee 40), takes care of all ongoing operations.

PROMOTION OF ACADEMIC LIBRARIES AS A ROLE OF DFG

In recognizing the fact that there can be no research without libraries, DFG—when it was reestablished in 1949—immediately initiated an aid program for academic libraries. In so doing, it resumed a tradition of the former Notgemeinschaft. In contrast to the practice of the 1920s, however, funds are distributed strictly according to the rule that the primary financial authority should not be relieved of its responsibility, but that transregional cooperation should be encouraged by giving purposeful support. On principle, then, DFG is not prepared to support projects of only local importance or to fill gaps in the budgets of various libraries; in any case, this would be completely beyond their financial means. DFG does, on the other hand, promote significant projects for the coordination and modernization of the academic library system in the Federal Republic of Germany as a whole. Among these are the large collective undertakings of the academic libraries (for example, the program of special fields of collection, or the union catalogs), central establishments (for example, subject and other special libraries), and experimental models or initial assistance for new developments (for example, rationalization, library techniques). Since the Federal Republic of Germany has *no national central library administration*, DFG is the only institution which can take on this task of planning, advising, and giving financial support. Its structure as a *self-governing organization of scholarship* (Selbstverwaltungsorganisation der Wissenschaft) provides a favorable prerequisite. Representatives of scholarship, government, and industry, as members of the Main Committee, jointly rule on the recommendations of the Library Committee (Bibliotheksausschuss), which is comprised of nine specialists of the library and documentation systems and three university professors, i.e., users. The librarian members of the Library Committee are appointed for a 2-year term with two reelections permitted; the term of office of the members is usually 6 years. Subject specialists are also members of the Library Department (Biblio-

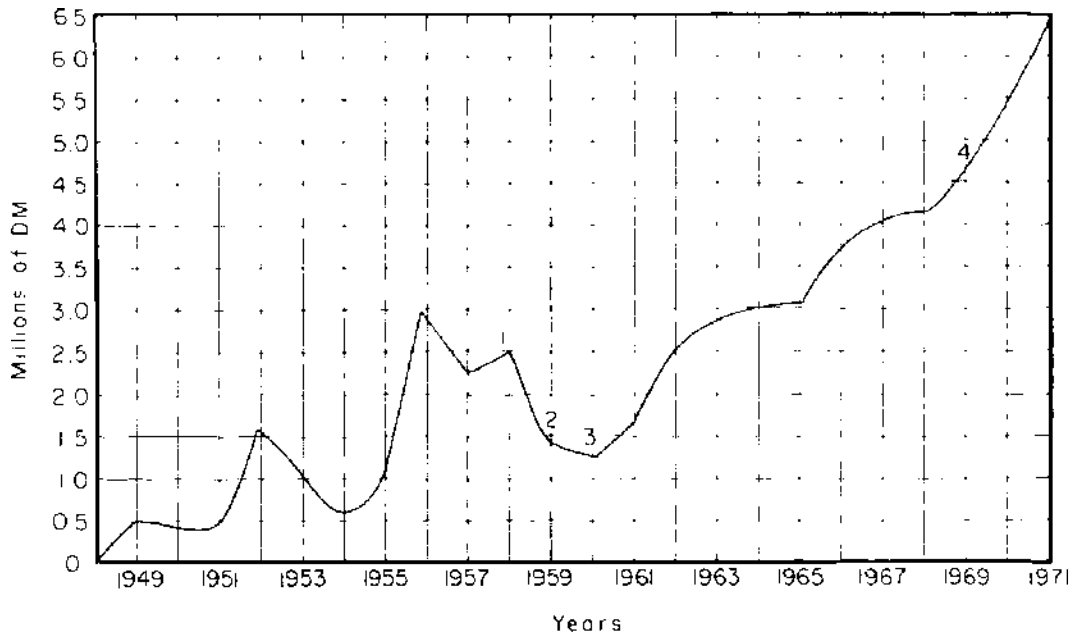

FIGURE 1. *Subsidies of the German Research Society for the promotion of research libraries in fiscal years 1949–1971. (1) Plus an additional 9.9 million DM from special federal funds. (2) Plus an additional 59,000 DM from special federal funds. (3) A fiscal year of 9 months. (4) Plus an additional 3 million DM from special federal funds.*

theksreferat) which is located at the main office of DFG. It is responsible for preparing and executing the programs developed by the Library Committee and also engages in extensive general information and advisory activities.

THE MOST IMPORTANT CURRENT PROGRAMS

The publication *Gemeinschaftsaufgaben und Gemeinschaftsunternehmungen der wissenschaftlichen Bibliotheken in der Bundesrepublik Deutschland* (*Cooperative Responsibilities and Ventures of the Academic Libraries in the German Federal Republic*) reports on those financially supported projects of DFG which provide for a whole system of cooperative library programs in the Federal Republic of Germany: programs of special fields of collection, centralized special and subject libraries, union catalogs, interlibrary loan catalogs of manuscripts and incunabula, and processing. Part of this system is also a program of exchange of academic publications which DFG maintains with 1,500 institutions in ninety-three countries. About 4,400 current periodicals and 10,000 monographs are acquired annually through this program. The greater part of these can only be obtained this way and would otherwise be lacking in the German libraries. This exchange is supplemented by a program of book donations which enables academic institutions in countries with limited currency exchange to receive German books and periodicals.

On behalf of UNESCO, DFG has actually taken on the function of a national exchange center for the international exchange of publications as carried out by German universities, academic societies, and libraries. Besides giving information,

this work entails the organization of regular collective shipments to foreign exchange centers, in which all academic institutions of the Federal Republic of Germany can take part, as well as the distribution of foreign exchange items in Germany. In 1970 approximately 245,000 items were handled.

A completely new approach to cultivate foreign library contacts is being tried in connection with the United States. In the spring of 1970 a foreign office of the German library documentation and information system, supported by DFG and the Institute for Documentation, was established in Washington. Its task is to facilitate collaboration with American institutions and to handle acquisition of materials not available in the book trade.

The library work of DFG is especially concerned with library organization and techniques. One important question in particular has been systematically investigated for several years: Is the use of electronic data processing in the library system expedient and profitable, and what kinds of organizational problems does it create? This concerns acquisitions, cataloging, and circulation control in "on-line and off-line" operation. DFG finances each experiment either completely or partially and has the results evaluated by colloquia. Beyond that, the coordination of all activities in this department is a considerable undertaking. In the future the department for library techniques (Arbeitsstelle für Bibliothekstechnik), established in 1969 at the Staatsbibliothek Preussischer Kulturbesitz through the initiative of DFG, shall become a center for the academic management of these problems and for the planning of experiments. Up to now data processing in the libraries has been subsidized mostly by the Central Office for Mechanical Documentation (Zentralstelle für maschinelle Dokumentation) in Frankfurt and by the German Computer Center (Deutsches Rechenzentrum) in Darmstadt.

In 1970 two organizational guidelines for the "conventional" library operation were published, with contributions from independent experts in scholarship and industry.

A completely different program deals with the collecting and processing of sources concerning German emigration 1933–1945. It now contains the complete films of around 150 important periodicals and newspapers of exile, a union catalog of exile periodicals, and a central documentation of the sources and information dealing with political emigration which were located in the archives.

In conclusion is must be noted that DFG has—in the form of memoranda and statements—acted on structural questions of the library system; for example, by creating budget models for college libraries or making recommendations for modernizing the library organization at institutions of higher learning.

DFG's total subsidy for the promotion of the library system came to about 65 million DM from 1949 to 1970. By 1971 an additional 6.5 million DM was subsidized (see Figure 1).

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DIETER OERTEL
(*Translated by Marie-Luise Stueart*)

National Information and Documentation System in the Federal Republic of Germany

GENERAL PRINCIPLES

A national documentation and information system can be established in various ways. At one extreme is the "laissez-faire" approach, depending upon supply and demand; and at the other extreme is centralization. Because information and documentation activities are on the whole not subject to economic measures, the first alternative does not offer a satisfactory solution. The second alternative presupposes a social and political structure, such as exists to an extent in the USSR.

As was only recently again demonstrated by the investigations and conclusions of the Organization for European Cooperation and Development (OECD) on behalf of their member states, the general trend is toward a system of coordinated decentralization in which emphasis may be placed at one extreme or the other, according to the structure and size of the country. It is thus important to first create —in addition to internal documentation centers (institutes which belong to and are part of an enterprise, an institution, or any other organization)—a network of discipline-oriented documentation centers which is as complete as possible and whose findings can be utilized by internal departments as well as individual users or groups of users.

Such a decentralized system requires interinstitutional coordination and planning on a national level, a conclusion which was emphasized by the recommendations and investigations of OECD on the structure of a national information policy. Also necessary are central units which are responsible for activities such as mechanical equipment, especially electronic data processing, reprography, training and education, and information science research,. Only with such a network of decentralized installations can a national information policy operate today in a Western society.

CENTRALIZED INSTITUTIONS

General Purpose Institutions

At the governmental level the Federal Ministry for Education and Science is responsible for national information policy and for participation in international documentation and information projects and in international government organiza-

tions [OECD, European Community, International Atomic Energy Agency (IAEA)]. This ministry finances documentation installations of central significance, among them the Institut für Dokumentationswesen (Institute for Documentation), the Zentralstelle für maschinelle Dokumentation (Center for Mechanized Documentation), and the Deutsche Gesellschaft für Dokumentation (German Society for Documentation), as well as specialized centralized institutions in the fields of nuclear energy, aeronautics and space, chemistry, mathematics, biology, materials, and the applied social sciences. The academic library system is discussed in the subarticles on Germany entitled "Cooperative Responsibilities and Ventures of the Academic Libraries in the Federal Republic of Germany" and "German Research Association."

In addition, each federal ministry is responsible for special centralized institutions in fields such as medicine, Post Office and telephone exchange, agriculture, geosciences, patents, and defense. An interministerial committee has the responsibility (under the direction of the Ministry of Science) to coordinate the activities of the various federal ministries in documentation and information.

Institut für Documentationswesen—IDW (Institute for Documentation) (Gemeinschaftsausschuss der Technik—Joint Committee on Technology). The institute was created in 1961 after discussions and consultations in government circles, academic institutions, and industry. It is responsible for carrying out plans for a national information policy for all these fields. It is an institute of Max Planck Gesellschaft; and just as are the Max Planck Gesellschaft and the German Research Association, it is an independent academic organization. It has a relatively small staff and an aid fund which is used to finance temporary projects or to provide initial subsidies for a maximum of 3 years, after which a permanent financial supporting agency has to be found.

The areas of activity of IDW are currently defined as follows:

1. Coordination and promotion of the documentation system in BRD and in relation to international cooperation: planning; means of financial support; surveys; recommendations and consultations for coordination; expansion of existing (and creation of new) documentation projects and information systems in the field of sciences, economics, and administration.
2. Carrying out project studies in broad fields (industrial information, materials data bank, legal documentation).
3. Creation and operation of a department of reprography for consultation, training, and testing purposes.
4. Creation and operation of a United States office in Washington, D.C.
5. Promotion of research and development in the area of documentation and information (classification terminology, and other linguistic problems; development of an information system, with emphasis on mechanized methods).
6. Promotion of the training system.
7. Collaboration in international organizations (European Atomic Energy Commission, European Economic Community, Food and Agricultural Organization, International Federation for Documentation, International Council of Scientific Unions, Organization for European Co-operation and Development, International Atomic Energy Agency) and in international projects, for example, in the field of food and trade sciences.

The IDW, together with the Center for Mechanized Documentation (ZMD), occupied a new building in 1969.

Deutsche Gesellschaft für Dokumentation—DGD (German Society for Documentation). Incorporated into the DGD is the Gesellschaft für Medizinische Dokumentation und Statistik—GMDS (Society for Medical Documentation and Statistics). It contains a number of special committees and commissions which work out general problems and methods (see the periodical *Methodik der Information in der Medizin*) (*Methods of Information in Medicine*).

Deutsches Komittee für Dokumentation—DKD (German Committee for Documentation). A number of documentation and information centers have combined to form this organization in order to discuss and represent their common interests on a national, as well as international, level. The committee pursues the following goals: (1) develops ideas on national and international problems of documentation and information; (2) assure adequate representation of these ideas at an international level; (3) stimulate discussions on cooperation; and (4) assume responsibilities in international organizations and at meetings.

Institutions with Overlapping Responsibilities

Zentralstelle für Maschinelle Dokumentation—ZID (Center for Mechanized Documentation). This center is an institution within the framework of the Max Planck Society (as is the IDW). It is responsible for implementing the mechanization aspect of the documentation and information system. In addition it conducts research and development in the field of mechanized documentation. The staff consists of information scientists, programmers, documentalists, and operators; the facility includes a computer installation and other equipment for data processing and information retrieval (see Figure 1).

Activity is concentrated on the mechanized production of bibliographies (national bibliography, special bibliographies, and indexes), abstract publications (e.g., food, science, and technology abstracts), and retrieval systems. One research department, for example, deals with special problems of automatic indexing.

The center is especially active in the training field. It organizes training courses in data processing and mechanized documentation; it has also begun to train documentalists and information scientists, the latter in a postuniversity training course of 2 years.

Arbeitsstelle für Reprotechnik beim IDW (Study Center for Reprography at IDW). The center, organized as a department of IDW, has the following responsibilities:

1. Keeping aware of all new developments.
2. Examining and testing of all new equipment.
3. Developing or participating in the development of new equipment.
4. Consulting on the development of reprography services at documentation centers, libraries, government offices, and academic institutions.
5. Educating and training through courses and seminars.
6. Supplying phototechnical services.

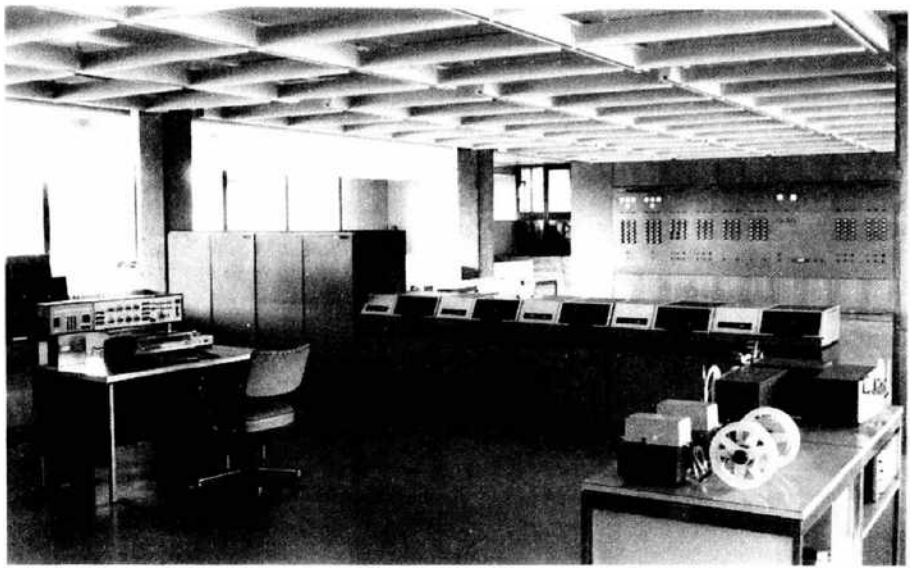

FIGURE 1.

In order to carry out these services the study center is equipped with all necessary reprographical apparatus. The technical work is currently concentrated in the development for the production and re-enlargement of microfiche.

Deutscher Normenausschuss—DNA (German Committee on Standards). This committee is the national institute for standards in the Federal Republic. It is responsible for the compilation of the internationally active "Deutsches Normenwerk"; it has at its disposal about 120 independent committees and other special standards committees. The Ausschuss für Klassifikation—AKF (Classification Committee) is available for special problems of standards in the areas of classification, particularly for the development, revision, and publication (complete, abridged, and special editions) of the decimal classification. The Fachnormenausschuss Bibliotheks- und Dokumentationswesen (Special Standards Committee for Library and Documentation Systems) is responsible for developing the special basic documentation standards. Standard required for terminological and lexicographical work are developed by the "Terminology" Committee. Members of these DNA committees represent the Federal Republic in the corresponding committees of the international organization (ISO).

Education and Training Facilities

The development of a national information network for science, technology, economics, and administration requires an adequate supply of trained specialists and their continuing education. The training system therefore has special significance in the framework of the national information policy. The existing division of responsibilities requires training of documentalists, information scientists, and information users. This division is not always clear in practice.

Documentalists (with the exception of the medical documentation assistants) are trained at the Training Institute for Documentation in Frankfurt (supporting agency: German Society for Documentation, financed through IDW).

The first level of training (academic documentalist) is based on completed university study; it consists principally of 1 year of practical work at a documentation center and 1 year of training at the institute. Upon completion of this program, the trainee is expected to be able to process scholarly literature and data according to the methods and techniques of documentation, and to assume responsibility for documentation service.

The second level of training (certified documentalist) is based on completion of a higher education; it consists of a 2-year practical training curriculum and 1 year of thoretical training at the institute. This curriculum is directed toward more practical, but independent, activity.

Training for the third level (documentation assistant) consists of a 2-year practical training curriculum at a documentation center, supplemented by special courses (reprography and use of perforated tapes), as well as a final training course at the training institute.

The programs at all these levels cover general and special methods and techniques in documentation, as well as basic principles of library science or practice.

Continuing training courses are also offered as a means of transmitting the most recent developments and advances in special fields. Such courses, which are currently much more in demand than available, are given, for example, at the following centers:

1. ZMD (4 week training course for mechanical documentation, 1 week training course for data processing).
2. Study Center for Reprography at IDW (introductory courses in reprography for documentalists and librarians, 1 week each).
3. German Computer Center, Department of Non-Numerics (4 week programming courses in nonnumerical problems).

Special training for medical documentation assistants is also provided. It is geared to the special needs of medical documentation, above all documentation of case histories and statistics. Special emphasis during the 2-year training course, which is based on the "mittlere Reife" (high school certificate) or the completion of a secondary school, is on the fundamentals of medicine, bibliographical and data documentation, library science, mathematics and statistics, data processing, and programming. Professional jobs are available at hospitals (hospital information systems); in establishments of the Public Health Administration, social security, and health insurance; in academic institutions; and in the pharmaceutical industry.

One of the first schools of this kind was established in 1969 (with a subsidy from IDW) at the department for medical statistics, documentation, and data processing of the University of Ulm. Another is planned at the University of Giessen. It is projected that three additional such training institutions, with an annual capacity of thirty pupils per course, are needed.

Training of Information Scientists. This discipline, which is actually an "interdiscipline," is defined here as the science of information systems and information processes. This includes the academic–technical, economic–social, cultural, and political–administrative fields. Information processing of machines, biological systems, and genetic mechanisms is excluded. Information scientists—through university study—should be trained to develop and manipulate information systems and processes. It is easily understandable that the need is already great today, and will become greater still.

The training possibilities in the BRD are currently very inadequate and in need of expansion. The Free University of Berlin has a chair for documentation and information sciences. Professorships in information science subjects have been established at a few other universities (for example Frankfurt a.M., Bonn, Regensburg, Düsseldorf). There are more chairs at university institutes for the application of information sciences. Those are so-called Rechtsinformatik (law), Betriebsinformatic (industry), and Wirtschaftsinformatik (economics). In addition, there are eleven professorships and institutes for medical documentation and statistics.

