ENCYCLOPEDIA OF LIBRARY AND INFORMATION SCIENCE

VOLUME 26

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UNIVERSITY OF PITTSBURGH
PITTSBURGH, PENNSYLVANIA

VOLUME 26

ROLE INDICATORS TO SCIENTIFIC LITERATURE

MARCEL DEKKER, INC., New York • Basel

MARCEL DEKKER, INC.
270 Madison Avenue, New York, New York 10016

LIBRARY OF CONGRESS CATALOG CARD NUMBER 68-31232

ISBN 0-8247-2026-1

Current Printing (last digit):
10 9 8 7 6 5 4 3 2 1

PRINTED IN THE UNITED STATES OF AMERICA

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ROLE INDICATORS

When several words or terms are combined in an information storage and retrieval system to describe a particular subject, it is desirable to provide as much information as possible about the context in which they are used together. This is true when the subject matter of documents is described at the indexing stage as well as when a query is formulated to specify the content of an information request.

In precoordinate systems there is a need to show the semantic relations that exist between the component parts of multiple word terms, and this is usually accomplished through the introduction of some kind of syntax in the term. The relationships of the concepts expressed in the linear string making up an index term can be indicated by combining words in an ordered sequence, through a convention of punctuation, through linking words by a set of relational operators, through the use of subheadings, through natural language syntax, or by a combination of two or more of these approaches (*1*).

While the need for syntax has been traditionally recognized by designers of precoordinate systems, the designers of early postcoordinate systems felt that they need not be concerned with it. The considerable experience acquired with postcoordinate systems has long since proven the erroneousness of this position (*2*). Today the question does not relate to whether or not context is desirable, but rather to how it can best be provided.

In postcoordinate searching several terms are combined using the Boolean connectives AND, OR, and NOT to formulate a query. Topics are specified by asking for the presence, the absence, or the simultaneous presence of the various terms in the Boolean expression (*3*). This kind of description of a subject, however, does not allow for the indication of the context in which the combination of terms is considered. For example, if the Boolean AND is used to combine DESTRUCTION, BACTERIA, and DYESTUFF, the expression BACTERIA AND DESTRUCTION AND DYESTUFF does not indicate whether the query relates to the destruction of bacteria by dyestuff or the destruction of dyestuff by bacteria. Documents on either of these topics will be retrieved (*4*).

Similarly, a document dealing with the conductivity of titanium and the hardness of copper, and indexed under the terms TITANIUM; HARDNESS; COPPER; and CONDUCTIVITY would be retrieved in response to a query on the conductivity of copper and one on the hardness of titanium.

The occurrence of this kind of incorrect term relationships in a postcoordinate system is reduced by the use of *roles* or *role indicators*. Role indicators are intended to compensate for lack of syntax in index terms by showing the function of a particular term in the subject description (*5*). A role indicator is a symbol added to an index term. It indicates the relationship that the particular term bears to the other terms used in the indexing of the document by specifying its role in the index description or the query.

The problem concerning dyestuff and bacteria can thus be solved through the use of two role indicators. Let us assume that Role 2 represents "object of action, recipient," and that Role 5 represents "tool, agent." Then a document dealing with the destruction of bacteria by dyestuff would be assigned the following terms and roles: DESTRUCTION; BACTERIA (2); and DYESTUFF (5).

In the same system a document dealing with the destruction of dyestuff by bacteria would be indexed as: DESTRUCTION; BACTERIA (5); and DYESTUFF (2).

In essence this means that a given term, through the addition of the various roles, is broken down into several more specific terms. "Dyestuff used as an agent" and "Dyestuff as an object of action" are both more specific than "Dyestuff" alone.

The principal way in which this method differs from the use of more specific natural language terms is that the relationships described through role indicators are standardized within a given system. For example, using the Engineers' Joint Council System of roles, a document on the molding of plastic housing would be indexed with the following roles and terms: MOLDING (8); PLASTICS (1); and HOUSING (2)—Role 8 to indicate principal subject of discussion, Role 1 to indicate raw material, and Role 2 to indicate product (*6*).

The use of roles in indexing requires complex intellectual judgments from the indexer, and they are difficult to apply consistently. Roles tend to decrease indexing consistency, and they can also have a significant effect on system economics. Since the productivity of indexers is reduced when roles are introduced, their use can greatly increase indexing costs. There is also some indication that the usefulness of roles will vary with the subject field, the complexity of the queries, and the size of the file. The more precise and unambiguous the language of the field, the more complex the queries, and the larger the file, the more successful are roles likely to be (*7*).

Today the trend seems to be away from roles. Since the use of roles increases indexing costs substantially, their use can only be justified if the added costs are compensated for by savings resulting from improved quality of output. However, the use of roles does not necessarily improve retrieval significantly. A study of the MEDLARS system, for example, showed that less than 10% of the false coordinations could have been prevented through the use of role indicators.

There is good reason to believe that the specificity of index terms provided by role indicators can be better achieved by using more specific natural language terms. In the MEDLARS study, for example, the coordination of the terms TOXINS and FISH, in a search for toxins produced by fish, retrieved a number of nonrelevant documents dealing with bacterial toxins affecting fish. Although this kind of "noise" could possibly be prevented by role indicators (fish as a producer, fish as a target), it could also be prevented by the use of the more specific terms ANIMAL TOXINS and BACTERIAL TOXINS (*8*).

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SUSAN ARTANDI

ROMAN AND GREEK LIBRARIES

Libraries of Greece

ORIGINS OF LIBRARIES IN GREECE

Although libraries in the sense of collections of documents existed in the eastern Mediterranean and Egypt as early as the third millennium B.C. (*1*), it can be safely stated that the library in the sense of collections of books for reference, teaching, and recreational reading first appeared in fifth-century Greece. The library as we know it today is the basic instrument of creative humanism and science; and these latter, as we know them today, are our finest heritage from the golden age of Athens. The Greeks were surely cognizant of the collections of papyri and clay tablets in Egypt and Babylonia as tools for the preservation and transmission of records and knowledge in general; but, just as in the case of other cultural legacies from neighboring countries, the Greeks endowed them with a new spirit and lent them new meaning and utility. Despite long periods of cultural depression, modern cultural and scientific institutions and traditions are lineal descendants of those of classical Greece.

The Greeks invented the word *βιβλιοθήκη*: "nam *βιβλίων* librorum *θήκη* repositio interpretatur" (*2*). The original use of the word was to indicate a cabinet or other container for books (i.e., papyrus rolls), and we find it used by Roman legal scholars in this sense (*3*). However, it was also used in the plural, *βιβλιοθῆκαι*, in the sense of an area or structure for keeping books (*4*). It also came to refer to the book collection itself (*5*), although some Christians restricted it to the collection of canonical scriptures in late antiquity. Since *βιβλίον* refers to any written document on papyrus, a *βιβλιοθήκη* could also be an archive (*6*).

Libraries are known to have existed in Greek-speaking countries as early as the sixth century B.C. The earliest Greek libraries of which we have a record are those of Polycrates of Samos (d. 522 B.C.?) and Pisistratus of Athens (ca. 605–527 B.C.). There is simply mention of the first in Athenaeus (*7*), but the second was a figure of considerably larger stature. The library created by him and his sons, especially Hipparchus, was a scholarly collection used for textual purposes, particularly by students of Homer. Aulus Gellius (among the many ancient writers who mention the library, Ref. *8*) says that it was seized and taken away by Xerxes when he took the city in 480 B.C., but that it was later returned by King Seleucus Nicanor. The library seems to have been available to the public, and the Athenians took sufficient pride in it to increase the holdings (*9*). Public archives were probably instituted in Athens about the same time.

Fifth-century Athens had other book collectors, for private libraries always coincide with periods of material prosperity and high levels of cultural achievement. Above all there was Euripides, whose works betray wide and judicious reading (*10*). Aristophanes pokes fun at the bibliomania of the dramatist (*11*). Another collector was Euthydemos, a wealthy youth who owned the best literature of Greece, including all of Homer and even the poems of the epic cycle (*12*). Socrates, who depended solely on the spoken work for communication, had nevertheless read widely (*13*). Plato surely owned a book collection, and Gellius tells us how the satirist Timon abused Plato for having bought a treatise on Pythagorean philosophy for an exorbitant sum (*14*). Diogenes Laertius quotes Satyrus to the effect that Plato wrote to Dion in Sicily instructing him to purchase three Pythagorean books from Philolaus for 100 minae (*15*). There is other evidence of Plato's bibliophily, and it may properly be assumed that his books constituted the Academic Library.

The most famous of all personal libraries in antiquity was that of Aristotle. It was a private collection, to be sure, but, as its history indicates, a collection for the use of his followers and sucessors even if it was not officially a part of the Lyceum's equipment (*16*). It passed from Aristotle to the ownership of his friend and successor, Theophrastus, who added to it and willed it to a colleague, Neleus of Scepsis. However, Strato was chosen head of the school instead of Neleus, about 287 B.C. While Strato surely kept some books (especially those of Aristotle and Theophrastus) in the Lyceum, Neleus probably took the larger part to Scepsis. Athenaeus says he sold the collection in 286 to Ptolemy II Philadelphus; but Strabo says he took it to Scepsis, where he is supposed to have kept both published and unpublished works of his masters and to have sold the remainder to the Alexandrians. Neleus's heirs stored the books in a cellar where they were gravely damaged by dampness and papyrophilic vermin. Nevertheless, it was still a rich collection of books and documents when it was bought by the wealthy bibliophile Apellikon of Teos and returned to Athens, where damaged rolls were copied. Presumably Apellikon lost his life in the Mithridatic War, and Sulla seized the books at the end of the war in 84 B.C. Two decades later the grammarian Tyrannio of Amisus bribed the librarian to permit him to make copies, of which he gave one to Andronicus of Rhodes (later director of the Peripatetic School), who used it for a definitive edition of Aristotle. Sulla had set up the library on his estate near Cumae where Cicero later acquired a country place. After Sulla's death his relative Faustus Cornelius Sulla inherited the collection, and Cicero wrote Atticus (IV, 10, 1) that he had used the books. Faustus Sulla's property was later auctioned, and Cicero acquired some of the books.

Other collectors, whose books may have been available in part to a selected public, were Eucleides (archon of 403/2 B.C.), Antipater, Proclus, and Piraeus (*17*). Zeno, founder of the Stoa, had books which his father brought to him from his commercial trips, and Antigonus Gonatas provided him with slaves for copying (*18*). The Apostle Paul had a small traveling library which may have been available to churches in Asia Minor and Greece, for he wrote to Timothy (II, iv, 13) to send him the cloak and the parchment books he left in Troas.

A striking aspect of Greek libraries was the likely presence of foreign books in the collections. A Parsi tradition says that Zoroaster's writings were confiscated by the Romans and translated into Greek after the death of Alexander the Great (*19*). A collection of Zoroastrian writings which survived the burning of Persepolis in 331 B.C. was presented to the Alexandrian library (*20*). The legend of the Septuagint is well known, and one may suspect that even Sanskrit texts could have reached the Mediterranean. At least we know from Dio Chrysostom that Homer was translated into an Indic language (*21*).

Although Athens was always the central point of European Greek culture, there were libraries elsewhere. Euripides refers to "black books loaded with the many utterances of Apollo" at Delphi, in the *Pleisthenes* fragment (*22*); and Platthy cites Plutarch and epigraphical evidence for a collection there. At Epidaurus a library was dedicated to Apollo Malcatas and Asclepius Soter (*23*). Pausanias, one of the richest sources for our knowledge of books in ancient Greece, mentions a lead tablet near the spring at Mount Helicon on which the *Works* (*Ἔργα*) were inscribed (*24*). Further, there were libraries at Pella and Philippi in Macedonia; at Andania (in Messenia), Olympia, and Patras in the Peloponnesus; and in Aegina, Crete, Cyprus, Citium, Delos, Cos, Rhodes, and Samos on the Greek islands (*25*). Some may have been only groups of inscriptions, but they were nevertheless collections of written material for reading and reference.

Of the libraries in European Greece those of Macedonia deserve special note, for Philip II had a special admiration for Greek cultural tradition and secured for his son Alexander, *φύσει φιλολόγος και φιλαναγνώστης*, the tutelage of none less than Aristotle. The bibliophily as well as the philosophy of the latter must have infected the conqueror. He had a traveling library including an *Iliad* annotated by Aristotle (*26*), and while campaigning on the Iranian plateau he commissioned Harpalus to send him numerous books, including works of the three great tragedians. The books were returned to Macedonia after Alexander's death; but the very fact that the great books of Greece had wandered through half of the known world must have been at least a partial inspiration for the proliferation of libraries in the Hellenistic Orient.

In Macedonia proper there was a library in Pella when Antigonus Gonatas finally secured the Macedonian throne for himself in 276 B.C. He gathered a glittering array of philosophers, poets, and scholars at his court, including Aratus of Soli, whose acquaintance with Alexander's *Iliad* brought the textual tradition of this precious copy into Homeric scholarship. In the next century, L. Aemilius Paullus Macedonicus defeated Perses (the Macedonian ruler) at Pydna and allowed his sons to choose books from the royal collection, the first example of large-scale removals of Greek libraries to Rome (*27*).

Of the libraries on the Greek islands, a few revealing points may be extracted from the sources. Athenaeus (I, 3) says that P. Livius Laresis had on Samos the largest collection of old Greek books ever assembled. Cos, with its Hippocratic tradition, had some kind of medical research collection, including clinical histories said to have been copied by Hippocrates (*28*). But Hippocrates was accused of biblioclasm by Tzetzes, who says that he burned the old medical books and the library after his appointment as librarian (*29*). There is also a precise record of donations of a building, books, and specific sums of money to a library on Cos about 200–175 B.C. (*30*).

LIBRARIES OF THE HELLENISTIC ORIENT: ALEXANDRIA

Alexander's example of carrying Greek books over thousands of miles in Asia became a matter of official policy with his successors, for the libraries they founded were surely major forces in the Hellenization of the eastern Mediterranean. Not only were the collections much larger than any assembled in the previous two or three centuries, but also they are the first examples of significant research libraries supported by public (vice, royal) funds. Furthermore, the royal precedents were followed by individuals, and private bibliophily came into full bloom.

The Ptolemaic rulers of Egypt were responsible for that country's most significant libraries, the Museion and the Serapeion (*31*). The founder of the dynasty, Ptolemy I Soter (ca. 367–ca. 282 B.C.), had been "companion, lifeguard and seneschal" to Alexander and later his biographer, and he shared the conqueror's respect and love for books. He was determined to make his capital the center of Hellenistic learning and to attract to it the leading scholars and scientists of the Greek world; and for this purpose he established a complex of institutions, including an observatory, an anatomical institute, and libraries, which resemble rather closely the structure of a modern academy of sciences. Actually he had a sort of model in the schools of Plato and Aristotle, and, indeed, he even attempted to bring Theophrastus (Aristotle's successor) to Alexandria, but without success.

Ptolemy was able to attract Theophrastus's pupil and friend, Demetrius of Phaleron (b. ca. 350 B.C.), to organize the Museion, which was located at the rear of the royal palace. Demetrius, in exile after Poliorcetes took Athens in 307, was experienced as a politician and soldier as well as a scholar, and when he arrived in Alexandria in 297 he assumed a position as *πρῶτος τῶν πτολεμαίον φίλον*. The first Ptolemies supported the academy so generously that its activities could be far more extensive and, in some respects, more productive than the Athenian schools on which it was modeled. The leading scholars of the Greek world were brought to Alexandria, notably Philetas of Cos (b. ca. 320 B.C.), who was to become the tutor to Ptolemy II Philadelphus (308–246 B.C.). The latter was responsible for providing a building for the Museion as well as the Pharus and other institutions of the city. Philetas's pupil, Zenodotos of Ephesus (b. ca. 325 B.C.), classifier and editor of the Greek epic and lyric poets (*32*), was the first official head of the Alexandrian Library (ca. 284 B.C.).

Ptolemy I was the founder of the Sarapis (in Latin, usually Serapis) cult with its sanctuary in Rhatotis, the southwestern part of the city inhabited by Egyptians. This effort to set up an imperial deity to be worshipped by Greeks and Egyptians alike probably occurred before 312. The sanctuary proper, the finest building of the city, was probably completed around 296 when Demetrius of Phaleron composed his hymn for the Sarapis cult. Like most Egyptian and many Greek temples, the Serapeion had quarters for a library for the use of the priests. It was probably not completed until the reign of the great builder Ptolemy II.

Book collecting for the Museion began with its establishment, and there is abundant evidence of the zeal of Ptolemy I and the scholars at his court for developing a universal collection comprehending all the arts and sciences. The fact that duplicates were acquired in quantity is all the more to the credit of the Alexandrians, for the textual situation of the authors of the day was notoriously defective. Editing was the major problem, and then (perhaps even more than today), the more copies of books that were available, the more accurate the resulting edition. Much as in the great rare book libraries of our day, the men associated with the Alexandrian library were competent scholars in their own right, even if their library science left something to be desired by modern standards. In any event, the enthusiasm for collecting was limited neither by funds nor geography, for Demetrius's agents combed the Greek world from Sinope on the Black Sea to Massilia (Marseille). Ptolemy III Euergetes (ca. 288/280–221) directed that manuscripts on all ships coming into Alexandria be copied, and he is said to have forfeited a bond of 15 talents to Athens for the loan of the official copy of the three great tragedians in order to keep it in Alexandria (*33*). But perhaps the most significant acquisition came in 286 when Ptolemy II acquired a large segment of the libraries of Aristotle and Theophrastus (supra).

The scope of the Museion was universal, while that of the Serapeion was smaller and may well have been stocked largely with unwanted duplicates from the former (*34*). The Serapeion may have been a sort of public library whose main purpose was to give Hellenistic culture a dominant role in the cultural traditions of the community (*35*). In any event it was surely a part of a common Greco–Egyptian cultural element in a sanctuary which the Ptolemies considered a sort of national monument of their empire. As for the holdings of the libraries—any guess, educated or not, must be predicated with the comment that library counting, up to the present day, is a notoriously inexact procedure. Unhappily, the *catalogue raisonné* of the Museion by Callimachus (ca. 305–ca. 240 B.C.)—*Πίνακες τῶν ἐν πάσῃ παιδείᾳ διαλαμψάντων καί ὧν συνέγραψαν* in 120 rolls—has not survived (*36*). Tzetzes uses Callimachus as a source for the statement that there were 42,800 rolls in the Serapeion, and 400,000 *συμμιγεῖς* (mixed) and 90,000 *ἀμιγεῖς* (unmixed) or *ἁπλαῖ βίβλοι* in the Museion. Some have argued that the "mixed" rolls contained several works, while the "unmixed" contained only one item; but a more widely accepted interpretation is that after deduction of duplicates from the "mixed" rolls there were only 90,000 ἁπλαῖ titles. The Serapeion, which probably derived its collections from the Museion, most likely had few or no duplicates. According to Gellius (VII, 17, 3), also quoted by Ammianus Marcellinus (XXII, 16, 12–13), the Museion had "septingenta voluminum milia" (700,000 volumes) when, so Plutarch says (*37*), it was burned during Caesar's siege of Alexandria in 47 B.C. But Dio Cassius claims only that the "storehouses of grain and books" were destroyed, while others allege the total destruction of the great library or of both libraries (*38*).

The whole event is so shrouded in the mystery of secondary and tertiary reports that one can safely assume only that a large number of books were destroyed, probably in the Museion. That Mark Antony is said to have presented Cleopatra with 200,000 books from the Pergamon library in 32 B.C. suggests that replacements were needed (*39*), and they may have gone to the Serapeion. The Museion continued to exist as an academy; but since its library was not mentioned after the holocaust of 47 B.C., the Serapeion was probably the research library of the city and was *the* Alexandrian Library. Certainly Alexandria's position as the library center of the ancient world was undiminished. Domitian felt that the best way to replace books destroyed by fire was to secure copies of the ones in Alexandria (*40*). In 197 Tertullian was under the impression that the original copy of the Septuagint was in the Serapeion (*41*), and John Chrysostom repeated the same story two centuries later (*42*). There is evidence that scholars associated with the Museion had official positions with the Serapeion and may even have moved physically to the Serapeion before the palace quarter was destroyed in 269.

In 391 the Patriarch Theophilus decided to convert all the temples of Alexandria into Christian churches, and riots broke out, probably most intense around the Serapeion as the center of the older religion. Teachers and students of the Museion opposed the Christian mob vigorously under the leadership of the philosopher Olympius. When Theophilus won imperial approval for his policy, the teachers fled from the city. There is no mention of the library, but it seems reasonable to assume that Theophilus would not have wished to spare the books from which the hated philosophers drew their wisdom. When Orosius (an orthodox Christian) was in Alexandria about 414, he reported that the temples "armaria librorum exinanita [erant] a nostris hominibus nostris temporibus" (*43*). While most of the Alexandrian scholars fled to Constantinople (e.g., the grammarians Ammonius and Helladius, Ref. *44*) and elsewhere, science and humanistic scholarship continued to be cultivated in the city of the Ptolemies up to the Arab conquest, and there must have been books to support their studies even if there was no longer a major research library. The old canard that Amru, who conquered Alexandria in 634, burned the great library he was said to have found there (on the orders of the Caliph Omar) has no basis and was refuted by Gibbon and others who have studied the library's history (*45*).

The position of *prostates* (director) of the library in the age of the Ptolemies carried the same prestige as that of the greatest national libraries of our own time. Oxychynchus papyrus No. 1241 from the second century A.D. has a list of the chief librarians of the Museion, but it is defective in the beginning and carelessly written. It lists Apollonius of Rhodes, Eratosthenes, Aristophanes of Byzantium, Apollonius ὁ εἰδογράφος, and Aristarchus of Samothrace. However, it seems likely that the first Apollonius was confused with the εἰδογράφος, and that the Rhodian does not belong in the list at all. In 145 Aristarchus retired to Cyprus in the wake of a tempest of anti-intellectualism (even though other scholars of the Museion seem to have been unaffected), and with his administration the line of great textual critics came to an end. Of subsequent librarians we can identify only one of any scholarly distinction: Ammonius, appointed by Ptolemy XII Auletes (116/118–51).

We know a little about the internal administration of the Museion, which was not too different from the broad routines followed by large research collections in our own time. Galen tells us that the new acquisitions did not go to the *armaria* at once but were arranged roughly according to provenance (*46*). Thereafter subject specialists arranged the rolls according to content, and we even know the names of some of these specialists from Tzetzes' introduction to comedy in the βίβλος Ἱστορική. The chief accomplishment of library technology before modern times was Callimachus's *Pinakes*, a work which was a comprehensive manual of Greek books of all types based on the catalogs of the Museion (*47*). Divided into six poetic genres and at least five areas of prose (history, rhetoric, philosophy, medicine, and law), and a section of varia (e.g., cookery and fishing), authors were arranged alphabetically in each category. For bibliographical accuracy the number of rolls occupied by each work and the number of lines (στίχοι) were given, with incipits where needed to avoid confusion. Dates of authors were provided, and there were critical commentaries where needed (e.g., for works of doubtful authenticity).

Callimachus surely had assistants for his great work, and we can identify one in Hermippus of Smyrna (*48*), a prolific peripatetic bibliographer whose defective scholarship surely had to be revised by his master. The *Pinakes* was imitated by other ancient library catalogs of which we have fragments (*49*). At the same time it must be recorded that Callimachus's cataloging theory was not totally original, and Wendel has shown a similar method used in Ashurbanipal's archive of clay tablets in Nineveh three centuries earlier (*50*).

The seven centuries during which there was a major research library in Alexandria cover a longer life-span than that enjoyed by any modern library, if we overlook the last two or three centuries of the Middle Ages when no European library had collections comparable to those of the Museion and the Serapeion. The notions that a research library should support an effective corps of textual scholars and that it should secure and protect copies in the best physical condition have their origins here. Library buildings and equipment to handle very large collections of papyrus rolls had to be provided for the first time, and thousands of foreign scholars visited the premises over the centuries. The technical processes of handling the collections, culminating in the *Pinakes*, were logical and necessary procedures, and they were developed for the first time in Alexandria. From a practical standpoint, the example of the Ptolemies in providing official support on a large scale for developing significant research collections was imitated not only by lesser Hellenistic princes but also by kings, emperors, dukes, and presidents for 23 centuries.

OTHER HELLENISTIC LIBRARIES IN THE EAST

We know far less about the other major research library of the Hellenistic age, that of Pergamon. We can probably assume that collections of books were begun by Attalus I (289–197), whose ability as a general and a diplomat elevated Pergamon to a significant position of political power in the Hellenistic East and whose patronage of literature, arts, and the sciences lent major prestige to the city as a cultural center. During his long reign from 241 to 197 he had in his entourage such distinguished persons as the mathematician Apollonius of Perge, the Stoic geographer Polemon of Ilium, the military engineer and optician Biton, and at least two individuals who commemorated his work: the biographer, bronze-worker, and sculptor Antigonus of Carystus, who helped make statues to celebrate Attalus's victory over Galatians (including the "dying Gaul"); and Neanthes (not the librarian from Cyzicus), who composed a lost history of Attalus's reign. Collections of books were surely necessary to support the work of these scholars, but apparently suitable housing for them was not provided until the reign of Eumenes II between 197 and 160 (or 159) when a major sequence of buildings was constructed to adorn the city (*51*).

The wealth of the Attalids permitted them to purchase books in the entire Greek world, and, quite naturally, they ran into competition with the Alexandrians. Although it is true that the Ptolemies placed an embargo on the export of papyrus, at least in part to keep it from Pergamon (*52*), the real explanation for the use of parchment in the scriptoria of Pergamon is simply that leather (easily available in a land rich in herds of sheep and goats) had long been used as a writing material and was now refined for quantity use. It is not unlikely that Neleus's heirs in Scepsis, a dependency of Pergamon, hid the remnants of Aristotle's library in a damp cellar (supra) to protect it from possible confiscation by agents from the capital.

There was no Callimachus in Pergamon to compile a monumental *Pinakes*, and perhaps the resources were insufficient for such a work. The names associated with Pergamon were distinguished, but far less so than those we know from Alexandria. The first librarian we can surmise for Pergamon was Artemon of Cassandreia (earlier Potidaea), whose works *On the Collection of Books* and *On the Use of Books* could hardly have been composed in the second century B.C. in a small community on the isthmus of the western peninsula of Chalcidice (*53*). Another librarian may have been Telephus of Pergamon (2nd century A.D.), tutor of Emperor Lucius Verus, Stoic grammarian, and author of works on literature, syntax, antiquities, scholarship, and bibliography (*54*). The possible loss of the 200,000 books said to have been presented to Cleopatra by Mark Antony (supra) apparently did not cripple the library permanently. The only Pergamon librarian actually named as such was Athenodorus Cordylion of Tarsus (to be distinguished from Athenodorus of Tarsus, the Stoic who came to Rome with Octavian in 44 B.C.). Our Athenodorus, a zealous Stoic brought to Rome in 70 B.C. by Cato Uticensis, is identified by Diogenes Laertius as the Pergamon librarian (*55*), quoting Isidorus of Pergamon.

The only indication of the size of the collection is in the story about Mark

Antony's alleged gift to Cleopatra. We do know that duplicates were retained, and the number of "mixed" rolls probably exceeded substantially the number of απλαι, if we may use Alexandrian terminology. There was a περγαμηνοὶ πίνακες (possibly not the exact title), and it is reasonable to assume that it resembled the great work of Callimachus. It probably recorded only βιβλία ἁπλᾶ, and the count on this basis may have been the source of the 200,000 figure given by Antony's accuser.

German excavations began in Pergamon in 1878, and 6 years later the description of the remains of the library of the Attalids was published (*56*). The exact functions of the various rooms in the building adjacent to the Temple of Athena Nikephoros were not clearly identified for a half century. It now seems clear that a large room was used for meetings (perhaps of the academy) and for ceremonies, and the three smaller adjacent rooms for shelving. Even if they were insufficient for the 200,000 rolls the library was said to have owned in 32 B.C., there is no reason why nearby buildings could not have been used, just as in the case of other libraries throughout the ages. More important is the implication that a large reading room was not an essential part of the Greek library, a feature that was characteristic of the Roman libraries of the empire (see Figure 1).

The Seleucids had cultural as well as military ambitions, and both Antiochus I and Antiochus II made some effort to attract poets and scholars and may even have started a library. Antiochus III (ca. 242–187) brought a number of leading scholars and poets to his capital city on the Orontes, which he wanted to make the center of Hellenistic culture in Asia. Among them was the learned poet Euphorion (b. ca. 275), and the Suda tells us that he was appointed head of the library in Antioch. The alternate capital, Seleuceia on the Tigris, also had a vigorous intellectual life (*57*). There was a school of rhetoric in Seleuceia, perhaps a branch of a gymnasium, which may be assumed to have had a library. We do know that Syria had a long library history, for in 364 A.D. Libanius wrote from Antioch to the philosopher and poet Fortunatianus that to bring books to Laodicea in Syria would be comparable to sending owls to Athens (*58*).

While Mithridates (Eupator, 120–63) is known mainly to history as Rome's most stubborn opponent in the east in the early first century B.C., he also had strong interests in medicine, and he was in touch with the leading scientists of his day. Pompey had his loyal freedman Lenaeus translate Mithridates' writing on pharmacology, reported by Pliny in a passage in which he refers to the *ingenii magnitudo* of the Pontine despot (*59*). It is likely that Mithridates' library was largely medical. In any event, Lucullus took it with other booty to Rome in 70 B.C. after the fall of Sinope (*60*).

TEMPLE AND ACADEMIC LIBRARIES

The Egyptians had collections of papyri in their temples, and the Ptolemies followed this tradition with their development of the Serapeion collection. The proximity of the Pergamon library to the sanctuary of Athena Nikephoros is also pertinent. The presence of books at Delphi and the library dedicated to Apollo at

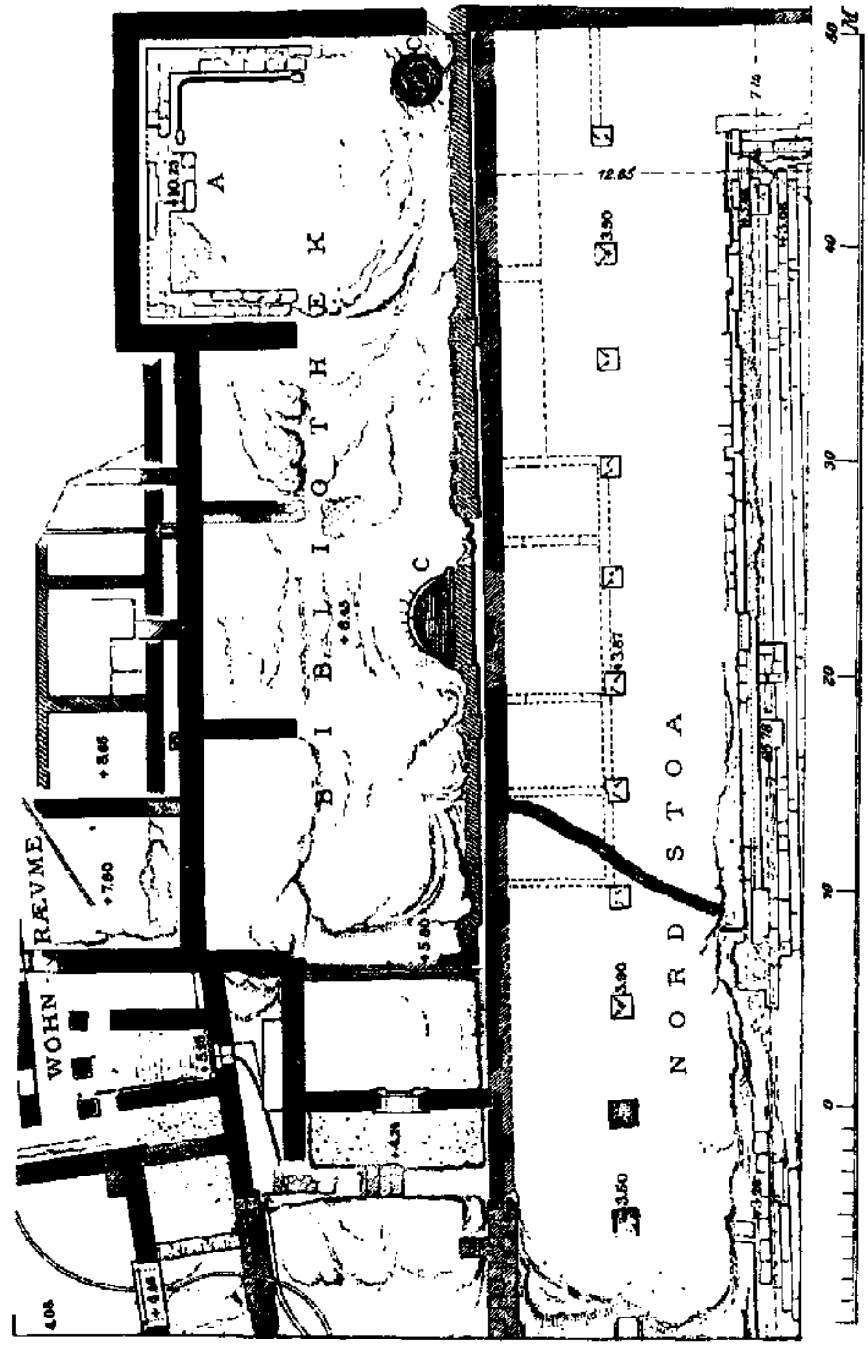

FIGURE 1. *Floor plan of the library and adjacent areas in the sanctuary of Athena in Pergamon. The large room with the podium is at the far right. From Christian Callmer, "Antike Bibliotheken,"* Acta Instituti Romani Regni Sueciae, **10**, *149 (1944),* (Opuscula archeologica, *No. 3).*

Epidaurus have been noted. When Augustus erected a temple in honor of the Divus Julius in Alexandria in 12 B.C. at the site of Caesar's landfall (*61*), a library designed to inform Alexandrians about Roman culture was associated with the sanctuary.

Libraries associated with educational institutions are better known and were more influential. We know that teachers of all ages have had their desk copies and ready-reference manuals. (See Figure 2.) From the fourth century B.C. we have the amusing incident from a fragment of the Middle and New Comedy poet Alexis, in which Linus asks his pupil Heracles to choose a book from his library collection predominantly used for reading. The thoughtless youth immediately seized a cook book (*62*)! The concern for a formal education to meet the needs of their culture was such that it would be difficult to conceive of a teacher such as Linus without classroom copies, or of a school without a library of some sort (*63*).

In 275 Ptolemy II gave the city a gymnasium which bore his name, and surely a library with it (see Figure 3), for in the first century B.C. the *epheboi* added 100

FIGURE 2. *Teacher instructing pupil, from a papyrus roll on a red-figure drinking cup by Duris (510–465 B.C.), formerly in the Staatliche Museen, Berlin.*

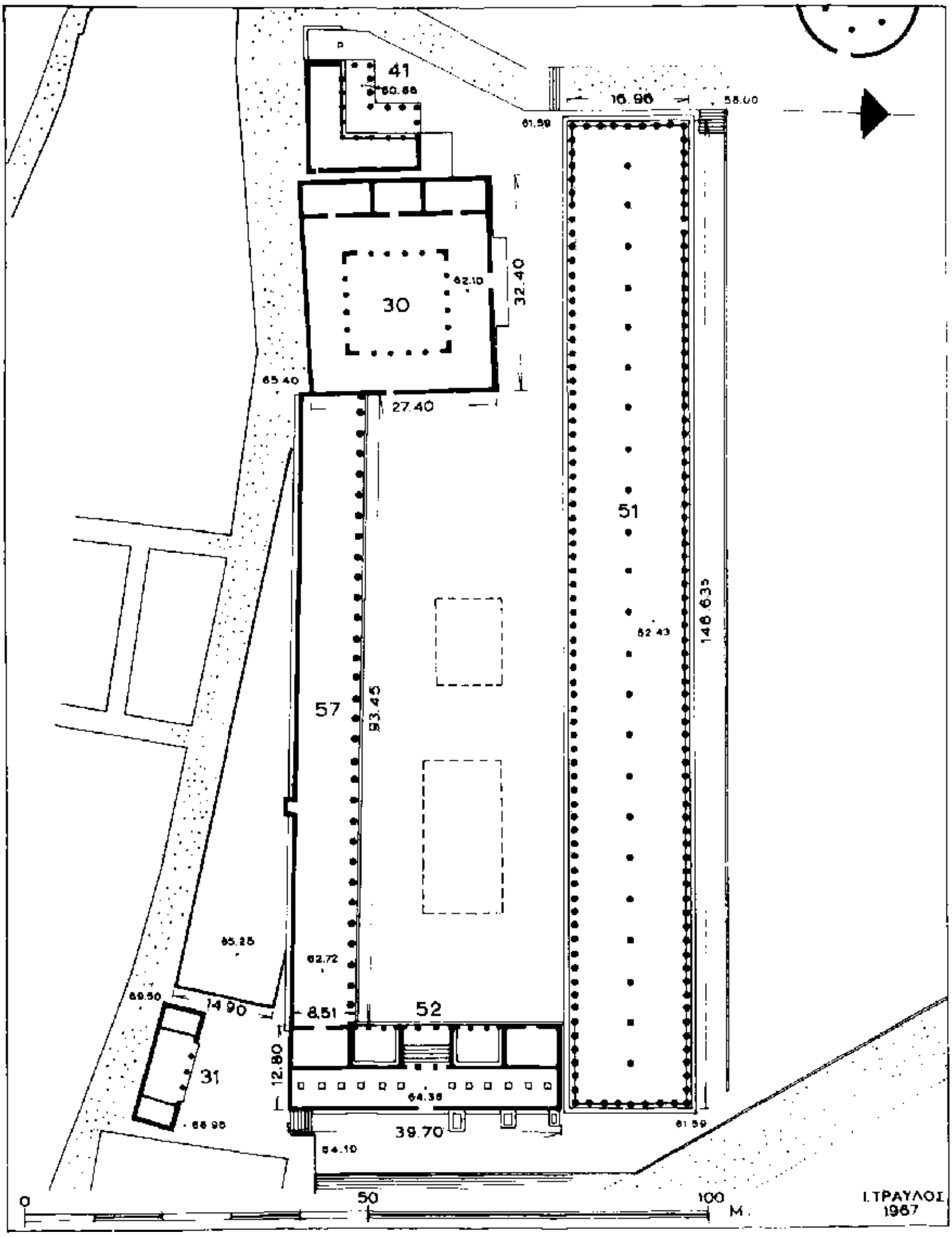

FIGURE 3. *Floor plan of the gymnasium of Ptolemy II in Athens. The library may have been in the area at the bottom, between Nos. 52 and 39.70.*

rolls to the collection annually (*64*). The library on Cos (supra), which received handsome gifts at the beginning of the second century B.C., was probably for a school. Archaeological and epigraphic evidence, including fragmentary book lists, points to the presence of libraries in Hellenistic gymnasia throughout the eastern Mediterranean. In Pergamon the gymnasium had a library in the middle of the second century B.C., according to two inscriptions (*65*). The gymnasiarchs at Rhodes recorded the names of donors to the library, and we have a partial list (*66*). About 100 A.D. the Amphictiony at Delphi financed the remodeling of the gymnasium and provided it with a library (*67*). In Halicarnassus the tragic poet Caius Julius Longianus was made an honorary citizen in 127 A.D., a bronze statue of him was set up beside that of Herodotus in the gymnasium of the *epheboi*, and his books were shelved in public libraries for the youth of the city along with those of the ancients (*68*). In Nysa, a community with strong cultural interests in the first century B.C., recesses for shelving rolls have been found in a building about 150 meters north of the gymnasium. (See Figure 4.) There is also evidence of gymnasium libraries in Mylasa in Caria (a non-Greek city, but well Hellenized in its

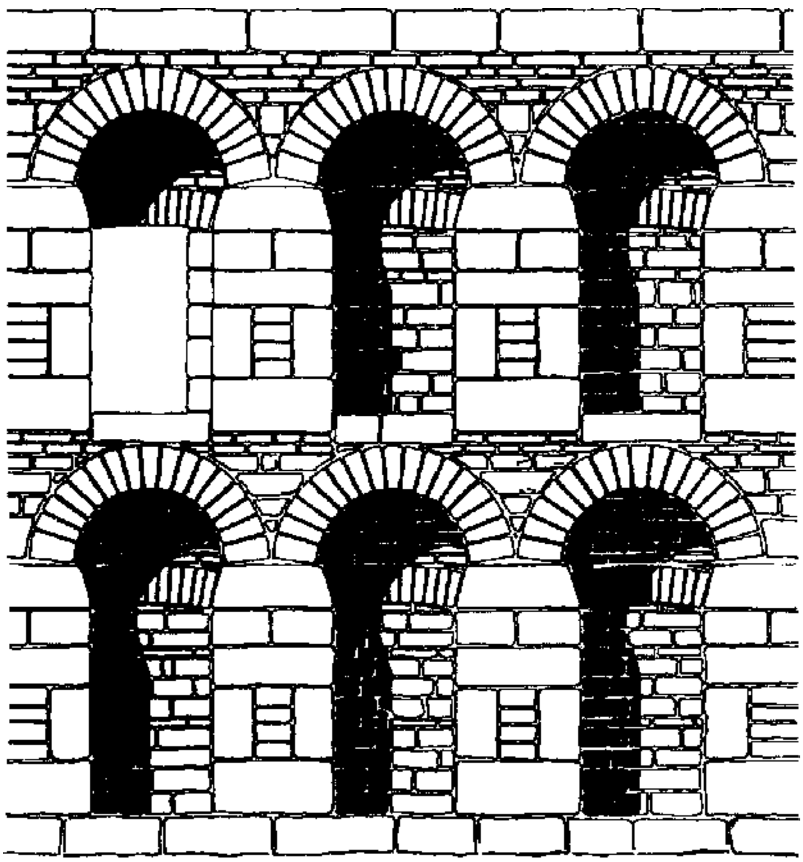

FIGURE 4. *A wall in the library at Nysa, from Walther von Diest, "Nysa ad Maeandrum,"* Jahrbuch des Kaiserlichen Deutschen Archäologischen Instituts, 10, *Ergänzungsheft, plate 10 (1915).*

culture), Teos, and Tarsus. The latter was a major center of learning and literature (*69*), and it is not improbable that a tentmaker's son named Saul was among the *νέοι* (upper form students) in the gymnasium there and read in what must have been a substantial library before he went on to Jerusalem to study under Gamaliel.

The higher institutions also had their libraries, even though the evidence is more fragmentary than is that for the gymnasia. The model for antiquity was the Museion in Alexandria. Indeed, when Hadrian established a university (if we may use the term) in 131/132 for Athens, as the mother of classical culture, he called it the Museion, and it was furthered by Antoninus Pius and Marcus Aurelius. When Hadrian's handsome stoa with its hundred columns was excavated in 1885, the hall for the library was recognized at once (*70*). (See Figure 5.) Hadrian also founded a university at Rome in 134, and he called it the Athenaeum (*71*). It lasted into Christian times, until 602. With it was associated the Bibliotheca Templi Traiani, where (according to Gellius, Ref. *72*) Roman scholars gathered for their colloquia. Possibly also for instructional purposes was the library founded in Athens by Titus Flavius Pantainos early in the first century A.D., of which the dedicatory inscription was located in 1933 in the course of American excavations in the Agora.

In Ephesus there was a Museion which was served by the library erected in honor of Titus Iulius Celsus Polemeanus by his son early in the first century A.D. (See Figures 6–8.) Possibly destroyed by an earthquake, the library is in a relatively good state of preservation today, with obvious recesses for shelving rolls. An inscription from about the beginning of the third century A.D. found in the vicinity refers to the plastering of the place: *πρὸ τοῦ αὐδειτωρίου καὶ τῆς* Κέλσου *βιβλιοθήκης*

FIGURE 5. *Wall in Hadrian's stoa in Athens showing niches for shelving rolls.*

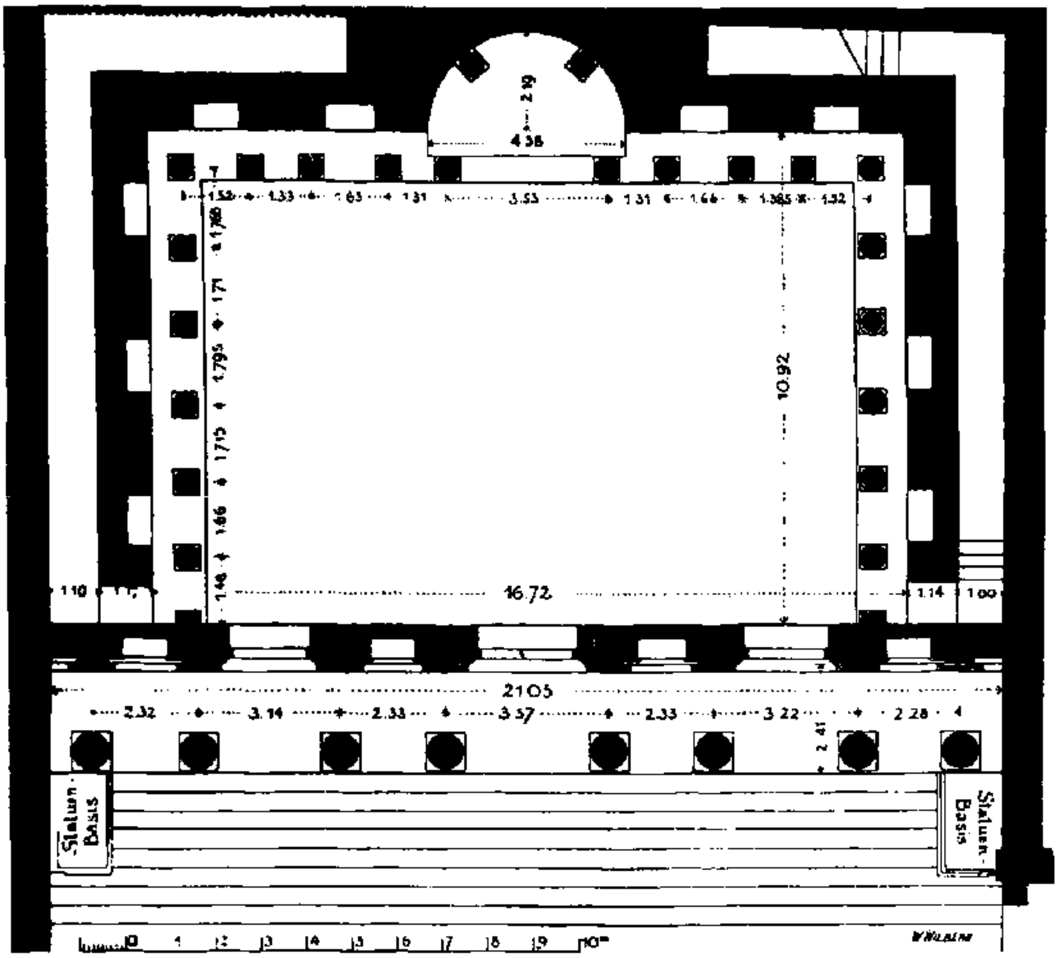

FIGURE 6. *Floor plan of the library at Ephesus. From Wilhelm Wilberg, "Die Fassade der Bibliothek in Ephesus,"* Jahreshefte des Österreichischen Archäologischen Institutes in Wien, 11, *120 (1908).*

(*73*). Midway between Ephesus and Pergamon is Smyrna, perhaps the leading intellectual center of Ionia in the first century A.D., and Strabo mentions a library there as one of its major buildings (*74*). Philostratus said that at that time all Ionia was a museion, and the Smyrna library—also possibly associated with a gymnasium dedicated to Homer, the 'Ομήρειον—must have served a group of scholars.

Medical faculties were separate from those of the grammarians, rhetoricians, and sophists in Athens and Rome, but in some other localities they seem to have been within one organization, notably in the Museion of Alexandria, the focal point of scientific research in the Hellenistic world. In Ephesus, where the humanists were περί τὸ Μουσεῖον παιδευταί and the medical people were ἀπὸ τοῦ Μουσεῖον ἰατροί, both faculties were in the local museion, and both were probably served by the library of Celsus. Of the independent medical schools, the first and best known was that of Cos. Whether there was an extensive collection beyond the 53 titles accepted as the bonafide Hippocratic corpus and the clinical histories

FIGURE 7. *Reconstruction of the facade of the library at Ephesus. From Wilhelm Wilberg, "Die Fassade der Bibliothek in Ephesus,"* Jahreshefte des Österreichischen Archäologischen Institutes in Wien, **11,** *122 (1908).*

ascribed to Hippocrates we cannot be certain, for we have already noted the loose traditions associated with the book collections said to have been on Cos. Regardless of whether there was a formal library on Cos in the fifth and fourth centuries B.C., and what its scope may have been, there was a continuing library tradition. The Asclepion on Cos was remodeled in handsome style by the personal physician of Emperor Claudius, C. Stertinius Xenophon, who dedicated it to the imperial house and to the people; and the subsequent remodeling in the third century A.D. has been identified with rectangular alcoves obviously for book rolls (*75*). Similar provisions for book rolls have been found in the sanctuary of Asclepius in Pergamon (*76*). Every major city probably had a σύνοδος of physicians who also provided some sort of instruction in the field and, likely as not, had a reference collection (*77*). Galen conducted his anatomical exercises and debates with his opponents in the Templum Pacis in Rome, and his complaint about the loss of his books there in the fire of 191 A.D. would seem to indicate that a library was housed

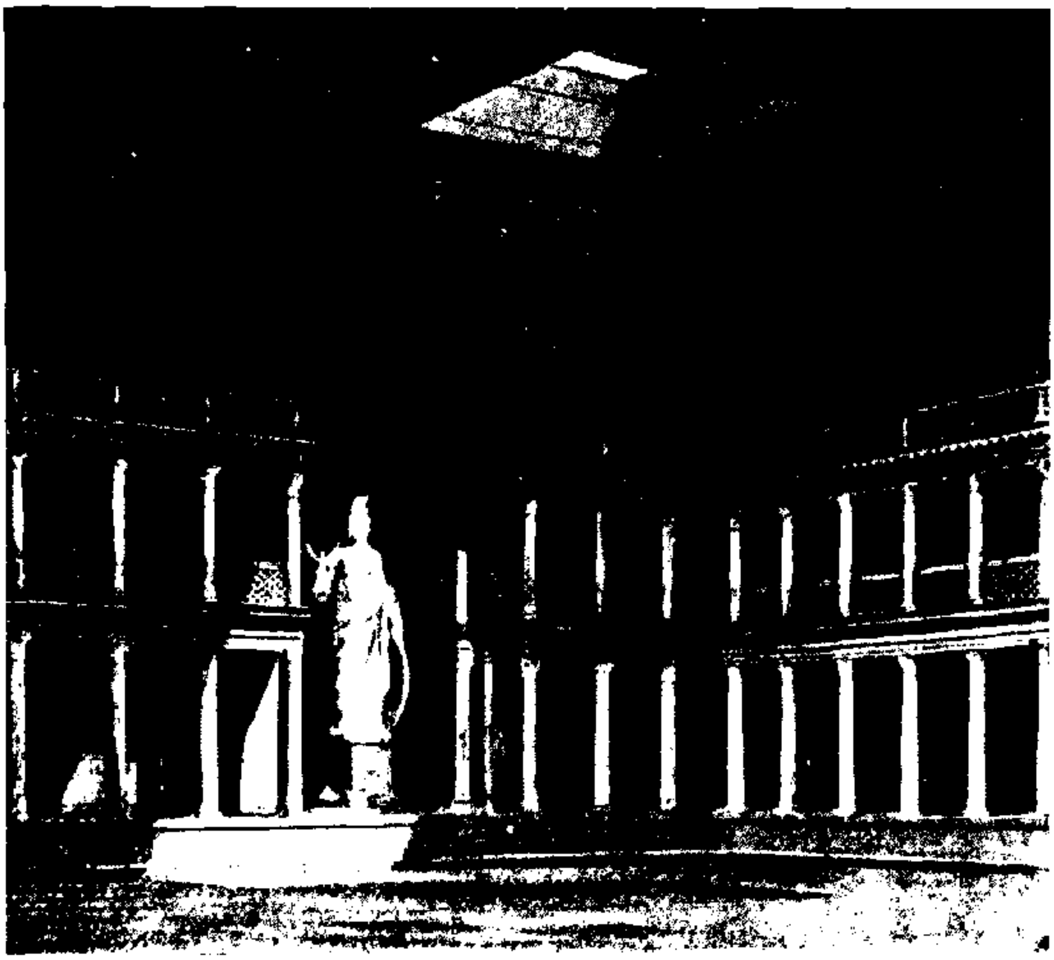

FIGURE 8. *Reconstruction of the interior of the library at Ephesus. From Rudolf Heberdey, "Vorläufiger Bericht über die Ausgrabungen in Ephesus,"* Jahreshefte des Österreichischen Archäologischen Institutes in Wien, 7, *(1904)*, Beiblatt, *col. 65.*

in the temple. Galen, like countless other members of his profession before and after him, was a bibliophile and a bibliographer of the first order, well acquainted with the great libraries of Alexandria and Rome as well as with lesser ones of places such as Smyrna and Pergamon, and his voluminous production bespeaks the riches of the libraries of his time. The legal profession also had its faculties, but, while it is most likely that there were special legal libraries, the ancient evidence for such collections is minimal.

Roman Libraries

LIBRARIES IN ROME

It would be far from accurate to say that Roman culture was wholly or even mainly dependent on the Greek tradition. On the other hand, physical manifesta-

FIGURE 9. *Roman portrait showing equipment for writing, in the Museo Nazionale in Naples.*

tions of Greek culture were visible to the eyes of the Roman conquerors, and in areas such as sculpture, painting, and book production there was no reason to change existing forms. The same applied to libraries. However, peculiar conditions and values of the imperial age created varying purposes and objectives for Roman libraries, even though the fundamental institution with its physical facilities underwent relatively slight change. The continuing existence of the great collections in Alexandria and the east and the easy intercourse of a man such as Galen between Ionia and Rome and their libraries guaranteed perpetuation of the Greek traditions. But Latin literature was respected as much as the Greek, and the Latin sections of libraries all over the empire were developed extensively.

The first large collections in Rome came in the first century B.C. as private libraries seized by generals in the east (*78*). This situation, along with other circumstances pointed out by Tønsberg (*79*), contributed to the fact that private libraries in imperial Rome were probably used more heavily and intensively than those set up for public use. The correspondence of Cicero (himself a passionate

FIGURE 10. *A reader with a roll, from a fresco at Pompeii.*

bibliophile) with Atticus in particular sheds much light on the zeal of sophisticated Romans to collect and read books. The same tradition endured through the empire.