The inadequacies in training opportunities throws a greater burden on the nonuniversity research institutions which currently have increased training responsibilities. For example, the ZMD initiated a 2-year "post-university training program for information scientists with specialization in indexing and retrieval" in 1971.

The training of information users is also still in the preliminary stages. A few universities have introductory courses in the use of documentation services; technical academies and institutions of industry hold short seminars. Also, the institutions mentioned in the previous section sometimes train users.

Institutions of Information Research

Information research itself is still in the development stages, as is the training of information scientists. Current activities in the field of information research are mostly carried out in the training institutes.

Centralized Institutions. The research department of ZMD, which deals particularly with problems of automatic indexing and the role of mathematics in information science and practice, has already been mentioned. The institute for information systems research of Gesellschaft für Mathematik und Datenverarbeitung (Society for Mathematics and Data Processing), which was established by the Federal Republic, is working more on the technical aspects of information handling. The area of concentration is in designing and building computer-based information systems. The department for governmental data processing systems of this same society handles problems of information systems in the public departments (law, administration). The Studiengruppe für Systemforschung (Study Group for Systems Research), Heidelberg, deals with the design of protoype information systems for research, planning, and administration. It also considers the role of systems analysis in the information sciences and the development of systems concept, as well as the evaluation and testing of information and documentation systems. The department

of nonnumerics at the German Computer Center, Darmstadt, is carrying out a number of practical research projects for text processing, linguistic data processing, and for the development of academic documentation systems. In addition the Federal Republic is promoting several long-term research projects (for example, mechanized translation on the basis of communicative grammar at the research group LIMAS, Bonn, and problems of computer linguistics and their use for information systems at the Institute for the German Language in Mannheim).

Establishments at Institutions of Higher Learning. Research projects (documentation languages, user analyses) have been initiated at the Free University of Berlin. The Institute for Communications Research at the University of Bonn is concerned with the development of computer linguistics for documentation. Considerable research in one practical area is being carried out at the sites of the professorships and institutes for medical documentation and statistics. Additional applied research is being performed, for example, in philosophy (University of Düsseldorf), in applied social sciences (University of Cologne), and in city planning and space research (University of Stuttgart).

Other Institutions. DGD has been active in research on terminology and problems of language. It is also engaged in research and development work in the area of chemical documentation, which is based on long years of work at the research departments of the chemical industry.

DISCIPLINE DOCUMENTATION CENTERS

General Remarks

A survey of the discipline-oriented documentation centers in the Federal Republic can be found in *Verzeichnis von Schrifttum-Auskunftsstellen* (*Index of Bibliographic Information Centers*). A selection of the most important discipline-oriented documentation centers is listed in Section G of the *Vademecum Deutscher Lehr- und Forschungsstätten* (*Guidebook to German Teaching and Research Institutes*). In the further development of existing disciplinary documentation centers or information systems, and in creating new ones, two general tendencies can be observed: (1) toward greater concentration of institutions whose disciplines belong together, and (2) toward increasing internationalization. The increasing volume of material necessitates careful division of work and avoidance of duplication. Also the interdependence of subject disciplines makes it increasingly desirable to develop information systems of the various disciplines which are so interchangeable that patrons can use several systems without great difficulty. In other words, it is desirable to create a connected network of information supply leading to a stronger organizational concentration, or to the creation of large disciplinary information systems or discipline-oriented documentation centers. Such institutions offer particularly good conditions for international cooperation.

Abstracting Services and Handbooks

The origin of modern documentation and information systems lies in the abstracting service and handbooks. In this field Germany has made important contribu-

tions toward development and international cooperation. The publications in question are *Chemisches Zentralblatt* which—in relation to international developments—is published today as a chemical information service; *Physikalische Berichte, Zentralblatt für Mathematik*, and *Astronomisches Jahrbuch*, which since 1970 has been published under the title *Astronomy and Astrophysics Abstracts*. In addition there are the Springer journals of medicine and biology, and several comprehensive handbooks, for example, *Gmelin Handbuch für inorganische Chemie* and *Beilstein's Handbuch für organische Chemie* (publications which are today recognized worldwide in the field of chemical information) and the Landolt-Börnstein *Physikalich Chemische Tabellen*.

Special Central Agencies

For broader subject areas there are central agencies which either handle all documentation and information activity in a given area or form a cooperative system with special agencies. They are currently combined with corresponding research institutions and special libraries, and their work is primarily on an international cooperative basis. Several of these are the central documentation for atomic energy; aeronautics and astronautics; the central documentation of the defense ministry; the foundation of a German institute for medical documentation and information; and coordinating centers for transportation and agriculture. Also being developed are a central agency for biological documentation and information and a central materials data bank which will record, evaluate, and store the properties of materials for users in research, industry, and management.

Additional projects in the natural sciences and engineering are given as further illustrations of developments in the Federal Republic of Germany.

In chemistry a successful plan is being carried out to combine the most important institutions dealing with chemical documentation into a study group. The aim is to design and execute a common concept on a national level and—as German representative—on an international level, through Internationale Dokumentationsgesellschaft für Chemie m.b.H., Frankfurt a.M.—IDC (International Documentation Society for Chemistry). Members of this study group consist not only of federally financed and other not-for-profit institutions, but also institutions of the chemical industry, who—at great cost to themselves—participate in the development of a modern and advanced system. One of the main responsibilities of this study group is the establishment of an information center—equipped with a computer—making available to the different categories of users in Germany not only the results of the German system but also of American systems. Users are the national or independent research institutes, and also research and development departments of the chemical industries of all sizes.

IDW and ZMD participate in an especially interesting multilateral information system in food sciences—the International Food Information Service (IFIS). The system is developed on the basis of an agreement among the Commonwealth Agricultural Bureaux in England, The Institute of Food Technologists in the United

States, the Institut für Dokumentationswesen (Institute for Documentation), and Pudoc (Center for Agricultural Information and Agricultural Documentation) in Holland. With technical assistance from ZMD, an abstract organ is produced, *Food Science and Technology Abstracts*, with monthly publications and detailed annual indexing, including the corresponding magnetic tapes. The parties to this agreement have pledged financial contributions and 3-year terms of service, after which the system will continue to exist for a while on accumulated and operating incomes.

There are currently special difficulties because of considerable differences in the intellectual levels of information seekers and therefore correspondingly different demands are made on the information storage by research, development, and production. In addition the increasing demands on a technical information system in all related branches by far exceeds the available financial and personnel resources. Therefore, documentation and information centers in the fields of technology find themselves in an increasingly troubled situation.

On an international level information services in technical fields are continually being improved through various documentation services in the form of magnetic tapes which are available for purchase. The coverage is more or less comprehensive. Discussions are currently under way as to the consequences for a national information policy.

In the interest of all users and of economic competition, adequate information services, involving the use of modern documentation methods, must be guaranteed. This will not be possible without assistance and financial support on the part of the government, particularly in areas which are of special public interest, or for which there are international obligations. This tendency will undoubtedly lead toward further concentration. Corresponding developments are in process in the areas of electrical engineering, mechanical engineering, metallurgy, oceanography, and environmental control.

The social sciences and fine arts very quickly adapted to documentation. Apart from difficulties which result from the contents of corresponding documents or data, there are some special problems of an organizational and financial nature. There is danger of too great a scattering or discontinuity, at least when universities and professional societies are engaged in projects of this kind. In the social sciences field at least there are a few planning and unifying measures. For example, the Dokumentationsring Betriebswirtschaft (Documentation Network for Management) was created, at the suggestion of IDW, as a joint project of sixteen German university institutes and furnished with a small central agency, in which corresponding institutions in the USSR, France, England, Holland, Italy, Switzerland, and Spain are now participating. Other projects include the creation of the Informationsstelle für Sozialwissenschaften (Central Information Agency for Social Sciences), in which the Federal Republic is taking a decisive interest; also the systematic building and improvement of Zentralarchiv für Empirische Sozialforschung (Central Archive for Applied Social Research), in which social data, for example, from psychology and social statistics, are collected, processed, and made available for

research purposes. In the area of Information zur Übersee-Forschung (information on developing countries, foreign aid, etc.), the documentation department of the Deutsche Shiftung für Entwicklungsländer (German Aid to Developing Countries) and four Hamburg overseas institutes (Africa, Asia, Orient, Latin America) have combined—for the purpose of promotional activities—to form a kind of information system in order to have available corresponding information for political, administrative, and above all, research purposes. Obviously, very close ties to other countries and to corresponding international organizations exist here.

In the area of education, several special research institutions have combined under the direction of Pädagogisches Zentrum (Educational Center) in Berlin to form Dokumentationsring Pädagogik (Documentation Network for Educational Theory) in order to record and process the relevant literature of Germany and of other countries; discussions are held on an international level (Europarat).

DOCUMENTATION CENTERS IN BRD

There are currently about 500 information centers in BRD, among them a number of institutions and administrative agencies, as well as many industries; all are distinguished by efficient documentation centers and are prepared to provide information. Many of these information centers are merging or reorganizing, a process in which they are often supported by IDW and receive subsidies.

Information centers are listed in *Verzeichnis von Schrifttum-Auskunftsstellen*, published by Deutscher Normenausschuss and Forschungsinstitut für Rationalisierung at Rheinisch-Westfälisches Technical College in Aachen, compiled by S. Barlen, 6th supplemented and enlarged edition, Berlin-Cologne-Frankfurt a.M., 1968, 217 pages, including subject, name, and location index.

Selected documentation centers which are of special significance for this article has been compiled by Institut für Dokumentationswesen and are listed in the following section.

SELECTED DOCUMENTATION AND INFORMATION CENTERS IN BRD

*General Institutions and Associations**

Institut für Dokumentationswesen—IDW (Institute for Documentation). Institute for the coordination and promotion of the documentation system in the Federal Republic of Germany and West Berlin. Niederrad, Herriot St., 6 Frankfurt/M. With United States office in Washington, D.C. Director: Dr. Martin Cremer.

Zentralstelle für maschinelle Dokumentation—ZMD (Center for Mechanized Documentation). Niederrad, Herriot St., 6 Frankfurt/M. Director: Klaus Schneider.

Deutsche Gesellschaft für Dokumentation e.V.—DGD (German Society for Documentation). Westend St. 19, 6 Frankfurt/M. President: Prof. Dr. Helmut Arntz.

Lehrinstitut für Dokumentation in der Deutschen Gesellschaft für Dokumentation e.V.—LID (Training Institute for Documentation in the German Society for Documentation). Westend St. 19, 6 Frankfurt/M.

* Compiled by J. Schön, Institute for Documentation, Frankfurt/Niederrad.

Verein Deutscher Dokumentare e.V.—VDD (Association of German Documentalists). Elsa-Brandström-St. 62, 5302 Bonn-Beuel. Chairman: Rudolf Harbeck.

Deutscher Normenausschuss—DNA (German Committee on Standards). Burggrafen St. 4–7, 1 Berlin 30. Director: Certified Engineer, Nikolaus Ludwig.

Bundesministerium für Bildung und Wissenschaft—BMBW (Federal Ministry for Education and Scholarship). Department for Documentation, Heussallee 2–10, 53 Bonn. Adviser for Documentation and Information: Councilman, Dr. Heinz Lechmann.

Deutsches Komitee für Dokumentation—DKD (German Committee for Documentation). Nierderrad, Herriott St., 6 Frankfurt/M. President: Prof. Dr. Helmut Arntz.

Mathematics, Chemistry, Physics, Technology, Transportation

Zentralblatt für Mathematik und Grenzgebiete Radaktion (Newsletter for Mathematics and Editorial Office). Motz St. 54, 1 Berlin 30. Director: Dr. Erika Pannwitz.

Chemie Information + Dokumentation Berlin (Chemical Information and Documentation Berlin). Formerly Western Editorial Office of the Chemical Newsletter, a department of the Society of German Chemists. Geisberg St. 39, 1 Berlin 30. Director: Dr. Christian Weiske.

Internationale Dokumentationsgesellschaft für Chemie m.b.H.—IDC (International Documentation Association for Chemistry). See also the special publication *Applied Chemistry International Edition in English 9 (1970) 545/648* which contains a large number of basic articles on the subject of chemical documentation and information. Hamburger Allee 26–28, 6 Frankfurt/M. Managers: Dr. Hans-Joachim Hahn and Dr. Arthur Kolb.

Beilstein-Institut für Literatur der organischen Chemie (Beilstein Institute for Publications in Organic Chemistry). Varrentrapp St. 40–42, 6 Frankfurt/M. Director: Prof. Dr. Hans-Günter Boit.

Gmelin-Institut für anorganische Chemie in der Max-Planck-Gesellschaft z.F.d.W. (Gmelin Institute for Inorganic Chemistry in the Max Planck Society). Varrentrapp St. 40–42, 6 Frankfurt/M. Director: Prof. Dr. Margot Becke.

Institut für Spektrochemie und angewandte Spektroskopie (Institute for Spectrochemistry and Applied Spectrocopy). Bunsen-Kirchhoff St. 11, 46 Dortmund. Director: Prof. Dr. Heinrich Kaiser.

DECHEMA—Deutsche Gesellschaft für chemisches Apparatewesen e.V. (DECHEMA—German Society for Chemical Appartus). Literature Department, Theodor-Heuss Allee 25, 6 Frankfurt/M. Director: Dr. Günther Loose.

Deutsche Glastechnische Gesellschaft e.V. (German Society for Glass Technology). Library and Documentation, Bockenheimer Landstrassee 126, 6 Frankfurt/M. Director: Dr. Günther Stein.

Deutsches Kunststoff-Institut (German Institute for Synthetic Products). Documentation Department, Schlossgarten St. 6 R, 61 Darmstadt, Director: Dr. Raimund Ulbrich.

Physikalische Berichte, Redaktion in der Physikalisch-Technischen Bundesantalt (Reports on Physics, Editorial Office in the Federal Office for Physics and Technology). Bundesallee 100, 33 Braunschweig. Director: Certified Physicist. Erst Bretnütz.

Zentralstelle für Atomkernenergie-Dokumentation—ZAED (Central Agency for Atomic Energy Documentation). Society for Nuclear Research, Kernforschungszentrum, 7501 Leopoldshafen. Director: Dr. Werner Rittberger.

Institut für Angewandte Geodäsie (Institute for Applied Geodesy). Library and Documentation, Kennedyallee 151, 6 Frankfurt/M. Director: Administrative Magistrate, Herbert Krehl.

Institut für Landeskunde in der Bundesforschungsanstalt für Landeskunde und Raumordnung (Institute for Geography in the Federal Research Office for Geography and Rural Organization). Michaelshof, 53 Bonn-Bad Godesberg. Director: Prof. Dr. Emil Meynen.

Deutscher Wetterdienst (German Meteorological Service). Library and Documentation, Frankfurter St. 135, 605 Offenbach. Director: ORR Certified Meteorologist, Max Schlegel.

Deutsches Hydrographisches Institut—DHI (German Hydrographical Institute). Library and Documentation, Bernhard-Nocht-St. 78, 2 Hamburg 4. Director: ORR Dr. Fritz Model.

Deutsche Dokumentationszentrale Wasser—DZW (German Documentation Center on Water). Rochus St. 36, 4. Düsseldorf-N, Director: Oberbaurat retired, Certified Engineer, Helmuth Hübner.

Verein Deutscher Ingenieure—VDI (Association of German Engineers). VDI-Documentation Center, Graf-Recke-St. 84, 4 Düsseldorf 1. Director: Engineer, Robert Harth.

Verein Deutscher Maschinenbau-Anstalten—VDMA (Association of German Mechanical Engineering Plants). VDMA-Documentation, Leugallee 63–65, 4 Düsseldorf-Oberkassel. Director: Dr. Frank D. Schmitz.

Bundesanstalt für Meterialprüfung—BAN (Federal Office for Materials Testing). Department of Documentation and Information, Unter den Eichen 87, 1 Berlin 45.

Verein Deutscher Eisenhüttenleute—VDEL (Association of German Iron Workers). Documentation Center, Breite St. 27, 4 Düsseldorf 1. Director: Engineer, Gunther Bauhoff.

Gesellschaft Deutscher Metallhütten- und Bergleute—GDMB (Association of German Metal Workers and Miners). Documentation Center, Paul-Ernst Strassee 10, 3392 Clausthal-Zellerfeld. Manager: Certified Engineer, Werner Andrae.

Verein Deutscher Giessereifachleute—VDG (Association of German Foundry Specialists). Special Library and Documentation, Sohnstrassee 70, 4 Dusseldorf. Director: Irmgard Hochstein.

Dokumentationstelle für Bautechnik in der Fraunhofer-Gesellschaft (Documentation Center for Building Technology in the Fraunhofer Society). Silberberg St. 119A, 7 Stuttgart. Director: Dr. Helmut Wantur.

Dokumentationszentrum der Bundeswehr—DOKZENT Bw (Documentation Center of the Federal Defense). Friedrich-Ebert-Allee 34, 53 Bonn. Director: Lieutenant, Ernst-Egon Schütz.

Deutsches Patentamt (German Patent Office). Main Office C, Zweibrücken St. 12, 8 Munich.

Elektro-Information Berlin—EIB (Electro Information Berlin). Gitschiner St. 97–103, 1 Berlin. Director: Oberpostrat, Kurt Sauer.

Dokumentationsring Elektrotechnik—DRE (Documentation Network for Electrical Engineering). Brown Boveri & Gie. Ag. 68 Mannheim-Käferthal. Director: Certified Engineer, Diers.

Verband Deutscher Elektrotechniker e.V.—VDE (Association of German Electrical Engineers). Documentation Card Index, Stresemannallee 21, 6 Frankfurt/M. Director: Renate Leopold.

Forschungsinstitut für Rationalisierung an der Technischen Hochschule Aachen (Research Institute for Work Simplification at the Technical College Aachen). Department of Documentation, Pontdriesch 14–16, 51 Aachen. Director: Dr. Erne Merbeck.

Zentrale Dokumentationsstelle für Verkehr—ZIV (Central Documentation Center for Transportation). Association for Transportation, Schildergasse 55 a, 5 Cologne. Director: Dr. L. P. Krause.

Deutsche Bundesbahn (German Federal Railways). Documentation Service, Karls St. 4–6, 6 Frankfurt/M. Director: Railways Director, Certified Engineer, Hans Sparkuhle.

Zentralstelle für Dokumentation und Information der Deutschen Bundespost beim Fernmeldetechnischen Zentralamt (Central Agency for Documentation and Information of the German Post Office at the Telephone Exchange Office). Rhein St. 110, 61 Darmstadt. Director OPDir., Gerhard Zimmermann.

Forschungsgesellschaft für das Strassenwesen e.V. (Research Society for Traffic Systems). Documentation "Traffic." Maastrichter St. 45, 5 Cologne. Manager: Dr. E. W. Goerner.

Zentralstelle für Luftfahrt-Dokumentation und Information—ZLDI (Central Agency for Aeronautics Documentation and Information). Institute of the German Association for Aviation—DGF, Maria-Theresia-St. 21, 8 Munich 80. Director: Doctor of Engineering, Hans-Joachim Rautenberg.

Biology, Medicine, Agriculture

Dokumentationsstelle für Biologie (Documentation Center for Biology). Ringmauer 7, 6407 Schiltz. Director: Dr. Martin Scheele.

Deutsches Institut fum Medizinische Dokumentation und Information—DIMDI (German Institute for Medical Documentation and Information). Weisshaus St. 27, 5 Cologne. Director: Dr. Rolf Fritz.

Deutsche Gesellschaft für Medizinische Dokumentation und Statistik in der Deutschen Gesellschaft für Dokumentation (German Society for Medical Documentation and Statistics in the German Society for Documentation). Berliner St. 27, 69 Heidelberg. Chairman; Professor Dr. Gustav Wagner.

Institut für Dokumentation und Information über Sozialmedizin und öffentliches Gesundheitswesen (Institute for Documentation and Information on Social Medicine and Public Health). Westerfeld St. 17, 48 Bielefeld. Director: Dr. O. Nacke.

Institut für Dokumentation, Information und Statistik am Deutschen Krebsforschungszentrum (Institute for Documentation, Information, and Statistics at the German Cancer Research Cener). Berliner St. 27, 69 Heidelberg. Director: Prof. Dr. Gustav Wagner.

Klinikum Steglitz der Freien Universität Berlin (Clinic Steglitz of the Free University of Berlin). Institute for Nuclear Medicine, Hindenburgdamm 30, 1 Berlin 45. Director: Prof. Dr. med., Karl Oeff.

Bundesinstitut für Arbeitsschutz (Federal Institute for Employment Security). Documentation Center, Casino St. 48–54, 54 Koblenz. Director: Werner Rosenkranz.

Zentralstelle für Agrardokumentation und Information (Central Agency for Agricultural Documentation and Information). Heerst. 110, 53 Bonn-Bad Godesberg. Director: Dr. Müller.

Dokumentationsstelle für Tierzucht und Tierernährung (Documentation Center for Animal Breeding and Animal Nutrition). Nord St. 22, 7 Stuttgart-Hohenheim. Director: Dr. Harald Haendler.

International Food Information Service—IFIS Niederrad, Herriot St., 6 Frankfurt/M. Director: Dr. Udo Schützsack.

Institut für Ernährungswissenschaft der Justus-Liebig-Universität (Institute for Food Sciences of the Justus Leibig University). Documentation Center, Wilhelm St. 20, 63 Giessen. Director: Dr. H. Eichner.

Bundesforschungsanstalt für Forst- und Holzwirtschaft (Federal Research Institute for Forestry and Timber), International Documentation Center, Schloss, 2057 Reinbek bei Hamburg. Director: Certified Forestry Warden, Certified Timber Warden, Siegfried Schrader.

Politics, Economics, Law, Education, Philosophy

Leitstelle Politische Dokumentation in Verbindung mit dem Otto-Suhr-Institut and der Freien Universität Berlin (Office for Political Documentation as part of the Otto Shur Institute at the Free University of Berlin), Paulinenstrasse 22, 1 Berlin 45. Director: Dr. Walter Krumholz.

Deutscher Bundestag (German Bundestag), Scientific Department, Bundeshaus, 53 Bonn. Director: Min. Dirig., Kurt Georg Wernike.

Presse- und Informationsamt der Bundesregierung (Press and Information Office of the Federal Government), Office of "Archives and Library," Welcker St. 11, 53 Bonn. Director: Archives Director, Dr. Roland Seeberg Elverfeldt.

Forschungsinstitut der Deutschen Gesellschaft für Auswärtige Politik (Research Institute of the German Society for Foreign Politics), Documentation Center, Schaumburg-Lippe-St. 6, 53 Bonn. Director: B. Baussmann.

Deutsche Stiftung für Entwicklungsländer (German Aid to Developing Countries), Department of Documentation, Blücher St. 16, 53 Bonn. Director Ernst Joachim Frhr. v. Ledebur (Baron of).

Deutsches Institut für Afrikaforschung e.V. (German Institute for Africa Research), Regional Documentation Office, Kl. Johannis St. 9, 2 Hamburg. Director: Dr. Martin Kraemer.

Institut für Asienkunde (Institute for Asia Information), Regional Documentation Office, Rothenbaumschaussee 32, 2 Hamburg 36. Director: Dr. Bernard Grossmann.

Institut für Iberoamerika-Kunde (Institute for Ibero-America Information), Regional Documentation Office, Alsterglacis 3, 2 Hamburg 36. Director: Dr. Albercht v. Gleich.

Detuches Orientinstitut (German Orient Institute), Regional Documentation Office, Mittelweg 151, 2 Hamburg 13. Director: Dr. Ernst Messerschmidt.

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Informationszentrum für sozialwissenschaftliche Forschung (Information Center for Social Science Research), Rheinallee 35 a, 53 Bonn-Bad Godesberg.

Hamburgisches Welt-Wirtschafts-Archiv (Hamburg World Economics Archive, Institute for the Promotion of Economics), Department of Documentation of Library, Karl-Muck-Platz 1, 2 Hamburg 36. Director: Certified Political Economist, Hans-Ulrich Wagner.

Institut für Weltwirtschaft an der Universität Kiel (Institute for World Economics at the University Kiel), Library, Düsternbrooker Weg 120–122, 23 Kiel. Director: Dr. Erwin Heidemann.

Rationalisierungs-Kuratorium der Deutschen Wirtschaft e.V.—RKW (World Simplification Curatorium of the German Economy), Literature Evaluation and Documentation, Gutleut St. 163–167, 6 Frankfurt/M. Director: Certified Merchant, Helene Eckard.

Ausschuss für Wirtschaftliche Verwaltung—AWV (Commission for Economic Management), Documentation Center, Gutleut St. 163–167, 6 Frankfurt/M. Director: Elisabeth Hagert.

Bundesstelle für Aussenhandelsinformation (Federal Office for Foreign Trade Information), Blaubach 13, 5 Cologne. Director: Dr. Peter Böhm.

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German Society for Documentation (DGD)

EARLY HISTORY

Together with France and Switzerland, Germany—through the Technisch-Wissenschaftliche Lehrmittelzentrale (Technological-Scientific Teaching Materials Center)—joined the Fédération Internationale de Documentation in 1924. The FID actually did not become an international association until that time because previously the Netherlands had been its only member. The beginning of systematic German documentation activity falls into this same period. In the year 1927 the Ausschuss für Buch-, Bibliotheks- und Zeitschriftenwesen (Commission on Books, Libraries, and Periodicals) of the German Commission on Standards (DNA) began the complete German edition of the Universal Decimal Classification system, which was completed after about 20 years. It is credited primarily to the librarian (Bibliotheksrat) Carl Walther.

The first systematic use of reprographical aids also occurred during this time, specifically microfilming under libraries director Dr. Walther Schürmeyer.

In 1937 the director of the Prussian National Library in Berlin, Dr. Hugo Andres Krüss, participated—together with a large delegation—in the World Congress of Documentation in Paris, where he delivered his pioneer address on the Beherrschung des Wissens (Control of Knowledge). This Congress provided the initiative for the foundation of the Deutsche Gesellschaft fur Dokumentation (German Society for Documentation) on May 28, 1941, in Berlin. Professor Dr. F. Prinzhorn, Leipzig, became chairman. The DGD published a journal *Dokumentation und Arbeitstechnik* (*Documentation and Work Technique*) and held a convention in 1942. Because of World War II, however, no real activity developed.

REACTIVATION

As a result of the war, efforts toward reactivation after 1945 were a particularly difficult task. Most notable was the loss of books and other documents through battles and bombs, and the confused monetary situation seemed to offer no possibility for rebuilding the collections within a reasonable time. The demands on documentation were therefore concentrated on the question of whether materials could be made available to students and researchers through the use of films (microfilms, reading apparatus) and microprint, which can be read by using a magnifying glass (microbooks).

The aspect under which the reestablishment took place on December 9, 1948, in Cologne was therefore expressly a reprographical one, and the departments of microcopy and photocopy (office copy) gave a definite direction to the DGD during the first 2 years under chairman Dr. Walther Schürmeyer. It is no coincident that the founding of the periodical *Nachrichten für Dokumentation* (*Documentation News*) was made possible primarily through advertising and other support by AGFA under the directorship of Dr. h.c. Bruno Uhl.

At the second annual convention, 1950 in Frankfurt a.M., the situation had changed drastically. After the currency reform foreign publications could again be purchased (in addition to generous book donations, primarily from the United States), and the German publishers quickly developed a considerable production. The DGD in Frankfurt therefore again took on the activities of the prewar years: the use of decimal classification, the processing of documents, and the processing of literature by documentary methods. An outstanding contribution was made by Dr. Hanns W. Eppelsheimer, the director of the Deutsche Bibliothek in Frankfurt a.M. for many years. Using twentieth century scholarship as a basis, he demonstrated that a people can only maintain a position in the competition for achievement when the most efficient methods are used to record and process the latest developments in all fields of knowledge. Actually this has remained the general theme to the present time, although the methods that were debated in the 1950s were very conventional and manual.

This was changed only a year later, during the third DGD convention in Bad Cannstatt near Stuttgart, through a lecture by Prof. Dr. Erich Pietsch, director of the Gmelin Institute for Inorganic Chemistry in the Max-Planck Society, at that time still in Clausthal-Zellerfeld. Following his impressions during a study tour in the United States, he reported on the function of the punch-card technique for voluminous collections of materials and demonstrated a new method for building large documentation centers, first in the fields of the natural sciences.

Under the impressions made by these ideas—still completely novel in Germany—the Arbeitsausschuss zur Mechanisierung der Dokumentation (Study Committee for the Mechanization of Documentation) was formed as the first committee of the DGD during this convention.

During the 4th convention, 1952 in Hamburg and Kiel, which was held in the Hamburg World Economics Archive and in the Institute for World Economy, the DGD demonstrated to the participants some practical documentation activities in the fields of social science and economics. Since reprography was now only one in many fields of interest, a Arbeitsausschuss für Photographische Hilfsmittel und Vervielfältigungsverfahren (Study Committee on Photographic Aids and Duplication Methods) was also formed at this time in order to maintain contact between the manufacturers of reprographical apparatus and materials, and the users whose special demands should be served by the production.

WIDENING THE RESPONSIBILITIES

In 1953, during the 5th annual convention in Goslar in the Harz mountains, Arne Möller, the president of the FID, formulated—on an international level—the responsibility of documentation for the entire academic world. Since that time the DGD has been pursuing the same areas of concentration as the FID with one notable exception: Under an agreement with the German Committee on Standards, this committee takes over all responsibilities for standards (including language and terminology) and the further development of the UDC.

Prof. Eppelsheimer, chairman of DGD since 1951, initiated at the Goslar convention a four-level training program for the DGD which developed into its most important responsibility. Under Dr. Karl Fill, the Kuratorium für Nachwuchsbildung (Board for Training Recruits) opened the way for the establishment of the Lehrinstitut für Dokumentation in der DGD (Training Institute for Documentation in the DGD).

In 1955 Prof. Dr. Erich Pietsch was elected chairman of the board of the DGD, an office he held for 6 years. During the same convention the DGD widened its program to include terminology and other language problems, especially translations. Another activity which had been developing since the very first conventions, that of medical diagnosis documentation, gave, through a study committee, the initiative to create the Deutsche Gesellschaft für Medizinische Dokumentation und Statistik in der DGD (German Society for Medical Documentation and Statistics in the DGD).

Occasionally the DGD also had a panel on copyright in order to take an emphatic stand on a "fair copying declaration" and the privilege to copy for scholarly purposes. The new German law on copyright has taken this suggestion into consideration.

A complicated field, that of patent documentation, was initially organized outside of the DGD, but, 5 years later this large committee, with its nineteen testing groups, has become a part of the society. Its problems, patent searching and patent classification, come very close to the concept of Tieferschliessung von Literature (in-depth searching of the literature) which, from another viewpoint, also plays an important role in the Information Analysis Centers.

During the course of its development the society had a number of ad hoc committees which dissolved after completing their various projects; for example, for the railroad system, aeronautics, and biology. Others were added later, such as social sciences, transportation, thesaurus research, electrical engineering, and management. A committee for cost fundamentals has been in existence for about 15 years. The Berliner Arbeitskreis (Berlin Study Circle) of the DGD combines, due to the exceptionally favorable situation in Berlin (experts in all fields concentrated in a small area), Berlin documentalists and librarians. All these committees face the same problems reported by other countries: It is becoming increasingly difficult to solve problems through the services of panels, and the system of paid experts is replacing the former "honorary appointment" activities. There are other reasons for this, and these are the pressure for time under which information and documentation find themselves, and the regulations of national financial supporters who demand completion of service within a short time.

INVOLVEMENT OF THE GOVERNMENT

The catch-words "national financial supporters" could almost be called a characteristic symptom for the DGD, because its fundamental status and responsibilities have changed since the government became interested in documentation. Al-

though the word Sputnik-shock was not used in Germany, this incident brought about an awakening in government circles similar to that in the United States. The Federal Minister for Nuclear Energy and Water Conservation, Prof. Dr. S. Balke, was planning the creation of a federal institute for documentation as early as 1958.

Because this plan did not succeed, the initiative was then taken by the Joint Commission on Technology, whose committee "Documentation," under the direction of Prof. Pietsch, made efforts to create a central institution for documentation and information in the Federal Republic of Germany. In 1961, therefore, the Institute for Documentation (Director Dr. M. Cremer) was founded as part of the Max-Planck Society for the Promotion of Science. It was conceived as an controlling and coordinating center. It is significant that the federal and state governments, each of which contributes half of the financial support for the new institute, from that point on spent millions on documentation whereas before only a few state ministeries and the education department in the Federal Ministry for the Interior were able to make a few thousand DM available for research in this field. The national interest, now manifested by a financial investment, necessarily resulted in a new respect for documentation, which also gave the DGD a new status but without altering its standing as a private association. The DGD was now more in a position—through financial support from the Institute for Documentation, especially in the area of education—to take on projects which would have been impossible to carry out without federal funds.

This development has improved even more since 1967 because the Documentation Department created in 1963 in the Federal Ministry for Scientific Research, currently the Federal Ministry for Education and Science, was authorized to give subsidies directly to the DGD in addition to financing half of the costs of the Institute for Documentation. These subsidies have become the biggest part of the DGD's budget, within 3 years, reaching 650,000 DM in 1971, and will continue to increase. The size of this sum really becomes significant when compared to the membership dues, a total of about 60,000 DM, which was the only financial support of the DGD during its first years.

This author, since 1961 chairman of the board (since 1967 president) of the DGD, had to live with the universal conflicts connected with receiving federal funds during his term of office; certainly federal subsidies are always connected with obligations that have to be strictly satisfied. It should be emphasized, therefore, that among those projects supported through these subsidies there are none that would not have been part of the DGD objective anyway.

This topic was thoroughly discussed in the Lechmann-Thesen during the annual convention of the DGD in 1967 and met with complete agreement. The subjects of this paper are the principles of the national interest in information and documentation and plans to put this interest into effective action. They were worked out in 1966 by the Documentation Advisor for the Ministry for Science, Ministerial Dr. H. Lechmann. These were, as are all documentation activities in the Western

World, strongly influenced by the Weinberg Report, as was the decision of the Joint Committee on Technology in November 1967 to build a comprehensive information network in the Federal Republic of Germany, in which the SATCOM findings played a role.

Mention of these activities which were carried out with the participation of the DGD but outside of its organization has a purpose: Cooperation in the field of information is not an isolated effort. The DGD, which was completely alone in the field of documentation between 1948 and 1960 (there was, as already mentioned, an amicable but quite distinct separation of responsibilities), now finds itself part of a growing network of institutions which are all active in the area of information and also have considerable federal funds at their disposal: for example, the Institut für Dokumentationswesen (Institute for Documentation), Zentralstelle für maschinelle Dokumentation (Center for Mechanized Documentation), Studiengruppe für Systemforschung (Study Group for Systems Research), or the large special documentation centers, such as the Zentralstelle für Atomenergie-Dokumentation (Center for Atomic Energy Documentation) or the Zentralstelle für Luftfahrt- und Raumfahrtdokumentation (Center for Aeronautics and Space Documentation).

This situation does not only mean that the DGD need not concern itself with responsibilities which are in good hands in other institutions, but also that it can devote all its energy to its particular areas of concentration. These are essentially seven areas.

CURRENT RESPONSIBILITIES OF THE DGD

In order of magnitude, these responsibilities are training and the documentation of the literature of the information system.

The *Lehrinstitut für Dokumentation, LID* (Training Institute for Documentation) holds training courses for the training of wissenschaftliche Dokumentare (Academic Documentalists). The participants already have a completed college education in a subject area. The other training branch leads to the diplomierter Dokumentar (certified documentalist) whose profession is the documentation itself. The number of lecturers (more than twenty) is high because all other border areas of documentation are also taught by specialists. About thirty-five documentalists are trained each year. The LID is financed through funds from the Institute for Documentation.

More than half of the subsidies given by the Wissenschaftsministerium (Ministry for Science) go to the ZDoK, Zentrale Dokumentationsstelle des Schrifttums der Informationswissenschaften (Documentation Center for Literature of the Information Sciences). The responsibility to identify and record all foreign publications, to build a reference library, to abstract important literature, and to give information has to be handled by one central agency. Much depends upon the proper solution to this problem, above all the information research, as well

as the availability of trained information specialists. In short, all the prerequisites for providing information service to science and technology, administration and management.

It is possible that both these institutions will not always be part of the DGD because currently the aim is to make documentation training a state responsibility, as has been the case in library education for a long time, and the ZDoK will in all probability eventually become a department of a proposed Federal Institute for Information and Documentation.

In third place the *Nachrichten für Dokumentation* (*Documentation News*) must be mentioned. In the 21 years of its existence it has developed into an internationally recognized professional journal with a circulation of 2,000 (a third of this to subscribers in foreign countries). In fourth place would be the *Wahrnehmung internationaler Beziehungen* (Attention to International Relations). Since 1971 the DGD has been a national member of the FID. For 5 years it has participated in documentation training courses in French- and English-speaking Africa; in projects of ISO/T.C. 37 and T.C. 46; and in work at the UNESCO departments for scholarship, libraries, documentation, and archives. In addition the secretary's office for the International Council for Reprography (ICR) is in the DGD. The international activities of the DGD are financed by funds from the Ministry for Scholarship; also the *Arbeitsstelle für Terminologie und Sprachfragen* (Study Center for Terminology and Language Problems), which works out the terminology and its international agreement.

It would be difficult to weigh the activities of the DGD committees, but it can be stated objectively that for many years the DGD has been concentrating on two areas almost exclusively: *medical diagnosis documentation* [for medical literature documentation, on the other hand, the Deutsches Institut für Medizinische Dokumentation und Information, DIMDI (German Institute for Medical Documentation and Information) was founded in Cologne], which is a special branch of medical data documentation, through the Deutsche Gesellschaft für Medizinische Dokumentation und Statistik, GMDS (German Society for Medical Documentation and Statistics) in the DGD; and *patent documentation*, through the committee on patent documentation with its testing groups.

The DGD is headed by an eighteen-member board of directors, out of which a five-member executive board is elected. Mr. Ernst Lutterbeck has been the president of DGD since November 1972. LID and ZDoK have special advisory bodies. For important individual projects (for example, publishing, coordination of committees, annual conventions) special chairmen are appointed. The DGD has about 800 members. The 1971 budget will be more than 1 million DM (including the funds given to the GMDS by the Federal Minister for Health).