Julius Caesar proposed a public library for Rome in which Greek and Latin literature would have positions of equal importance, and in 47 B.C. he appointed Rome's greatest scholar, Marcus Terentius Varro, as keeper of the still nonexistent library (*80*). The idea was not actually realized until Gaius Asinius Pollio (who, as praetor in 45, had supported Caesar) defeated the Parthini in Illyria in 39 and used the booty to build Rome's first public library in the Atrium Libertatis beside the Forum. There were Greek and Latin sections, the latter including a portrait of Varro as the only living author represented in the library (*81*). There is no record of the library's subsequent history.

Once Augustus was firmly established, one of his first acts to emphasize Rome's greatness was to establish a Latin and Greek library in the Temple of Apollo, on the Palatine near his own residence (*82*). The association of the library with a sanctuary was in the tradition of Alexandria and Pergamon. The first keeper was the poet and grammarian Pompeius Macer, and subsequently Augustus installed his learned Spanish freedman Gaius Julius Hyginus in the office. The Palatina was especially strong in Roman law (*83*), and for years it was the most important library in Rome. The fire of 64 A.D. destroyed it, but Domitian restored it. Marcus

FIGURE 11. *A Roman reading a roll in front of a niche with shelves* (armarium), *from a sarcophagus in the garden of the Villa Balestra in Rome. Perhaps a private library in a residence, on account of the small size of the niche.*

Aurelius used the collections, and it was probably an active service institution until the fire of 363, perhaps even later (*84*).

Another library was set up by Augustus on the Campus Martius in the portico around the temple of Jupiter Stator and Juno Regina. It was probably finished after the death of the son of Augustus's sister Octavia, Marcellus, in 23 B.C., since it was dedicated to him (*85*). The keeper was Gaius Melissus, a freedman of Maecenas, compiler of a jest book and known as the inventor of a form of light drama in the *fabula trabeata.* The fire of 80 A.D. destroyed the library, and again it was Domitian who restored it. He even sent scribes to Alexandria to make copies from the best manuscripts, sure to be found there (*86*). After Domitian this library disappears from history, although the main entrance to the Porticus Octaviae may be seen today near the church of San Angelo in Pescheria.

After Augustus's death and deification Tiberius erected a temple for his stepfather and installed a library in it, of which we have a record only from literary sources (*87*). It too was burned with the temple but restored by Domitian. We know nothing of the library's subsequent history, although it was in existence in the second century. There was also a Bibliotheca domus Tiberianae. We do not know whether it was founded by Tiberius himself (*88*), and there is other evidence that it was still in existence in the fourth century (*89*).

Domitian's father, Vespasian, was also concerned with libraries. In the period 71–75 the latter erected the Templum Pacis and installed a library in it, and a century later Gellius found some scarce books there (*90*). It was damaged by fire in the reign of Commodus, but Trebellius Pollio mentioned it at the end of the third century (*91*); and Ammianus Marcellinus at the end of the fourth century said that the Templum Pacis was one of the great sights of Rome.

Probably the most frequently mentioned library of the empire was that erected by Trajan in his forum and dedicated by him in 113, the Bibliotheca Templi Trajani, first called Bibliotheca Ulpia (from the family name of the emperor, Marcus Ulpius Traianus) in the fourth century by the none-too-trustworthy Flavius Vopiscus in the *Historia Augusta* (*92*). (See Figure 12.) It is likely that at least one part of the collection consisted of older archives; but its long and apparently useful history and its design, to house a Greek and a Latin collection, indicate that it was a general library. Indeed Trajan's memorial column, which has decorative features in the form of an unrolled papyrus, is in the center between the two sections, presumably the Greek and the Latin. Those who know their way about modern Rome's Department of Streets and Sewers can find the library beneath the Via dei Fori Imperiali, where concrete columns supporting the road bed also provide a roof for Trajan's library. The podium and the niches for the cabinets containing the rolls are remarkably well preserved. Sidonius Appollinaris was rewarded by his father-in-law, the Emperor Avitus (455/430), for a verse panegyric with a statue in Trajan's Forum (*93*). Although none of the surviving manuscripts of the *Regiones Urbis Romae* have the following short passage, the oldest printed edition states: "Bibliothecae XXIX. Ex iis praecipuae duae, Palatina et Ulpia" (*94*). Thus the libraries founded by Augustus and Trajan may have had a history of useful service until the final collapse of the empire.

It cannot be too strongly emphasized that the Roman baths (*thermae*) were not simply places of ablution and recreation but were also virtual civic centers, with club rooms, lecture halls, museums, and libraries (*95*). Apparently the facilities of some of them for housing books were sufficiently adequate to have permitted the removal of the Ulpian, or at least the Latin section, to the baths of Diocletian in Flavius Vopiscus's time (probably a temporary measure due to building renovation) (*96*). We even know the name of a librarian in one of the baths, the imperial slave Onesimus, "vilicus thermarum bybliothecae graecae" (*97*). It is likely that only the largest baths had extensive libraries, since the restricted quarters of the smaller ones hardly had room to segregate the absorbent papyrus from the moisture; but we must take cognizance of the universal human pleasure of reading during and after the relaxation of bathing.

In any event, there is archaeological evidence of the presence of the characteristic niches for shelving for papyrus rolls in the bathhouse complexes. Giuseppe Lugli clearly identified such niches in the Baths of Trajan (*98*). There were two levels of

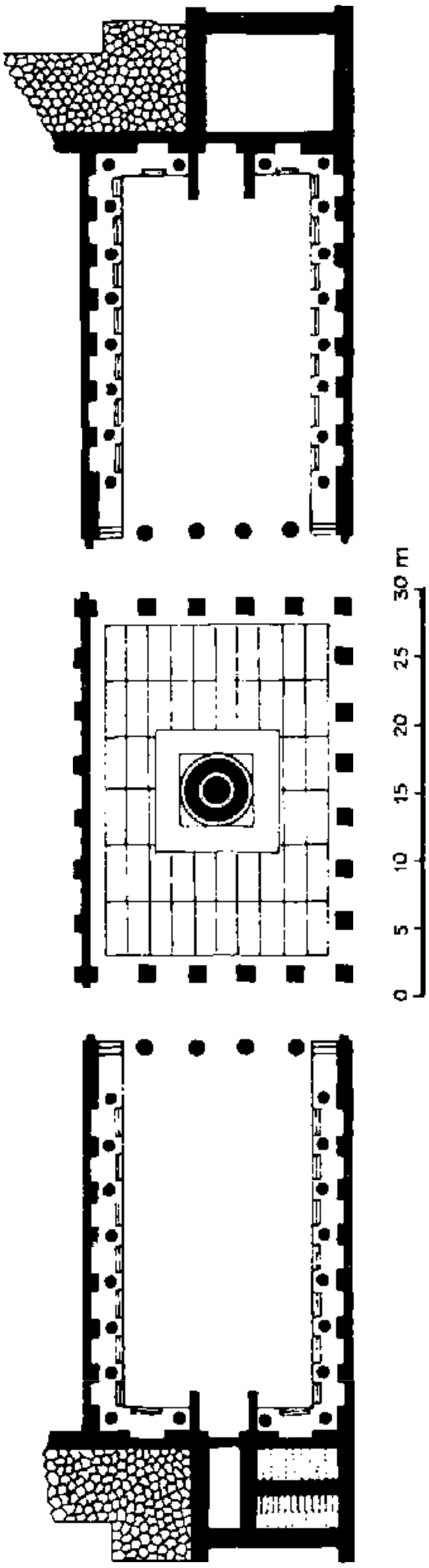

FIGURE 12. *Floor plan of the Biblioteca Ulpia. From Giorgia de Gregori, "Biblioteche dell'Antichità,"* Accademie e biblioteche d'Italia, **11**, *15* (1937).

the familiar rectangular niches, the upper one, available from a balcony, in a semicircular area facing the main complex. (See Figures 13 and 14.) In the Baths of Caracalla, E. Ghislanzoni first identified the library rooms (*99*). The niches seem to have been rather high and steps were probably installed to reach the top shelves. Further, it is significant that here, just as in the Baths of Trajan, the library was fairly remote from the steaming baths, and that it opened on the garden. The baths were dedicated in 216, but they were not fully completed until a decade or so later, by Alexander Severus (*100*). There is strong evidence that the Baths of Diocletian contained a library, and they surely had room for one if part of the Ulpian was housed there at any time (*101*). More extensive excavations are needed before we have firm evidence on the library rooms. Finally, Tønsberg (following Lanciani) thinks that there was a library in the Baths of Alexander (Nero), although the presence of modern structures over the ruins prevents the excavation necessary to secure further evidence (*102*).

The last public library founded in Rome of which we have a record is that of Alexander Severus (emperor, 222–235), who set up his library in the Pantheon

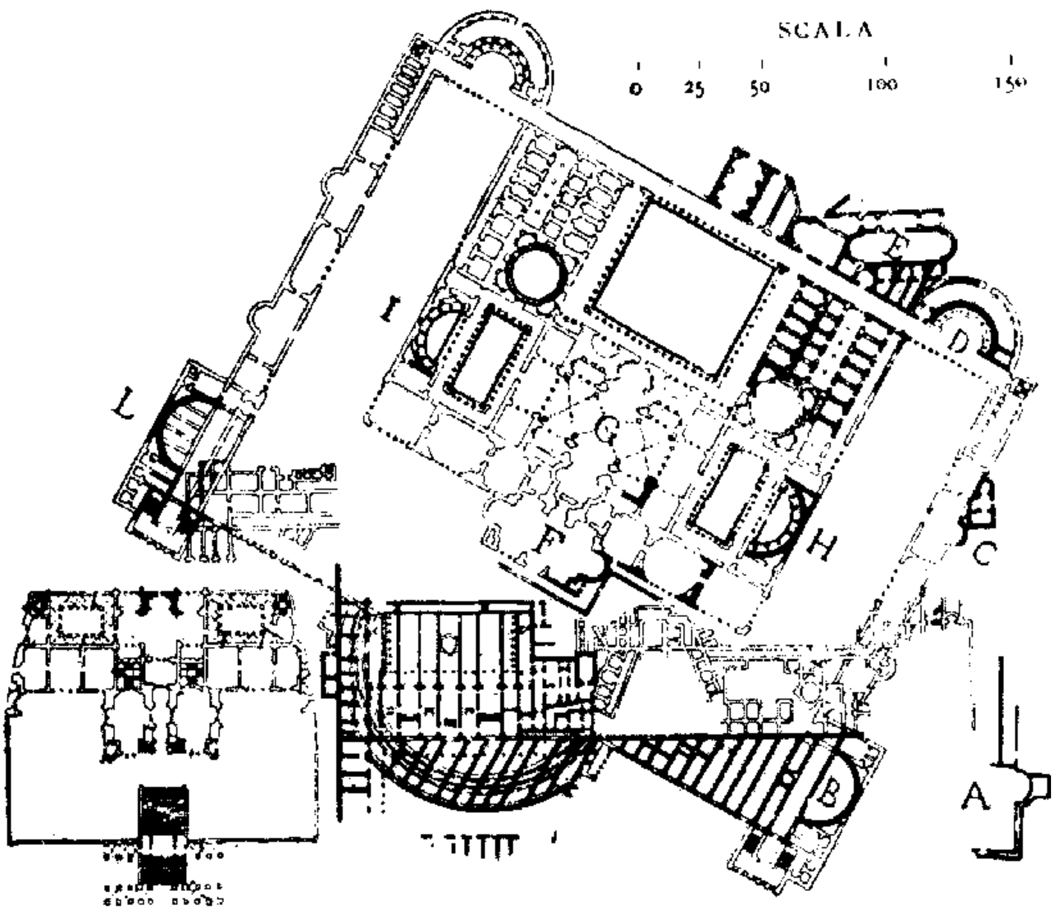

FIGURE 13. *Plan of Baths of Trajan. The semicircular room on the left designated "L" contained the library. From Giuseppe Lugli,* I monumenti antichi di Roma e suburbio, *Rome, 1930–1940, 4 vols., Vol. I, plate IV.*

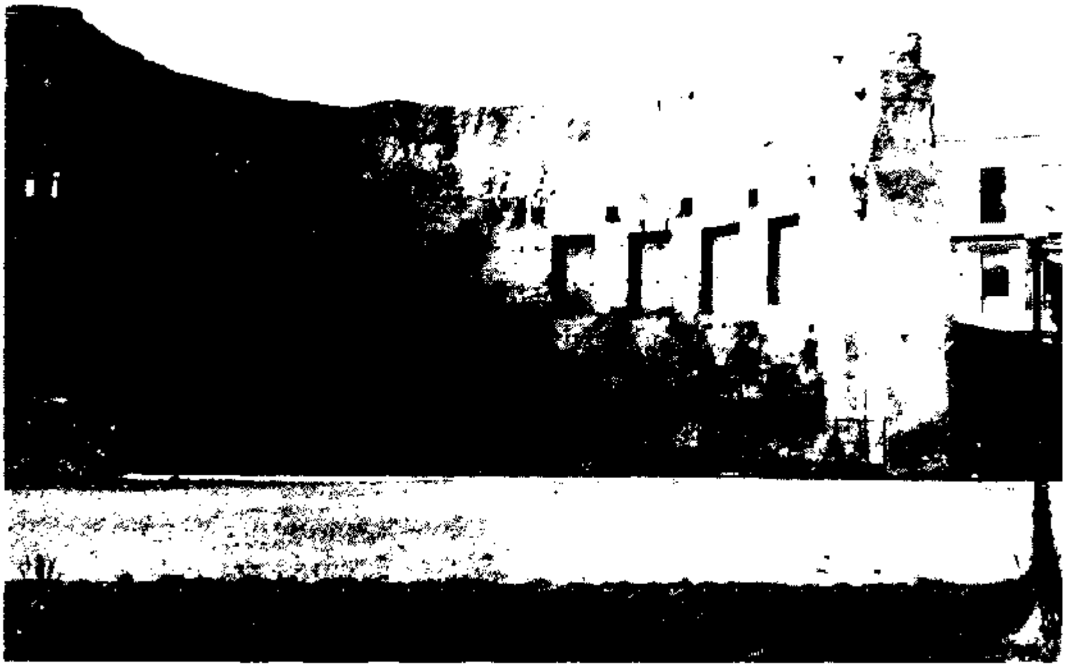

FIGURE 14. *Room in Baths of Trajan which was probably for the library. The bottom of the lower level of niches does not appear, since they were not excavated. The square holes below the upper range of niches supported the balcony. See Jeppe Tønsberg,* Offentlige biblioteker i Romerriget, *Danmarks Biblioteksskole, Copenhagen, 1976, pp. 52–53* (Danmarks Biblioteksskoles Skrifter, *No. 10*).

and put the Christian historian and encyclopedist Julius Africanus in charge (*103*). At a time when oriental deities and religious personalities, including Jesus Christ, began to receive public recognition in Rome, it is likely that Julius Africanus had Christian and oriental pagan literature in his collections. Of the other public libraries of the imperial city we know nothing. At the time of Constantine there were supposed to have been 29, but we know of only 10 (*104*). The facts were probably stated accurately by Ammianus Marcellinus toward the end of the fourth century when he reported that they were closed like graves (*105*). The readers simply were not there, and, most likely, they satisfied their needs in private collections.

Two other libraries of Rome (neither of them public in the sense of those described in the preceding paragraphs) should be noted, since both had official sponsorship. There was a library on the Capitol, which we know only from literary references (*106*). It may have been founded by Nero, who had some of his poems engraved on gold for Jupiter Capitolinus; by Domitian, who restored the Capitol after the fire under Hadrian; or by Hadrian in connection with his Athenaeum. It could have been simply the Tabularium (the Roman record office located between the two summits of the Capitol), a temple archive maintained in connection with the sacred relics in the Capitol, or a conventional library. It could hardly have existed after 455 when Gaiseric plundered the Capitol. There was also a library in Hadrian's villa in Tibur (Tivoli)—private, to be sure, but the private library of a monarch with strong intellectual interests and surrounded by the leading intelligentsia of the empire, who needed access to a book collection. Tønsberg has rejected two proposed locations for the library in the villa complex and identified another which he thinks has the proper type of niches (*107*).

LIBRARIES OUTSIDE OF ROME

In addition to the library in Hadrian's villa, there was a public library in Tibur, mentioned twice by Aulus Gellius (*108*). He located it in the temple of Hercules, and, while the temple has been located, the actual buildings are not known. In Como, the birthplace of both the Elder and the Younger Pliny, the latter held

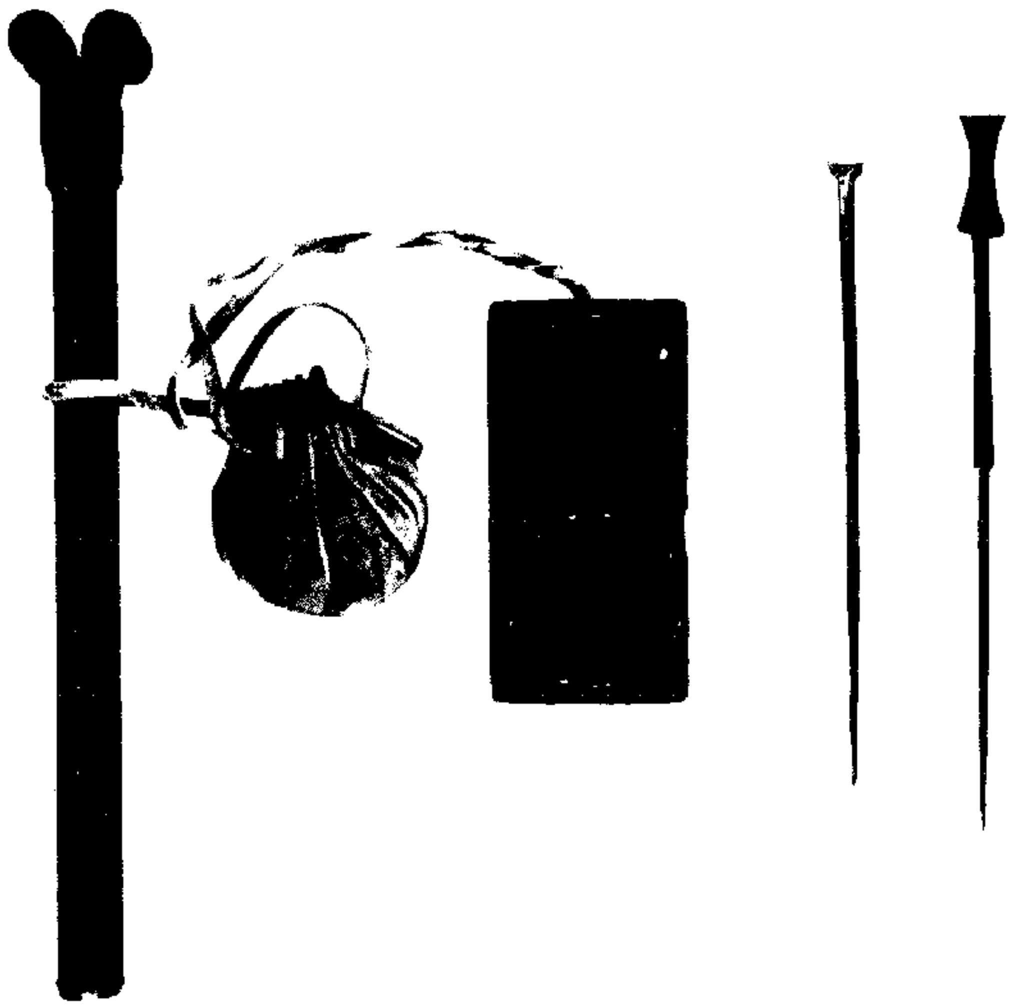

FIGURE 15. *Writing apparatus with a sack, ink well, and stylus. Formerly in the Staatliche Museen, Berlin.*

much property and was a community benefactor. He founded a library there, and he expressed special concern for the young people of the town (*109*). In Aurunca (later Suessa) in the Latium–Campagna border region there is an inscription recording a Bibliotheca Matidiana (*110*), named for Hadrian's mother-in-law (d. 119), for whom the emperor delivered the funeral oration and whom he deified. In Volsinii (possibly modern Orvieto or Bolsena) there was a library, but we have no details, not even a date (*111*).

There were private libraries in the western portion of the empire, such as those of Sidonius Apollinaris in Auvergne in the fifth century, and there have been claims for the existence of public libraries elsewhere, for example, in Roman Britain, in London, Cirencester, Verulam, and Wroxeter (*112*). We do know definitely of one library in the west, that of the so-called Temple of Diana in Nimes (*113*). The building is fairly well preserved, and the walls of the one-story building have clearly identifiable niches. There are narrow corridors between the niches and outer walls which might have served as stack rooms. (See Figures 16 and 17.)

In Roman Africa we know of libraries in Carthage, Oea (modern Tripoli), and Timgad. Apuleius speaks of the first two, although we cannot be sure that the passage in the *Apologia* refers to Oea (of which nothing remains save a four-way arch of 163/4 A.D.) (*114*). Certainly the library of Carthage could have served illustrious readers such as Tertullian, Cyprian, and Augustine. In Thamugadi (Timgad), founded in 110 A.D. by Trajan as a veteran colony, there was a vigorous community life, with many public baths, a market place, a theater, and a library. An inscription was located in 1901 by French archaeologists at Timgad commemorating a gift of 400,000 sesterces by M. Julius Quintianus Flavius Rogetianus to his native city for the construction of a library, probably about the middle of the third century (*115*). The excavations have revealed the main outlines of a building with niches. It was probably a one-story building, and the relatively small number of niches was probably compensated by a stack room. The niches were in a semicircular room, probably covered by a rounded dome, thus contrary to the usual situation with a rectangular room, but comparable to the arrangements in the Palatine in the Temple of Apollo and in the Baths of Trajan and Alexander (Nero). Another significant point about the Timgad library is that there was apparently no division into Greek and Latin sections.

LIBRARIES OF THE CHRISTIANS

With the rise of Christianity, a new type of library, as far as content was concerned, developed throughout the empire. The acceptance of the Old Testament and much Jewish tradition by the Christians implied the need for the extensive literature involved, but other material for worship services and historical and administrative records—such as calendars, lists of deacons and bishops, martyrologies, correspondence, and writings of the church fathers—also had to be preserved. Some well-to-do Christians of the early period such as Tertullian may have had private libraries, but Tertullian could also have used the library we know to have existed in his native Carthage for the Greek and Latin classical literature

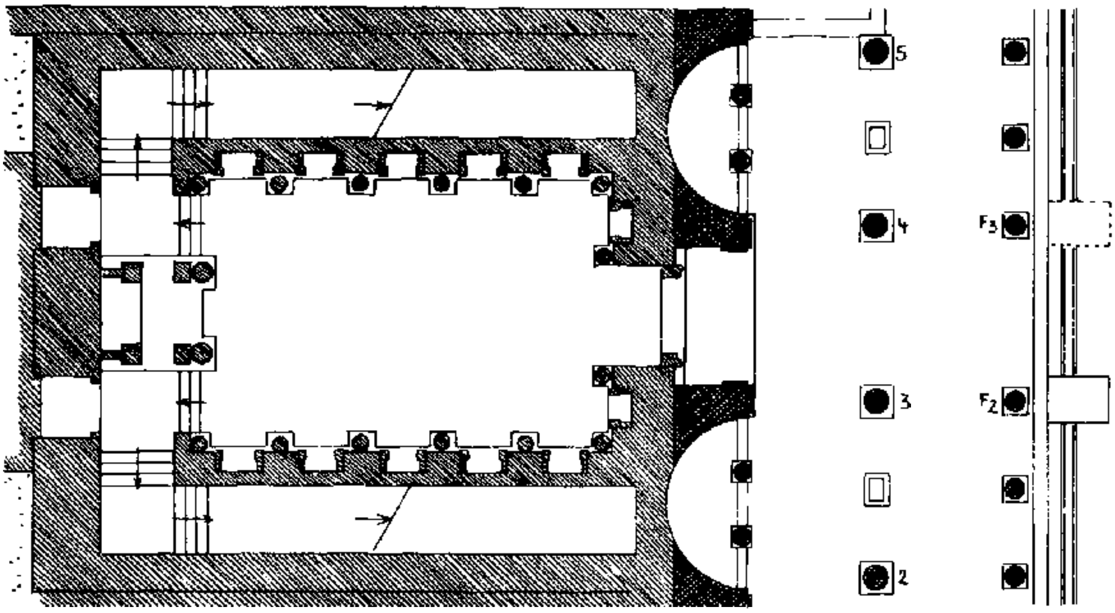

FIGURE 16. *Floor plan of the library at Nîmes; north is at the top. From Rudolf Naumann, "Der Quellbezirk von Nîmes,"* Denkmäler antiker Architektur, 4, *(1937), plate 13.*

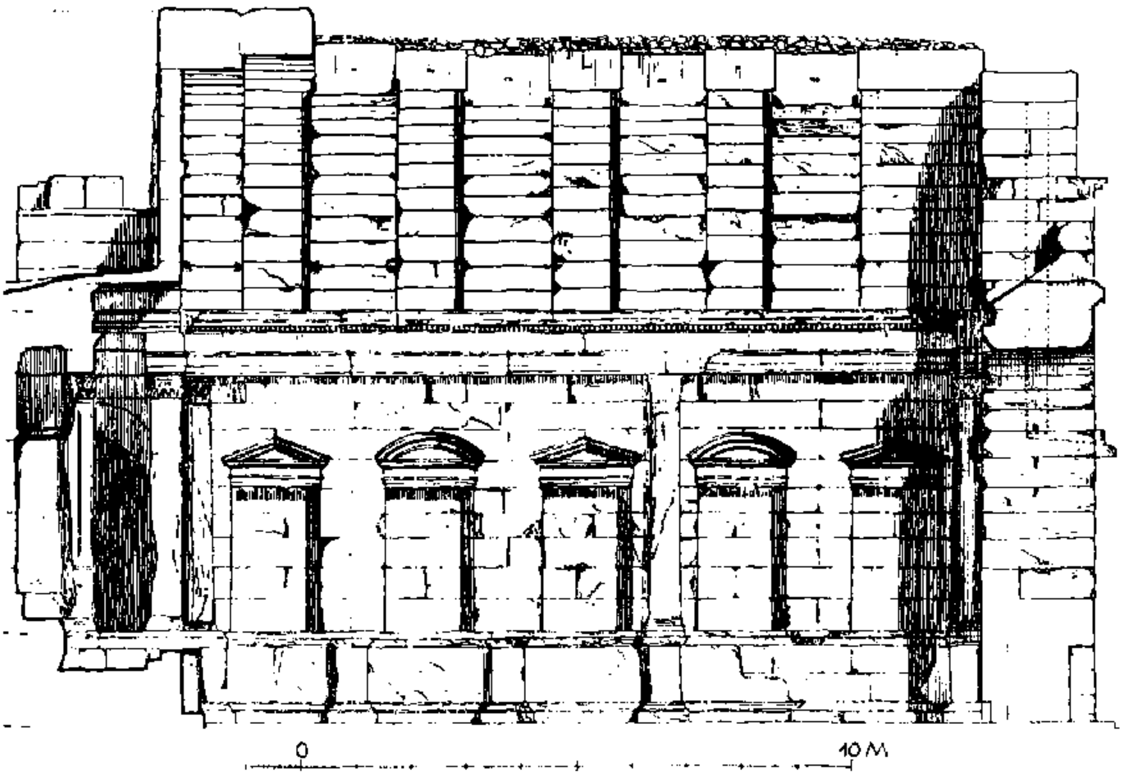

FIGURE 17. *The north wall of the library at Nîmes. From Rudolf Naumann, "Der Quellbezirk von Nîmes,"* Denkmäler antiker Architektur, 4, *(1937), plate 7.*

he knew so well (*116*). While the Manichaeans, those formidable opponents of early Christianity, are beyond the scope of this article, the existence of the literature of this sect in Coptic and at least three Iranian languages (as well as Uigur–Turkish and Chinese) permits the assumption that there may have been Manichaean libraries within the empire which possibly also included Greek and Latin works.