The DGD, similarly to other institutions established by the state or fully financed by the state, faces the same situation as the nongovernmental organizations, as opposed to the governmental organizations with high government subsidies. The DGD is of the opinion that there is still room for individual initiative, and that the government, if it wishes to solve the problem of directing all important information

to the point where it will be of the most use, must enlist the cooperation, the idealism, and the special knowledge of its citizens.

The German Society for Documentation, e.V., is located at 6 Frankfurt a.M., Westend St. 19; the Foreign Secretarial Office of the DGD is at 534 Bad Honnef, Lohfeld 76; and the German Society for Medical Documentation and Statistics in the DGD is at 6900 Heidelberg, Berliner St. 27.

HELMUT ARNTZ
(*Translated by Marie-Luise Stueart*)

Training in Information and Documentation Sciences in the Federal Republic of Germany

AREA OF INSTRUCTION. DEFINITIONS

Research and development in all areas of human creative efforts depend on the complete and expedient availability of relevant information. This includes the recording of the so-called *formal,* i.e., predominantly written information, as well as the *oral,* i.e., those areas of information recorded from, for example, conventions or discussions. Actually, the oral portion can make up as much as 50% of the total information (*1*). Both groups together comprise the total amount of information in which the information science is limited to those processes which serve to solve problems in order to increase the knowledge or understanding of a person or a group of people (work team). This total amount of information is a result of including all activities in science, technology, and management in a private as well as within a public and administrative field, with the goal of making all conceivable information available to the user or a group of users: plans and designs directed toward research, development and technical execution of methods by including pilot projects.

Although a certain precision of documentation and information seems to have been achieved in this manner, the question of definition has become considerably less obvious in the last few years. At the time when the definitions for "documentation" (1954) and "information" were accepted, most documentalists were quite clear about the concept of documentation: it included the systematic concentration of literature, its expert recording and processing according to subject content, and its storage in appropriate depositories from which it can then be made instantly, selectively, and accurately available under the concept of "retrieval." In this way information was labeled as the *active form* of documentation, with an increasing tendency to look upon documentation as the different tools for information. This point is not to be explored further in this connection, although it is necessary to establish a certain basis for the following text. In doing so we will refer primarily to the basic explanations of definitions by Schober and Wersig (*2*), as well as by Koblitz (*3*), who define the total field as "information and documentation science." The opinion of Kunz and

Rittel in their evaluation of the information sciences must also be considered (*4*), according to which "documentation systems are special information systems." Therefore "documentation research is an information science. It is a particular kind of information sciences, because documentation systems make up the core of especially important information systems."

In consideration of these ideas, we will define documentation and information jointly as information sciences (*5*, *6*).

These difficulties of definition explain why no clearly defined training programs for the information sciences have been established in the BRD to date; however, those fields bordering on the information sciences or overlapping them (library sciences, informatik) already have good results from their training programs or expect them in the near future. A similar situation exists in medicine which, as a result of its subject structure, already has chairs for medical documentation and statistics.

The statements made here are valid both on a national and international level in spite of long and intensive study of the training problems in the large area of information. In addition, the tremendous increase in information—in chemistry alone it doubles every 11 or 12 years (*7*)—has made it perfectly clear that the questions of access to information, or in other words the theory of the information sciences, has become the key question for the existence of documentation and information. The critical situation for all relevant training programs thus becomes clear, despite recognizable results in the DDR (*8*) and also in the United States, the USSR, the United Kingdom (*9*).

NATIONAL EFFORTS TOWARD TRAINING IN INFORMATION SCIENCES IN THE BRD

The necessity for training courses early became the focus of the board of directors of the Deutsche Gesellschaft für Dokumentation—DGD (German Society for Documentation). Discussions and negotiations on the subject of documentation and information in the BRD centered on these training programs [See the subarticle on Germany entitled "German Society for Documentation (DGD)"]. In the meetings of the board of the DGD in 1955–1956 the president of the board at that time (Pietsch), with the support of his colleagues on the board, primarily by Fill (*10*), took up this question of training in the information fields, based on his studies to this question, especially in the Netherlands (NIDER) (*11*). The Ausbildung für Dokumentare (Training for Documentalists) Committee was converted into a Kuratorium für Nachwuchsbildung (Board for Training Recruits), which a few years later changed to the Fachbeirat für Ausbildung (Special Council for Training) under H. W. Schober, Berlin, who appropriately divided it into a Arbeitsgruppe für Fragen des Dokumentationslehrinstitutes (Study Group for Questions on the Documentation Training Institute)—Fill, and Forschung, Lehre und Studium an Hochschulen und Akademien (Research, Teaching and Studies at Colleges and Specialized Institutions of Higher Learning)—Pietsch groups. The training courses

thus created in the Lehrinstitut für Dokumentation—LID (Training Institute for Documentation), as part of the DGD, improved from course to course in profile and content with the intent of achieving national acknowledgment, which has to be granted through the Ministery of Education of the state where the institute is located, i.e., in the state of Hessen. Between 1957 to the beginning of 1971, 400 documentalists were trained: 122 academic documentalists, 250 certified documentalists, and 28 documentation assistants (*12*). See also the subarticle on Germany entitled "Training of Documentalists and Information Officers on a Nonuniversity Level in the Federal Republic of Germany."

A second way was initiated in 1958 upon the suggestion of F. Frowein within the Gemeinschaftsausschuss der Technik—GdT (Joint Committee on Technology), whose members are the technological-scientific associations, the associations of management and employers, the professional engineers organizations, the employee organizations, and those federal ministeries concerned with questions of technologies. Starting from questions on information in the area of patents, it led to the founding of the Committee "Documentation" (Pietsch) whose first job was to study whether the creation of an Institute for Documentation (IDW) in the BRD would be significant in the sense that it would not carry out any actual research, but that the material and economic management and the financial promotion of information and documentation activities would be turned over to it. The recommendation of the GdT committee was affirmative: In 1961 the IDW was established as part of the Max Planck Society. Together with the DGD, it was able to take over control (and balanced financing) of the activities of the Documentation Training Institute in Frankfurt.

The second recommendation the GdT-committee of Documentation assumed resulted in the "Leitsatze für eine nationale Dokumentations- und Informationspolitik im Bereiche von Wissenschaft und Technik" ("Principles for a National Documentation and Information Policy in the Areas of Science and Technology"), the so-called Lechmann-Thesen (*13*). After about 2 years of study they were adopted—in a somewhat changed format—as the "Vorschläge zum Aufbau eines umfassenden Informationsnetzes in der Bundesrepublik Deutschland" ("Suggestions for the Creation of a Comprehensive Information Network in the Federal Republic of Germany"), and intended for the information and evaluation of the federal government, the state governments, the Bundestag, and the supporting panels of the GdT. As far as these topics pertain to this article, they are quoted here (*14*):

> Existence, efficiency, and the competitive ability of an industrial nation and also its social development depend primarily upon the speed and quality of converting information about research and development results into the manufacture of new materials and goods, and into new production methods, as well as making them useful in a sociopolitical scope. In the Federal Republic of Germany the foremost responsibility emerging from this is the need to develop suitable establishments for the immediate availability of information to industry, political and economic organizations, and parliaments and governments, in order that they may be informed as quickly and as accurately as possible. The need for informa-

> tion exists for all fields of national and international research and development, but primarily for the whole technology, including patents, medicine, law, sociology, and politics.
>
> This comprehensive information responsibility necessitates a well-synchronized collaboration between management—including its organizations—science, and government agencies.
>
> A thorough training of new recruits for the fields of sciences, technology, economics, and government in the methods of information and documentation, as well as the training of specialists for information and documentation centers, is essential as is more intensified research in the fields of information and documentation science.

It is understandable that the IDW did not want to limit its activities in the training of documentalists to the more or less economic assistance of the Training Institute of the DGD, but that it also took on the much larger question of training in the information sciences, especially on the nonuniversity level. The committee work in the IDW is based on a survey by Kung (Heidelberg) and Rittel (University of California), both members of the Studiengruppe für Systemforschung, e.V. (Study Group for Systems Research), under the title *Die Informationswissenschaften—ihre Ansätze, Probleme, Methoden und ihr Ausbau in der Bundesrepublik Deutschland* (*4*). In the first detailed discussion in the IDW, experts from many areas concerned participated. The following are excerpts of the report's guidelines:

> An analysis of the status of information research indicates that this field is still in the stage of formation and orientation. In spite of extensive efforts and an abundance of findings, there is still no balanced division of projects into the various fields. The theoretical principles of the fields and the problems of planning methods are especially in need of more intensified and coordinated efforts. The nontechnical and nonscientific information systems particularly have so far received little attention, although the need has been well recognized. Further, the results of introducing information systems have so far barely been investigated. A reorientation of information-science research in connection with these "deficiencies" has begun (*15*).
>
> The establishment of information sciences in the BRD should therefore be concentrated primarily on the existing information-science research installations in order to arrive at a few specialized areas of concentration; for example, classification rules, thesaurus construction, documentation languages, communication procedures, academic theoretical principles, nonnumerical data processing for the documentation, mechanically supported text preparation, plan and outline for prototype information systems, and the development of systems-analytical methods (*16*).
>
> There is no single job description of the information scientist. This is not only because information science is a young field, but also because of the many different functions which have to be filled by the specialists in the information sciences. Each academic structuring of the field must give credit to a large number of professional impressions, some of which are not yet established. The need for information scientists is a fact; variations in their training is of secondary importance for their respective professional function so long as it is guaranteed that the main emphasis in their training includes the principles and methods of information science (*17*).

> The number of information scientists needed—therefore to be trained—per year in the BRD is about 600 (*18*).

The Kunz-Rittel evaluation takes the diversity of information demands into account insofar that the student does not have to confine himself to a limited subject within one particular discipline, but that he *can help in the transition from a single discipline of scholarship to a subdivision of subject fields*, which is now being undertaken as part of the educational reforms in the federal republic. The proposed method will take the interdisciplinary approach into account. At the same time the opinion is voiced that a college education cannot adequately prepare a graduate to fill future jobs; for example, in industry. From the beginning of training a combination of information sciences with other subject areas and disciplines should be facilitated and offered. Two study programs are suggested: Information sciences as a secondary subject or as a main subject. The creation of a main subject (major) in information sciences would require a structural change of main and secondary subjects in the BRD, possibly modeled after the system in the United States. There the information scientist has the chance to complete his study in information science through graduate study, i.e., before he can pursue this subject he has to complete an undergraduate degree (bachelor's) in another subject. The suggestion for the BRD is as follows: during the first half of the study program (perhaps up to the Vorexamen—first examination—or the first diploma), information science can only be taken as a minor subject. For students who have taken a diploma or passed a state examination in another subject, the possibility should be created for them to earn a second diploma in the information sciences. Besides that, the possibility should exist to admit some parts of information science as a minor subject in a natural science, social sciences, or fine arts course of study. For those who have completed the study course for a diploma, there should be a chance, under the proper conditions, to acquire a doctorate. The last-mentioned course should lead primarily to create more teachers at institutions of higher learning and more researchers. The planning and designing of information systems is among the first priorities in the planned course of study: therefore each student with an information science major must pass the whole sequence of Entwurfpraktika (practical courses in designing systems); his admittance to a Praktikum (course of practical work) should, among other things, depend upon his completing the preliminary practical study. The relationship to the bordering areas must be carefully taken into consideration. This applies to library science as well as to psychology and mathematics. The Kunz-Rittel evaluation is aware that the area of information sciences discussed is only a section of the total field of information. Therefore it recommends for further improvement the creation of a Fachbeirats für Informationswissenschaften (Special Committee for Information Sciences) (*4*).

As a preliminary result of the first IDW meeting on these problems, the following guidelines, among others, were worked out for the further handling of this question: In spite of close relationship and cooperation with other areas of knowledge, the *information sciences demand an independent subject field*, especially

since the responsibilities and problems assigned to them are not handled by any other academic or technical discipline in the BRD. The result is an urgent demand for an open and flexible study program which will make possible a large number of specialized and individual study courses, i.e., the creation of a combined system with corresponding opportunities for variations and a number of choices. There are as many possibilities and kinds of specialization as there are for application. Participation in practical design courses—where real information problems are to be worked out—is obligatory in the beginning of training. Planned areas of study include theories and methodologies of information sciences, information procedures, structure and description of information, transformation of information, technology of information systems, information policies and legislation, and organization and management of information systems. Upon completion of the study program and receipt of a diploma, the possibility for promotion and further research as part of a continued study program is planned. Study and research stipends should be made available in adequate numbers in order to fill the need for new specialists, especially teachers, as quickly as possible. Efforts should be made to have foreign visiting lecturers, at least in the beginning.

INTERNATIONAL EFFORTS TO INTRODUCE INFORMATION SCIENCES AS A TEACHING SUBJECT

The international association for documentation, the Fédération Internationale de Documentation (FID), has taken the initiative to have the question of the necessity for training documentalists (information officers) investigated in a special committee on training documentalists [established 1951, since spring 1970 called Education and Training: FID/TD or FID/ET)]. This institution, up to 1972 under Polish direction (Centralny Instytut Informacji Naukowa Technicznej i Ekonomicznej: CIINTE), from 1973 under the direction of the BRD (Wersig) with members from the BRD and DDR, and other nations, is working on the whole field of information and documentation (*19*): study of existing installations, setting up exhibit models for teaching programs, working out systems favorable to the user and consideration for the question of the relationship between the user and information officer (psychological–sociological aspects), allowing for the principles of documentation and information to be considered in the last year of a higher education in schools; and organization and realization of special training courses on an international level. During the last meetings, in Lançut, Frankfurt a.M., and Warsaw, resolutions were worked out, adopted, and passed on the UNESCO via the FID Council, with the aim that UNESCO would forward them to the governments in question as recommendations. Following a statement of the urgency and necessity for documentation and information, the resolution reads as follows (*20*):

> Realizing that well-trained and competent information specialists constitute one of the decisive factors in the information work;
>
> Being aware of the fact that, unfortunately, training of information specialists in many cases does not have the full support it requires from responsible agencies;

> Being convinced that the maximum effectiveness of documentation and information services could be reached only when not only the information specialists but also those who produce and use the information are well trained and educated;
>
> It is hereby resolved that UNESCO recommends to appropriate agencies in its member states responsible for education, scientific, and technological planning and development, to give high priority to the study, organization, and development of education and training for scientific and technological information work.
>
> It is also resolved that UNESCO recommends to appropriate agencies in its member states responsible for education to ensure that adequate time and facilities for the training of students in universities and other institutions of higher learning in the use of scientific and technical literature and documentation be included in the curricula.

Independently, but with the same aim, work of the European Economic Association Special Commission Wissenschaftliche und Technische Information und Dokumentation (Scientific and Technical Information and Documentation) progresses in connection with the Kommission der Europäischen Gemeinschaft/Generaldirektion Allgemeine Forschung (Committee of the European Community/Board of Directors for General Research), Brussels; the BRD, through the BMBW, the IDW, and others, is also participating in these projects. Programs currently under consideration are: consideration of education and training of information specialists or information generalists in connection with industry, research, business, government, and mass media under the concept that a decision on basic principles for the training of documentalists and information specialists must be approached from a broad base. Attention is also given to the question already taken up by FID/TD (see above) of the relationship between the user and the information producer (*1*), tending toward achieving user-oriented information systems (*21*); also the question of borders between national institutions and international ones, the study of primary publications (responsibilities and attitudes between author, editor, and publisher), the intellectual demands or prerequisites which are to be asked of the student in this field, and the computer science (= informatik) which would have to be included in the training program (especially since library science is increasingly gravitating toward a new dynamism such as is demonstrated by the automatic production of bibliographies—which can already look back on 5 years of practice. The OECD seminar (March 1970) on the problem of government responsibilities for the information system in industry and government (how can industry help the government, how can government help industry) made the recommendations that the need for information specialists be established and that building an international school for the training of specialists be considered. Such a university-level center would simultaneously improve conditions in the various countries (*22*) (see also Ref. *23*).

The work of both panels still needs considerable time before recommendations for specific teaching programs can be made, particularly since it will be extremely difficult to create the necessary academic quality on an international level within a short time.

THE SITUATION OF INFORMATION AND DOCUMENTATION TRAINING IN THE BRD

Because of the extraordinary subject diversity of information and documentation, the already mentioned question of drawing border lines is very difficult.

The *library sciences* may possibly keep their specific plan—developed over many years—of training their professionals, or it may have to be improved (or even radically changed!). The results of a colloquium at the Library Training Institute in Cologne (October 1969) may be mentioned in this connection: Grunwald and Krieg defended their concept that library science must be taken as a science in a stricter sense, having as its object the professional training for libraries or in the problems of information systems and communication networks (*31a*). In this manner library science would become a *special applied information science,* a new and independent science in research and teaching (*24*).

Studies and plans have, in the meantime, been made on the much smaller field (compared to information science) of computer science. It must be clearly indicated that with around 7,300 computer centers in the BRD (as of February 1971) there is no adequately competent personnel available for the use of these installations (*25*). This situation is not tolerable, and competent sources in industry insist that temporarily the urgent need for specialists be filled primarily by mathematicians or engineers. The number of computer scientists needed before 1975 is estimated at about 8,000 (*26*). The Federal Ministry for Education and Research has, in the meantime, made efforts to create a computer science study program by establishing chairs for computer science (called Informatik). The first results of this program are easily recognized: a survey of the colleges in the BRD indicated that in the summer semester of 1970 about 1,100 students had registered for computer science, with the following distribution; Munich 300, Karlsruhe 250, Berlin 215, Kiel 160, Darmstadt 85, Erlangen/Nürnberg 45, and Bonn 30. During the winter semester 1970–1971 there were additional enrollment possibilities at the universities of Hamburg, Saarbrücken, and Stuttgart. At the same time, lectures in computer science were offered at the colleges in Aachen, Freiburg, Hanover, and Cologne. A 50% increase in the number of students occurred in the winter semester 1970–1971 (*27*). Dortmund began offering (from August 1971 on) a college-level education in computer science at the Fachhochschule (technical college) (*28*). In 1969 the computer scientists organized the Gesellschaft für Informatik (Society for Computer Science) located in Saarbrücken (*29*). In spite of these favorable developments on the college level, it will still be necessary—at least in the beginning—to train people by special lectures and introductory courses such as those offered by the Center for Mechanized Documentation (ZMD) and by the German Computer Center (DRZ) in Darmstadt. In addition, the introductory courses and seminars held by the firms which build computers—such as IBM—will continue to fill the gaps. Computer science is built on thorough introductory training in the fields of mathematics, physics, and electrical engineering in order to lead the students from these areas into the field of hardware (*30, 31*). From the

standpoint of the information sciences, which so far in the BRD are still without a decision on their institutionalization at the universities, and therefore actually exist only through private initiative (see below), it appears to be necessary to keep the path to an agreement with computer science open in order to arrive at a possible *joint training program in the fields of computer science* (similar to combining all mathematical and technical fields of knowledge which are connected to the development and use of EDV installations) *and*—by definition a considerably larger field—*information sciences* (which make use of the methods of documentation for the classified compilation of literature, processing by subject, storage and retrieval procedures, including all reprographical work connected with this, which must be given special organizational attention). We must keep aware that the Informatik comprises only a section, although a very important one—namely that of computer science—out of the large field of the information sciences. Even library science should be more strongly motivated than before to hold joint introductory sessions of the library training institute and the information sciences; in this connection the observations of Grunwald and Krieg are of special importance and value (*31a*).