The persecution of Diocletian in 303, particularly harsh in Palestine and Egypt, probably caused the effective destruction of most church and episcopal libraries, although some writings were surely hidden and preserved (*117*). At least one Christian library, that founded by Bishop Alexander in Jerusalem in 212, must have survived the persecution of Diocletian, since Eusebius found in it valuable sources for his *Historia ecclesiastica*, published about 324 or 325 (*118*). Alexander, a follower of Origen, was possibly inspired by the Catechetical School in Alexandria, an institution of religious education but one that, in Alexandria at least, also encompassed general education. Book collections and scriptoria over and above those of the Serapeion must have been needed, and in the fourth century Athanasius could export a number of Bibles from Alexandria to Rome (*119*).

The fact that Origen established a school and a library when he went to Caesarea after banishment from Alexandria in 231 suggests strongly that he modeled it on one he may have known in Alexandria (*120*). His own writings were the basis of this collection. After Origen's death, the elder Pamphilus rehabilitated the collection and increased it, including secular authors and others such as Philo Judaeus, Plotinus, and even legal authors. Pamphilus also prepared a catalog of the library which Eusebius included in a lost biography (*121*). It was the source on which Isidore of Seville based his report that the library contained 50,000 rolls (*122*). The library at Caesarea survived the great persecution even though Pamphilus was martyred in 310. The usefulness of the library and the scope of the collections are obvious from the single fact that it was Eusebius's source for his *Ecclesiastical History*. In the early Christian world a Septuagint based on a Caesarean text of Origen's monumental Hexapla or Tetrapla (polyglot Bibles) bore the reputation of authenticity, and so too did the New Testament manuscripts from the scriptorium of Caesarea (*123*). About the middle of the fourth century it was necessary to transcribe the fragile papyrus rolls in Caesarea to parchment, a task supervised by Eusebius's immediate successors (Akakios and Euzoïos) in the episcopal see (*124*). The most famous reader in the library was Jerome; and during the eastern travels of Hilary of Poitiers (356–361) and Eusebius of Vercelli (355–356) it is likely that they used the collection for their Latin commentaries to make Origen's explications of the Psalms available to the western church.

The Jews were (and are) "the people of the book," and the same tradition was continued by the Christians. The congregations of the new church, triumphant in the fourth century, had to have the Holy Writ and other books and records, and Jerome speaks of *bibliothecae ecclesiarum* (*125*). (See Figure 18.) The first Christian library in the city of Rome for which we have firm evidence is that set up as an archive by St. Damasus, pope from 366 to 384, in the church of San Lorenzo (*126*). It should not be assumed that there were only official records in San Lorenzo, for examples of the combination of archives and libraries have already been noted

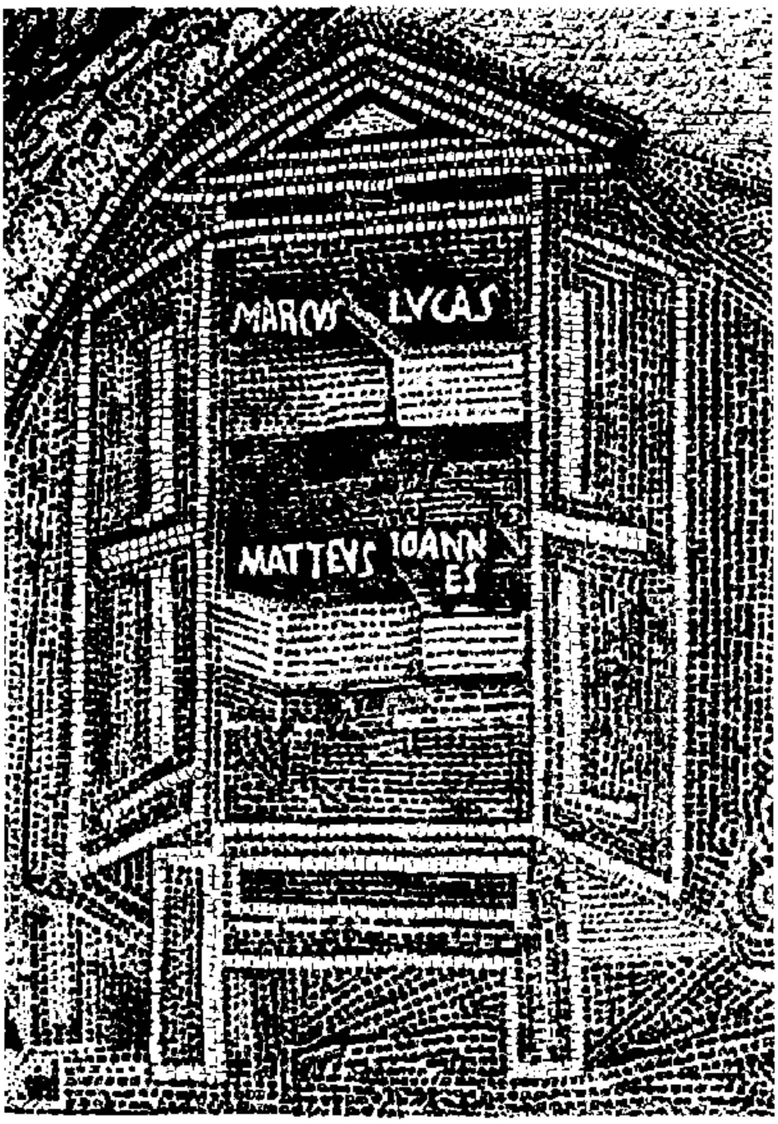

FIGURE 18. *Cabinet in a church library portrayed in a wall mosaic in the mausoleum of Galla Placidia in Ravenna.*

in antiquity and they were also common in subsequent periods. The collection of papal biographies known as the *Liber pontificalis* contains several references to *archiva* and *bibliotheca.* Pope Hilary (461–468) established a monastery, baths, a villa, and a Greek and Roman library in the basilica of what is now the church of San Lorenzo fuori le mura (*127*). In Hippo there was a library established by Augustine (*128*). It was divided into sections of biblical texts, the works of Augustine, and writings of other church fathers. Augustine died in 430 and the Vandals took Hippo the next year; but the library survived, since Possidius (Augustine's biographer) mentioned it after the Vandal conquest. Bishop Paulinus of Nola in Campania erected a basilica in his see with a separate room on the left of the apse for sacred writings. Undoubtedly some of the church fathers, notably Jerome and Tertullian, had private collections, and others are mentioned, for example, that of Philip Sidetes (of Side, in Pamphylia), who collected zealously for his *Χριστιανικη 'Ιστορια* (*129*). To what extent they were also congregational collections we may only speculate. The history of the early monastic libraries has already been discussed in this encyclopedia (*130*).

When the great new city of Constantinople was established on the site of old Byzantium, it was a new foundation adorned with fine new churches (old temples apparently were preserved only as museums), never sullied by pagan worship, says Eusebius. Constantius II established the first major public library in 353 (*131*), and Julian the Apostate donated books to it. In 372 Valens provided a staff, including copyists (*132*). It was divided into Greek and Latin sections according to Roman tradition, and it probably served the university founded in 425. It was burned in 475, at which time it was supposed to have 120,000 *biblia* (codices and rolls) (*133*), but the library was restored during the reign of Zeno (477–491). It is likely that the library's history ended in 726 when Leo III "The Isaurian" closed the university (*134*).

Library Service and Administration

Two characteristics of ancient libraries that endured through the 19th century are that they were established by bibliophilic rulers and that their higher staffs were composed of literary men and scholars. Literate slaves were put to work in the scriptoria (*135*), and they were needed not only for acquisition purposes but also for repair and replacement. A papyrus roll exposed to the air could not last more than 200 years, and the friable material could easily suffer grave damage when quite new. Since the podium found in most Roman libraries prevented direct access to books, a page was needed to fetch them, designated as *promus librorum* by Apuleius.

In Alexandria there was a *prostates* (director) of the Museion, an office occupied by a series of distinguished scholars. In Rome we find the title of *procurator bibliotecarum* (i.e., of the Greek and Latin sections of one library) as early as the time of Claudius (*136*), thus implying a professional rank. In the fourth century the *praefectus urbis* seems to have had responsibility for general supervision of the libraries of Rome, and Vopiscus quotes one incumbent in that office, Iulius Tiberianus: "Curabo autem ut tibi ex Ulpia biblioteca et libri lintei proferantur" (*137*). But the custodian of a specific library had direct responsibility for services, as when Marcus Aurelius asked his mentor, Fronto, to arrange with the librarian of the Bibliotheca domus Tiberianae for acquisition or loan of a specific book: "Igitur Tiberianus bibliothecarius tibi subigitandus est" (*138*). The specific provisions for a library staff by the Emperor Valens (supra) were incorporated into law, and it is likely that they reflected the personnel practices that developed in Roman libraries from Augustus to Constantius.

It would not be thoroughly accurate to assume that libraries were not used by the lower classes because they were illiterate, since evidence such as that of the Pompeian graffiti indicates clearly that the ancient proletariat was not totally analphabet. More likely there was a general notion that libraries were primarily for the intellectual and social elite. One small point is significant: Vitruvius (*139*) and the regulations for the Pantainos Library in Athens (*140*) indicate that libraries were open only in the morning, hours that are free only for those who have flexible time. The regulations of the Pantainos Library prohibited loans, but there are literary references that indicate external circulation. (See Figure 19.) Policies of loan may have varied from one library to another.

The main source for acquisition by the major libraries was enthusiastic support by monarchs of the stature of the Ptolemies, the Attalids, Augustus, and Trajan. Books were bought, borrowed (for transcription or for keeps), copied, and confiscated. The unsophisticated book trade of antiquity would hardly have been a major source of acquisition for libraries, and the library scriptoria in places such as Alexandria and Caesarea were probably far more productive. The content of ancient libraries has been indicated here, so far as it is known. Censorship of library holdings by the emperor was noted by Ovid and Suetonius (*141*). The earliest

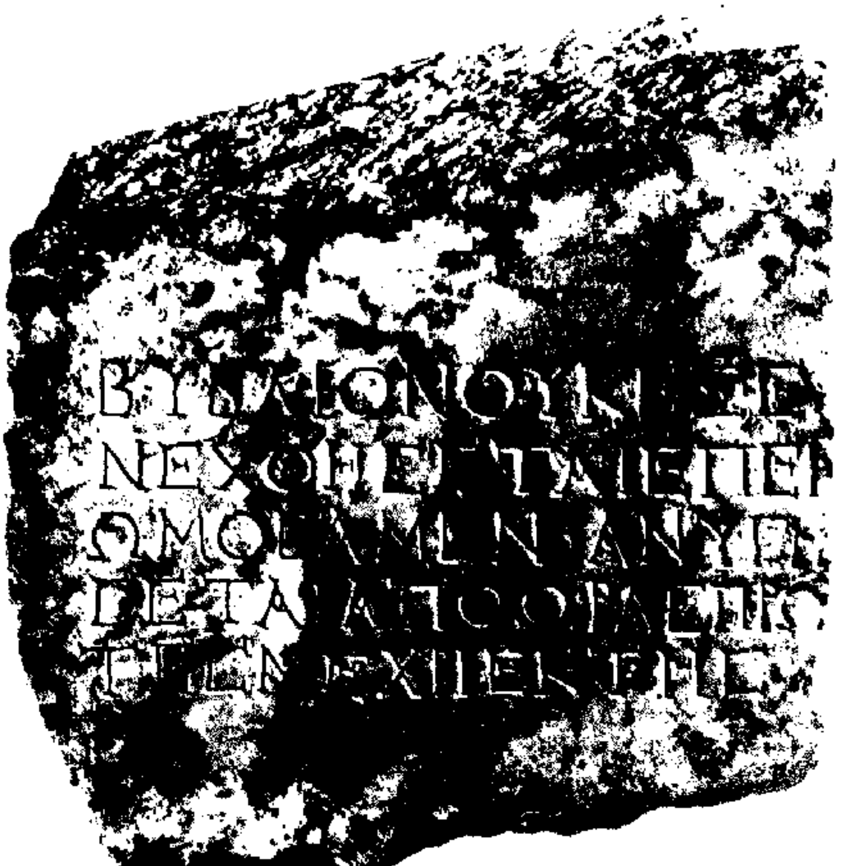

FIGURE 19. *Regulations for Pantainos Library in Athens.*

Christian collections included classics and secular works, but the persecutions and theological polemics of the fourth century led to removal of books from many libraries.

All of the catalogs of which we know or which have survived in any part are classified by broad subject. They probably corresponded precisely to the position of the books on the shelves (hence, πινακης). There were portraits or busts of authors near their books. There is no evidence of the use of shelf marks, and rolls were probably identified from *tituli* on tabs hanging from the outside end of the rolls.

What we do not know about ancient libraries is far greater than what we know. There is always the possibility of new information from excavations, inscriptions, papyri, and manuscripts that may turn up in various forms and conditions. However, we can be satisfied that we have identified the major collections and the basic facts about their organization, services, and contents. New evidence is likely to confirm and expand what is already known.

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33. Galen, *Commentarius*, II, 4, in *Hippocratis epidemias*, III.
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36. Contrary to former belief, we now know that Callimachus was never the *prostates* (director) of the library: see *Oxyrhyncus Papyri* (Egypt Exploration Fund, London, 1898–), edited by B. P. Grenfell and A. S. Hunt, 1241, col. ii, 1. It is also unlikely that Callimachus's bitter enemy, Apollonius Rhodius, was ever chief librarian.
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ROMANIA, LIBRARIES AND DOCUMENTATION CENTERS IN

Introduction

HISTORICAL BACKGROUND

The territory of Romania has been inhabited since the earliest times, and rich and varied civilizations—in both the material and the spiritual senses—have flourished there since the beginnings of recorded history.

The ancestors of the Romanian people were the Geto-Dacians, from the Thracian group of the Indo-Europeans who lived in Romania, then called Dacia. Led by their king, Decebal, they were conquered in two wars (101–102 and 105–106 A.D.); and the conquering Roman Emperor, Trajan, transformed Dacia into a Roman province called Dacia Felix ["Happy Dacia"]. The massive, organized colonization of the new province with Romans and romanized settlers was accompanied by the forceful introduction of Latin as the only official language, and by the adoption of Roman civilization, which stood at a higher level than that of the local inhabitants. These events led to the romanization of the Dacians and to the formation of the Daco-Roman population as the basic element in the ethnogenesis of the Romanian people.

From this period to the institution of the feudal Romanian states (in Transylvania, Moldavia, and Wallachia), the territory of Dacia Felix was swept by successive waves of "barbarians": Germanic, Slavic, and Turkish migratory populations that came from Asia and settled temporarily. This was the historical period during which the Romanian people and language were shaped, a process that was fully completed by the end of the 10th century.

In this period and somewhat later, the first Romanian state formations developed and expanded their jurisdictions throughout the territory of Romania. These states included Gelu, Glad, and Menumorut, which were formed in Transylvania during the 10th century (and which were gradually conquered by the Kingdom of Hungary between the 11th and 13th centuries); Secea, Sestlav, and Tatos, which were formed in Dobrudja in the 11th century; Moldavia, formed in the Barlad Valley in the 12th century; and Litovoi, Ioan, Farcas, and Seneslau, formed in Oltenia and Wallachia (later called Muntenia) in the 13th century.

In the 14th century, the strengthening of feudalism, and the presence of some favorable external political conditions, resulted in the formation of the Romanian feudal states of Tara Românească (Wallachia; 1310) and Moldavia (1359).

The historical development of the Romanian people in the Middle Ages involved three political groups: Tara Românească (Wallachia), Moldavia, and Transylvania. The first two were independent states; the last was included in the Hungarian Kingdom, but as a principality that enjoyed a special autonomy. There were always strong economic, political, and cultural relations among the three Romanian states, so that the Romanian people continued as a well-defined ethnic entity, despite the political frontiers. Fighting unceasingly for political unity and independence, the Romanian people realized their goal very late. They enjoyed a short period of independence at the beginning of the 17th century—when Mihai Viteazul (Michael the Brave), after winning several victories against the Turks, accomplished the first political union of all Romanians (of Wallachia, Moldavia, and Transylvania) in 1600. Final establishment of the Romanian nation came about after the breakdown of the Austro-Hungarian Empire at the end of World War I, in 1918.

The Romanian people are a neo-Latin island surrounded by Slavs (Russians, Bulgarians, Poles, Czecho-Slovaks, and Yugoslavs) and Finno-Urgians (Hungarians); but they have preserved their heritage throughout the centuries: the beautiful neo-Latin language; the orthodox Christian religion; the original national costumes, folklore, and dances; traditional customs; and unique popular poetry and songs. By its origin, structure, and vocabulary, Romanian is a Romanic language, the only direct descendant of the Latin spoken in the Balkan provinces of the Roman Empire. The Romanian language is a single whole, without dialects, in all provinces of Romania: Moldavia, Transylvania, Banat, Oltenia, Muntenia (Wallachia or Tara Românească), and Dobrudja. There is a Romanian dialect, but it exists outside Romania, in the Balkan area: the Macedonian, or Aromanian, dialect spoken by the Romanian people living in Greece, Albania, Yugoslavia, and Bulgaria.

Romania is a rich and beautiful country. At its center is the ring of the Carpathian Mountains, a kind of fortress encircling "the heart of Romania"; this is the province of Transylvania (from the Latin words *Trans Silva*, meaning "on the other side of the forest"). This center area is surrounded by a hill-and-plain region that descends to the Black Sea coast. Unfortunately, the gate through which all the migratory peoples coming from Asia to Europe passed was this region, between the Carpathian Mountains and the Black Sea. The history of the Romanian people therefore became the record of centuries of migration and change, and the Romanians were nicknamed the "historical miracle." At the same time, while the other peoples of Europe enjoyed a quiet development and easy construction of their societies, the Romanians' destiny was to fight incessantly against the "barbarians." In fact, this struggle was a tradition inherited from their ancestors the Gets, who, several centuries earlier had fought against other barbarians, the Scyths. In this regard, the great Latin poet Ovidius, who lived in Tomis (Constantza, in Dobrudja) in the first century A.D., asserted: "The Gets have one hand on the plough and the other on their weapons." Very often the only possibility for salvation for the Romanian people was to retire into the forests or the mountains, waiting until the waves of barbarians had passed by. Coming back to their burned and destroyed villages, the Romanians were often obliged to rebuild their settlements from the very beginning.

Given such geographical and historical conditions, it is no wonder that, in the western countries of Europe, there were favorable conditions in the Middle Ages for the development of such great personalities as Thomas Aquinas and Roger Bacon, while in Romania we can speak only of the first Romanian *voievodes*, who were primarily heads of the armies. And while in Western Europe the Renaissance was dispersing the murkiness of the Middle Ages, with such world-renowned personalities as Leonardo da Vinci creating in peace and quiet their masterpieces such as "Mona Lisa" and "The Last Supper," in Romania the greatest personalities were primarily military leaders. Among the Romanian leaders fighting against the Turks and other enemies for the peace of Europe was Stefan cel Mare (Stephen the Great), called by Pope Sixtus IV "The Defender of Christianity" or "Athlete of Christ." Even under such adverse historical circumstances, Stefan cel Mare built the world-famous painted churches of Northern Moldavia (Bucovina), Voronetz, etc., which were not only built like fortresses, but also contained such masterpieces as "The Last Judgment" (*1*).

An accurate historical presentation of Romanian culture and library development must first of all emphasize the great discrepancy between the conditions for cultural development in Central and Western Europe, on the one hand, and in the Romanian territories, on the other. For hundreds of years the Romanians were oppressed by three empires: the Austro-Hungarian, the Russian, and the Turkish. Again and again the Romanian princes of Wallachia, Moldavia, and Transylvania—Mircea cel Bătrîn (the Old), Vlad Tepes (the Impaler), Stefan cel Mare (the Great), Iancu de Hunedoara, and many others—routed numerous Turkish armies, very often without any European help.

The frequent wars between Russia, Austria, and Turkey (in the 18th century and in the early 19th century) were fought on the territories of the Romanian principalities. These wars caused destruction, dislocation of the population, and territorial losses. In this respect, Austria annexed (1718–1739) the province of Oltenia, and in 1775, the northern region of Moldavia (i.e., Bucovina). After the Russian–Turkish war of 1806–1812 and the Peace of Bucharest, the eastern half of Moldavia (called Bessarabia) was integrated into czarist Russia. (Today, both provinces are part of the Soviet Union.)

The unity and independence of the Romanian people was realized with great difficulty, step by step. The movement for national and social emancipation began in 1821 (in Wallachia), with the revolutionary movement led by Tudor Vladimirescu. It was continued by the Revolution of 1848 (in Moldavia, Wallachia, and Transylvania), as a fight against feudalism but aiming concomitantly at liberation from foreign rule and at the achievement of Romanian national unity. Further progress occurred with the realization of the union of Wallachia and Moldavia, in 1859, and with the proclamation of the new modern state called the Romanian Principalities, under Turkish suzerainty. Romanian independence was completed first by winning the Independence War against the Turks, in 1877/78; but only after World War I, in 1918, did the Romanian people realize their whole unity, when Bessarabia, Bucovina, and Transylvania joined Romania.

These years were a very long period of military and political fights, but there were also theoretical struggles. Romania is a rich country, and other peoples still desire to conquer and possess it, so that Romanians have always been obliged to fight in order to defend their own country. Even now, a fifth of Romania's territory is outside its actual frontiers. Also, strange "historical theories" were created during the centuries to account for unjustified claims on Romania's territory, for instance: that Romanians had left Romania's territory, coming back only after the arrival of the Hungarians; that there are "two" Romanian peoples—the Romanian and the "Moldavian" (Moldavians being romanized Slavs); that Dobrudja, the oldest territory of Romania, is a Bulgarian area; and so forth.

In spite of such unfavorable historical conditions, Romanian culture has been intensively developed, because of the following factors: Romania's particular position in Southeastern Europe; the Romanian people's love for books and libraries; their generous feeling toward other people's cultures; and because of great Romanian personalities such as Dimitrie Cantemir, Nicholas Milescu, Constantin Cantacuzino, and the historian Nicholas Jorga. All these factors resulted in the creation of a climate favorable to culture. As Romanians were for five centuries the only autonomous people in Southeastern Europe (not conquered by the Ottoman Empire, and preserving an autonomous state, institutions, and culture) it was possible only in Romania to continue the brilliance of the Byzantine Empire, which had been conquered in 1453 by the Turks.

The great historian Nicholas Jorga's excellent work *Byzantium After Byzantium: Continuation of "The History of Byzantine Life"* [Byzance après Byzance: Continuation de "L'Histoire de la vie byzantine"] (*2*) is particularly dedicated to the special role of the Romanian people in the achievement of this vocation. Among the Romanian initiatives that benefited all the nations of the Ottoman Empire, we can mention not only the 46 schools supported by the Romanian princes (in Southeastern Europe, Asia Minor, Syria, Palestine, and Egypt) and the Romanian-printed books in the Greek, Persian, and Georgian languages, but also the brilliant Romanian libraries, such as the Mavrocordates Library and the *stolnic* Constantin Cantacuzino's library (representing two of the most famous collections in Europe).

The love of the Romanian people for books, libraries, and study is well known. The chronicler Miron Costin asserted at the end of the 17th century: "There is not a more precious free-time activity than reading." The traditional Romanian love for books is also exemplified by a 17th-century case, that of *sholtuz* Musat, who (with his wife and daughter) bought a religious book in an oriental bazaar and sent it back to a church of Campulung, from which it had been robbed by the Tartars, asserting that "a book is like a friend and must be redeemed from the slavery." Significant too is the opinion of a Canadian–French journalist, who recently visited Romania and who said that the "Romanian has the reputation of reading very much." The journalist asserted that while visiting a part of the country, he was greatly impressed by the constant activity carried on in each Romanian bookstore. "Ten publishing houses produce books for six million people, about one-third of the whole population of the country. The average number of copies in an edition is 15,000. A literary success exceeds easily 100,000 copies. Proportionately speaking, this represents the same quantity as in France, and much more than in Canada" (*3*).

Numerous and varied testimonies demonstrate the traditional Romanian thirst for books and culture. This is also evident in the Romanian attitude toward other people's cultures and even in the history of Romanian printing (*4*). For instance, in the 17th and 18th centuries Romanians printed not only books for their own needs, but also books in support of foreign culture. In Bucharest (Wallachia) during the reign of Constantin Brâncoveanu—an actual "prince of culture" and creator of the artistic "Brâncoveanian Style"—many such works were produced in the printing house managed by a great cultural personality, the Metropolitan Bishop Antim Ivireanul. These books were printed not only in Romanian, but also in the Greek, Arabic, Turkish, and Georgian languages, in order to support the cultures of these peoples. Also, in Jassy (Moldavia) books were printed in the Arabic language in 1742.

The Romanians' love for libraries is also illustrated by the presence in this country, since oldest times, of numerous and varied libraries, some of them famous all over the world. We shall mention only some examples. The largest Wallachian library of the 17th and 18th centuries was the library belonging to the *stolnic* Constantin Cantacuzino, who had studied in Italy, and who was renowned in Europe as a great scholar and politician. Prince Constantin Brâncoveanu's great library was kept in the monastery of Hurezu (Oltenia). The library of the great Romanian scholar Dimitrie Cantemir, prince of Moldavia and member of the Berlin Academy of Sciences, was well known too. But the most famous Romanian library in the past was the Mavrocordates library founded by Alexander Mavrocordat, a scholar and diplomat, who studied in Padua and Bologna. The library was developed by Nicholas Mavrocordat, *voievode* of Moldavia and Wallachia, and by his son, Constantin Mavrocordat. The historian Nicholas Jorga asserted that "the whole Orient had not such a library like that of the prince Nicholas Mavrocordat evaluated to half a million . . ." (*5*). The library was placed in a splendid hall in the monastery Văcăresti, near Bucharest. In this collection, many rare books from the older libraries of Constantin Cantacuzino and Constantin Brâncoveanu were gathered. After becoming Prince of Wallachia, Nicholas Mavrocordat collected precious publications, primarily from the Ottoman Empire territories. Nicholas Mavrocordat's messengers were the most successful competitors against the West-European buyers of manuscripts and rare books, both in the Orient (Constantinople, Alexandria, Teba, Monembasia) and the Occident. A contemporary source asserted: "The Prince of Wallachia bought the most interesting books and manuscripts to be found in the Ottoman Empire, irrespective of their price." The French Abbot Sevil, who was an official buyer of books and manuscripts for the Kings of France Library, declared in his report of April 16, 1729, in Paris: "It is impossible to be in competition with the Romanian prince, who disposes both of cash and credit; all that is on sale is acquired by him." The king of France vainly tried to get manuscripts and books from the famous library, by means of special agents. Finally, he had to be satisfied with some duplicates. Even after Nicholas Mavrocordat's death, neither the German emperor, the king of France, the sovereign of England, nor the pope himself could succeed in getting the precious collection of the library, although each offered 100,000 piastres. Constantin Mavrocordat continued to enrich the library with new acquisitions. In the same period, the items in the library collection were artistically bound by skillful masters, who even created a new "Romanian Style" in book binding.