A special field within the information sciences is medicine. Wagner, in his annual report on the responsibilities and achievements of the Deutsche Gesellschaft für Medizinische Dokumentation und Statistik (German Society for Medical Documentation and Statistics) in the Deutsche Gesellschaft für Dokumentation—GMD (German Society for Documentation), comments on this (*32*):

> A society which sees its duty in the promotion of modern scientific methods cannot be satisfied with demonstrating the scientific progress during conventions. It must also make an effort to introduce the knowledge of proven methods to as wide a circle of consumers as possible.

The GMD has from the very beginning made an effort to do productive work in this sense through study programs, seminars, and continuous training courses for physicians. In 1957 a 1-week seminar for 123 physicians was held in Münster, in 1961 a 2-week international seminar with 231 physicians in Berlin, and in 1963 a similar training course in Cologne. Following these, the Arbeitsgruppe Ausbildung und Fortbildung (Study Group for Training and Further Education) was appointed. In the following year—under H. J. Heite, with financial support from the IDW—five continuing training courses for physicians and seven training courses for the training of medical documentation assistants (this professional characterization was not known in the BRD until this time) were held. In April 1967 a committee to work out the curriculum for a 2-year training course for documentation assistants was appointed in the GMD, which served as a model for the first school for the training of medical documentation assistants in the BRD, opened in Ulm in the fall of 1969. An additional training center began in 1971 in Giessen.

The fact that the medical profession very early took most of the responsibility into their own hands (they represent about a third of the 800 members of the DGD in 1970) is very much a result of the fact that the diagnosis documentation pursued by them requires a specific attitude toward the object, the human being: the

systematic preparation and formulation of the so-called Krankenblätter (clinical data sheets) which make statistical use of the training and practice of the physician. As a result, since 1964, chairs for medical documentation and statistics have been created in connection with the universities in Berlin, Bonn, Düsseldorf, Freiburg, Hamburg, Heidelberg, Kiel (including Lübeck), Mainz, Marburg, Münster (including Bielefeld with its Institut für Dokumentation und Information über Sozialmedizin und Öffentliches Gesundheitswesen—Institute for Documentation and Information on Social Medicine and Public Health), and Tübingen. In addition, there are training programs in the School for Medical Documentation (for documentation assistants) in Ulm (1969) and in Giessen (1971).

Training at the college institutes is a 2-year full-time course of study with instruction in medicine, mathematics, statistics, literature, and data documentation—including data processing, library training, and administration in the respective field. The practice-oriented training is interrupted for short-term practical work in clinical stations, clinical libraries, and archives, and for sufficient computer activity. The need for medical documentalists is considerable: it is estimated at about 2,000 for the next 5 years, and at about 400 for each of the following years (as of February 1971).

The situation of the real information sciences is very different. In the beginning of their considerations on the principles for an academic structuring of the information sciences in the BRD, Kunz and Rittel (*26*) state:

> The BRD is—compared to other countries—quite far behind where training in information sciences is concerned. Compared to the United States it is alarmingly far behind. Vigorous efforts could diminish this difference. The opportunity lies in utilizing the experiences gained elsewhere from the beginning and to realize new concepts.

This statement applies completely to the situation in the BRD; not to West Berlin. This fact must be credited to the City Council of the Free City of Berlin and Prof. Dr. H.-W. Schober, who has been energetically developing a working program for education and research in documentation and information science for years (*33*). In 1968 documentation was assigned to him as an independent teaching and examination subject, while he was attached to the philosophy faculty. Schober applied the term "documentation and information science" to his new assignment. Study in this field can be done as a minor subject or as a major subject; as a minor subject the requirements are at least 4 semesters with a minimum of 4 hours per week; as a major subject the permission of the special advisor and of the faculty are required. The academic certificate is the M.A. and/or the Ph.D. The subjects of library science and documentation indicate their training programs jointly; each recognizing the other. The chair for documentation has the right to give lectures to students of all disciplines as well as giving special lectures at the Berlin Librarian Academy (Institute for Library Education at the Free University of Berlin); the latter are also valid as part of the examination for the candidates for gehobener Dienst (certified librarian) in academic libraries. For candidates at public libraries

there is a six-semester introductory study in documentation. The candidates are offered—among the subjects selected for the examination toward a diploma—one in the area of documentation. Schober has seven assistants to help him in carrying out his work and with lectures and seminars. Beginning with the summer semester in 1971, cooperation in the academic fields of communication and information and documentation sciences occurred. Considerations for building a large central institute for documentation sciences are under way (1971). The decisive difference between the situation in West Berlin, with an understanding and enthusiastic government, and the situation in the BRD is probably because in West Berlin a certain stability was achieved by admitting the information sciences to the obligatory subjects included in the examinations. This situation does not yet exist in the BRD, and therefore there is no motivation to attend lectures in a subject which is not included in the final examinations. A situation similar to the one in West Berlin exists in the DDR, which has for years aimed toward and achieved its academic goals with noticeable success through subject majors at its colleges as well as through correspondence courses (*8*). A few other explanations for the delay in deciding on a significant and active program, which is separated from bordering areas but is a clearly defined subject, have already been given.

Although the topics of the lectures and exercises offered vary from semester to semester, the total number nevertheless results in a useful profile for a certain period of time and is representative of the currently existing (inadequate) program. The following summary will give an idea of the curriculum in the total field of information sciences in the BRD, including West Berlin. The status given as of January 1970 (*34*).

AACHEN

Technische Hochschule (School of Technology)

External institute with the college institutes: Technische Akademie Bergisch-Land and Institüt für Führungslehre. The Technische Akademie e.V. conducts seminars among others on the topics: Basic mathematical knowledge for programmers and organizers, programming with practice exercises logic/standardization of programming, EDV (electronic data processing), medical documentation with EDV, EDV installations and punchcard machines, process computer systems, net-working technique, data banks, Datenfernverarbeitung (remote data processing), personnel administration, personnel management with electronic data processing, COBAL, FORTAN, operations research, systems analysis, development, and adaptation.

WEST BERLIN

Freie Universität (FU)

Lectures: Possibilities and Methods of Documentation (Schober).
Introduction to Documentation (Schober).

Exercises/Seminars: Processing of Various Kinds of Documents (Krumholz).
Documentation and Library, Their Tasks and Methods in Transmitting Information (Laux).

Problems and Aids in Documentation (Schober).
Languages in Documentation (Schober/Wersig).
The Documentation Center and Its Users (Schober. Wersig).

Special Lecturers: In Publicity (Schober).
In Library Science (Laux).
In Political Science (Krumholz).

Technische Universität (TU)

Lectures: Documentation and Library Standards (Kaegbein).
Catalogs, Card-Indexes, Indexes (Kaegbein).

FRANKFURT AM MAIN

University

Lectures: Introduction to Bibliography (Köttelwesch).
The Information Contents of Chemistry and Physics Literature, Part I and II (Pietsch).

Excursions/Seminars: Special Themes in Chemical Information (Pietsch).
Visits to Modern Information Services and Libraries (Pietsch).

Center for Mechanized Documentation (ZMD)

Training Courses in Mechanized Documentation (in two parts with a total of 114 teaching hours).

Training Courses in Data Recording (total of 24 teaching hours).

Postuniversity Training for Information Scientists with Specialization in Subject Indexing and Retrieval (2 years).

MARBURG

University

Lecture: Medical Biological Documentation (Scheele).

REGENSBURG

University

Exercises: General Bibliography. Introduction in the Use of the Large National Bibliographies, Library Catalogs, and Indexes of Periodicals (Pauer).

STUTTGART

University

Lecture: Introduction to the Use and Documentation of Technical Literature (Kirchhof).

PARTICIPATION BY THE FEDERAL REPUBLIC OF GERMANY IN INFORMATION WORK IN OTHER COUNTRIES

The committee FID/TD, during its Warsaw meeting of 1970, decided to hold an International Seminar of Educational Problems in 1972 in Hungary. The BRD actively participated.

In order to diminish the difference between industrialized and developing coun-

tries, it is necessary to make this newly discovered knowledge available on a worldwide basis by establishing and perfecting documentation centers, and thus, by closing this technological gap, making it possible for these countries to catch up with the industrial nations. Building on this basic concept, the Friedrich-Naumann-Stiftung began in 1965 to organize training programs in documentation in West Africa and in 1968 in East Africa, and carried them out with their own financial resources (see below). Arntz gave some directive points to the subject (*35*) in "Documentation for Developing Countries," November 1968, at the Institute Ali Bach Hamba (Tunis), in which specialists from the UNESCO, FID, OECD, industrial nations, and the Francophile African countries participated. Arntz made it clear that the young countries were themselves responsible for achieving decisive production in the areas of documentation and library systems, but that it should be the *responsibility of the industrial nations to take over training* of the documentalists, i.e., to make available information and documentation sciences and to handle the methods for acquiring them. Requirement for participation in the training courses is the bachelor's degree. Efforts are made to train technical personnel on a national level, candidates for the Gehobener Dienst (certified librarian) on a regional level (the locations for teaching are Tunis for documentalists and Dakar for librarians), with practical cooperation between national, regional, and international documentation institutions in order to promote economic, social, and cultural development through a coordinated network of information exchange. The basic subsidies through the Friedrich-Naumann-Stiftung are additionally supported by amounts from UNESCO and from Tunesia and Uganda, respectively.

Under the direction of Vice-President Arntz of the FID, five training courses (in French) had been given (by the beginning of 1971) at the Institute Ali Bach Hamba with such success that Pérez-Vitoria, Departement de la Documentation des Bibliothèques et des Archives of the UNESCO, raised the question during a planning session in 1967 (*36*) of whether the BRD—in view of the evident training program successes in Tunis—would be willing to organize corresponding training courses in East-Africa (in English). In 1969 the program came into being. The training program director in Uganda, Cordes Koch-Mehrin, was able to carry out this course with thirteen participants in Kampala in spite of initial organizational difficulties (*37*). Six lecturers helped the director (Krumholz), and the examination was given by Arntz. The participants, whose number per course was limited to twenty, came from different countries. The 1970 training course in Tunis was attended by participants from Tunisia, Algeria, Morocco, Dahomey, Cameroon; Kampala/Uganda) had participants from Uganda, Kenya, Tanzania, and Zambia.

Krumholz (*37*), a member of the training program administration in Kampala, after his raining course, made the following remarks about fundamental reforms in the training courses: "contrary to the generally accepted practice to make the lecture materials available only after the actual lecture—resulting above all from the international make-up of the teaching personnel—it is imperative to have the materials available at the latest in time for the corresponding lecture." It has been recognized that practical exercises have to follow the lectures immediately.

The fundamental *importance of the African training courses* is evident from the fact that a few of the participating countries have already planned or realized the establishment of national or regional documentation institutions (*37*) in which the training course participants who achieved especially good marks have been assigned leading positions.

DOCUMENTATION AND INFORMATION INSTRUCTION AT UNIVERSITIES

Now that it has become an undisputed fact that information sciences will soon be an established subject at schools, the question is raised of the manner in which the student can be prepared for this during his last school years. According to thorough considerations within the FID/TD (Warsaw, 1970), it seems advisable to include this preparatory teaching in the last 2 school years. A recommendation to this effect has been passed on from the FID/ET via the FID Council to UNESCO. For demonstration material there is the technique of marginally punched cards and peek-a-boo cards, which, together with an order of definitions for already existing teaching subjects, can be given as experimental work to the student. The first experiments in the BRD of study groups have been made.

FUTURE OF THE INFORMATION SCIENCES IN THE BRD

The tremendous changes of our times demand increased economy and efficiency in intellectual work. This changing in thought and restructuring requires a consequent incorporation of the information sciences at the universities of the BRD. On a federal level this development is handled by the federal promotional program of the Federal Ministery for Education and Research, supported by the planning activities of the Institute for Documentation.

The college reforms in process will bring about a change of disciplines into subject areas, an important decision for the interdisciplinary information sciences.

The following guidelines are for the relationship between the information sciences and the universities:

> The information sciences should be coordinated to one (or several) subject area, should be recognized as a valid study program with admission to examinations (major subject, minor subject), and at the same time should contain possibilities for research.
>
> In order to manage the turbulent developments of these decades, additional study programs which will inform the already educated scholar about the current standing of knowledge, have to be established at the universities.
>
> The separate study program in computer science should create and maintain a loose bond with the information sciences through joint announcements of certain lectures and seminars.
>
> Dynamic cooperation should exist between library science and information science; both disciplines are concerned with the same basic item: the document in all publication forms.

School and university should represent one educational unit; therefore the first should—perhaps during the last 2 schools year—introduce the methods of documentation and information (systems of concept, working with manual and punched cards).

The rapid realization of these basic requirements would ensure timely development of the information sciences in the BRD.

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Training of Documentalists and Information Officers at the Nonuniversity Level in the Federal Republic of Germany

The first public discussion of the need to recruit and train appropriate personnel for the field of documentation took place in the Federal Republic of Germany in 1953. At that time there existed a great number of Literaturnachsweisstellen (information offices for literature), especially in industry. Leaders in these activities had developed methods and procedures for their special tasks which, since the early 1940s, had been gathered under the term "documentation." To some extent those leaders were librarians; most of them, however, were experts in various disciplines who had a peculiar tendency for working with literature, for systemization, and for classification. They trained their collaborators themselves and usually only for their special tasks.

In November 1953 Karl Fill presented his *Thesis on the Training of Documentalists* (*1*) at the 5th Convention of the Deutsche Gesellschaft fur Dokumentation, DGD (German Association of Documentation) in Goslar. He demanded the development of programs for vocational education and the assignment of special experienced practitioners to teach them.

During the convention a small Committee for Training Questions was created. It set to work immediately and in March 1954 organized the "First Training Course for Documentation and Its Technical Tools." Everybody interested in documentation was welcome to this first training course; only a good general knowledge was expected, professional education was not a prerequisite, and the age of members was not restricted.

This first training course met with a lively response and caused DGD to include in the program the "promotion and supporting of training of documentalists in all fields of techniques and sciences, economy and administration." The "Training and Improvement of Documentation Experts" was added to the charter, as a special task, in 1960.

A "Second Training Course for Documentation" was announced for March 1965; the response demonstrated that the engineering sciences and industry recognized the importance of documentation and that DGD met a real need with its training courses. This second course, however, confirmed the experience of the first one, that the needs of the members were extremely varied. On the one hand there were older, self-made documentalists who wanted to deepen and to broaden their self-gained knowledge and wanted further practice in documentation techniques. On the other hand there were younger people who saw documentation as a profession for the future and who asked for a fundamental, comprehensive, full education ending with an examination and a certificate. There was a strong demand to introduce documentation into technical high schools and universities to provide a modern tool to the students and set the stage for the documentation sciences.

Information and information techniques at that time were principally enveloped in the term "documentation"; but training for documentalists should deal with information problems as well.

The experiences from the first two courses and from several special courses which followed resulted in changes and the establishment of a Board of Training. As its first project it worked out a syllabus for the first half year's course (100 hours), This course ran from December 1957 till June 1958.

The invitation for this course read:

> The course intends to train documentalists who want to be leaders of documentation centers or experienced experts in this profession. The course is not restricted to special fields of work and therefore comprises all the needs for documentation centers of the sciences, industry, commerce, trade, and management.

A second course in 1959 was extended to 120 hours, divided into eight different sessions; a third course followed in 1960 with 165 hours and eleven sessions.

From the very beginning it was the intent of DGD to offer full vocational education and training on various levels. This required first a good picture of the profession as a whole through the establishment of a list of the multilateral activities.

In 1960 a committee of experts dealt with the evaluation of specified activities in documentation in comparison with similar professions; for example, with activities in libraries or archives. Of course, such characteristics influence a syllabus (*2, 3*).

Professional documentalists incorporated as Verein Deutscher Dokumentare, VDD (Association of German Documentalists) in 1961. The objectives were to bring the new profession "documentation" to a proper place in society and to launch it into the civil service structure. For these reasons the following titles were established in 1961:

Dokumentationsgehilfe	Attendant documentalist
Dokumentationsassistent	Assistant documentalist
Diplomierter Dokumentar	Diplomaed documentalist
Wissenschaftlicher Dokumentar. Fachdokumentar	Scientific documentalist. Expert documentalist

In this way the learned society (DGD) and the professional association (VDD) were able to develop and promote good cooperation with the professions in the field of documentation.

In 1960 the Board of Training established the first Regulations for the Conduct of Training and Examination, managed the courses as Annual Courses, and enlarged them until they reached some stability in 1964 at 388 short hours (45 minutes each).

Since 1965 the courses take place at the Lehrinstitut für Dokumentation in der Deutschen Gesellschaft für Dokumentation, LID (Institute for Training of Documentation in the German Association of Documentation), 19, Westendstrasse, D-6 Frankfurt a.M. The teaching staff of two full-time, experienced, volunteer lecturers, who also run the institute, is augmented by experts from throughout the Federal Republic of Germany. The government shows great interest in the training facilities and supports the institute.

The mixed interests of those enrolled in the courses, their range of ages, and differences in their levels of education made teaching difficult. Beginning in 1968 it was possible to offer education and training at various levels in separate, independent courses for scientific and expert documentalists (at the university level), for diplomaed (fully graded) documentalists, and for assistant documentalists. There are no courses for attendant documentalists at present; as a rule they are trained in documentation offices for limited activities.

THE DIPLOMAED DOCUMENTALIST (*4,5*)

The training course in 1972 (fourteenth course) consisted of 440 hours (short hours of 45 minutes each) in twelve sessions. The sessions were held during 11 weeks, with lectures and training in the Institute in Frankfurt from January through September. In addition there were 2 weeks of practice in selected documentation centers. The final examination was given in October 1972.

Admission requirements include the so-called Abitur (the graduation certificate of a high or secondary school) or a comparable level of education plus 2 years of practice in a documentation center. At least a part of this practice should be at an Anerkannte Ausbildungsdokumentationsstelle (acknowledged training documentation center) (Table 1). Those training centers are obliged to provide systematic introduction and practicum in documentation and information, involving the use

TABLE 1

Training Documentation Centers (October 1, 1971)

Dokumentationsdienst der Deutschen Bundesbahn 6 Frankfurt a.M., Karlstrasse 4—6
Dokumentationsstelle für Bautechnik in der Fraunhofer-Gesellschaft 7 Stuttgart-W., Silberburgstrasse 119 A
Dokumentationszentrum der Bundeswehr 53 Bonn, Friedrich-Ebert-Allee 34
Universitätsbibliothek der Technischen Universität Berlin Abt. Literaturdokumentation 1 Berlin 12, Strasse des 17. Juni 135
Verein Deutscher Ingenieure, VDI-Bücherei und VDI-Dokumentationsstelle 4 Düsseldorf 1, Graf-Recke-Strasse 84
Zentralstelle für Atomkernenergie-Dokumentation (ZAED) 7501 Leopoldshafen, Kernforschungszentrum
Zentralstelle für Luftfahrtdokumentation und -information 8 München 27, Maria-Theresia-Strasse 21
Zentralstelle für maschinelle Dokumentation (ZMD) 6 Frankfurt a.M.-Niederrad, Herriotstrasse 5

of various relevant techniques. The practicum must be certificated. Activities in libraries, archives, or similar institutions can be credited.