But, if the presence of excellent libraries in the past is obvious, the destructive historical conditions are obvious too. For instance, the most precious monastery libraries were destroyed or robbed by the invaders. The chronicler Cezar Deponte stated that "on September 12, 1737, the Turks ravaged the town Tîrgoviste [in Wallachia] and set fire to the old Metropolitan Church. Robbing the monastery's library, they loaded many carts with books and carried them across the Danube River. In Moldavia, in 1687, the Tartars set fire to the old Metropolitan Bishopric and to the church Trisfetitele, robbing and destroying everything." Sulzer, a scholar at Alexander Ispilanti's court, asserted that in 1754, "after Nicholas Mavrocordat's death, the most precious and famous Mavrocordates library was left in pawn and carried to Constantinople. The most valuable books remaining in the Văcăresti monastery were taken by the Russians and sent to Petersburg" ["Was sonst noch rares da war, soolen die Russen in letzten Kriege weggenommen und auf Petersburg geschicket haben"] (*6*). In a similar manner, the Hungarian authorities confiscated the big library of the Romanian Transylvanian *autodidact* Badea Cârtan in 1904–1905, loaded his books (about 50,000 volumes) into 12 carts, carried them to Brashov, and set them on fire.

Given such historical conditions it is very difficult to learn the history of Romanian libraries. Sometimes it is necessary to undertake very special historical research in order to reconstruct the history of a collection, by means of a catalog or even from a single collection piece, in a manner similar to that of Cuvier's reconstruction of the mammoth with the help of a single bone. For instance, this was done in the case of the great library of Udriste and Radu Năsturel, who were great Wallachian scholars of Latin culture. The history of this unfortunate library—which contained, in 1645, "the latest publications from Abroad"—was reconstructed by Professor Lucia Aramă by means of the marginal notes in an annotated Seneca, *Epistolae*, now in the Romanian Academy's Library (7).

Romanian library development in the past was also aided by numerous great Romanian personalities, the owners of excellent book collections and the founders of academies, schools, or libraries, some of whom were librarians or documentalists themselves. In the first category we can mention: the founders and representatives of Romanian humanism—princes, great scholars, and famous personalities, who studied in other countries and had relatives abroad—like the Moldavian chroniclers Miron Costin and Grigore Ureche, who spoke several languages; the *spatar* Nicholas Milescu, a scholar who traveled through and wrote about Asia and China; the *stolnic* Constantin Cantacuzino, who studied in Italy; Udriste Năsturel (in Wallachia); Nicholas Olakhus (Nicholas the Romanian), friend of Erasmus of Rotterdam; the *coryphaei* of the "Transylvanian School"—Samuel Micu, George Sincai, Petre Maior, Ion Budai-Deleanu, who studied in Vienna and Rome—and other Transylvanian personalities; and the great historians such as Nicholas Bălcesu, Michael Kogălniceanu, and Nicholas Jorga.

In the second category, we can mention some of the greatest Romanian personalities who were for a period of their lives librarians or documentalists. As in other countries—for instance, France, where scholars like Jules Michelet, Leconte de Lisle, and Anatole France were for some time librarians—in Romania there were famous people who worked for some period of their lives as librarians or documentalists. Some of them were: the outstanding Romanian poets Nichael Eminescu and Lucian Blaga; great scholars like Gheorghe Lagăr, B. P. Hasdeu, Vasile Pârvan, Emil G. Racovitză, and C. Motas; and prominent literary critics like Ilarie Chendi (Kendi), Tudor Vianu, and Serban Cioculescu (*8*).

GENERAL INFORMATION

In a study entitled "Library—Memory of Culture," published on the occasion of the celebration of the First Centenary Anniversary of the oldest and greatest Romanian library (the Romanian Academy's Library), professor Mircea Malitza asserted that "libraries represent the fundamental basic index for the estimation of a country's cultural life" (*9*). And indeed, the huge network of more than 20,000 libraries in Romania today may be compared to an active body of living cells, through which the Romanian cultural life and creativity is powerfully pulsating.

The history of the diffusion of knowledge through libraries has very old traditions in Romania. The continuous presence of libraries over the centuries not only provided the documentation needed for the Romanian people's material and spiritual development, but it also contributed to the maintenance of two of their most important characteristics: unity and continuity. Romanian lingual and cultural unity all over the territory of the country, independent of temporary political frontiers, could not have been maintained without the help of libraries. The presence of the same books at the same time in all libraries of the country, containing and expressing the same aspirations and ideals, created the necessary cultural climate for the great events of the 19th and 20th centuries, which led to the achievement of the Romanian people's political unity and independence. A very interesting book in this respect is V. Curticăpeanu's study entitled *The Romanian Cultural Movement in the Austro-Hungarian Empire (1867–1918)* (*10*). The book illustrates the manner in which the political union of Transylvania with the other Romanian provinces took place. It shows that this was for a long period preceded by and prepared for by the cultural unity movement of all Romanians, and that the libraries had a very important role in this development.

There is, finally, another general characteristic of Romanian libraries. The historian Nicholas Jorga, speaking about Prince Constantin Brâncoveanu's grant conferred to the Bucharest High School of Saint Sava and its library at the end of the 17th and the beginning of the 18th centuries, pointed out the reason for this assistance: "the wish of the Romanian Prince to make of it an instrument of prestige and influence in all the Christian Orient, where his personality was dominant"(*11*).

HISTORICAL SURVEY OF ROMANIAN LIBRARY DEVELOPMENT: HISTORICAL PERIODS AND LIBRARY CATEGORIES

A division of Romanian library history into two periods, that of the "old libraries" and that of "modern libraries," is the most acceptable approach. The first period had its beginnings in the earliest times of the Romanian people's existence and lasted until the end of the 18th century. The modern libraries period originated in the time of the illuminist movement called the "Transylvanian School" [Scoala Ardeleană] at the end of the 18th and the beginning of the 19th centuries, and continues up to the present. The modern libraries period can be subdivided into two periods: the first, the period of World War II, and the second, the postwar period to the present time.

In his studies "Old Romanian Libraries . . ." (*12*) and "About Collecting and Printing the Sources Related to the Romanian People's History: The Role and Mission of the Romanian Academy" (*13*), Nicholas Jorga classified the old Romanian libraries in four categories: (*a*) viovodale or court libraries, (*b*) monastery libraries, (*c*) boyards' libraries, and (*d*) school libraries. Jorga's classification was generally accepted from 1903 and 1907 by other specialists and authors in library history, for example, G. Cardas (*14*) and Dan Simonescu (*15*). Ioachim Crăcium, in his work *Romanian Libraries in the Past and Present Times* (*16*), and Mircea Tomescu, in his study *Romanian Libraries until August 23, 1944* (*17*), added the category of popular (semipublic) and public libraries. Ion Muslea, in his work *Contributions to the Knowledge of the Romanian Libraries in Transylvanian Towns (until the Great Union* [*1918*] (*18*), added the category of society and union libraries. The sphere of societies is a very large one, including all kinds of societies, from artisans' unions (*sodalii*) to reading societies (*casine*), as well as teachers', students', and women's literary societies. Virgil Cândea, in his study "Romania's Libraries in the Past and Up to the End of the World War II" (*19*) added the special category of socialist (working-class movement) libraries.

It is necessary to emphasize that assigning a library to one or another category is in fact a relative process. For instance, how must the great Brancoveanian library—held in the 18th century in the monastery Hurez (Oltenia)—be considered? Must it be looked upon as a private library or as a monastery library? Very often the profile of a library has changed, a university library becoming for a certain period a public library, and after a while becoming a high school library (e.g., the Central State Library of Bucharest).

We accept the following library classifications:

1. Monastery libraries, including also seminary, parochial, diocesan, episcopal, metropolitan, patriarchate libraries, etc.
2. Court libraries
3. Private libraries and collections
4. Educational libraries, including school libraries
5. Public libraries
6. Society, union, and organization libraries (including political)
7. Scientific–technical libraries
8. National libraries

Some categories can be subdivided, for instance, educational libraries into high school or university libraries and school libraries. This classification has the advantage of being suitable for an examination of Romanian library history, and it is valuable for the modern library period too.

Libraries and Collections in Romania's Territory: 10th to 18th Centuries

BEGINNINGS

The oldest libraries and collections in Romania's territory are not known. What scanty information we have is of some pieces from very old collections and some information about very old Romanian libraries that may not be the first.

The late Professor Nicholas Georgescu-Tistu of the Bibliological Department of the University of Bucharest asserted in his studies "Daybreak of Libraries in Romania" (*20*) and "Folkloric Period of the Culture and Libraries in Romania" (*21*) that "the monastery libraries (of the 14th century) would represent only the second period of the Romanian libraries history." This presumes that in the 10th to 13th centuries there must have existed "little and very active libraries" which have not survived in historical records.

Asserting the existence in Romania of a "folkloric period" of libraries, N. Georgescu-Tistu tried to establish a presumed catalog for such a library, containing the first religious books (not only for the liturgy but also laical books and manuscripts), common law works, popular books, and so forth.

OLD MONASTERY AND CHURCH LIBRARIES

The oldest Romanian libraries generally accepted as such were the monastery libraries of Voditza (founded in about 1379), Tismana (about 1377), and Cozia (about 1386), all in Wallachia; but it is presumed that the first orthodox episcopate of Wallachia, founded in 1359, must have had a library too. In Moldavia, the first monastery libraries of which we are certain were those of Neamtzu (about 1392) and Bistritza. In Transylvania, the oldest church library seems to be that of the Saint Nicholas Church in the Scheii (Brashov), although its existence is certified only for a much later period, as the second Romanian church library in Transylvania, after Metropolite Sava Brancovich's library.

Certainly there were numerous monastery and church libraries in Romania, and their historical importance and value were well known at the time. For instance, the great scholar Johann Honterus (from Brashov) stated in the 16th century that he had undertaken a special journey in the Romanian Danubian Principalities in order "to study the monastery libraries of those countries." However, most of the Romanian monastery libraries were destroyed by the Turks (in Wallachia), and by Tartars and the Turks (in Moldavia and elsewhere). In fact, no library was completely preserved.

Generally, each church establishment had, by reason of its activities, a collection of liturgic, patristic, and hagiographic manuscripts and books, as well as historical and clerical works. There were also *sborhiche*, manuscripts containing various kinds of popular literature, fragments of old and new chronicles, and the books called *bogomiles: Varlaam and Joasaf, The Travel of Saint Virgin Mary in the Inferno, The Life of Saint Friday*, etc. Obviously, older libraries had more manuscripts than printed books, but the printed collection of monastery and church libraries became richer as printing developed.

In several monastery and church libraries, works of the highest historical and artistical value have been discovered. For instance, the oldest manuscripts in Romanian were found in the monastery of Voronetz (Moldavia): a Psalter and the so-called Codice Voronetzean [Voronetz Codex]. In the monastery Tismana (Oltenia), the oldest miniate Slavonian manuscript in Romania was found: a Four-Gospels, written and illustrated by the priest Nicodim from Byzance, the founder of the monastery (1404–1405). A very beautiful illustrated Four-Gospels, from 1429, was discovered in the monastery Neamtzu (Moldavia); it is now in the Bodleian Library in Oxford.

In general, old Romanian, Slavonic, and Greek manuscripts (as well as copies of the first Romanian printed books) have also been found in the monasteries Cozia (Oltenia), Humor, Putna, and Sucevitza (in Moldavia), and in the Saint Nicholas Church of Scheii (Brashov in Transylvania). A rich collection was found in the library of the monastery Barnoviski, near Jassy (1727). This collection contained not only religious literature, but also Greek and Latin classical works of Homer, Aeschylus, Aristotle, Euclid, Virgil, Cicero, etc.—as well as works of European humanists. In the monastery library of Coshula (Moldavia), the first Romanian translation of Herodotus' *Histories* was discovered (1645). In the Archidiocesan library of Blaj (Transylvania) there were incunabula and a great collection of manuscripts not only in Romanian, Slavonic, Greek, and Latin, but also works in Arabic, Persian, and Turkish (the last originating from the private collection of the scholar Timotei Cipariu).

The value of the Romanian monastery libraries and collections was acknowledged by various foreign visitors, like the oriental traveler Paul of Alep—writing of the monastery of Bistritza (Oltenia), in the 18th century; and by Franz Sartory—writing of the Blaj Seminary Library (Transylvania).

Because of the great historical value of the old monastery manuscript collections, a special commission was initiated after 1900 by D. A. Sturdza, Ioan Bianu (from the Romanian Academy), and Petre Garboviceanu (from the "Church House"), in order to arrange the transfer of the monasteries' most precious collections to the Romanian Academy. On this occasion, several bibliographical works describing different monastery holdings were found which were very useful afterward for researchers in Romanian library history. The beginning was made by Nicholas Jorga, who compiled the manuscript holdings of the monasteries Cernica (1902), Ghighiu (1904), Argesh (1904), and Vacaresti (1914). Jorga's example was followed by A. Lapedatu's work about the libraries of the monasteries Bisericani, Risca, and Dalhautzi.

One of the characteristics of monastery and church libraries was the small number of readers—generally monks, priests, or other clergymen—scholars who were interested in problems of religion and of history, and who possibly appreciated the artistically decorated and beautifully bound books. In this way, a very refined sense of beauty developed. In the old Romanian monasteries there were also calligraphic and miniaturist-illustrating centers, sometimes of an exceptional artistic value.

These traditional calligraphy schools were led by great artistic personalities. Among the most famous calligraphy school personalities, we can mention: Nicodim from Byzance, in the monastery Tismana (Oltenia), already cited; Macarie and Calinic, in Cernica; Popa Floru (the Priest), a Slavonic language teacher, in Bucharest; Vartolomeu Mazareanu, in Risca; and Paisie, nicknamed by Nicholas Jorga "the General of the copyists, transcribers and translators," in Neamtzu. The founder of the Dragomirna Monastery (near Suceava), the Metropolitan Bishop Anastasie Crimca, was also the organizer and leader of an excellent school of calligraphers and miniaturists (*22*).

We must also mention that some very great and famous private libraries were installed in Romanian monasteries: Prince Constantin Brâncoveanu's library, in the monastery Hurezu (Oltenia); that of the *stolnic* Constantin Cantacuzino, at Margineni; and the Mavrocordates Library, in the monastery Vacaresti (near Bucharest). We will discuss these later as "court libraries" or "private libraries and collections."

COURT LIBRARIES

More brilliant but less accessible to the broad masses of people were the old Romanian court libraries. Indispensable for princes' information, and intensively used as cultural and civilization tools, some court libraries also were very precious collections of manuscripts, incunabula, and old printings. Sometimes they were even more extensive, the objects of that genuine bibliophilic passion manifested throughout Europe.

The first attested records of Romanian court libraries date from the 16th century, but it is assumed that such libraries existed in the 15th century and even before. In fact, we suppose that each Romanian prince must have had a court library. For instance, it is inconceivable that Stefan cel Mare (Stephen the Great)—prince of Moldavia (1453–1504), called by the pope "The Defender of Christianity"—did not have a large court library, following the examples of Matei Corvin (Romanian by birth, head of the Hungarian Kingdom), of the Russian czar of Moscow, or of the Italian dukes, with whom Stefan cel Mare had permanent relations. There is another necessary reason for this assumption; at Stefan cel Mare's court a chronicle of his reign was compiled using foreign models.

It is likewise impossible that many other Romanian princes had no court libraries, for instance: Vasile Lupu, *voievode* of Moldavia, who in 1651 donated a copy of Ioan Chrisostom's book, printed in 1612 in London, to the high school founded by him (in the monastery Trei Ierarhi in Jassy); or Matei Basarab, prince of Wallachia, brother-in-law of the great scholar Udriste Năsturel, and proprietor of a very famous library; or Miron Barnovschi, who gave as a gift several precious Greek and Latin classical works to the Barnovschi monastery he had founded; or Serban Cantacuzino (a real *maecena* of the Wallachian culture); or Michael Sturdza, Barbu Stribei, etc.

The first Romanian court library for which we have certain information is that of Despot Voda (Jacob Heraclid the Despot), prince of Moldavia (1561–1563). This great personality studied and traveled in Germany, France, Italy, etc., and founded in Jassy the Academy of Cotnari, which had as professors several very famous scholars such as Sommer, Ioachim Rheticus, and Melanchthon's friend Gaspar Peucer. Despot Voda had his own library in Suceava, which included, among other precious books, the work "Libri Ciceronis de Republica ad Atticum," printed in golden letters on parchment. This work was considered lost in the 17th century. Two documents from 1585 attest that Despot Voda gave it as a gift to the nobleman Woinowski, with other books including the work *De Republica*. Later documents continue the history of this book; it was brought from the Romanian court library of Suceava to the monastery of Volhynie, from which the Vatican Library obtained it. The manuscript was in this way rediscovered and published in 1822 by Cardinal Angelo Mai. This contribution of the Romanian court library of Suceava to the rediscovery of a famous classical work is very interesting and symbolic.

Another court library of the 16th century was the library of Petru Schiopul (Peter the Lame), prince of Moldavia (1574–1591), who abdicated and took the library with him into his self-willed exile in Bolzano (Tyrol), where he died. There are records indicating that some of his books were taken by the Archduke Maximilian, the brother of the Austrian Emperor Rudolf.

Another great court library (at the end of the 17th and beginning of the 18th centuries) was the library of Constantin Brâncoveanu, prince of Wallachia (1688–1714). This great *maecena* of Romanian culture, who created in Wallachia a very propitious cultural climate—a real "Byzantium after Byzantium"—originated a genuine artistic style, the so-called Brancovenian Style. He was a great amateur collector of precious books, too. Many valuable manuscripts, such as Byzantine chronicles and precious printed books, were in Constantin Brâncoveanu's collection. His great library was installed in the monastery Hurezu (Oltenia), in a specially prepared room, which had a Greek inscription on the gable wall of the entrance door: "A library is made of the most desired spiritual food; this house of books invites to a wise feast." Among the most valuable works of this famous bibliophile's collection—cited in a West-European museum guide of 1727 (*23*)—we can mention the Bible in seven languages (Biblia Septaglotta) in six volumes, published in folio in 1655–1657 in London by Walton Bryan; and a complete series of the *Byzantine Stories*, published in the King's Printing House of Paris in the 17th century. After Constantin Brâncoveanu's tragic death (the Turks took him to Constantinople and decapitated him and his four sons, in 1714), his most famous books were scattered. A part of his precious manuscript collection is now in the Austrian National Library of Vienna. We have some information about the books which remained in the monastery Hurezu collection from two "catalogs": the "catagraphy" of 1791, and a "catastih" [catastikh] of 1804 (*24*).

Contemporaneous with Constantin Brâncoveanu was Dimitrie Cantemir, prince of Moldavia (1693 and 1710–1711), who was a great scholar and a member of the Berlin Academy of Sciences (1714). Famous above all as an orientalist, his name was known in all the scientific circles of the continent as the chief authority in Ottoman history. However, the full extent and complexity of his work is illustrated by his writings in philosophy and logic, history and geography, literature, music, ethics, and theology. He was the author of several famous works: *History of the Growth* *and Decay of the Ottoman Empire* [Historia Incrementorum atque Decrementorum Aulae Othomanicae]; *Descriptions of the Ancient and Present-day State of Moldavia* [Descriptio antiqui et hodierni status Moldaviae]; *The Divan, or the Wise Man's Strife with the World, or the Quarrel of the Soul with the Body; The Hieroglyphic History;* and *Treatise of Turkish Music* [Tarifu ilmi musiki ala vegni maksus], etc.

Cantemir was characterized by a Wallachian envoy in the following words: "I have seen there a prince who, although still a young man, is surrounded by books and weapons, from which I may conclude that he has a bent for both." Later, a Greek scholar, Michael Schendo, said about D. Cantemir: "The muses loved him, the scholars valued him, the Emperors treated him with every mark of distinction" (*25*).

Certainly Dimitrie Cantemir was not the first Romanian scholar integrated into the European culture of his time. There were many other cases, for example: in the 16th century, *The Teachings of Neagoe Basarab to His Son Theodosie*, a political and ethical work written by a Romanian prince (Neagoe Basarab), was translated into Greek as soon as it was completed. Petru Cercel, a Romanian prince of the same century, was praised by the Italian humanists for the gracefulness of his verses in the Tuscan dialect. The Romanian chronicler Miron Costin could also write in Polish; and his contemporaries Constantin Cantacuzino and Nicholas Milescu carried on active exchanges of ideas and information with foreign scholars from France to Sweden, from Italy to the Levant. However, the Prince of Moldavia Dimitrie Cantemir stands apart from his predecessors. His work circulated in manuscript and in editions printed in 10 languages, and was quoted in Paris, Berlin, and London; in St. Petersburg and Bucharest; and from Mount Athos to Istanbul and Alep in the Near East. Great spirits in European letters—Voltaire in his *Histoire de Charles XII*, Byron in *Don Juan*, and Victor Hugo—praised him. On the frontispiece of the Bibliothéque Saint Geneviève in Paris, near the Pantheon (which was meant by the French Revolution to be a Temple of Fame), Cantemir's name is carved in stone beside the names of the most famous men of the world.

Cantemir changed his residence from Constantinople to Jassy, and from there to Moscow (after abdicating the throne of Moldavia in 1711), and he became one of the most appreciated scholars in exile at the court of Peter the Great. He was obliged to reestablish his precious library several times. Unfortunately, from his most valuable collection we now possess only one book, which today belongs to the Romanian Academy's Library: a Greek–Latin dictionary. This working tool of one of the greatest European scholars of the 18th century has the following annotation: "Ex libris Ioanis Principis Cantemiri Voivodae Principis terrarum Moldaviae, 1696."

The most famous Romanian court library—or, better expressed, the most admired and desired one—was the Mavrocordates library of the 18th century. Nicholas Jorga's statement that "there is nobody having a library similar to that of Nicholas Mavrocordat" (prince of Moldavia and Wallachia, 1709–1730) is not the only such assertion. For instance, in 1720, in the *Giornale dei letterati d'Italia*, a writer admired "the beautiful library" [la bella liberia] from Wallachia, described it as "beyond compare" [non ha pari] in matters of "authors' selection" [la scelta degli autori], and pointed out "the splendor of the editions [la belleza dell'edizioni]. The library, which contained a great number of rare books from Brâncoveanu's and Cantacuzino's libraries and many other pieces of exceptional value, and which was worth "about half a million thalers," was very much desired in the Occident. For instance, the Abbé Savin, the representative of the Parisian Royal Library, longed to buy the library "if the Prince's death or disgrace would make possible such a brilliant acquisition." But, after the *voievode*'s death in 1730, the numerous attempts of the French in Constantinople to acquire, or at least to obtain copies of, the most renowned manuscripts were in vain.

Who were the proprietors of this magnificent Romanian library, so much desired by Germany's emperor, the kings of France and England, and even by the pope? Three Mavrocordates built the library. They were known as the most learned scholars in all the East (the Orient), and they had a large following in the Occident too. Disposing of a great fortune, especially after ascending the Romanian throne, the three Mavrocordates princes—the father (Alexander), the son (Nicholas), and the nephew (Constantin)—succeeded in creating one of the most famous libraries in Europe.

Alexander Mavrocordat Exaporitul was a great *dragoman* ("foreign secretary") of the Ottoman "Porte" in Constantinople. He had, however, taken medical studies in Italian universities (Padua and Bologna), and his doctor's degree in medicine, on "blood circulation," was based on William Harvey's theories.

Nicholas Mavrocordat, prince of Moldavia and Wallachia (1709–1730), was a learned man too. His bibliographical culture was so vast and his working instruments so varied and extensive that he was able to correct, and sometimes even to complete, information contained in classical works. He was rich, proud, and very fond of his books. The prince was so dominated by his bibliophilic passion that he always succeeded in buying the most precious pieces of the East, and even of the Occident, for his huge collection.

Constantin Mavrocordat, prince of Wallachia and Moldavia (1730–1749 and 1756–1769), received as his heritage from his father "the same great love for beautiful and rare books in all languages." He was unwilling to give up his library even when the German emperor, the kings of France and of England, and the pope each offered to him the incredible sum of 100,000 piastres.

What did the Mavrocordates library contain? Various sources inform us that among the most precious manuscripts, rare books, and numismatic pieces (in 1723, the Moldo–Wallachian *voievode* attached a numismatic collection to his library, the first one recorded in this part of Europe) there were wonderful pieces such as: a Coptic Bible, from the third century B.C.; many rare Italian books; part of the first editions of the classics (Princeps), with precious bindings, engravings, and titles printed in gold; and the best Oxford editions.

One characteristic feature of Nicholas Mavrocordat's bibliophilic activity was his scientific investigation of bibliographical sources, old and current, in order to be well informed on all aspects of the universal movement. The prince was a subscriber to the *Giornale dei letterati d'Italia* and the *Journal des savants*, and he regularly received printing house and bookstore catalogs from Leipzig and other European printing centers. He also obtained the most complete universal or special bibliographies and the catalogs of the largest libraries in the world, and other bibliographic materials.

In this respect, Corneliu Dima-Drăgon discovered in the Romanian Academy's Library in Bucharest two bibliographies of the 17th and 18th centuries, annotated by Nicholas Mavrocordat, which pointed out the prince's special scientific manner of completing his library (*26*). The first bibliography is the most renowned work of the German humanist Johannes Henricus Boeclerus: *Bibliographia Historico-politico-Philologica Curiosa*, published with an Appendix in 1677 in Germanopoli (Frankfurt am Main) by Schottel. The second was the work of the German scholar Daniel Georg Morhof: *Polyhistor literarius, philosophicus et practicus, Maximam partem opus posthumus . . . Edition secunda* (Lubecae, Sumptibus Petri Bochmanni, 1714).

The prince's annotations in Latin reveal both the rich content of the library and his vast culture. His bibliographical erudition was always directed toward the scientific completion of the library's collection. The prince's marginal annotations are rich in references to the content and the bibliographic value of the works. When referring to some authors (present in Morhof's bibliography by the main editions of their works), the prince's annotations mention—not without bibliographilic pride, of course—the exhaustiveness of his court library collection. For instance, for Theophrastus' work, the prince says: "Omnes editiones Theophrasti extant in nostra Bibliotheca" [All Theophrastus' editions are present in our library]. And when Boeclerus in his bibliography erroneously assigned *Historia Saracenica* to the orientalist Thomas Erpenius, the Wallachian prince corrected the mistake, writing the actual name of the author, Georgius Elmacinus—instead of Thomas Erpenius, its translator.

Four catalogs illustrating the library's organization are preserved: three for books (one not dated, one from 1723, and one from 1725) and a partial catalog of manuscripts from 1732. The works are arranged according to book size in the first two catalogs, and according to language and format (with marginal annotations on subjects) in the third one.

Having been deposed, Constantin Mavrocordat was obliged to sell his library in order to obtain the necessary money to set himself free from prison in Constantinople and to regain his throne. He consigned his collection to the English merchant Barker, in Constantinople. Barker, after 1757, sold in England the greatest part of the library, especially the manuscripts and rare books. "There also remained about 6 or 7 carts of books in Bucharest," said the historian Sulzer, "but their destiny was cruel too. Some of them were robbed by the Russian army, some eaten away by mice and rats." Only the volumes stored in the Bucharest Metropolitan Bishopric Library were transferred to final safety—to the Saint Sava College Library in 1836, then to the Central State Library in 1864, and from there (in 1901) to the Romanian Academy's Library.

Today there are pieces of the Mavrocordates Library in several collections and libraries all over the world. In the British Museum there are the Greek manuscripts mentioned by Richard Marcel in his catalog from 1952 (*27*), which include the "History of America and Christopher Columbus," written by Alexander Mavrocordat, with a preface by Nicholas Mavrocordat. Some manuscripts were sold on the occasion of a great auction in 1967 (*28*); through this sale a version of the *Sermones* of the Metropolitan Bishop Antim Ivireanul and the entire *Epistolary* of Alexander Mavrocordat came to London too. In the National Library of France in Paris there are the manuscripts of Johannes Lydus's *De magistratibus republicae Romanae* (*27*). Other pieces from the famous collection can be found in the Greek National Library in Athens, in the Romanian Academy's Library in Bucharest, and in the "Nicholas Balcescu" School Library in Craiova (Oltenia). The historian Nicholas Jorga had also in his private library a volume of a beautiful Boileau edition from 1716, bound in red Morocco leather, bearing the Wallachian emblem and the initial letters: I[o] N[icholas] C[onstantin] V[oievode]. (His father's volumes bore the mark: "Ex libris Io, Nicolai Mavrocordat de Scarlatti, Principis Moldaviae et Valachiae.") Another volume, the seventh volume of Henri-Philippe de Limiers's *Histoire du regne de Louis XIV* (second edition), is now in the Jassy University Central Library collection (*30*).

PRIVATE LIBRARIES AND COLLECTIONS

Following the example of their princes, many learned Romanians—ecclesiastic and laical—became passionately fond of collecting books, and assembled their own libraries. Some of the numerous private collections contained precious manuscripts, incunabula, and other printings. Such libraries satisfied not only the pleasure of reading and thirst for culture of the owners; they also served the documentation needs posed by their proprietors' studies and researches, while keeping them acquainted with the world intellectual movement. This trend in library formation was influenced by the Renaissance spirit, which came to Romania via Italy and Poland. It is not surprising to find that the first private owners of libraries were the most learned people and the greatest representatives of Romanian humanism. Besides Romanian private libraries, there were also the collections of foreign merchants and travelers through Romania's territory—for instance, Sonnini de Manoncourt's library, which was eventually bought by the Romanian Metropolitan Bishop Ignatie, and afterward donated to the Princely Academy at Saint Sava Monastery in Bucharest.

The libraries' proprietors were acquainted with local Romanian book production, but they generally acquired their publications from abroad. From the local book merchants of Sibiu and Brashov they bought periodicals, such as *Journal des savants* and other French and German bibliographical reviews. They also transcribed ancient manuscripts borrowed from Romanian and foreign libraries.

Unfortunately, a characteristic feature of these early private libraries was the loss of the collections as time passed. With few exceptions, what remains today are only some scattered volumes, a catalog, some records, or sometimes only a reference to a big private library that has been entirely lost.

It is sufficient to mention only a few of the most important private libraries of the 16th to 18th centuries, which belonged to enlightened *boyards* or other great political personalities, metropolitan bishops, chroniclers, great scholars, and *coryphaei,* "leaders" of the "Transylvanian School." All these personalities were characterized by their progressive political views, based on a humanist philosophy. All of them considered it an honor to create a collection of books and manuscripts, and they were proud to collect a great number of the best editions of classical and contemporary writers. In this respect, the opinion of one of these private library proprietors, the *boyard,* scholar, and chronicler Miron Costin, is significant: "There is no better free-time occupation than book reading."

A great Moldavian scholar of the 17th century, the chancellor Luca Stroici (Stroich)—who was the author of a version of the Lord's Prayer in Romanian, with Latin characters—possessed a rich library. It contained various precious classical editions, especially in Latin and Greek, and many Renaissance works such as those of Carlo Sigonio Francesco Robertello, Joachim Camerarius, Philippus Melanchthon, Gaspar Peucer, and others. From Stroici's library catalog, elaborated by the Moldavian *boyard* himself (now in the Lvov–Lemberg University Library, in Poland), we find that the library also contained a copy of Sebastian Munster's *Cosmographia* and other scientific works. Chancellor Luca Stroici eventually donated his whole library to the Dragomirna monastery near Suceava (in Moldavia).

Another private library, from which no book has been preserved, was that of the Moldavian *boyard* and chronicler Grigore Ureche (1590–1647), an outstanding representative of Romanian humanism. His studies in Lvov–Lemberg not only acquainted him with the Polish language (he spoke Latin and Slavonic as well), but also with the Renaissance spirit. Considered one of the most learned men of his time, with a large cultural horizon, he wrote the first chronicle in Romanian: *Moldavia's Chronicle* [Letopisetul Tării Moldovei], which integrated historical facts into a comprehensive system of political thought. His library contained historical writings, literature, and other scientific works.

From the library of another important Moldavian *boyard* and chronicler, Miron Costin (1633–1691)—a learned man of humanist cultural ideas who wrote a *Moldavian Chronicle* [Letopisetul Tării Moldoveai . . .] and other works (both in prose and in verse) in Romanian and Polish—there are preserved only two Latin manuscripts (fully annotated), in the Romanian Academy Library in Bucharest. Generally, all Romanian chroniclers from Moldavia, Transylvania, and Wallachia possessed famous private libraries. Examples are: Nicholas Costin (1660–1712) and Ican Neculce (1672–1745), both authors of a *Moldavian Chronicle* [Letopisetul Tării Moldoveai . . .] and of other works; Michael Moxa (17th century); Stoica Ludescul (17th century); Radu Popescu (17th century); Radu Greceanu (17th–18th centuries). These libraries were necessary primarily for documentation of their historical research. For instance, we find from a document of 1777 that the chronicler Ionitză Canta bought as a "documentation tool" a big "Kiklopedia" (most probably the French *Encyclopédie*), "in several volumes."

Other important private libraries were those belonging to two prominent Moldavian personalities: the Metropolitan Bishops Varlaam and Dosoftei.

The Metropolitan Bishop Varlaam (d. 1657), who was a very learned man and who founded a Romanian printing press in Jassy, possessed a rich library. He was the author of many works, among them his famous *Romanian Book of Sermons* [Carte românească de invătăturăl] and *Sermon* [Cazania]. He was a friend of Udriste Năsturel, another proprietor of a large and very valuable library. Unfortunately, no books have been preserved from Varlaam's library.

We also have little information on the library of the Metropolitan Bishop Dosoftei (1624–1693). He was a very learned man who spoke Latin, Greek, Polish, and Slavonic, and was the author of the first significant work of Romanian verse: *The Versified Psalter* [Psaltirera în versuri]. In fact, we have today only two books from Dosoftei's library: *Universal History*, printed in Cologne in 1544; and a hagiographic work printed in Venice in 1663, entitled *An Universal History from the World Beginning until 1500, written by Ioan Neukler of Tübingen and continued . . . by Nicolaus and others, until 1544.* Both these works are now in the Romanian Academy Library; the second after belonging for a time to the Wallachian *boyard* Constantin Cantacuzino. On this volume is written: "It was bought by the Metropolitan Bishop Dosoftei; and then gave it to the medical doctor Jacques Pilarin . . ., who afterwards donated it to the *boyard* Constantin Cantacuzino from Wallachia" (*31*).

We have no information about the private library of one of the most learned men and representatives of Romanian humanism, the Moldavian *spatharus* Nicholas Milescu (1636–1708). He studied history, theology, and philosophy in Constantinople and traveled widely in Germany, France, Sweden, Russia, and also in China. He spoke Latin, Greek, Russian, and other languages. Because of his erudition, he was appointed "Head Translator" of the Moscow Diplomatic Council. He was the author of many works of a historical, religious, educational, and philosophical character; the translator of the Bible in 1677; and author of the first Romanian work printed in Paris, an orthodox theological treatise that was written in Sweden. He was very much appreciated for the great originality and documentary value of two works: *China's Description* and *Items List* [Statejnyj spisok]. Unfortunately, we still have no information about this outstanding personality's private library.

In Wallachia a famous private library was that belonging to one of the most learned men of the 17th century, the *boyard* Udriste Năsturel (1597?–1659). Brother-in-law of Prince Matei Basarab, Udriste Năsturel was a great diplomat, poet, and translator of several important works, such as *Imitatio Christi* (printed by him on the monastery of Dealu printing press). A foreign messenger said admiringly of him: "He lived surrounded by books that he acquired from abroad." It was in Udriste Năsturel's library that his friend, the Metropolitan Bishop Varlaam, found the famous *Calvinist Catechism*, the first book printed in Romanian (at Brashov, in 1544; now lost). Varlaam reported: "In 1645, in Tirigviste, in the house of Udriste Năsturel, who is a friend of learning and of orthodox faith, he showed me, among other new books, the unique booklet printed in our Romanian language, the *Catechism.*" It was against this book that Varlaam would later publish his *Answer to the Calvinist Catechism*.

From Udriste Năsturel's library we have only one book, now in the Romanian

Academy Library, a copy of Seneca's *Epistolae*. Using the marginal notes in this copy, Lucia Aramă succeeded in reconstructing the history of this very precious Romanian private library of the 18th century.

We have little information about the private library of another great Wallachian personality, the Metropolitan Bishop Antim Ivireanul (d. 1716). He was a great scholar; the founder of several printing presses in Romania, at the monasteries Snagov (near Bucharest) and Rimnic (Oltenia), as well as abroad; and author of many liturgical, didactic, and moral works: *Didahii* and *The Gifts Flower* [Floarea darurilor]. He was at the same time a gifted artist, printer, book illustrator, painter, sculptor, etc. Unfortunately, he was killed by the Turks and his private library was scattered.

We have information about numerous Transylvanian private libraries, beginning with the 15th century. For example, a *Catalog of Incunabula* belonging to the Bruckenthal Museum in Sibiu (*32*) registered 18 Transylvanian incunabula owners, including: Petre Ursul (Peter the Bear), who (in 1505) donated to the priests of Sibiu (. . . sancti Crucis Cibiniensis Ordinis fractum predicatorum) the work *Pantheologia* of Raynerus de Pisis (Anton Koberger, Nuremberg, 1477); and Paulus Andreae, who wrote in 1598 the catalog of his library, containing editions of Latin writers, Aristotelian works, Calvinist writings, etc.

An important group of private libraries are those of the Transylvanian prelates, for example, the Metropolitan Bishop Sava Brancovich and the Bishops Ioan Giurgiu and Ioan Inocențiu Micu-Clain.

The large library of the Metropolitan Bishop Sava Brancovich (d. 1683), champion of the orthodox faith against Calvinism, was scattered in 1680 when the prelate was dismissed and imprisoned by Hungarian authorities.

The illuminist Bishop Ioan Inocențiu Micu-Clain (1692–1768), founder of the "Transylvanian School" [Scoala Ardeleană], had a large and excellent library. When the famous Library of Blaj was founded in 1727, its first 250 volumes were donated by Ioan Inocențiu Micu-Clain, together with the other Romanian Bishop, Ioan Giurgiu, who also owned a substantial library.

Other important private libraries belonged to the great illuminist personalities of the Transylvanian School: Gheorghe Sincai (1754–1816), Petru Maior (1781–1821), and Samuel Micu-Clain (1799–1823); and also Gheorghe Lazăr (1779–1823), who was the founder, after 1816, of the Wallachian school system for instruction in the Romanian language.

Besides the large number of private libraries of Romanian Transylvanians, there were numerous libraries owned by Hungarian-, Saxon-, and Szeckler-Transylvanians. These included the famous library of Matei Corvin (1458–1490), king of Hungary, who was Romanian by birth. At the beginning of the 15th century, his library was preserved in the castle of Hunedoara; later on it became the famous "Corviniana" collection, and it was scattered after Buda's conquest by the Turks in 1541.

Also famous was the library of the great humanist and scholar Nicholas Olahus (Nicolae Românul; 1493–1568), who was of Wallachian origin. He traveled extensively in the Netherlands and in other West-European countries and had direct contact by means of correspondence with many German, Spanish, Italian, Belgian, Dutch, and Danish humanists. He was very much admired by Erasmus of Rotterdam.

We must also cite the private library of the famous Transylvanian Saxon, Johannes Honertus (1498–1549), who was a great humanist, an advocate of Lutheranism, and a great reformer of the Saxon Transylvanian Church. Born in Brashov, he studied in Krakow, Vienna, Wittenberg, and Basel. He was the author of *Rudimenta Cosmographiae* and other important works; and he organized the humanist college of Brashov, the local printing establishment, and, of course, his excellent library.

Four large and famous private collections, very important for Romania's library history, were those of the *stolnic* Constantin Cantacuzino (17th century), in Wallachia; and the Bruckenthal, Teleki, and Batthyaneum libraries (18th century), in Transylvania.

The biggest and the most famous private Wallachian library of the 17th century was the Cantacuzino family's library. Founded by Court Marshal (*stolnic*) Constantin Cantacuzino—foreign secretary of Prince Matei Basarab (1633–1654)—the library existed as early as 1655, when it received Lucas Osiander's *Enchiridion controversiarum* (in three volumes) as a present, with a dedication from Rector Martin Albrich of Brashov. But it was under *Stolnic* Constantain Cantacuzino's proprietorship that this collection reached its full magnificence. The autograph "Ex libris Constantin Cantacuzeni" was well known all over Europe.

The *Stolnic* Constantin Cantacuzino, a great scholar and politician of the Brancovenian epoch, was renowned in Europe. He studied at the University of Padua, in Venice, and in Constantinople; and he traveled through Europe. The epigraphist Edmund Cishall noted in his travel diary that the *Stolnic* Constantin Cantacuzino "[was] an eldery person, who traveled in many countries in Europe, and [was] skilled in the controversies of their own church, as well as in several liberal sciences." In 1688, the *Stolnic* Constantin Cantacuzino refused the Wallachian throne—sustaining Constantin Brâncoveanu in his golden cultural epoch—and decided to dedicate his efforts to a great historical work concerning all Romanian people from the three provinces: Wallachia, Moldavia, and Transylvania. He did not succeed in finishing his *History of the Romanian People*, but an excerpt of it has been preserved, which shows the universal dimensions of his historical knowledge and conception. In order to compile this work, *Stolnic* Constantin Cantacuzino gathered information from everywhere, especially during his travels abroad, concentrating first of all on the history of the Romanian people. He organized book and information exchanges with many scholars of Transylvania and Moldavia, as well as with foreign politicians and other cultivated people. For instance, he was acquainted with Sir William Paget, the ambassador of Great Britain in Constantinople, whom he visited in 1702. In this way he developed a very precious collection, about which a contemporary source said: "It was the greatest valuable vivliothiki [library] . . . realized with extraordinary expenses, containing many Greek, Latin, French, and Turkish books." Many Romanian establishments of Wallachia, Transylvania, etc.; numerous cultural centers throughout the Balkan and Eastern Mediterranean area; and a large number of foreign scholars borrowed, or received as gifts, basic works from this important library. In 1714, when the Princely Academy at Saint Sava Monastery in Bucharest was founded, *Stolnic* Constantin Cantacuzino offered it many books from his library.

What did this splendid and most famous library contain? Fortunately, it is one of the few early Romanian libraries generally well preserved today. Many specialists have dedicated their time and efforts to the "rediscovery" of this precious collection; and some of them, especially Corneliu Dima-Drăgon, have succeeded in identifying and cataloging about 600 volumes of Constantin Cantacuzino's library. Historical and geographical works prevailed in the library, including: those of Martin Cromer; *Polonia sive de origine et rebus gestis Polonorum libri XXX* . . . (Colonise Agrippinae, 1589); Johannes Sleidanus's *De quatuor Monachiis libri tres* (Lugdunum Batavorum, 1669); *Chronicon Carionis . . . ab exordio Mundi usque Carolum Quintum imperatorum a Philippo Melanthone et Gasparo Paucero* . . . (1581); and Jean de Laet's *Novus Orbis* [*sive*] *Descriptiones Indiae Occidentalis libri XVIII* (Lugdunum Batavorum, 1633). Two books with "MEdMM Edm.[und] Cishull" as their ex libris (received as a present by the *stolnic*) were *Il Cardinalismo di Santa Chiesa* (1688) and *Il Nipotismo di Roma* (1677). The library also contained such works as: precious editions of Greek and Latin classical authors like Homer, Aristotle, Terence, Horace, Titus Livius; those of later authors like Erasmus of Rotterdam; such works as Justinian's *Institutiones;* textbooks such as Laskaris's *Greek Grammar* and Manuel's *Latin Grammar*; and a variety of other material, from logic books to medical and astronomy treatises. There also were oriental books, especially liturgical works and hagiographies like *Penticostariu* and Ioan Commenius's *Emperor Ioan Cantacuzino's Life.*

After Constantin Cantacuzino's death, his wonderful collection was scattered. The most precious books were acquired by Nicholas Mavrocordat and shared the fate of the rest of the Mavrocordates Library. Today about 80 books are in the Romanian Academy Library in Bucharest; *Penticostariu* is in the monastery Curtea de Arges (Argesh). Fortunately, the efforts at reconstructing this most precious Romanian library have been successful. A *Catalog* and some exhibitions dedicated to the *Stolnic* Constantin Cantacuzino Library were recently completed under the sponsorship of the Romanian Academy of Sciences (*33*).

Three other important private libraries, also fortunately well preserved, are the Bruckenthal in Sibiu, the Teleki in Tîrgu Muresh, and the Batthyani in Alba-Iulia—which today would be called documentation libraries.

Founded by the Baron Samuel Bruckenthal, Queen Maria Theresa's counselor and governor of Transylvania (1777–1787), this library started with a precious stock of incunabula, old printings, and a remarkable collection of paintings—which would later form the actual Bruckenthal Museum. When the library became a public cultural institution in 1803, its collection contained 76 incunabula, about 16,000 volumes of rare books (among them, a beautiful collection of books in Latin, Greek, Italian, German, French, and so forth), and valuable manuscripts and documents concerning Transylvania's history. A great majority were bound in genuine leather, with the Bruckenthal ex libris. For the scientific organization of his library, Samuel Bruckenthal brought a specialist from Vienna, the librarian Samuel Hahnemann, also renowned as a homeopathist.

After 1803 the library was continuously enlarged from the bookstocks of other old Transylvanian libraries such as the so-called Chapel Library [Kapellenbibliothek], the old Sibiu town library and the Dominican Monastery's library, the Albert Huet collection, the Law Academy Library, and many other private collections.

Today, the Bruckenthal Museum Library possesses 363 incunabula, the oldest being Thomas Aquinas's *Opus praeclarum quarti scripti* (Mainz, 1469). There are about 300,000 volumes, among which are rare books; old Romanian printings; many publications concerning Transylvania's history; and works on art, archaeology, law, etc.

Another important private library was that of Count Samuel Teleki (1739–1822; counselor of the Austrian Empire from 1791 to 1822). During his studies in Basel, Strassbourg, Utrecht, Leyden, Rotterdam, Paris, and Vienna, he became a passionate book collector and decided to create a public scientific library. He began in Alba-Iulia by collecting Janus Pannonius's editions (in 1784 he published *Janus Pannonius' Work*); but the library was definitively set up in Vienna after 1787. There the library was installed in five rooms of a special building, and it was organized by a professional librarian. With the latter's assistance, Samuel Teleki elaborated and published the *Printed Catalog* in four volumes (1796, 1800, 1811, and 1819). The library was later moved to the country, to Tîrgu Muresh (Transylvania), after the building of its "Book House" (1799–1802). A testament stated the conditions of the library's administration and functioning. After the death of its founder in 1822, no other books were acquired for the Teleki Library until 1944. After 1945 it received many collections: the library of the Protestant Colleges of Orăstie and Sighet, the collection of the Unitarian Lycée [Secondary School], the Franciscan Friars' Library of Călugăreni, and the collection of the Roman Catholic Lycée of Tîrgu Mures. The library, which also contains a mineralogical collection, is now organized together with the Bolyai Library, under the name Documentary Library "Teleki–Bolyai" in Tîrgu Mures, which has about 50,000 volumes.

The Roman Catholic Bishop of Transylvania, Ignace Batthyani (1741–1798), a contemporary of Samuel Teleki, founded the Institutum Batthyaneum in 1794, and he endowed it with an astronomical observatory and a very valuable library. Being ex-librarian of the College Sant Apollinario in Rome, Ignace Batthyani personally organized his library on a scientific basis; and in 1798 it became "accessible to each scholar." The library received several rich donations over a period of time and today includes about 70,000 books and 1,300 precious manuscripts. In the collection there are 530 incunabula from the presses of Nicholas Jenson Gallicus, Aldus Manutius, Anton Koberger, and other famous printing houses. Among the most famous manuscripts is the first part of the *Codex aureus* (Evangelium scriptum cum auro pictum habens tabulas ebourneaes), on parchment (9th century). The second part is in the Vatican Library, and its beautiful ivory covers are in the British Museum (London) and the Museo Scaro in Rome. Miniatures of great value are included, such as *Horae canonicae latine et gallice* (15th century), *Psalterium* *cum calendario* (12th century), and *Missale Strigoniense* (1377). There is a fragment of the Saint Luke Gospel (Greek, 9th century), which came from Saint-Gall Monastery, and a Sallustius *De bello Jugurthina* manuscript.

Today, the Documentary Library "Batthyaneum" in Alba-Iulia is one of the most beautiful and valuable libraries of Romania.

EDUCATIONAL LIBRARIES

More accessible to a greater number of people than the categories of libraries already described, the educational libraries were primarily meant for a wider readership of teachers and students. They also represented—especially before the regular organization of public libraries in Romania—the most important institutions for the dissemination of culture, and were the most dynamic factor in permanent education. In this regard, the Jesuit friar Fasching wrote (in 1743) the following about the oldest Romanian school—at Saint Nicholas Church in Scheii (Brashov), Transylvania: "The Romanians have here a wonderful school—the best in the world—because all teachers make the greatest endeavor to teach writing and reading to the little 'republic' of children, among which there are also adults and married people."

To present the history of educational libraries in Romania, it is necessary to outline Romanian school history from its beginning to the 18th century.

The first Romanian schools were in monasteries, bishoprics, and metropolitan areas, and used books from the church library. Generally, the church maintained an active educational process. The monastery, church, and bishopric schools became, in the course of time, an efficient educational network, and they brought about an exclusive spiritual development with powerful social influences (*34*).

At the beginning there were only elementary monastery schools; there was no form of higher school activity. Speaking about the Moldavian monasteries Moldovitza and Bistritza (founded in the 14th century), Nicholas Jorga said: "These were our high school centers . . . Rector was the Father Superior . . . professors . . . the monks, learned in Slavonian, calligraphers, tachygraphers, miniature painters . . . students . . . those young men, from all over the country, wearing long hair as student and hermit badge . . ." (*35*).

Responding to the religious and administrative needs of that time when the church was also an important land owner, these elementary schools trained priests and monks as well as lay specialists in the official language, Slavonian (called *dieci* or *spisari*). Such schools were organized in numerous monasteries throughout Romania's territory, in Wallachia, Moldavia, and Transylvania. Among the most important monasteries (in which an intense spiritual life was being experienced) were those of Argesh (founded in 1339), Tismana (1386), Dealu (14th century), Bistritza (Oltenia; 15th century)—in Wallachia; Neamtz, Bistritza, and Probota (founded in the 14th century); Putna, Voronetz, Moldovitza, and Humor (15th century)—all in Moldavia; and Ieud (founded in 1364), Peri (1391), Vad, Scorei, and Prislop (1398)—in Transylvania. Other schools were at the orthodox bishoprics in Severin, Argesh, Roman, and Radautzi, and at the metropolitan seats in Suceava (in Moldavia), Tîrgoviste (in Wallachia), and Alba-Iulia–Bălgrad (in Transylvania). There were Catholic bishopric schools in Milcov, Baia, Siret, Bacău, Argesh, Oradea, and Alba-Iulia; and Lutheran and Calvinist ones in Sighisoara, Caransebesh, Hatzeg, and Turda.

In many monasteries there were also apprentice schools for calligraphy, manuscript illumination, and music, as well as schools for the teaching of artisans' crafts, especially silver working (for producing Bible and icon covers). Later on, in the 18th century, in the most important churches there were special elementary schools organized for the children of artisans and merchants, the so-called church-schools or *dăscălii*. All these educational activities were carried out, in the beginning, in Slavonian (the official state and church language), and later in Slavonian and Romanian. All were under the influence and sponsorship of the church.

A more advanced school category was represented by the confessional colleges—Orthodox, Catholic, Uniate, Lutheran, and Calvinist. Orthodox secondary schools were created in Bucharest and Jassy. An example of a secondary school is the Gymnasium in Blaj (Transylvania), where three schools were successively created in 1754 and later: an elementary school; a gymnasium, or Latin school; and a seminary. There were Roman Catholic gymnasia in Alba-Iulia, Tîrgu Muresh, Mediash, etc.; Lutheran Saxon ones in Sibiu, Brashov, Sighisoara, etc.; and Hungarian reformate gymnasia in Cluj, Tîrgu Muresh, Odorhei, etc.

Besides these schools, directed and sponsored by the church, there were also other categories of laic schools, for instance, those functioning in connection with the princely chancelleries and local administrative offices. The first were in the capital, the others in different provinces, districts, counties, and towns. These schools were especially intended to train the *dieci* or *pisari*. Other categories of laic state schools in Transylvania in the second half of the 18th century were the special Frontier Guards regiment schools of elementary and secondary levels, the mining schools in mining areas, and, of course (after the laws of 1774, 1777, and 1781), the state elementary rural schools.

A later category of schools was that of the brilliant educational institutions, the high schools, founded under Western European influence by Romanian princes and other great personalities. These schools had a tentative beginning with Despot Voda, who founded in 1563 his famous High School of Cotnari, or Schola Latina. They were continued by Petru Schiopul (The Lame), and culminated in the creation of the illustrious Princely Academies in Bucharest (1679) and Jassy (1714).

In the 17th and 18th centuries, the Romanian educational process and the Romanian school system were greatly influenced by the Western European countries, especially Italy. Italian influence was exercised both directly through Romanian students who attended the Italian universities at Padua, Bologna, Rome, and Venice, etc. (for example, *Stolnic* Constantin Cantacuzino and Alexander Mavrocordat), and indirectly through Constantinople, Poland, and Russia. Concomitant with the creation of the Great High School of the Orthodox Metropolitan Bishopric in Constantinople, Princely Academies were founded in the Romanian principalities. The first was in Bucharest, the famous Princely Academy at Saint Sava Monastery. It was created in 1679 by Prince Serban Cantacuzino, and it was developed afterward by Prince Constantin Brâncoveanu according to the project drawn up by the *Stolnic* Constantin Cantacuzino with the help of Dosoftei, the metropolitan bishop of Jerusalem. Similarly, the Princely Academy of Jassy was founded in 1714. This school was created by Prince Nicholas Mavrocordat, who reorganized the old Princely High School of Trei Ierarhi Church (founded in 1640 by Prince Vasile Lupu with the assistance of, and professors from, the Metropolitan Bishop Petru Molivă of Kiev, Russia; and with books, professors, etc., from Hrisant Notara, the metropolitan bishop of Jerusalem). Mavrocordat organized the new Princely Academy of Jassy in a manner similar to that of the Princely Academy of Bucharest. Both Princely Academies taught Greek and Latin, the international learned languages of those times, and had some of the best professors in Europe.