A committee admits an applicant either on the basis of his credentials or after personal interview. It is not possible to register for only some lecture session; each applicant is obliged to participate in all sessions, to attend all lectures regularly, and to deliver home and seminar work at required times. All of these conditions must be fulfilled before admission to the final examination.

The examination is voluntary. Those not taking part can receive a certificate for participation in the course. However, in this case the course is not considered as "completed." The Regulations for the Conduct of Training and Examination of June 14, 1971, were in force for the 1972 annual course. The examination is held by an examining body whose members are appointed by the president of DGD and the director of LID. Decisions are by majority vote. The marks are:

Sehr gut (very good)	= 1: for extraordinary good result.
Gut (good)	= 2: for a result well above average.
Befriedigend (satisfactory)	= 3: for a result which fully meets all the average requirements.
Ausreichend (sufficient)	= 4: for a result which still meets the average requirements except for some particular deficiencies.
Mangelhaft (deficient)	= 5: for an unacceptable result because of considerable deficiencies.
Ungenügend (insufficient)	= 6: for a totally unsuitable result.

An examinee who has failed in the examination is allowed to repeat it with those enrolled in the next course. If he fails again, he has to repeat the whole course to be admitted for a further (and last) examination.

The fees are DM 600 (about $150) for the course and DM 100 (about $25) for the examination. Enrollees must pay for their travel, room, and board in Frankfurt.

The curriculum of the 1972 training course for diplomaed documentalists was:

1. *Introduction.* Historical survey. National and international organizations in the field of documentation or connected with it. History of science.
2. *Fundamentals of librarianship.* Bibliology. The German libraries (types, buildings). Acquisition. Cataloging and catalogs. Users. Copying and duplicating as library quick-service. Library staff. Bibliographies. Printed catalogs. National and other kinds of bibliographies. Visit to a scientific library.
   Special libraries. Development, organization, the modern trend. Acquisition, indexing, using reports, conference papers, patents, etc.
3. *Mathematics for documentalists.* Properties of numbers. Fundamentals of logic, theory of aggregates, combinatorial analysis, calculus of probability.

4. *Classification and classification systems.* Terminology and history of languages. Standardizing of terms. General problems of classification, principles, descriptors. Classification systems: formal systems, systematic-hierarchical systems, faceted and colon classification systems, the thesaurus method (principles, guidelines for developing a thesaurus, models of thesauri). The International Universal Decimal Classification (UDC), their history and present status of development.
5. *Formal processing and indexing documents.* The procedure of the documentation process. German standards in the field of documentation. Formal indexing. Objective indexing by keywords, descriptors, summaries, abstracts. Storage. Card files. Making and using indexes. Problems of handling reports, their indexing by descriptors. Samples from large foreign documentation centers.
6. *Information and the user.* Various characteristics of documentary information, different needs of users. Users profiles. Active information: circulation systems, information services, custom information according to users' profile. Exercises in editorial work. proofreading. Passive information: Supply of bibliographical details and technical particulars. Compiling of technical biblographies.
7. *Punched cards.* Principles of selection. The various kinds of punched cards. Coding methods. Structures of inquiries. Punched cards and automatic procedures. Demonstration of punching and sorting machines, exercises.
8. *Automatic processing.* Introduction into automatic documentation. Orginizing a project. Representation of data with punched cards, magnetic tapes. Electronic data processing, computers. Arranging of bibliographies, absract services, and indexes. Retrieval. Samples of systems in use.
9. *Reprography.* Techniques of reprographical procedures. Reproducion: Microfilm and Microfiches. Application of those procedures in the field of documentation. Equipment and organization of reprographical workrooms. Demonstration of machines and materials. Exercises.
10. *Legal science for documentalists.*
11. *Questions of administration.* Introduction to general management. Budget and cash-account. Estimate of costs.
12. *Organization and management of documentation centers.* Two 2-day peiods of practical work in two selected large documentation centers with theoretical introduction and guidance. The members of the training course have here the possibility to share full-time specific documentation work and to see the layout of well organized and equipped centers.

The DGD makes every effort to gain the endorsement of the government of the Federal Republic of Germany for the training program and the final certificate. The number of hours in these training courses will probably have to be increased to about 700 in two semesters. As soon as this objective is met, a complete theoretical education in addition to the 2 years of practice will be guaranteed and comparable with studies for librarianship.

THE ASSISTANT DOCUMENTALIST (6, 7)

The tasks of the assistant documentalist at various levels are:

Cataloging all kinds of documents.
Establishing simple card files and collections of documents.

Pre-sorting and sorting documentation cards according to simple or less difficult systems of order.
Marking and punching cards.
Designing codes for punched cards.
Circulating documents.
Assisting in preparing statistics.
Writing more difficult texts in connection with documentation cards, reference lists, indexes, acquisition of documents and lending service.
Responsible proofreading of simple texts.
Using more difficult reproduction processes.
Assisting in retrieval.

Trainng is for 2 full years. The best age for starting is between 16–20 years; the applcant, however, should not be more than 35.

Admission requirements include a graduation certificate from a higher grade or a technical school, knowledge of at least one foreign language (English, French, Russian, and efficient typewriting and shorthand. In exceptional cases the successful completion of an apprenticeship (e.g., to a bookseller or in any technical field) wil be accepted.

The course comprises about 3,800 hours, of these, 3,400 hours are devoted to decentralized practical training in a documentation center. At least 200 hours more are spent in one of the Anerkannte Ausbildungsdokumentationsstellen (acknowedged training documentation centers) (see Table I) for theoretical lectures on

Introduction to documentation, tasks, history, national and international organizaions, running a documentation center, information and retrieval.
library science in general.
Standards and rules for cataloging.
Classification, filing, and storage of documents in general.
Introduction to the use of punched cards, data processing, statistics, administratio, and office management.
Preparing of reference lists and indexes until "ready for press."

Abou 40 hours are devoted to a centralized course in reprographical processes, with lecures and exercises given alternately. Another centralized course of 2 weeks serves a the introduction to mechanized documentation.

During the course the students have the opportunity to visit documentation centers of different kinds, archives, libraries, printing offices, and publishing houses. They complete their training with a written or an oral examination for which they receive . certificate.

In ths case also, the DGD makes great efforts to receive the endorsement of the govenment for the course and the certificate.

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The Gmelin Institute

The Gmelin Institute in Frankfurt/Main has the task—as part of an entire chemical documentation—to reproduce all available knowledge in inorganic chemistry and the results of research in this field, and to make this knowledge available to the scientist. Leopold Gmelin, the founder of the handbook named after him, called the handbook a book of facts which, in addition to textbooks, must serve to provide information for teachers and students alike. This purpose has been changed very little basically, but has been expanded considerably.

The eighth edition of the handbook contains a very concentrated description of all chemical, physical-chemical, and physical facts which are essential for the scientifically complete description of chemical elements and their compounds. This description depends on the original publications. The text of the handbook therefore has a dual function: in addition to providing information by giving facts, it also serves a general referring purpose. Both functions are interwoven and complementary. The handbook text can, of course, perform this referring service much better and more accurately than any index which works with keywords, and which is therefore highly dependent upon the imagination of the user. The reason for this is that each reference in the handbook is accompanied by informative text, which permits immediate confirmation of the research concept and also facilitates easy expansion and specialization in the research process. This combination of information and reference gives the user insights; stimulates his imagination to find

new relationships, analogies, and foundations; and also gives him helpful hints for his daily practical work.

Many fields of knowledge, even those for which there are already many monographs in existence, become clear for the first time when they are treated in the Gmelin handbook, when their actual trends and objectives can be recognized and when the motivations which existed for the treatment of certain areas can be examined.

HISTORY

Leopold Gmelin was born in Tübingen in 1788. While he was professor of chemistry at Heidelberg University in 1817 he introduced the first edition of his *Handbuch der theoretischen Chemie* (*Handbook of Theoretical Chemistry*), which he had designed "for the purpose of his lectures." In the introduction to the first edition Leopold Gmelin described the organization of the material. In principle this corresponds to the organization used in the eighth edition. The first volume of the three-volume work contains—following an exposition of the theoretical concepts of chemistry during the early part of the nineteenth century—the description of the "inorganic compounds of the weighable nonmetallic materials," i.e., the elements hydrogen, oxygen, nitrogen, carbon, etc. and their simple compounds. The second volume deals with the theory of inorganic compounds of metals, and the third volume is devoted to the description of organic compounds, which are included in the Gmelin Handbook up to its fourth edition; they were finally dropped from the fifth edition—about 1852—and were from then on included in the *Handbook of Organic Chemistry* by Konrad Friedrich Beilstein.

The fourth edition, which appeared between 1843 and 1866 in eight volumes, is of special interest because immediately after its publication it was translated into English for the Cavendish Society and was at the same time brought up to date: a very impressive example of international cooperation in chemistry as early as the last century.

All editions were edited by Leopold Gmelin himself up to and including the fifth edition. After his death in 1853 the sixth edition was begun and completed in 1872 by a few of his colleagues under the direction of Karl Kraut.

The seventh edition of the Gmelin Handbook, begun in 1905, which was compiled by a group of university lecturers with Franz Peters as editor, served as a necessary and useful source of information during the time that the eighth edition was being drafted; however, it quickly became outdated because of the rapid developments in chemistry. The constantly increasing literature could no longer be handled by a small group of scientists working on part-time appointments. A new course was therefore undertaken: the founding of a full-time work group, appointed in 1922 through the Deutsche Chemische Gesellschaft (German Chemical Society). R. J. Meyer was appointed director of this work group. He had established a reputation with his research in the field of Seltenerdelemente (rare-earth elements), and he now took over the continuation of the Gmelin Handbook

under a new concept which was rooted in a knowledge of physical chemistry. As the first volume of the new work, the volume Edelgase (Inert Gases) was published in 1926, preceded in 1924 and 1925 by individual issues on Zink (Zinc) and Cadmium.

In the Vorwort für das Gesamtwerk (Foreword to the Entire Work) in his general descriptions on the treatment of the material, and in the comments for the use of the handbook, which introduce the Edelgase volume, R. J. Meyer established the principles for the work on the eighth edition; through these a sensible division of the materials as well as uniform editing and presentation was made possible.

The Gmelin Institute, the agency which does the work on the Gmelin Handbook in the eighth edition, was located in the Berlin Hoffmannhaus of the German Chemical Society where the Beilstein Handbook was also being compiled. After World War II the institute, which had been under the direction of Prof. E. Pietsch since 1936—to whom the academic community is indebted for his active work on further volumes of the Gmelin Handbook as well as for his many achievements and suggestions in the areas of general chemical documentation—was first moved to Clausthal in the Harz mountains, and eventually settled (in 1957) in the Frankfurt Carl-Bosch-Haus (see Figure 1), again a center for chemical literature. The institute, which was incorporated into the Max-Planck-Gesellschaft z.F.d.W. in 1946, has been directed by Prof. M. Becke, Professor of Chemistry at the Univer-

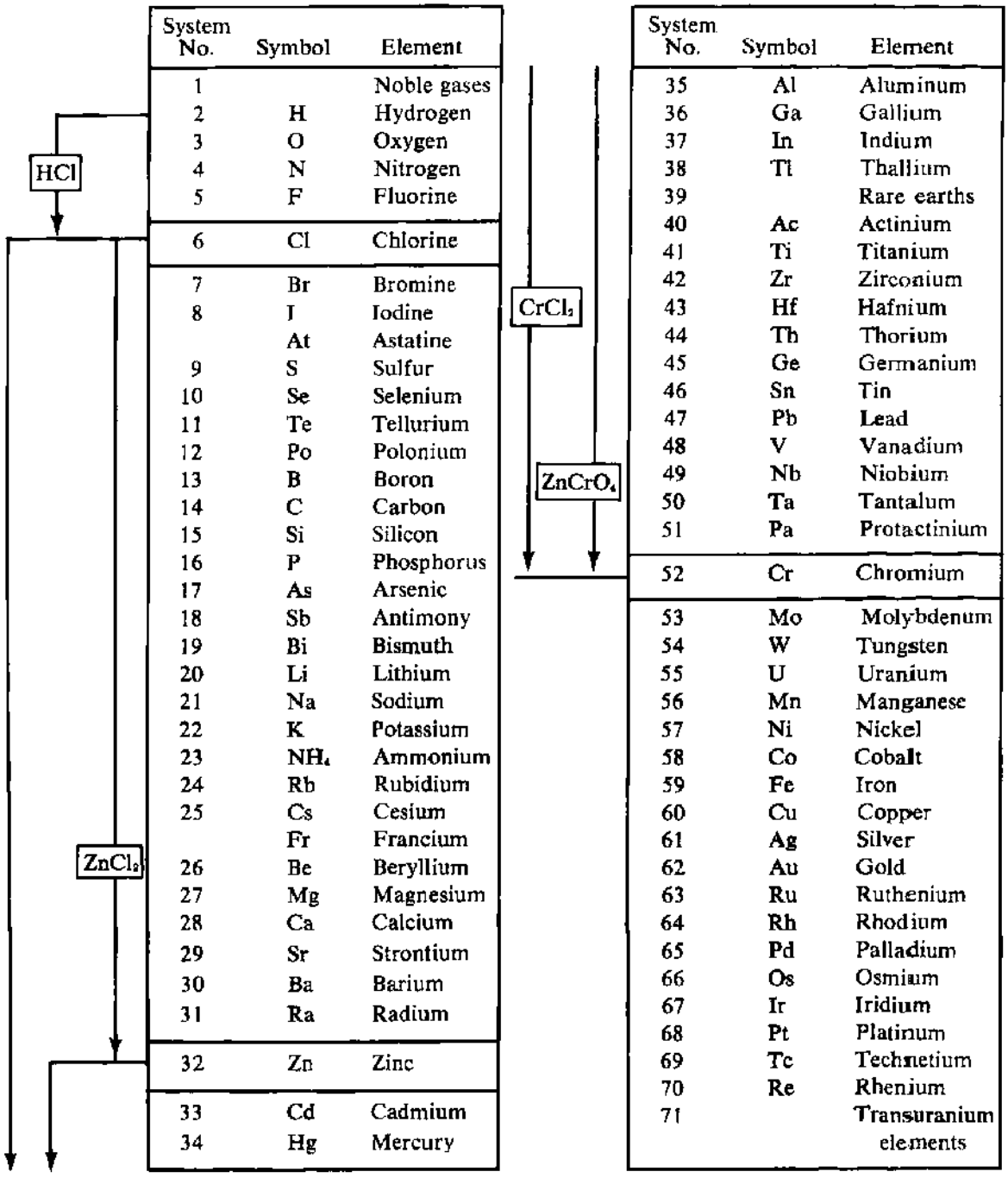
FIGURE 1. *The Frankfurt Carl-Bosch-Haus, present home of the Gmelin Institute.*

sity Heidelberg (like Leopold Gmelin), since 1969. Prof. Becke is advancing the work with new ideas, evidenced by her great contributions to the development of modern inorganic chemistry as well as the realization of the need for information and the stimulation of colleagues through a handbook which has been researched for long-term validity and is comprehensive in both materials and facts. The direction administration of the institute consists of Prof. Dr. M. Becke-Goehring as director, Dr. Karl-Christian Buschbeck as head of the academic editorial office, Dr. Walter Lippert as head of the technical editorial office, and Wilhelm Busch as administrative head.

ORGANIZATION OF THE HANDBOOK

It is natural to organize the subject material and facts of inorganic chemistry by the chemical elements, in which case it merely remains to decide which element of a binary compound, for example, sodium chloride (NaCl), is to be used as the basis for classification. The classification system of the last digit (see Figure 2), which assigns running numbers to the elements, is used in the Gmelin system; the component with the highest running number always determines the location of the description. In our example Cl has the classification number 6 and Na has the classification number 21; therefore NaCl is found in the volume on sodium. This system of classification guarantees that for each element all its characteristic compounds can be described, for example Al_2O_3 with Al, HCl with Cl, and $LiTaO_3$ with Ta. In a few cases, particularly in the newly begun main supplement to the eighth edition, a departure from the system was necessary. However, this usually happens in the sense of rounding off the content; for example, the carbaboranes containing carbon are described in the boron volume, although in the strictest sense they actually belong to classification number 14 (carbon). Since the Gmelin classification numbers are not identical to the order numbers of the periodic law of the elements, each Gmelin issue has a periodic table including classification numbers printed on the first cover page to facilitate the use of the handbook.

Within each classification number a division into "elements" and "compounds" is usually necessary. Under "element" the history, occurrence and geochemistry, technical and laboratory preparations, atomic and macrophysical properties, and—if necessary—the toxic behavior, as well as some additional special chapters are treated. In a few cases it is necessary to deviate from this standard division; for example the transuranium elements. For the division within the "compounds," the order of the elements dealt with in the entire work is again applied so that, for example in the vanadium volume the V-H System is followed by the oxides and hydroxides, then by the V-N compounds, the V-N-O compounds, etc. Compounds with constituents with a higher number than that of the element just described are now treated additionally in an abbreviated article which also includes material that had not been published at the time that the appropriate Gmelin volume was compiled. In the case of compounds, the rough division by structure and preparation, physical properties, and physical behavior has proven its value, especially when the



System No.	Symbol	Element
1		Noble gases
2	H	Hydrogen
3	O	Oxygen
4	N	Nitrogen
5	F	Fluorine
6	Cl	Chlorine
7	Br	Bromine
8	I	Iodine
	At	Astatine
9	S	Sulfur
10	Se	Selenium
11	Te	Tellurium
12	Po	Polonium
13	B	Boron
14	C	Carbon
15	Si	Silicon
16	P	Phosphorus
17	As	Arsenic
18	Sb	Antimony
19	Bi	Bismuth
20	Li	Lithium
21	Na	Sodium
22	K	Potassium
23	NH_4	Ammonium
24	Rb	Rubidium
25	Cs	Cesium
	Fr	Francium
26	Be	Beryllium
27	Mg	Magnesium
28	Ca	Calcium
29	Sr	Strontium
30	Ba	Barium
31	Ra	Radium
32	Zn	Zinc
33	Cd	Cadmium
34	Hg	Mercury

System No.	Symbol	Element
35	Al	Aluminum
36	Ga	Gallium
37	In	Indium
38	Tl	Thallium
39		Rare earths
40	Ac	Actinium
41	Ti	Titanium
42	Zr	Zirconium
43	Hf	Hafnium
44	Th	Thorium
45	Ge	Germanium
46	Sn	Tin
47	Pb	Lead
48	V	Vanadium
49	Nb	Niobium
50	Ta	Tantalum
51	Pa	Protactinium
52	Cr	Chromium
53	Mo	Molybdenum
54	W	Tungsten
55	U	Uranium
56	Mn	Manganese
57	Ni	Nickel
58	Co	Cobalt
59	Fe	Iron
60	Cu	Copper
61	Ag	Silver
62	Au	Gold
63	Ru	Ruthenium
64	Rh	Rhodium
65	Pd	Palladium
66	Os	Osmium
67	Ir	Iridium
68	Pt	Platinum
69	Tc	Technetium
70	Re	Rhenium
71		Transuranium elements

FIGURE 2. *Gmelin system of elements and compounds. The material under each element number contains all information on the element itself as well as on all compounds with other elements which precede this element in the Gmelin system. For example, zinc (system number 32) as well as all zinc compounds with elements numbered from 1 to 31 are classified under number 32.*

compound can, because of its importance, be assigned a separate chapter. For the many compounds which by themselves are so unimportant that only a place in a table is necessary, different division methods—probably combining many compounds—must be applied.