Parallel with the Romanian elementary school system and educational process—which was intended to enlighten the Romanian people by schools functioning in their own language, but which, in fact, still used principally the Slavonian language—another school system was created in Romania. This so-called Greek school system was of a high level; it was famous throughout Europe and had great influence in all the Christian Orient. It was dominated by great Romanian personalities, such as the *Stolnic* Constantin Cantacuzino, and by Alexander, Nicholas, and Constantin Mavrocordat. This Greek school system lasted more than 125 years in Romania, this "Byzantium after Byzantium." It was of great benefit to all Southeastern Europe and to the culture of the whole Christian Orient, but was also very important for the Romanian people's culture. This school system was dominated by the church in general, especially by the Metropolitan Bishoprics of Constantinople and Jerusalem, and used primarily the Greek language. Therefore, a Romanian nationalistic backlash occurred, and there was even an actual fight between the Greek and Romanian school systems. The Greek school system did create some very important advantages for the Romanian people. Thus, it was Nicholas Mavrocordat who first introduced Romanian as the official language for the educational process (in 1714, in a special section of the Princely Academy of Jassy). Second, under the tutorship of the best foreign professors of the Greek world, the Greek school system also trained Romanian teachers. Finally, since it introduced in the school programs new scientific disciplines, the Greek school system prepared the way for the future laic state university system in Romania.

Consequently, the characteristic feature of the 18th century was the creation of the state educational and school system; first using Greek, in Wallachia and Moldavia; and German and Latin, in Transylvania. Of course, the traditional forms of education in the old monastery and church schools, functioning in Slavonian and Romanian, were continued. However, the need for schools using the Romanian language became more and more obvious. The battle between the Greek and Romanian school systems lasted until the second decade of the 19th century, when the real nationalization, romanization, of the educational process and school system took place—first in Wallachia (Muntenia) in 1818, and later on in Moldavia. In Transylvania, this process began earlier, after the impartial laws of 1774, 1777, and 1781.

As school activity is not possible without at least three basic elements—pupils, teachers, and *books* (that means libraries)—the questions are: What was the link between schools and libraries in general? and What was the evolution of the educational libraries, from their beginnings to the end of the 18th century?

All Romanian schools had libraries, because the educational process was not possible without books, at least textbooks. At the very beginning there were no manuals; the pupils of the first monastery and church schools used breviaries or books of hours, the so-called *ceaslovs* (*cheaslovs*), and *psaltichii* (*Psaltikii*, i.e., psalters). In this way, the monastery and church libraries served as school libraries, as later on the school libraries would play the role of public and even scientific libraries.

But there were exceptions, and these became proper school libraries; for instance: the library of the first Romanian School of Scheii (Brashov), founded in the 15th century in Transylvania; and that of the Lutheran school, founded by Johannes Honterus in the 16th century in the same town. Several catalogs of Honterus's library have been preserved. For example, the catalog of 1575 contains an alphabetical list of about 600 volumes, of which 70 were manuscripts. Among the books, there were a large number of Luther's and Melanchthon's works.

In Moldavia, we have no certain information about the existence of school libraries, not even in the Schola Palatii (the Slavonian school), which was founded in about 1400 in Suceava by the Moldavian Prince Alexander cel Bun (Alexander the Good). Nor do we know about the libraries of Prince Alexander Lăpusneanu's College in Hîrlău and the Music School in Suceava. But we do have definite information about the library of the Schola Latina of Cotnari, near Jassy, which was founded in 1563 by Prince Jacob Heraclid Despot (*36*). This extraordinary school—where professors included some of the greatest personalities of that time: Ioachim Rheticus, Johannes Sommer, and Melanchthon's friend Gaspar Peucer—had, of course, a valuable library. Its fate was the same as that of the school itself; they lasted only three months, until the prince's death.

More fortunate was the library of the high school founded in 1640 by Prince Vasile Lupu (The Wolf), the Vasilian School, or Schola Vasiliana, at the Trei Ierarhi Church in Jassy. As the school was organized with help from the Kievian Metropolitan Bishop Petru Molivă (of Romanian origin, who studied in Poland), it was much influenced by Kiev: books and professors came from that city; it followed the model of the Kievian Academy; and even its rector, Sofronie Pociatski, came from Kiev. The collection of the library began with the books donated by Prince Vasile Lupu. This high school was very famous, having as one of its pupils the *Spathar* Nicholas Milescu. The Catholic missionary Bandinus, who visited Moldavia, attested that in Jassy there were also other schools functioning with teachers and books (libraries).

The library of the Greek–Latin School of Tîrgoviste was the first in Muntenia (Wallachia). It was organized with help from Prince Matei Basarab, and it functioned in the house of Court Marshal Constantin Cantacuzino, the initiator of the famous Cantacuzino Library. The school was led by the great scholar Pantelimon Ligaridi, and it had as one of its pupils the future Wallachian prince, Serban Cantacuzino. The school library contained the necessary books on rhetoric and logic, and those for other courses held in Greek and Latin.

Another school—a Slavonian one, founded by Prince Antonie Voda in 1770, in Cîmpulung—must have had in its library both Slavonian and Romanian books. The library of the Princely School at the Saint Georges monastery in Bucharest, where teaching was in Slavonian, had been founded at the end of the 17th century at the monastery Coltzea in Bucharest by the *Spartharus* Michael Cantacuzino. The library of this school was meant to support studies in "rudimentary knowledge," "the sciences," and "the singing art."

The most important Wallachian high school of the end of the 17th and the beginning of the 18th centuries was that of the Princely Academy at Saint Sava Monastery in Bucharest, founded in 1679 by Prince Serban Cantacuzino. It is discussed later with the Princely Academy of Jassy (founded by Nicholas Mavrocordat in 1714), after taking note of some earlier important educational libraries of Transylvania.

In Transylvania the Calvinist University (founded in 1629, in Alba-Iulia) had three faculties: theological, philosophical, and philological. Prominent personalities served as professors (for instance, the scholar Ioan Heinrich Alstedtius, from the University of Hearborn), and it had, of course, a large library.

The Romanian Calvinist School in Făgărash, founded in 1657, was especially intended to disseminate Calvinism among the Romanians living in the Făgărash area, and it had a library.

These and other proselyte schools of the era, especially created for religious propaganda purposes, were unstable institutions dependent on their protectors. For instance, a Jesuit University in Cluj was founded in 1581 with three faculties (theology, philosophy, and law) and a large library, but it functioned only until 1603, when the Jesuits were driven out of Cluj. However, all these schools, religious and cultural at the same time, did operate fully: they had drawn up their curricula; they had gathered their most famous professors; they had printed books, at times in their own printing houses; and they had organized their libraries as teaching and cultural instruments.

We must also mention two important Transylvanian college libraries, fortunately still preserved to the present: the library of the Reformate College of Tîrgu Muresh, now called the Documentary Library "J. Bolyia"; and the library of the Academic College, which was founded in Alba-Iulia but today functions in Aiud, under the name of the Documentary Library "G. Bethlen."

The Documentary Library "Bolyai"—or, better said, the "Bolyai" Section of the Documentary Library "Teleki–Bolyai"—was founded in 1557, when the citizens of the town Tîrgu Muresh (who had been converted to Protestantism) created the so-called Schola Particula and endowed it with a library. Afterward it became the Reformate College library. In spite of several moves, dispersals, and partial destructions, the library—enriched by the private collections of the scholars Farkas and János Bolyai—succeeded in preserving its stock of manuscripts and books. These are very important for the study of Transylvania's scientific development. An accession catalog, dated 1653, includes the list of books received by the library as donations. Today the library has about 50,000 volumes, among which are 9 incunabula, 417 early Transylvanian publications, 712 manuscripts, and 354 unpublished documents.

The Documentary Library "Bethlen" in Aiud was founded in 1622 in Alba-Iulia as the library of the Academic College created by Gabriel Bethlen, prince of Transylvania. The library was robbed several times and destroyed by wars and revolutions. For instance, the library was burnt by Austrian troops during the 1848–1849 revolution. Each time, it was rebuilt with the help of its professors and students. After the 1661 destruction by the Tartars, the library was moved from Alba-Iulia to Aiud, where it functions today.

The library collection has more than 70,000 volumes, among which are: 20 incunabula—most of them editions of the works of Plutarch, Cicero, Caesar, Ovidius, Sallustius, Seneca, Vergilius, etc. (the most beautiful one is the incunabulum of Persius Aulus Flaccus's "Satyrae cum comment . . ."); books from the Bodoni, Didot, Lemaire, Elsevier, Bleau, and Jansson printing houses; and 1,200 manuscripts. Also, its 18th- and 19th-century journals, reviews, and pamphlets form a priceless collection. The whole library collection is very valuable, especially for researchers studying the penetration of positivist philosophy and sciences in Transylvania, and generally for the study of the history of science in this Romanian province.

The most brilliant educational libraries in Romania in the 17th and 18th centuries were those of the Princely Academies of Bucharest and Jassy. Although inaugurated in 1689 (*37*), the Princely Academy of Bucharest was founded in 1679 by Prince Serban Cantacuzino with the help of Constantin Cantacuzino, at Saint Sava Monastery, and it was reorganized in 1694 by Prince Constantin Brâncoveanu. The founder of the Princely Academy of Jassy was Prince Nicholas Mavrocordat, who created the new academy and its library in 1714, and who afterward reorganized the old high school, Academia Vasiliana, which had been founded by Prince Vasile Lupu in 1640 at Trei Ierarhi Church in Jassy. However, the actual authors of this idea of creating the two Princely Academies—and even of their organizational plans and educational programs, similar for both Wallachian and Moldavian high schools—were the metropolitan bishops of Jerusalem, Dosoftei and Hrisant Notara. The historian Nicholas Jorga, in his works *The Romanian Education History* and *The History of the Romanian Literature in the Eighteenth Century*, pointed out the great importance of the action of these two *coryphaei* of Orthodox Hellenism. Founded with the special aim of fighting against the expansionist tendencies of Catholicism, both academies originated in Romanian principalities which had a largely Hellenistic cultural trend; although not national, this had powerfully influenced Romanian spirituality. Comparing the contribution of Hellenistic culture with the Latinist one (which came to Romania through Poland), Nicholas Jorga said: "If the Polish culture transmitted to the Romanian people some great ideas of Western Europe, the Hellenistic culture gave them the corresponding material knowledge and forms."

The first professor and leader of the Princely Academy at Saint Sava Monastery in Bucharest was the Greek scholar Sevastos Kymenites, who formerly had been the rector of the Great Orthodox Metropolitan School in Constantinople. Of course, he brought with him the "models" of the "academy" of Constantinople and, most important of all, the curriculum plan of the school. This curriculum was taught by three professors and included: (*a*) logic, rhetoric, physics, mathematics, astronomy, and "the origin and evolution of the things and soul"; (*b*) the *orationes* Isocrates, Pindar, Demosthenes, Xenophon, Plutarch, and Thucydides; and (*c*) Greek grammar for beginners, prosody, and orthography: Chrysolaras, Caton, Phocilid, and Pythagoras. A contemporary scholar, Alexander Helladius, who was acquainted with the organization of many European universities, wrote in 1714 about the high school of Bucharest: "It's no wonder if we call it Academy, because it contains besides the bishop and the two 'hypo' teachers (called in Latin 'magistries'), professors of philosophy and theology, and three physicians (professors too), among whom the newest is an Italian, replacing the scholar Comnen. The number of pupils very often exceeds 200."

Under such conditions, the presence of a big scientific library was considered to be a fundamental and indispensable condition for the whole educational and cultural activity, and it was even stipulated in the academy's organization plan (elaborated by the Metropolitan Bishop Hrisant Hotara, *Stolnic* Constantin Cantacuzino, and Prince Constantin Brâncoveanu). It must be mentioned that this library, like other contemporary institutions, was endowed from the beginning (in this case by means of a large donation made by *Stolnic* Constantin Cantacuzino) with the books required by the program of study. Generally, this was not a matter of didactic textbooks (very rare at that time), but of works treating a great variety of subjects, written by Greek and Latin classical authors as well as by humanists.

The content of the library became even more complex after the charter (*Khrisov*) of Prince Alexander Ipsilanti in 1776, which stated that the Central School would also have, as subordinate branches, two lower schools in Craiova and Buzău and elementary schools in several other towns. The study program also became much more complex, containing four "cycles," each lasting 3 years. The first three cycles were dedicated to the formation of basic grammatical and encyclopedic knowledge in Greek, Latin, French, and Italian. The fourth cycle was reserved for "the sciences": arithmetic, geometry, trigonometry, geography and history, Aristotle's philosophy, and astronomy. The library was obliged to put the necessary books at the professors' and students' disposal.

The same *Khrisov* of 1776 also stated the "Library Regulation" (statutes) which established the book inventory and loan rules, and which also pointed out the necessity of a "faithful librarian" for "the good preservation" of books. We know that in 1714 the "teacher" Marcu was working as superintendent-librarian, and in 1791 the "teacher" Panait was helped by two "skillful pupils."

The Princely Academy of Jassy was founded at the beginning of the 18th century, but it was reorganized several times: in 1728, 1741–1743, 1766, etc. Founded by Prince Nicholas Mavrocordat in 1714, the academy received not only its program of study (similar to that of the "academy" of Bucharest) but also the necessary books from the Metropolitan Bishop Hrisant Notara. Although the successor of the old Academia Vasiliana (founded in 1640 by Vasile Lupu), the high school needed new books corresponding to the necessities of the new, modern curriculum. The new program of study became progressively more complex. In 1728 a new Metropolitan Charter reorganized the Moldavian schools; it stated that the academy must have four professors: two teaching in Greek, one in Slavonian, and one in

Romanian. Later on, in 1741–1743, the academy was again reorganized and began to teach also in Latin, Turkish, and Arabic. But the most important reorganization took place in 1776 when Prince Grigore Alexander Ghica's charter (*Khrisov*) declared the high school an "academy for science teaching" (*epistimii*). The *Khrisov* also created two subordinate Greek schools, in Galatzi and Botosani, and 26 Romanian schools (3 at the bishopric seats and 23 in the county capitals). The consequences of this educational structure for the academy library were very important. In such an educational hierarchy, the position of the academy and the tasks of its library grew more complex, concomitant with the state's assistance. In this respect, Prince Grigore Ghica (during his last reign; 1774–1777), sent the *Boyard* Saul abroad as special emissary (first to France, Germany, and Italy), "to buy for the Academy library all books proper to help the scientific, cultural and artistic development of Moldavia." The sum of money spent for this purpose was a significant one: 1,000 florins. Another valuable initiative, at the end of the century, was the charter (*anaforà*) of the Metropolitan Bishop Iacob Stamati (1792–1803), who established the first form of legal deposit favoring the Princely Academies. Iacob Stamati's "Report on the Reorganization of the Education in Moldavia" was very important because it reflected a new point of view regarding programs of study; this had consequences for the academy library, which (like all educational libraries dedicated to broad masses of people) fully reflected in its collection the change taking place in that era, in matters of philosophical and social opinion. The Metropolitan Bishop Iacob Stamati proposed the introduction in the academy's program of the study of sciences and professions (trades). In the same respect, in the introductory part of the charter of 1766, Grigore Alexander Ghica gave great attention to the promotion of the study of sciences, because "learning must be connected with people's welfare, with their needs . . . and must also develop economic science and even political science."

All these tendencies—which prepared the way for the future laical university school—were fully reflected in the library collection of the Princely Academy of Jassy. This library and that of the Princely Academy of Bucharest became the largest educational libraries of the country. Therefore, when the question of creating the Central State Libraries and the National Libraries in the Romanian Principalities was raised in the 19th century, these two great libraries of the Princely Academies made the project possible and ensured its competition, by transmitting their rich collections.

THE FIRST PUBLIC AND SCIENTIFIC LIBRARIES

Romanian public libraries—organized as such, and as separate institutions—came into being very late, in the 19th century. Their development was a normal consequence of the economic, social, and cultural development of the Romanian Principalities. However, much earlier (even in the 14th century) other categories of libraries were already performing some of the functions of public libraries.

The situation of the Romanian scientific–technical libraries was similar. This kind of modern library became a regular category as a normal result of technical, scientific, and social development in the 19th century. Even before the 19th century, however, other categories of libraries (especially the educational ones) already performed some of the functions of scientific–technical libraries.

THE FIRST PUBLIC LIBRARIES

It was in 1828—in an official act (*anaforà)* of the Schools' Ephory in Moldavia—that the idea of a public library was expressed for the first time. In this act the Metropolitan Bishop Veniamin Costache (Costake) and the humanist scholar George Asachi (Asaki) asked the Moldavian Prince Alexander Sturdza to establish a national library "for all people's use and the benefit of learning." This idea was to be developed in the Organical Regulations (Regulamentul Organic) of both Muntenia (Wallachia) and Moldavia; but much earlier (even from the beginning of the 14th century), other categories of libraries were already serving as semipublic libraries.

For instance, from the very beginning, Romanian monastery and church libraries were open not only to the monks and priests, but also to pupils studying in these religious and cultural institutions; they were even open to any visitor, traveler, or passerby who wanted to read. The monastery and church libraries' collections consisted not only of religious books and manuscripts (necessary to the church ritual) but also of chronicles, books of history, geography, and the so-called *bogomilii.* It is not a wonder, then, that in 1830 Article No. 246 of the Organical Regulation stated: "In order to realize the collection of the first Wallachian Central State Library, all books and manuscripts of the Metropolitan Library of Bucharest, and the bishopric, church and monastery collections will be gathered in the Central State Library at Saint Sava College." So, it is obvious that before the foundation of this public library, its function was partially performed by the monastery and church libraries, which also had the character of semipublic libraries.

The situation of the private and school libraries was similar. In many cases the great private libraries and collections belonging to princes, *boyards,* and scholars were also accessible to those interested in consulting them, especially to outstanding scholars and other personalities from the Romanian Principalities and from abroad. For instance, in the 17th century, the Syrian traveler Paul de Aleppo visited the famous Cantacuzino Library of Mărgineni, where he read and transcribed precious manuscripts. The same library was consulted by the Serbian chronicler Sava Brancovich. It is not surprising that *Stolnic* Constantin Cantacuzino, in his letter of 1708 to the patriarch of Jerusalem, Hrisant Notara, wrote: "A great number of books from my small and modest library are borrowed, so that its shelves are almost empty" (*38*).

Although they were more important from the point of view of their size and the composition of their holdings (which were relevant to the cultural and educational concerns and for the trends of that era), and for their accessibility to a large number of readers, the educational libraries were at the same time playing the role of semipublic libraries. Throughout this period, educational libraries were dynamic instruments for the dissemination of cultural values, as well as being an important means for permanent public education. Therefore, the history of school libraries may be considered as the early history of Romanian semipublic libraries.

The oldest attested public and semipublic libraries in the territory of Romania date from the 14th century; they functioned in the Transylvanian towns of Brashov and Sibiu.

The library that functioned at Saint Nicholas Church in Scheii (Brashov), the oldest Romanian school, was not only a school library but also a semipublic one, and it had a great cultural influence on this part of the country. Dr. Vasilie Popp, the first librarian (who organized this library), stated that it contained "many venerable antique monumental works." Unfortunately, the great majority of them were lost.

Another public library was founded in the same town in 1541 by Johannes Honterus, and it was installed in an adequate special building. Its regulations were the first in the history of Romanian libraries.

However, the public library of the town Sibiu existed prior to Honterus's library in Brashov. Initially consisting of books donated by young people traveling and studying abroad, the library was afterward supported by public contributions. The first attested contribution by municipal authorities is dated 1537. In 1592 the library was moved to Saint Jacob Chapel, and it was afterward called the Chapel Library (Die Kapellenbibliothek). The library served both the local gymnasium's pupils and the people of the town.

THE FIRST LIBRARIES WITH SCIENTIFIC–TECHNICAL CHARACTERISTICS

The history of Romanian scientific–technical libraries is similar to that of public libraries. Created as a category late in the 19th century, they were preceded by some scientific functions developed by other categories of libraries, especially by educational libraries. For instance, in the library of the Princely High School of Jassy (Academia Vasiliana), the "students" studied not only philosophy, theology, rhetoric, poetry, and music; but also arithmetic, geometry, astronomy, and other sciences; and they had at their disposal all necessary documents.

The famous Cantacuzino Library had a scientific character too. *Stolnic* Constantin Cantacuzino (who studied in Padua University—not only philosophy, logic, rhetoric, and poetry; but also mathematics and physics) needed a scientific library for his activity, one containing not only historical works, but also books of science. He also had scientific communications with other scholars and great personalities, the owners of scientific collections. In this respect, the correspondence between *Stolnic* Constantin Cantacuzino and Ferdinand de Marsigli is a model of scientific cooperation between two great scholars.

According to the educational program of the High School of Bucharest (in the 17th century), the library of the Princely Academy at Saint Sava Monastery contained not only works of theology, philosophy, rhetoric, etc.; but also books concerning different scientific disciplines, such as mathematics, physics, and history. In the 18th century, when the Princely Academy was reorganized (1776)—when one of the learning cycles was especially dedicated to the sciences (*epistimii*)—the library was obliged to acquire, organize, and to put at the students' disposal, books in different scientific fields, such as those on arithmetic, geometry, trigonometry, astronomy, geography, history, etc.

The situation of the Moldavian High School in Jassy and its library was quite similar. When the high school was transformed into an academy for the development of the sciences (*epistimii*), Prince Grigore Ghica sent a special emissary abroad, with 1,000 florins, in order "to buy for the library all the books necessary for the scientific and artistical progress of Moldavia."

In Transylvania the situation was similar. The curriculum—mathematics with technological applications, physics and chemistry with applications to mining, biological sciences with applications to agriculture, astronomy, etc.—obliged the respective educational libraries to acquire and organize the necessary scientific and technical materials.

At the same time, the Bolyai Library and the Bethlen Library acquired collections specializing more and more in the general history of sciences, but particularly concerning Transylvanian cultural and scientific history.

In fact, the presence in the library collections, in all the Romanian Principalities, of Greek and Latin books with scientific content (which had been especially printed for the use of schools) proves that Romanian educational institutions and libraries were at the same high level as those of West European countries. The heritage of the 18th century (called *Le siècle des lumières*) and especially the general trend toward laical scientific schools and libraries were part of the progress of modern Romanian culture. The continuously greater importance conferred on scientific disciplines in Romanian religious high schools of the 18th century prepared the way for the laical scientific educational institutions of the 19th century. In a similar manner, the scientific activity of the high school libraries of the 18th century prepared the way for a new category of libraries in the 19th century in Romania—the specialized scientific–technical libraries.

Romanian Libraries in the 19th and 20th Centuries (Until WW II)

HISTORICAL BACKGROUND

The end of the 18th and the beginning of the 19th centuries marked the end of one era and the beginning of another, with great transformations resulting in the creation of the modern Romanian state and of modern Romanian culture and libraries. The Romanian Principalities of the 18th century (the Century of Enlightenment) experienced—as did other European countries during this time—powerful trends of rationalism and of dissemination of lay culture, along with the development of an antifeudalistic ideology. But, as in other countries, in the Romanian Principalities this modern revolutionary trend was combined with the process of crystallization of the national consciousness; and this led to a new ideology, within which the national idea played a leading part. The idea of the Romanic character and origin, common to Romanians on both sides of the Carpathians, was transformed from the scope of history and philology to that of political struggle, and it became the main support of the idea of Romanian unity. A decisive movement was made for the promotion of national revival by the Transylvanian Romanians, with Inocentiu Micu-Clain and the generation of writers, philologists, and historians of the Transylvanian

School (Scoala Ardeleană). To this was added a trend of advanced political ideas, especially from French sources, with centers of propagation in Wallachia and Moldavia.

Great transformations also took place in the Romanian Principalities' economy during the second half of the 18th and the early 19th centuries. The great landed properties began to evolve into agricultural enterprises of a capitalistic type, a process which was accelerated following the abolition of the Turkish monopoly over Romanian trade (1829) and the involvement of Moldavia and Wallachia in world trade channels. Handicrafts, manufacturing industry, and trade were in progress; the bourgeoisie began to feel inconvenienced by feudal relations in general, by custom barriers and other kinds of charges and taxes, and by the continuance of Ottoman rule (in Wallachia and Moldavia) and of Hapsburg domination of Transylvania. This situation had positive repercussions on the development of political thinking and on cultural development.

As a consequence of the campaign on the ideological level and of the impetus for national revival, Romanian language and culture took the place of the Greek language and culture, which had been imposed during the reigns of the Phanariots (*39*). The new period included breaking new ground in cultural activity and the assimilation of advanced European culture, which was the standard-bearer of progressive social, political, and philosophical ideals.

An outstanding part in the development of the national culture was played by the new organization and direction given to education, a patriotic undertaking in which the most preeminent contributors were: Gheorghe Asachi in Moldavia; Gheorghe Lazăr and Ion Eliade Rădulescu in Wallachia; and the representatives of the Transylvanian School, who imposed Romanian as the language of instruction. At the beginning of the 19th century, a number of cultural associations were founded; and new magazines and newspapers were issued—all having titles expressive of the nature of the spiritual movement, for example: *The Romanian Courier* [Curierul Românesc], *Romania, Literary Dacia* [Dacia literară], *Historical Magazine for Dacia* [Magazin istoric pentru Dacia], among others. Original literature began to develop rapidly, while modern national historiography witnessed its first successes: Nicholas Bălcescu was the author of an excellent study (admired by West European historians) entitled *Question économique des Principautés Danubiennes*, and Michael Kogălniceanu wrote several valuable scientific works. In the schools founded by Gheorghe Asachi in Jassy (Moldavia) and by Gheorghe Lazăr in Bucharest (Wallachia), as well as in the Romanian schools at Blaj and other Transylvania towns, a new generation was educated in the sentiments of love for the Romanian homeland and for the ideas of liberty. This generation aspired to achieve the unification of their nation and then to achieve the independence of the nation, which they began to call "Romania."

The wide cultural movement, which at the same time represented a great political force, disseminated such advanced ideas as that of the suspension of the feudal privileges and the establishment of citizens' equality before the law, exalting the principle of social liberty. It contributed to the formation of Romanian bourgeois ideology, facilitated the spread of ideas among the three Romanian Principalities, and paved the way for the revolutionary atmosphere of 1848.

In the consolidation of the achievements (especially manifested on the cultural level) and in the focusing and widening of the arena of political struggle, a decisive part was played by the antifeudal and anti-Ottoman revolutionary movement headed by Tudor Vladimirescu (1821). This had a precursory program—in the main, similar to that of the movement of 1848, aspiring to the same ends—and it had a momentous political consequence: the abolition of the Phanariot regime imposed by the Ottoman Porte and the return of Romanian native princes.

The political events of the fourth decade of the 19th century contributed to the acceleration of the development of this atmosphere too. At the beginning of the Russian–Turkish war of 1828–1829, Russian troops occupied the Romanian Principalities of Moldavia and Wallachia. After the treaty of Andrianople (1829), the czar (represented by Count Pavel Kisseleff) imposed on Wallachia (1831) and on Moldavia (1832) similar governing regulations, called the Organic Règlements [Regulamentul Organic]. Through these regulations the ruling prince was elected for life by the great *boyards*; and power was entrusted to a National Assembly, an embryo of the parliamentary regime. But, under the pretext of suppressing serfdom, the Organic Règlements actually sanctioned the conditions that preserved and strengthened feudal conditions, essentially through agrarian legislation which favored the big landowners at the expense of the peasants.