In order to improve the arrangement and location of the compounds, many volumes have been provided with an index; formula and subject indexes as well as ligands index for volumes with complex compounds. A particularly important present undertaking is the compilation of a main index for all Gmelin volumes already published.

Special mention must be made of the scientific description of the metallurgy of iron, the *Gmelin Durrer*. It is now being published in its 4th, newly revised, edition, from Volume 2 edited by G. Trömel and from Volume 3 edited by G. Trömel and W. Zischkale.

So far a total of 231 parts, with 75,071 pages of text, have been published of the eighth edition. This includes *Gmelin-Durrer* and the supplementary volume.

THE STAFF

Deliberations at the beginning of the eighth edition led to the conclusion that only a permanently employed staff would be able to handle the necessary work in a reasonable time and with the necessary continuity. This staff consists currently of about seventy-five graduate scientists, inorganic chemists, physical chemists, physicists, organic chemists, and geologists. Many of them have been trained in the special fields to which they will be assigned (for example, crystallography, kinetics in the gas or solution phase, thermochemistry, chemistry of metalorganic compounds). In order to compile a handbook chapter it is always necessary to study the corresponding original text in great detail. Developing the handbook articles requires an understanding which results from solid chemical knowledge and the ability to combine heterogeneous material—sometimes with contradictory facts—with the right statements to create a homogeneous chapter without, of course, any distortion of facts. The availability of a well-coordinated staff is of paramount importance; text preparation, the library, and the proofreading department play a special and significant role. The proofreading department, by keeping in constant contact with the scientists, is in charge of proofreading and, if necessary, correcting all manuscripts for handbook volumes for spelling, punctuation, and style. It represents the important connecting link to the printing press where the handbook makes its final appearance.

LITERATURE SCOPE IN THE HANDBOOK

When the eighth edition was begun, an up-to-date treatment of all anticipated volumes was, of course, attempted. In the beginning this approach was possible, but in the course of time this led to seemingly insurmountable difficulties in completing the volumes due to the steadily growing flood of literature. A deadline for the

publications to be used for the eighth edition was, therefore, established, fixed in this case for December 31, 1949. The earlier volumes of the eighth edition initially had different literature deadlines, usually shortly before the publication dates; whereas for a fairly long period after 1950 the same literature deadline of December 31, 1949 applied to original publications evaluated for successive volumes. This was acceptable for a few years after 1950. However, it finally led to a situation where the issues were no longer up-to-date; this, of course, could not be tolerated. Accordingly, in the mid-1960s a literature deadline as current as possible was again introduced. This was accomplished through close cooperation between the scientists and the employees in the department of Literaturvorbereitung (documentation).

BIBLIOGRAPHIC SOURCES FOR THE HANDBOOK

With the beginning of the work on the eighth edition, a bibliographical search was initiated which developed into a fairly large documentation center after the Gmelin Institute was moved to Frankfurt. The resulting archives, which contain bibliographical references divided according to elements, served then—and still serve—as the basis for the scientific work on the handbook. A small work group interprets and evaluates the running issues of *Chemical Abstracts* for current and future projects; another group does research for special chapters by using the volume index of *Chemical Abstracts*. This takes into account the fact that by searching through these indexes about 20 to 25% more references to certain compounds and facts are made available than through the text of the abstracts alone.

In order to take advantage of the documentation material stored on tapes for computer use, a work group is now establishing criteria which will enable their colleagues to be supplied with the relevant literature for each project. This method is becoming increasingly important, not only for reasons of lack of personnel.

RULES AND REGULATIONS FOR AUTHORS AND EDITORS

In addition to the above-mentioned division according to the system of the last digit, and also to the above-described division of chapters—by which authors and editors are guided in dividing and processing the published materials—a uniform "style" in the handbook is achieved primarily through rules for citing references, for the notation of physical units and formula symbols, as well as for the nomenclature of the inorganic compounds, and rules and recommendations for the arrangement of data and chemical results. In this way the precision of statements is increased and the possibility of relocating them is improved. In principle a clear, concise and accurate style is required, which will also enable foreigners to read the text (English-speaking readers also receive help through English tables of contents, indexes, and marginal notes). Word abbreviations, with the exception of a few commonly known ones, are no longer used because their unified use is difficult and the revision control of their use becomes disproportionately expensive.

For the above-mentioned important principles for bibliographical references, notations, and nomenclature, the Gmelin Institute is governed by the recommendations of panels working on an international level: the bibliography, which lately has been summarized at the end of smaller sections, is cited with abbreviations from *Chemical Abstracts*. For the physical notations the International Union of Pure and Applied Physics (IUPAP) recommendations adopted by the International Union of Pure and Applied Chemistry (IUPAC) apply, and for the nomenclature of inorganic compounds the institute adheres to the recommendations of the IUPAC Nomenclature Committee, or the *Richtlinien für die Nomenklatur der Anorganischen Chemie* (*Guidelines for the Nomenclature of Inorganic Chemistry*) written in German. The authority for the correct naming of organic compounds is the Beilstein Handbook; in special cases the recommendations of the Organic Nomenclature Committee for the IUPAC apply. Additional definitions are usually determined during the planning and drafting of the individual volumes.

OPERATING PROCEDURE

Based on the considerations of the institute management, consisting of the director of the institute and the heads of the scientific and technical editorial offices, suitable and necessary volumes for future projects are selected and a main editor is chosen based on subject matter and available time. This editor then, after looking through the available bibliographical references, compiles a subject disposition, gives instructions for supplementing the literature, and assigns, in close cooperation with the institute management, the various chapters to qualified and currently available authors. Each author is assigned a special editor who gives assistance in the development of the chapter, examines the completed chapter for accuracy, completeness, legibility, etc., and also helps to take care of such details as the selection and preparation of illustrations. The manuscripts are checked by a special group in the correction department, and are then sent on to the printers for galley proofs or page makeup. Galley proofs or made-up pages coming off the press are proofread in the correction department; then by the author, the special editor, and main editor; and are then put together by the main editor for the final volume. Contents and form are controlled on all levels in order to keep the number of errors to a minimum and to achieve the greatest possible value of information. In this manner a total of ten to twelve parts are published per year. In the printing of so many parts a thorough knowledge in the printing office of the special problems of handbook printing is of great advantage. The handbook is sold through the publishing house Verlag Chemie.

CURRENT STATUS OF THE HANDBOOK

At the time this article is being written all classification numbers for the eighth edition of the Gmelin Handbook have been compiled or are in the process of being compiled. For many of the classification numbers processed during the first years

of work on the eighth edition, there are supplementary volumes available or they are in the process of being compiled. The elements last worked on are silver, tin, manganese, and rare earth elements. The first three volumes of the main supplement to the eighth edition have been produced. The diversity of the editorial program is seen by the volumes published during 1970:

Ruthenium—supplementary volume (586 pp).
Carbon C1 (584 pp., C-H and C-O compounds).
Tantalum B1 (275 pp., first part on the compounds).
Lead C3 (406 pp., next to the last part on compounds).
Silver A2 (350 pp., technology and preparation as well as the physics of silver).
Noble gas compounds (first volume of the main supplement to the eighth edition, 160 pp).
Sodium—supplementary volume, part 5 (508 pp., chlorate, perchlorate, Na^+-solution systems).
Niobium B1 (424 pp., first part on compounds).
Potassium—appendix volume, supplementary volume (166 pp., ocean salt systems).
Tantalum B2 (383 pp., conclusion of the compounds).
Silver B1 (542 pp., beginning of the Ag-compounds to AgCl).

FURTHER PROJECTS

In addition to completing the documentation on the above-mentioned elements, some new projects have been begun or are in the planning stages. These are particularly significant in regard to developments in modern chemistry and the documentation or information demands connected to these developments. Here the volume on Noble Gas Compounds must again be mentioned; it is the first volume of the main supplement work to the eighth edition. For this volume the System der Letzten Stelle (classification of the last digit) had to be anulled, because the inert gases are No. 1 in this system. This volume contains all compounds of the inert gases from XeO_3, to $XePtF_6$, the first inert gas compounds ever discovered.

It had also been of special concern to handle the many inorganic compounds—which result from the combinations of metals or inorganic basic structures with organic groups—in an adequate manner. Therefore the metal-organic compounds of vanadium and chromium were described in a handbook (as Volumes 2 and 3 of the main supplement); for the chromium part alone 3,000 individual compounds had to be described. In order to find these compounds, ligands-formula indexes were prepared for both volumes, which also facilitated the locating of ligands combinations. Of the metal-organic compounds, those with Fe, Co, and Ni are currently in process; ferrocene and its derivatives alone will probably take one volume.

Another project is the documentation of the boron compounds, and for this the present time seems to be particularly appropriate for several reasons: the chemistry of boron, especially that of the boranes, carbaboranes, and the boron-nitrogen compounds has reached a certain conclusion (by no means an end), so that a classification process is possible without too many unfilled gaps. In addition a nomen-

clature recommendation from the IUPAC is now available for the boron compounds, another sign that in the development of boron chemistry a certain saturation has now been achieved. In a situation such as this, documentation of the field might very well provide new impetus for future research; in some cases this might even lead to the opening up of new areas of knowledge. The existence of many monographs makes it possible to check the facts and presentations collected in the chapters. The volumes planned for the boron compounds will leave out a few areas of boron chemistry, for example the boron-oxygen compounds, which will be dealt with in a later volume.

In addition, volumes on the compounds of haloids and those of sulfur are in the planning stages. Additional volumes are planned on the complex compounds of iron, cobalt, and nickel, as well as supplementary volumes for volumes of the eighth edition already completed.

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(*Translated by Marie-Luise Stueart*)

Libraries in the German Democratic Republic

The German Democratic Republic (DDR) is the socialist state of the German nation. Seventeen million people live in an area of 108,174 square kilometers. The capital is Berlin. Of the 9,037 communities, twenty-six have a population of more than 50,000. There are 36,000 libraries in the DDR with total holdings of about 75 million volumes. Almost 7,000 titles (including music and books for the blind), with an average of about 22,000 copies, are published annually, as well as 536 continuing journals. This puts the DDR into a leading position among the European countries in books and library systems.

The libraries of the German Democratic Republic have the responsibility:

> to promote academic work and to support the education of all children, young people, and adults according to their different needs, interests, and requirements of acquiring, processing, and acting as an agent in dispensing literature. (From the Law for the Unified Socialist Education System.)

In detail this means the acquisition and collection of books, periodicals, newspapers, pictures, and recordings, as well as handwritten manuscripts in all languages and from all countries of the world; their processing and publicizing through catalogs, bibliographies, open-access libraries, and exhibitions, as well as their availability, i.e., lending to all persons and institutions who have need for these materials.

In the German Democratic Republic these general responsibilities are carried out according to the basic principles for socialist library work. Among these are (*1*)

1. Partiality for humanism.
2. Continued, coordinated and systematic development of the complete library system.
3. Close association with the socialist practice.
4. Active promotion of the academic and material-technical progress as well as participation in the continued education of all levels of society in the direction of a well educated nation.
5. Selective acquisition of the academic and cultural heritage with special consideration for the national cultural heritage.
6. Development of various forms of socialist cooperative work within the individual libraries as well as among libraries of a specific type or speciality."

Library work in the DDR is governed by the Verordnung über die Aufgaben des Bibliothekssystems bei der Gestaltung des entwickelten gesellschaftlichen Systems des Sozialismus in der Deutschen Demokratischen Republik (Regulation for the Responsibilities of the Library System in the Shaping of the Developed Social System of Socialism in the German Democratic Republic) of May 31, 1968 (*2*).

World War II inflicted untold damage to the country's libraries. Many buildings were destroyed or damaged, and valuable holdings of books and manuscripts were lost because of the war. In the eastern part of Germany—at that time the Soviet-occupied zone—projects to repair damage and recover evacuated library holdings were begun as early as 1945. Simultaneously—as a result of an order from the Allied Control Commission—library holdings were reviewed and facist military and racist literature was withdrawn from general use. Only 30% of the industrial potential of the former German Reich was located in the territory of what later became the German Democratic Republic, and 45% of this was destroyed during the war. Efforts during the first postwar years were directed toward reconstruction of the economic base, an achievement largely completed by 1950. At the same time the building of a democratic library system was begun with the support of the Soviet military administration. The holdings of libraries were placed at the disposal of everyone in the Soviet-occupied zone of Germany, and the care and circulation of humanistic and progressive literature became the primary responsibility of the libraries.

After the founding of the German Democratic Republic in October 1949 the era of the Five-Year Plans of economic and cultural rebuilding began. On the basis of these plans the DDR was able to reach, by 1960, sixth place among the industrial nations of Europe and also moved into the ranks of the leading countries in cultural fields.

Because the libraries fulfilled their responsibility by making literature for research, education, and entertainment available, they received increasingly large subsidies for their work. The network of public libraries was improved and enlarged. Since 1954 each community of the country has at least one public library. The district and regional libraries assumed the role of holding centers and took over the methodical guidance of the general libraries in their area.

In industry, above all in the volkseigene (national) sectors of the economy, Gewerkschaftsbibliotheken (trade union libraries) were created. Numerous chil-

dren's libraries or children's departments in the public libraries were created. New possibilities for increased holdings in the academic-general libraries were opening up through the cultural agreements between the socialist countries. In answer to the needs of the political economy and the building of new installations for research and education, large numbers of academic libraries were created. Development since 1959 of the main departments of the library system has been carried out largely according to national plans.

The Deutsche Bibliotheksverband (German Library Association), created in 1964, combined libraries of all types for the first time. It transforms the division of the German library system, which had existed since the last century, into one public and one academic branch. Within the total system of information, these libraries have an important responsibility in achieving and maintaining top world positions in the leading branches of science and political economy.

The current responsibilities of the library system in the DDR are primarily determined by:

> The further enlargement of the library system with concentration in the areas of universities and special colleges as well as the national public libraries, and special consideration for cooperation between libraries of all types.
>
> The constant improvement in fulfilling educational and informational functions, especially through the use of modern technology, primarily in the areas of bibliography (electronic data processing) and reprography (xerography, microcopy).
>
> The further promotion of library research by employing existing and by creating new cooperative relations between the socialist countries.

The library system of the German Democratic Republic is divided into two branches: academic libraries and public libraries.

Some of the academic libraries developed out of court libraries whose beginnings go back to the sixteenth and seventeenth centuries; some of them developed from university libraries as far back as the fourteenth century. The largest number of them, however, above all the special libraries, are independent establishments of recent times. The public library system has its roots in the Volksbüchereien (people's libraries)of the nineteenth century which were established for those who had no access or admittance to the academic libraries.

Today the two branches of the library system no longer differ in the degree of their availability but only in their functions. The academic libraries primarily serve for research and teaching, and for this purpose collect mostly scholarly literature. The public libraries promote the general education of the public in general knowledge as well as in self-development. The holdings of these libraries consist mostly of technical and subject literature as well as appropriate entertainment literature. The development of the library system in the DDR secures close cooperation and mutual supplement of both types of libraries on the basis of socialist cooperative work, with the goal of satisfying the literary needs of the whole country.

The lending library system on a payment basis is disappearing in the DDR.

The academic libraries are subdivided into (1) general libraries and (2) special libraries. There are currently more than 12,000 academic libraries with a total of about 47 million volumes in the DDR. They basically acquire literature from all countries and times as well as in all languages, as far as this literature falls into the particular function and acquisition policy of each library.

The academic-general libraries collect and process literature in all areas of knowledge. In the interest of an economical and expedient division of labor, however, these libraries concentrate their collections on certain subjects which are usually a result of tradition, geographical location, and requirements of educational establishments in the area. The responsibility of the academic libraries for the various subject fields is determined by a Sammelschwerpunktplan (Subject Specialization Plan). Among the general academic libraries are:

Deutsche Staatsbibliothek, Berlin (4.9 million volumes, of which about 1.8 million are stored in the Federal Republic of Germany and West Berlin).

Deutsche Bücherei, Leipzig, (3,750,000 volumes).

The university libraries in Berlin (3.6 million volumes), Greifswald (1.7 million volumes), Halle/Saale (3.1 million volumes), Jena (1.4 million volumes), Leipzig (2.1 million volumes), and Rostock (1.5 million volumes).

The Sächsische Landesbibliothek, Dresden (1.2 million volumes).

The Hauptbibliothek der Deutschen Akademie der Wissenschaften zu Berlin (the main library of the German Academy of Sciences in Berlin) (160,000 volumes).

The general academic libraries of the districts.

The Deutsche Staatsbibliothek Berlin is the central academic library of the DDR. Its main activities are collecting, processing, and providing foreign literature. The library was found in 1661 as a court library and developed toward the end of the nineteenth century into the leading library in Germany. During World War II it suffered damage to its building and loss of holdings. The Deutsche Staatsbibliothek has about 5 million volumes (1970). It is a United Nations depository library, and it is the center in the DDR for the international exchange of literature and for the German and international interlibrary loan system. The latter function is being handled by the Institut für Leihverkehr and Zentralkataloge (Institute for Interlibrary Loan and Union Catalogs) at the Deutsche Staatsbibliothek. The bibliographical work is concentrated in the *Berliner Titeldrucke*, as an index—printed on cards—of new acquisitions in foreign languages, and in several periodical indexes such as the *Gesamtverzeichnis ausländischer Zeitschriften (Index of Foreign Periodicals)* (2nd ed., 1939–1959). The library has eleven reading rooms and six special departments (Music Department, Asia-Africa Department, Handwritten Manuscript and Literary Archive, Incunabula, Maps, and Children and Young People's Literature Departments) with valuable holdings in some cases. The editing office for the international *Gesamtkatalog der Wiegendrucke (Union Catalog of Incunabula)* is located in the Incunabula Department. The Deutsche Fotothek Dresden, zentrales Bildarchiv für Wissenschaft, Forschung and Lehre (Central Picture Archive for Science, Research, and Education) as well as the Theodor-Fontane-Archiv, Potsdam, are all connected to the Deutsche Staatsbibliothek.

The Deutsche Bücherei, Leipzig, in its capacity as the national archive for German literature since 1913, is the German national library. In its acquisition program are included the complete German literature (including university publications), the translations—published in other countries—of German works as well as literature about Germany and personalities of all German speaking countries. The Deutsche Bücherei was created in 1912 on the initiative of the Börsenverein der deutschen Buchhändler (Society of the German Book Dealers) and currently has about 3.75 million volumes (1970). It is the center for the German national bibliography and published the *Deutsche Nationalbibliographie* as well as other bibliographies. It has four reading rooms. The *Verleger- und Institutionenkatalog* (*Publisher and Institution Catalog*) is something exceptional. The Deutsche Buch- und Schriftmuseum (German Books and Scripts Museum) with its Deutsches Papiermuseum (German Paper Museum) is attached to the Deutsche Bücherei.

The libraries of the universities, colleges, and technical schools collect, process, and provide scientific literature for teaching and research as well as for the education and training of students. As part of the 3rd University Reform (1968) and on the basis of the library regulations of 1968 the central libraries of these institutions have taken over new responsibilities in the improvement, direction, and coordination of the library network in their respective university, college, or technical school area. With these responsibilities they simultaneously became depositories of the libraries of the departments or faculties. The library network is under the chancellor of the respective university or college, or the director of the technical college.

The library regulation of 1968 attempts to create a library network patterned after the administrative division of the DDR. According to this, general academic libraries, which are established either through an increase in function or through a merging of existing libraries, are created in the districts. They take the place of the former Landesbibliotheken (county libraries) which corresponded to the former division of Germany into Länder (for example Saxony, Thuringia) and have, since 1952, each been carrying out central responsibilities for several districts.

The special libraries are usually not independent but are connected to academic, art, or administrative institutions. Among them are:

Libraries of the special institutes as well as branches of the university libraries in the various departments.
College libraries.
Industrial research libraries, and libraries of the academies and societies specializing in certain subjects.
Libraries of museums and archives.
Special libraries of government offices and administrative institutions.
Academic libraries of political parties and social organizations.

The special libraries primarily serve specialized research and education. Many of them handle important functions within the information/documentation system. The DDR currently has about 12,000 special libraries.

Contrary to the general academic libraries, most of the special libraries are limited in their public, i.e., their holdings are primarily for the use of the employees and workers of the supporting industry or institutions; the holdings are, however, available to the public via interlibrary loan.

The public libraries' holdings offer general and professional education as well as entertainment. There are about 24,000 libraries of this type in the DDR with about 28 million volumes. Among them are:

1. State public libraries
   a. General public libraries
   b. School libraries
   c. Home, patient, or institutional libraries
2. Trade union libraries
3. Military libraries

The state public libraries make up the largest group. They continue the positive traditions of the former German Volksbüchereien.

Currently there are about 13,000 general public libraries, of which 3,600 are managed by full-time, trained librarians. They have a total of about 17.5 million volumes; approximately 3 million readers annually borrow over 50 million volumes.

The smallest unit of this type of library is the community library. It serves the library needs of villages or similar settlements. For this purpose it has, according to the number of readers, several hundred volumes available. In rural areas several community libraries are serviced by one central library which is run by a full-time librarian.

The regional library is the library center of the rural area; it is comparable to the municipal library for the urban district. In most cases libraries of this size combined into Stadt- und Kreisbibliothek (Municipal and Regional Library) have holdings of between 10,000 and 50,000 volumes.

At the top level of general public libraries is the district library which is combined with the central library of the district town to form the Stadt- und Bezirksbibliothek or enlarged into the Wissenschaftliche Allgemeinbibliothek (Academic General Library) of the district. This type of library, which has up to 300,000 volumes, also serves as a link between the general public libraries and the network of academic libraries.

The regional, district, and municipal libraries are not only the library centers of their respective regions, but also instruct their subordinate libraries in techniques and methods. The specialization in holdings increases in proportion to the size of the library, so that community and central libraries have mostly general literature, whereas regional and district libraries have, in addition, special works which may be requested when needed by the smaller establishments.

All state general public libraries have children's literature. In the larger towns there are special children's libraries which have literature for all age groups.

Music libraries or music departments supplement the holdings of the general public libraries with printed music, records, and tapes.

School libraries exist in about 5,300 schools in the country. They provide literature for young people to increase and deepen the knowledge acquired in the schools, for the activities of the youth organizations (Pionier Organisation Ernst Thälmann, Freie Deutsche Jugend), and for entertainment appropriate for the age groups.

The home, patient, and institution libraries are located in homes for the aged, hospitals, and prisons.

The DDR currently has about 7,400 trade union libraries. They are maintained with funds from the Freie Deutsche Gewerkschaftsbund and their primary responsibility is to supply workers in industry with literature. Their holdings are meant for general education and entertainment as well as for job training. The size and character of these libraries are determined by the size and type of the industry they serve. The libraries in the trade union vacation homes are part of the trade union libraries.

Military libraries exist at the various troop locations of the Nationale Volksarmee. Their holdings are used for military training as well as for entertainment.

A special type of library is the Deutsche Zentralbücherei für Blinde (German Central Library for the Blind) in Leipzig. Its holdings include 17,000 volumes in Braille and 80,000 tapes (1969). It lends its literature via mail to people with defective vision in Germany and foreign countries.

The basis for the activities and administration of the national libraries of the DDR is determined by the previously mentioned Verordnung über die Aufgaben des Bibliothekssystems . . . (Regulation for the Responsibilities of the Library System. . .). It determines the responsibility of ministers and directors of other government agencies, or the regional and district councillors in the planning, administration, and organizations of library work in their areas.

The Deutsche Staatsbibliothek, Berlin, the Deutsche Bücherei, Leipzig, and the Landesbibliothek, Dresden, are governed by the Ministerium für Hoch- und Fachschulwesen (Ministry for Universities and Colleges). The responsibility for the academic libraries of the universities, special and technical schools, government agencies, industry, etc. lies with the administration of the respective establishments. The state public libraries are governed by the regional councils of the areas for whose library service they are responsible. The Bundesvorstand des Freien Deutschen Gewerkschaftsbundes (Executive Committee for the Free German Federation of Labour) is the governing body for the trade union libraries.

The following agencies are involved in the administration of libraries:

The Methodisches Zentrum für wissenschaftliche Bibliotheken beim Ministerium für Hoch-und Fachschulwesen (Center for Academic Libraries at the Ministry for Universities and Colleges) in Berlin.

The Zentralinstitut für Bibliothekswesen (Central Institute for the Library System), which is subordinate to the Ministerium für Kultur (Ministry for Culture), and is responsible for the state public libraries.

The center for the work of the trade union libraries at the Hermann Duncker Library in Halle/Saale.

Besides its responsibilities for the various libraries, the Ministry for Culture is responsible for the basic decisions in the development of the library system as well as for library research and training.

The Beirat für Bibliothekswesen (Council for Library System), in which researchers and practitioners as well as members of the Deutscher Bibliotheksverband—DBV (German Library Association) are represented, advises the minister for culture.

DBV was created in 1964. It combines libraries of all types and library institutions for the first time. Since its founding the association has been a member of the International Federation of Library Associations (IFLA). Among the responsibilities of the association is the further development of the socialist library system, the promotion of cooperative undertakings, library training, and the exchange of experiences as well as the cultivation of international relations.

The function of the association is supported by central agencies, regional groups, departments for libraries of the same subject areas, and committees for the solution of special subject problems.

The German Library Association currently has about 1,100 members, of which about 400 are academic, about 500 are general public, and 200 are trade union libraries.

Acquisitions in the libraries of the German Democratic Republic are handled primarily through the book trade. A few libraries (among them the Deutsche Bücherei and the Deutsche Staatsbibliothek) receive depository copies of the complete literary production of the DDR as set down by the Anordnung über die Ablieferung von Pflichtexemplaren (Directive for the Delivery of Depository Copies) of July 4, 1960 (Statute of the DDR, Part I, 1960, pp. 423–424).

The holdings of the public libraries consist mainly of literature published in the DDR. These they generally receive ready for circulation, i.e., in library binding with the necessary catalog and index cards as well as classification numbers from the Libraries Department of the Leipziger Kommissions- und Grossbuchhandel (LKG). Foreign publications are either bought through the Deutscher Buchexport und Import, Leipzig, or the LKG, or they are acquired through exchange with foreign libraries. Close contact exists between the libraries of the socialist countries, which goes as far as the exchange of the complete literary production of countries on the basis of national cultural agreements.

Since the currency of the DDR is not freely convertible in the capitalist countries, exchange with their libraries and institutions is of great significance. As exchange articles the libraries of the DDR have available their own publications, those of their supporting agencies, and duplicates, as well as titles of the native literary production.

Processing in the libraries is done through catalogs, abstracting indexes, and bibliographies. Author and subject catalogs are almost universally used for main catalogs. Alphabetical cataloging is done according to specific rules; the academic libraries generally follow the *Regeln für die alphabetische Katalogisierung in wis-*

senschaftlichen Bibliotheken (*Rules for Alphabetical Cataloging in Academic Libraries*), the former *Preussische Instruktionen*, whereas the others, above all the public libraries, use other, also codified, rules.

The most significant difference is in the grammatical or mechanical order of subject titles. On the basis of the recommendations of the International Conference on Cataloging Principles of 1961, new regulations for alphabetical cataloging are currently being worked out in all German-speaking countries, with the participation of librarians from the DDR. These regulations will lead to unified guidelines.

The subject catalogs are primarily classified catalogs. The academic libraries use different classifications. The decimal classification is used in the catalogs and abstract card file, primarily in the fields of the theoretical and applied natural sciences as well as technology. The Systematik für allgemeinbildende Bibliotheken—SAB (Classification for Public Libraries) is unified and applicable for this type of library. In addition, many libraries have alphabetical subject catalogs or indexes as well as many mixtures or special forms of catalogs.

There are several regional and special union catalogs in the DDR. There is a strong tendency toward further centralization, especially with the introduction of electronic data processing. In the DDR a union catalog for monographs, periodicals, and serials is being compiled at the Institut für Leikverkehr und Zentralkataloge (Institute for Interlibrary Loan and Union Catalogs) of the Deutsche Staatsbibliothek. A few libraries are also participating in international union catalog undertakings; for example, the *Gesamtkatalog der Wiegendrucke* (*Union Catalog of Incunabula*) and the *Repertoire International des Sources Musicales*.

The use of all libraries in the DDR is principally free of charge although occasionally small fees are charged for special services (e.g., advance reserve, interlibrary loan, and copies). The public libraries are open to all people, i.e., citizens of the DDR and other countries. The opening times are staggered in such a way that evening and weekend use of the library is possible. The public libraries are primarily lending libraries, with only the Deutsche Bücherei having a strong emphasis on reference; the Deutsche Staatsbibliothek lends only to certain reader groups (students, industries, etc.).

Most of the larger libraries have their own photo laboratories for the production of microfilms, photocopies, Xerox copies, and reproductions. Other libraries arrange to have copies made.

The library system of the DDR is connected to the international interlibrary loan system. The well-organized network of the native loan system is based on the Anordnung über den Leihverkehr der Bibliotheken der Deutschen Demokratischen Republik—Leihverkehrsordnung (Rules for the Interlibrary Loan System of the Libraries in the German Democratic Republic—Interlibrary Loan Regulation) of October 1, 1965. The central and coordinating agency is the Institute for Interlibrary Loan and Union Catalogs at the Deutsche Staatsbibliothek, Berlin.

The most important panels to represent the interests of the readers in library work are readers conventions and the Bibliotheksbeirat (Library Council), which exist in most libraries.

The reference activities of the libraries include giving verbal and written information; publishing lists of new acquisitions, lists of holdings, and bibliographies; and arranging exhibits and poetry readings. The mailing of the *Leipziger Titeldrucke* (card-form of the *German National Bibliography*) through the Deutsche Bücherei, and of the *Berliner Titeldrucke* (new foreign language acquisitions in academic libraries of the DDR in card-form), is as much a reference activity as the periodicals contents information (mailing of copies of table of contents) which is done by the reprography department of the Deutsche Staatsbibliothek; the latter leads into the information/documentation system. At the university and college level the director of libraries' responsibilities include information activities as well as the departmental libraries.

The use of electronic data processing (EDP) for information activities has been introduced. The *German National Bibliography* is planning to switch to EDP in the near future.

There are three groups of library professions in the German Democratic Republic:

1. Junior library assistant.
2. Library assistant.
3. Librarian.

The job of the junior library assistant includes primarily manual, technical, and mechanical activities; for example, shelving or general straightening up in the stacks, reading rooms and catalogs, record keeping, circulation, and helping the readers.

Training is carried out at larger libraries in the form of a 2-year training course, which follows the completion of the 10-year school and is completed with the Facharbeiterprüfung (Professional Examination).

Two branches with different responsibilities and training have to be considered in the library assistants group: assistants of academic libraries, and assistants of public libraries.

The library assistant in academic libraries must have a competent knowledge of foreign languages (especially Russian, English, and French). His job consists mostly of independent work, especially in acquisition, cataloging, reference, and providing other types of information. He is capable of managing smaller libraries or individual departments of larger libraries. He is trained at the Fachschule für wissenschaftliche Information und wissenschaftliches Bibliothekswesen (Special School for Information and Academic Librarianship) in Berlin or at the Fachschule für Bibliothekare und wissenschaftlichen Bibliotheken (Special School of Library Assistants in Academic Libraries) in Leipzig, with a 3-year course of study (including 1 year of practical work in a library) which is concluded with a Staatsexamen (State Board Examination).

The job of the library assistant in public libraries requires good pedagogical and psychological training. It includes independent work in acquisitions, processing, book selection, and administration, up to the position of director of a public

library. He is trained at the Fachschule für Bibliothekare Erich Weinert (Erich Weinert Special School for Library Assistants) in Leipzig with a 3-year direct course of study or a 4-year correspondence course (including practical work).

The librarian is primarily responsible for academic (e.g., book selection, subject cataloging, scholarly reference work, compilation of bibliographies) and administrative jobs up to the directorship position of departments and libraries of all sizes. Formerly the job of the librarian was limited to the academic libraries; however, his training is currently more and more a requirement for the directorship of large general educational libraries as well.

He is trained at the Institut für Bibliothekswissenschaft und wissenschaftliche Information der Humboldt-Universität (Institute for Librarianship and Information at Humboldt University), Berlin, in three possible courses of study; direct course of study, 4 years; correspondence course, 5 years; or postgraduate study, 2 years.

Library research is coordinated through the Ministry of Culture. It has the responsibility of working out the academic principles for the character, administration, and organization of library work, solving problems of planning and administration in the library system, and interpreting the latest advances in work experiences and introducing them into practice.

Centers for library research are the Institute for Librarianship and Information, the Center for Academic Libraries, and the Zentralinstitut für Bibliothekswesen (Central Institute for Library System). In addition, special research problems are solved by individual scientists and scholar teams in the German Library Association as well as in several libraries.

Students of library science are introduced to and made familiar with the handling of various problems through an academically productive program of study during their training. Especially talented students and trainees have the opportunity to devote themselves to library research during a 3-year research–study program or in the form of a traineeship. Both routes generally lead to the acquiring of the doctorate. Many scholars, active in the library profession, carry out additional research; for example, in the processing and editing of handwritten manuscripts and incunabula, and in solving library practice questions.

In collaboration with several libraries, the Zentralinstitut fur Bibliothekswesen publishes *Informationsdienst Bibliothekswesen* (*Information Service for Library Science*) which documents German and foreign literature of library science.

APPENDIX

Statistics: Except when otherwise indicated, the data give the status as of 1969.

German Democratic Republic

Inhabitants: 17,041,000 (1971).
Of reading age: about 15.4 million.
Number of libraries: about 36,000.
Total holdings: about 75 million volumes.
Volumes per inhabitant (of reading age): 4.9 volumes.

Book production: 6,936 titles (annually).
Total copies: 113.9 million copies.
Books per inhabitant: 7 volumes.
Number of continuing periodicals: 536 titles in 6,914 issues.
Total copies: 432.6 million.

Academic Libraries

Number of libraries: about 12,000 (of which 815 have over 4,000 volumes).
Total holdings: about 47 million volumes.
Interlibrary lending:
Lending: about 160,000 volumes (annually).
Borrowing: about 150,000 volumes (annually).

1. Academic General Libraries
Number: 14.
Holdings: 25,300,000 volumes.
Readers: about 240,000.
Loans: about 2,660,000 (annually).
Copying (microfilming, Xerox, etc.): about 3.5 million (annually).

2. Special Libraries
Number: about 12,000.
Holdings: about 21.7 million volumes.
Libraries with more than 4,000 volumes:
Number: 800.
Holdings: 8.5 million volumes.
Readers: about 150,000.
Loans: 2,340,000 (annually).
Copies (Microfilm, Xerox, etc.): about 1.4 million (annually).

Public Libraries

1. National General-Public Libraries
Number: 12,800.
Holdings: 18,766,422 volumes.
Readers: 3,096,234.
Loans: 51,918,136 (annually).

2. Trade Union Libraries
Number: 5,750.
Holdings: 6,676,374 volumes.
Readers: 873,446.
Loans: 10,485,775 (annually).

3. School Libraries
Number: about 6,400.
Holdings: about 2.5 million volumes.

Bibliographies

The most important bibliographies compiled by the Deutsche Bücherei as the German National Library are:

1. *Deutsche Nationalbibliographie, since 1931.* A union catalog of literature published in both German states and literature published in the German language in foreign countries. Series A: *Neuerscheinungen des Buchhandels (New Editions in the Book Trade)*: published weekly.

Series B: *Neuerscheinungen ausserhalb des Buchhandels (New Editions Outside of the Book Trade)*; published twice a month.

Series C: *Dissertationen und Habilitationsschriften (Dissertations and Inaugural Dissertations)*; published monthly.

The titles of Series A and the most important titles of Series B are cumulated in the *Jahresverzeichnis des deutschen Schrifttums (Annual Index of German Publications)* and in *Deutsches Bücherverzeichnis (German Books Index)*, begun 1911, which covers 5 years in its cumulation. The titles of Series C are collected annually in the *Jahresverzeichnis der deutschen Hochschulschriften (Annual Index of University and College Publications)*, begun 1936.

2. *Bibliographie der Übersetzungen deutschsprachiger Werke (Bibliography of Translations of German Works)*, begun 1954, published quarterly.
3. *Bibliographie fremdsprachiger Werke über Deutschland und Persönlichkeiten des deutschen Sprachgebietes (Bibliography of Foreign-Language Publications about Germany and Personalities of German-Speaking Areas)*, begun 1963, published quarterly.
4. *Deutsche Musikbibliographie (German Music Bibliography)*, begun 1829, lists printed and music publications, published monthly. Cumulated in the *Jahresverzeichnis der deutschen Musikalien und Musikschriften (Annual Index of German Printed Music and Music Publications)*, begun 1943.
5. *Bibliographie der Kunstblätter (Bibliography of Art Prints)*, began 1907, published quarterly as a supplement to the *Börsenblatt für den deutschen Buchhandel*, Leipzig. Cumulated in the *Fünfjahrsverzeichnis der Kunstblätter (Five-Year Index of Art Prints)*, begun 1945.
6. *Bibliographie der deutschen Bibliographien (Bibliography of German Bibliographies)*, begun 1957, lists all independent and hard-to-locate German bibliographies published since 1954, appears monthly.

The Informationsdienst Bibliothekswesen (Information Service for Library Science) is published with the collaboration of several libraries. Approximately 50 titles are documented in monthly issues. Order information is facilitated by the DK number and the author-title or by subject headings.

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(Translated by Marie-Luise Stueart)

ERRATUM

Volume 8 lists Mary D. Quint as the author of the article "Fellowships for Library Education." The article was written by Cosette Kies, Assistant Director, Personnel and Public Relations, Stamford's Public Library, Stamford, Connecticut.

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