The revolutionary movement was gradually emerging. It was the political testament of the great Wallachian Prince Michael the Brave (who had, historically speaking, achieved a very brief independence for Wallachia in 1600), and it was an aspiration constantly kept alive by the consciousness of the Romanic origin common to all people of Wallachia, Moldavia, and Transylvania—whose economic, political, and cultural relations had been maintained and developed all through the Middle Ages. This concept of a common origin became, in the 19th century, a vital question and therefore it became the slogan that polarized all the political forces of the Romanian people.

Secret organizations were created for the organization and leadership of the revolutionary movement of 1848, such as the Brotherhood [Frătia], founded in 1843 in Wallachia by Ioan Ghica, Nicholas Bălcescu, and Christian Tell; the Patriotic Association [Asociatia patriotică] in Moldavia, which also had an impact on the revolutionary movement of Transylvania; and the association of Romanian students in Paris.

The revolution of 1848 had as its main goals: a democratic, independent republic including all three Romanian Principalities (the main ideal of the Forty-eightists' consistent struggle), equality of the citizens before the law, suppression of the titles of nobility, emancipation of the peasants, and land reform.

Although separately developed in each of the three parts of the Romanian territory—Moldavia, Wallachia, and Transylvania—the Romanian revolution of 1848 had a strong, united character since it originated in the same causes and spoke for almost identical goals common to all Romanians, among which the most imperative objective of the era was: *the union of all Romanians within the borders of one and the same national, democratic, and independent state.* The Romanian revolution of 1848 was, at the same time, an integral part of the European 1848 revolution. It represented the most advanced point of that revolution in the East, and it contributed to the dissemination of the movement's ideas in Southeastern Europe.

Each of the three parts of the national territory was defeated in its attempt to end Russian, Turkish, and Austrian imperialism, but the Romanian revolution of 1848 nevertheless had important consequences for further historical evolution. It brought to the forefront those major problems which Romanian society had to solve in its historical development, through modernization of the economic, political, and social structure: achievement of national independence and establishment of the national state through union of the three Romanian Principalities.

Political life after the revolution of 1848 was dominated by the struggle for union into a single state, a political action which was partially carried out in 1859. The Union of Moldavia and Wallachia [Tara Românească] in that year marked the end of the first stage in the achievement of state unity, and it was realized only with great efforts and political battles. The Peace Treaty of Paris (1856), after the Crimean War, stated guarantees for the sovereignty (not yet suzerainty) of only two of the Romanian Principalities: Moldavia and Wallachia; but it was a premise for their union and the Romanian people had to take advantage of it. In this regard, the Romanian ad hoc election assemblies of both Jassy and Bucharest voted for the program of the "Unionist Parts." The Parisian Conference of 1858 approved the "United Principalities of Moldavia and Wallachia (Tara Românească)," but only with "two separated state administrations." The actual union was not achieved until 1859, when Alexander Ion Cuza was elected the sovereign of both Moldavia and Wallachia. This was the first stage in the achievement of Romanian state unity.

Alexander Cuza's reforms, among which the most important was the agrarian reform of 1864, consolidated the new Romanian capitalist state, which developed rapidly. It was under the reign of Charles I (from 1866, sovereign; and from 1881, king of Romania) that the Romanian state won its full independence (i.e., its suzerainty) in the so-called Independence War (1877–1878). Proclaimed on May 9, 1877, the independence of the Romanian state was actually won not by treaty papers, but in the bloody battles won by the Romanian army against Turkish troops at Giurgiu, Rahova, Plevna, etc. Both the Peace of San Stefano and the Berlin Congress of 1878 attested Romania's independence, as well as the retrocession of the province of Dobrudja, the oldest Romanian territory. Unfortunately, on the strength of the same diplomatic act, three districts in the south of the Romanian province Bessarabia were appropriated by the Russian imperialist government—just as the greatest part of the same Romanian province had been appropriated by the czarist empire in 1812—on the pretext of being "liberated from the Turkish imperialist government."

The achievement of state independence created better conditions for Romania's economic development. It was in the second half of the 19th century that the development of industry, railroads, and the banking system, and the modernization of the Danubian and maritime harbors took place. The economic and social structure of Romania at the end of the 19th and the beginning of the 20th centuries was that of a capitalist state in full development. This situation was first sanctioned by the Constitution of 1866, which was maintained (with some modifications) until the new Constitution of 1923.

The Union of Moldavia with Wallachia [Tara Românească] in 1859 and the achievement of Romania's independence in 1877–1878 had a powerful effect on Romanians living in Transylvania, who entertained hopes of national liberation by the new, free Romanian state. In the meantime, this large section of Romanian territory, Transylvania, was incorporated into Hungary after the creation of the dualistic Austro-Hungarian state (1867). And, as the government in Budapest began to put into application its magyarization program for all non-Magyar Transylvanians, one of the most paradoxical situations resulted. The Romanians, representing the great majority of the population in Transylvania, were denied all political rights and were obliged to fight for their elementary freedom. Under such conditions, the struggle for the national liberation of the Romanian people of Transylvania from the Austro-Hungarian yoke became more and more fiery.

Under these political conditions, a prominent part in the struggle for freedom and for the realization of national unity was played by Romanian cultural associations, especially the following: the Transylvanian Association for the Progress of the Romanian Literature and for Romanian People's Culture—ASTRA [Asociatia transilvană pentru literature română si cultura poporului român—ASTRA], founded in Transylvania in 1861; the Romanian Academy [Academia Română], set up in Bucharest in 1866; and the League for the Cultural Unity of all Romanians, abbreviated the Cultural League [Liga pentru unitatea culturală a tuturor Românilor, or Liga culturală], founded in Bucharest in 1890. These cultural and scientific associations prepared the way for the political union of all the Romanians.

It was in the battles of the First World War that the Romanian people won full state unity and independence. In 1914, the First World War broke out between the countries of the Entente and the Central Powers. After 2 years of neutrality, on August 15, 1916, Romania agreed to fight for the Entente Powers, which promised the realization of a Great Union of all Romanians. After several military victories in Transylvania, the Romanian army was obliged to withdraw in Moldavia in 1917. But Romania finally won its independence—after great battles and the famous victories over German troops at Mărăsesti and Mărăsti, among others; as a result of the fall of the Russian and Hapsburg Empires; and under the blows of the revolutionary fight for social and national liberation. In 1918 the Romanian people accomplished their century-old ideal through the union of Transylvania, Bucovina, and Bessarabia with Romania, realizing through this "Great Union" the free national state of Greater Romania.

The achievement of a united Romanian national state represented the greatest victory of this people, accomplished after more than six centuries of political, social, and economic oppression, and struggle for liberty. At the same time, the creation of the united Romanian national state brought about new, favorable conditions for the multilateral development of Greater Romania. The following years (1919–1928) represented a period of great reforms (for instance, the agrarian reform of

1921 turned over to Romanian peasants about 66% of the agricultural lands of the old landowners), of great economic and social development, and also of political and social fights. A new social class, the proletariat, organized its own party, the Romanian Communist Party, which was founded in 1921. In 1923 a new constitution sanctioned the new economic, social, and political realities within the framework of a capitalistic Romania in full development. After the period of economic crisis and political struggles of the years 1929–1933, Greater Romania's economy entered another phase of development, reaching its highest level in 1938.

But, under the conditions of Fascism's consolidation in Europe—after the Munich Agreement (September 1938) and the increased strengthening of Hitler's Third Reich—Romania, as well as the other Central and East European countries, fell more and more under the economic and political influence of the Nazi state, and later on was directly pressured by it. After attacking Austria, Czechoslovakia, and Poland in August 1940, Hitler "raped"—with the so-called Dictate of Vienna—the northern part of the Romanian province of Transylvania. He gave this territory to the Horthyst Hungary and exerted a policy of dictatorship and blackmail in order to force Romania to take part in the anti-Soviet coalition. In the same year, the Soviet Union appropriated, on the basis of an ultimatum note, the Romanian province of Bessarabia and the northern half of Bucovina. On June 22, 1941, Romania was obliged to take part in the anti-Soviet war in order to liberate its occupied territories.

Then, on August 23, 1944, Romania denounced general Antonescu's treaty, and—in alliance with the United States, Great Britain, and the Soviet Union—declared war on Hitler's Germany. Liberating all the territories of Romania from Nazi occupation, the Romanian army took an active part in Europe's liberation, fighting until the final victory. Romanian soldiers numbered about 500,000, the equivalent of 50 divisions, of whom more than 170,000 were casualties. Many moral and material efforts were also expended for Hungary's and Czechoslovakia's liberation. Romania's economic contribution was estimated at about $4 billion (fourth largest, after the United States, Great Britain, and the Soviet Union). The peace treaty ending World War II assured the retrocession of Northern Transylvania, but the Romanian province of Bessarabia and Northern Bucovina remained under Soviet administration.

LIBRARY DEVELOPMENT

It was in the 19th century that the beginning of the modern Romanian library organization took place. And, as the national consciousness and the idea of the unity of all Romanian people played a leading part in the new ideology, the amalgamation of these political and cultural tendencies was reflected in the domain of libraries.

The 19th century was not only the period in which the first modern Romanian public libraries came into being (institutions of the greatest importance for general progress, the dissemination of culture, and permanent education), but it was also the century in which the idea of a national library was developed and finally realized. Thus, great public libraries having national library characteristics were created in all Romanian Principalities: the Central State Library in Bucharest, the Central State Library in Jassy, and the Transylvanian Association for the Romanian Literature and the Culture of the Romanian People—ASTRA Library in Sibiu. These represented the preliminary stages of the creation of the first Romanian National Library: the Romanian Academy Library founded in 1867.

In the same period, the public library network of the urban and rural public libraries was developed. The modern evolution of Romanian public libraries had two stages: (*a*) the first, in which the public libraries were developed in the form of distinct sections within the framework of the school libraries; and (*b*) the second period, in which the public libraries became quite independent institutions. This process was carried out on the basis of several modern laws that were adopted over a period of years: in 1864, 1898, 1912, 1919, 1922, 1932, and 1938. Further developments in modern educational libraries—including the university library network; the growth of the scientific and technical libraries; and the formation of numerous union, society, and other special libraries—all proceeded toward the same goal: the realization of the modern Romanian library system.

PUBLIC LIBRARIES

The Creation of the Central Library in Bucharest

The first legislative texts concerning public libraries in Romania were articles No. 246–249 of the Schools' Regulation [Regulamentul Scoalelor] drawn up in 1831–1832 by Costache Poenaru, who was head of the Wallachian Public Education Board and an expert on West-European public libraries. The regulation went into effect in 1833, and it stipulated the founding of the Central Library in Saint Sava College (Bucharest) and the Library of Craiova, the capital of the province Oltenia.

The law required that the most precious books and manuscripts from all the Wallachian monasteries, bishoprics, and churches, as well as those from the Bucharest Metropolitan Bishopric Library, were to be gathered in the National Library of Bucharest. The same regulation established legal deposit assuring the availability, for books, of five copies for the library of Bucharest and three copies for the library of Craiova of all works printed in Wallachia; and for periodicals, one copy of each Romanian periodical publication for each library. An annual amount of 5,000 lei, especially allocated in the state budget, was designated for the development of both libraries.

In 1838, the year of its inauguration, the library of Saint Sava College possessed about 10,000 volumes. Its first librarian, George Ioanid (professor of Saint Sava College), supervised the use of the book collection, permitted only in the reading room, which was open every day from 10 A.M. to 3 P.M. In 1846 the collection of the library contained about 14,000 volumes; and in 1864, 27,000 volumes and 300 manuscripts.

The first catalog, written by Professor Iosif Genilie according to the most modern bibliographical rules, was published in 1864. This catalog, printed in two volumes, is very interesting both for culture and for library history.

The Library of Craiova, founded on the basis of the same Schools' Regulation, was installed at the Central School of Craiova. It functioned until 1848, when it was occupied and partially destroyed by Turkish troops during the revolution. Restored after 1850, the library was once again occupied and destroyed in 1853–1854, this time by Russian troops. So, in 1858, the Schools' Ephors were obliged to send another set of duplicates from Saint Sava College Library of Bucharest in order to restore the collection of the Library of Craiova.

It was after the union of Moldavia with Wallachia in 1864 that the first Romanian law pertaining directly to libraries was adopted: the Regulation for Public Libraries. It was the first official Romanian state act to provide for a "national library system." In this respect, the law stipulated the creation of three library categories: (*a*) special didactic libraries in every primary and secondary school; (*b*) communal libraries in every urban and rural commune; and (*c*) central state libraries, "for the moment only two, in Bucharest and Jassy."

The first chapter of the Regulation for Public Libraries of 1864 (nicknamed Nicholas Cretzulescu's law, for its author) established the status of each category of library. Items No. 10–13 stated the profile, the role, and the tasks of the Central State Library of Bucharest. The library had an encyclopedic profile, including "all kinds of books, in all languages," as well as "manuscripts, maps, lithographs, engravings, medals, coins and other numismatic collections, coins etc." The library had a central position and role, receiving books and money from the state, and it had the mission of providing publications to all libraries (didactic and communal) of the country.

The collection of the Central State Library of Bucharest, containing the most precious books and manuscripts taken from the old library of Saint Sava College, was increasingly enriched by systematic accessions through legal deposit (on the basis of the Press Law), by purchases funded by a special permanent budgetary sum, and by gifts, as well as by international publication exchanges.

The Central State Library of Bucharest was managed by a Special Committee, which included the rector of Bucharest University, the deans of the faculties, the General Schools' reviser, and the librarian-in-chief (as secretary). The library staff, including a librarian-in-chief, librarians, custodians, and the administrative staff, was appointed and paid by the Ministry of Education.

The development of the Central State Library of Bucharest continued until April 1, 1901, when its collection—comprising 26,035 works in 47,736 volumes of books and periodicals, 104 geographical and historical atlases, 138 engravings and lithographs, 87 maps, 8 albums, and 23 musical scores—was transferred and integrated into the collection of the first Romanian national library, the Romanian Academy Library.

The Organization of the Central Library in Jassy

In Moldavia, the necessity of a national library had been expressed twice: the first time in the report of the Metropolitan Bishop Iacob Stamati, about 1800; the second time, on January 1, 1828, in the text of the *anaforà* of the Schools' Ephors, asking for the creation of a National School and a National Library, necessary "for all the people's use and for the progress of learning." This endeavor was realized through the application of the Regulation for the Public Schools. Elaborated by the Public Education Ephors, this regulation contained 234 articles, among which Items No. 224–228 were especially dedicated to the foundation, organization, and functioning of the new public library, created along with the Michaelean Academy of Jassy.

Similarly to the Wallachian Schools' Regulation, the Moldavian Regulation for the Public Schools set up the legal deposit obligation of five copies of every book and one copy of each periodical, budgeted a permanent sum of money especially dedicated to the development of the library, and established the qualifications and tasks of the library's staff.

On June 16, 1835, the Michaelean Academy was inaugurated by Prince Michael Sturdza. The Public Library, founded on November 8, 1839, and initially endowed with 600 volumes, was amalgamated with the academy library and opened on November 23, 1841. A "Reglement of the Public Library . . ." was elaborated by Gheorghe Asachi and Veniamin Costache, and it was published on November 17, 1840, in the Moldavian newspaper *Albina românească* [The Romanian Bee]. The first librarian was D. Gusti, who compiled and published in 1841 *The Catalog of the Books of the Michaelean Academy's Library*, the first public library catalog printed in Romania. He also initiated the first publication exchanges, with the Wallachian Central Library at Saint Sava College in Bucharest and with several libraries from abroad. The Central Library in Jassy already possessed 2,000 volumes in 1841, and 3,661 volumes in 1851; the latter was the year when the second *Catalog* of the library was published.

After the revolution of 1848, as a reaction against the revolutionary movement, the national education system was abolished and the Michaelean Academy was changed into a French educational institute. But in 1860, after the union of the Romanian Principalities, it was transformed into the University of Jassy, and its library became the Bibliotheca Ulpia. The years 1860–1864 represented a period of full development for the library. It received donations from several great Moldavian personalities—e.g., the poet Vasile Alecsandri and the linguist B. P. Hasdeu (himself librarian of Bibliotheca Ulpia in 1862–1862)—and it gathered the most precious books and manuscripts from all Moldavian monasteries and churches, as well as those from the Metropolitan Bishopric of Jassy. By 1864 the library's collection included 14,500 volumes.

On the basis of the Regulation for Public Libraries, in 1864 the university library was transformed into the Central State Library of Jassy.

There were five chapters in this law: Chapter I: On the libraries; Chapter II: On the staff; Chapter III: Obligations; Chapter IV: On catalogs, inventories, registers; Chapter V: On the reading room and the readers. These instituted the national and encyclopedic character of the library; stipulated its collection's profile, comprising five sections (books, manuscripts, engravings, numismatic pieces, and "varia"); designated its accessions sources (legal deposit, purchase, gifts, and publication exchanges); and also identified its central position and tasks. Receiving books and money from the state, the library was entrusted with the endowment of all didactic and communal libraries in Moldavia. A Special Committee—similar to that of Bucharest, including the Jassy University rector, the deans of the faculties, the School's General reviser, and the librarian-in-chief as secretary—represented the managing board of the library.

Systematic book exchanges were organized with the Central State Library of Bucharest and the Transylvanian Association for the Romanian Literature and the Culture of the Romanian People—ASTRA Library of Sibiu, as well as with libraries from abroad. These helped to develop the character of this Moldavian National Library. Its historical mission continued until 1916, the year in which Romania began its fight in World War I, through which the "Great Union" of Muntenia (Wallachia), Transylvania, and Moldavia (including Bessarabia and Bucovina) was realized.

After World War I, the Central Library of Jassy continued its activity as the Jassy University Library.

The Foundation of the ASTRA Library in Sibiu (1861)

The third great library having the characteristics of a national library (this time in Transylvania) was the central library of a cultural association: ASTRA. The Transylvanian Association for Romanian Literature and the Culture of the Romanian People—abbreviated the Transylvanian Association, or ASTRA—was the most important Romanian cultural association fighting for the unity of all Romanians.

At its very beginning, the Transylvanian Association for Romanian Literature and the Culture of the Romanian People founded in Sibiu a laical boarding school, a large library, and a museum; and very quickly it developed a large network of the so-called ASTRA branches, each having its own library, in the most important Transylvanian towns.

ASTRA's activities were various and very efficient. It published the first *Romanian Encyclopedia*, in three volumes (1898–1904); it founded the Romanian literary review *Transylvania* (1868–1946); and it printed numerous literary and scientific works, and also a special *Popular Collection*, of which it distributed about 4,000,000 copies. For the numerous Reading Circles, ASTRA organized actual "caravans of books" in all parts of the country. Developing many other cultural, scientific, and political activities all around Transylvania, ASTRA was preparing the way for the "Great Union" of 1918.

ASTRA's Central Library was founded in 1861 and carried out the functions of a Romanian National Library of Transylvania until 1918. Its collection today contains about half a million volumes. The collection was developed by various means: Numerous contributions and donations were made by the Romanian population from all Transylvania, and there were gifts from the publishing and printing houses of the town Sibiu; publication exchanges were organized with the Romanian cultural institutions from beyond the Carpathians, especially with the Central State Libraries of Bucharest and Jassy, as well as with other cultural societies from abroad; and, later on, legal deposits added to the holdings (1923–1949). The first donation was that of the Education Ministry of Bucharest in 1868, the same year in which the publication exchange with the Central State Library of Jassy was started. Other gifts were received from important personalities, such as Michael Kogălniceanu, Gheorghe Baritziu, Joseph Hodosh, Aurelia Sulutziu, and George Meitani. Great private libraries like those of Gheorghe Baritziu, Joseph Hodosh, and Simon Mangiuca were included in the collection of the library. The library recognized the great importance of the collection of periodical publications (newspapers, cultural magazines, etc.) for scientific research and information (especially in the historical and literary areas) and for the development of the Romanian people's national consciousness. Therefore, the ASTRA Library promoted, from its very beginning, the policy of setting up a very well supplied periodical collection, which is today one of the largest and the most important in Romania. Many scientific and cultural institutions, scholars, researchers, professors, etc., today consult ASTRA's collection. It contains many of the first Transylvanian Romanian periodicals, such as: *[News]Paper for Wit, Soul, and Literature* [Foaie pentru minte, inimă si literature], Brashov (1838–1944); the newspaper *The Tribune* [Tinuna], Sibiu (1884–1903), founded by the writer Ioan Slavici; the magazine *Transylvania,* Brashov, Sibiu (1868–1945); *The Family* [Familia], Oradea (1864–1906), the most popular Transylvanian literary magazine; *The Journal of the Bucovina Society* [Foaia Societătii din Bucovina]; and many others. Regarding "old Romanian books," that is, the books printed in Romania between 1508 and 1830, ASTRA's library collected about 400 of the rarest works, including: *The Slavonian Sbornic,* printed by Deacon Coressi in 1580 in Sas Sebesh; *The Book of Learning* [Carte de învătătura], Jassy, 1643; the New Testament [Noul Testament] of Bălgard, Alba-Iulia, 1648; the French edition of Dimitrie Cantemir's *Histoire de l'empire othoman,* Paris, 1743, as well as the German (1743) and the English (1756) editions; *Supplex Libelus Valachorum Transylvaniae,* Cluj, 1791; Radu Tempea's *Romanian Grammar* [Gramatica românească], Sibiu, 1797; and *Orthographia Latino–Valachica,* Cluj, 1805.

The collection of documents and manuscripts of the ASTRA library contains today about 2,000 of the most precious historical, sociopolitical, and literary pieces, especially those concerning Transylvania's history. Very important documents for Moldavia's and Wallachia's history during the reigns of Princes Stephen Tomsha (1623), Moise Movilă (1630 and 1633), Vasile Lupu (1637), and Ghica Voda (1768) are preserved in the ASTRA Library in Sibiu. This library also has the letters of many classical Romanian writers, such as I. L. Caragiale, V. Alecsandri, M. Eminescu, G. Cosbuc, Al. Vlahutză, B. P. Hasdeu, I. Slavici, St. O. Iosif, Duiliu Zamfirescu, C. Negruzzi. and Titu Maiorescu.

While gathering such a valuable collection, the ASTRA Library also performed another very important mission: it endowed all ASTRA branches with books that served as a kind of Romanian National Library in Transylvania.

ACHIEVEMENT OF THE FIRST ROMANIAN NATIONAL LIBRARY: THE ROMANIAN ACADEMY LIBRARY

After the realization of the union of the Romanian Principalities of Moldavia and Wallachia in 1859 and the creation of the national state, progressive intellectuals from all Romanian provinces—including those still under the authority of the Austro–Hungarian Empire (Transylvania and Bucovina) and the Russian Empire (Bessarabia)—became more and more aware of the necessity of a central national forum, which they realized was quite indispensable for the organization and guidance of the national culture of all Romanians. This central cultural and scientific forum was the Romanian Academy.

Founded in Bucharest on April 1, 1866, as the Romanian Literary Society, the organization was inaugurated on August 1, 1867, under the name of the Romanian Academical Society. Including the greatest Romanian personalities, men of the highest spiritual values, from all Romanian provinces, this national institution anticipated the unification of all Romanians by about half a century.

The first mission assumed by the new institution was the perfection of the most important means for intensifying cultural and scientific relations among all Romanians: the language, by establishing its orthography and by elaborating its grammar and the standard dictionary of the Romanian language.

After Romania's victory in the Independence War (1877–1878), a law of March 1879 transformed the Romanian Academical Society into a national institute called the Romanian Academy. This was considered as "the highest Romanian Scientific and cultural institution," entrusted with the study of "the Romanian language and history, the natural sciences, the literature, and the fine arts."

From its first session, on August 6, 1867, the academy proposed organizing a great library suited to its fundamental scientific and cultural goals. In order to assist the Romanian Academy's research plan, and especially the studies regarding the Romanian language, the first task of the library was to gather all texts, manuscripts in print in the Romanian language or written by Romanians, and all documents concerning Romania and the Romanian people. The second, parallel, task was the elaboration of the fundamental bibliographical repertories of the Romanian people's history and culture, the Romanian national bibliography. In fact, these tasks were the primary missions of a proper Romanian national library, the necessity for which had become more and more evident. There had been previous attempts—the setting up of the four State Central Libraries with some national library characteristics in each Romanian province (Moldavia, Transylvania, Wallachia, and Oltenia); these had anticipated the solution, but had not yet solved the problems. It was for all these purposes that in 1867 the Library of the Romanian Academy, the first Romanian National Library, was created in Bucharest. The second Romanian National Library was created much later, after World War II (in 1955), under the name of the Central State Library of the Socialist Republic of Romania.

The task of collecting the whole "gold mine" of all Romanian publications, printed or in manuscript, and all other documents created by the Romanian people or concerning their existence and activity—this represented the permanent mission of the Romanian Academy Library. Today, the Romanians are very proud of their national library. The Library of the Romanian Academy, after more than a century of existence, is one the few national libraries in the world which contains in its rich collection (more than 8 million pieces) about 85% of all national publications. This is, however, the result of a century-long endeavor and the effort of many generations of Romanians struggling to gather this most precious national storehouse.

The first books of the library were those donated by the bishop of Buzău, Dionisie Romano: 73 old Romanian books, dating from the 16th century to 1836. In its first decades, the collection of the Library of the Romanian Academy developed mainly through state support and the assistance of some great scientific and cultural personalities, such as V. A. Urechia, Al. Odobescu, V. Alecsandri, I. Ghica, T. Cipariu, M. Kogălniceanu, I. Negruzzi, O. Densusianu, and N. Jorga, among others. During the years 1867–1870 there were only a few donations: that of D. Romano (already mentioned) and those of V. A. Urechia, Petrache Poenaru, Al. Papiu-Ilarian, and Al. Odobescu. However, after the publication in the newspapers, in 1872 and afterward, of several "Appeals for Books" by the academy, which were addressed "to all Romanian people," the donation of publications became very usual. Among the most important donations were those of the following: A. G. Asachi, I. A. Ghica, M. Kogălniceanu, E. Donici, T. Balsh, G. Baritz, A. Papadopol-Calimakh, the metropolitan bishop of Moldavia, Iosif Naniescu, Th. Rosetti, I. Negruzzi, I. Tanoviceanu, Titu Maiorescu, Jacob Negruzzi, the family of the poet G. Cosbuc, I. E. Toroutziu, and G. Orghidan. Among the libraries completely incorporated into the collection of the Library of the Romanian Academy, either in the Central Library or in its network, were the libraries belonging to: E. Pencovici, Visarion Roman, St. Anastasie Stolojan, St. Sihleanu, Liviu Rebreanu, St. C. Longinescu, C. Hamangiu, Em. G. Racovitză, N. Jorga, Fr. Reiner, D. Danielopolu, M. Ciucă, G. Oprescu, and G. Ionescu-Mihăesti.

From 1885 the library of the Romanian Academy began to enjoy the provisions of the legal deposit law, which assured to the library two copies of each Romanian publication.

Another way of developing the library's collections was publication exchange. This evolved from the first exchange—contracted in 1871 with the Royal Scientific Society of Copenhagen—to the more than 10,000 exchange agreements with partners from 102 countries that exist a hundred years later.

Last, but not the least important way for increasing the library's collection, were the state's permanent grants. These were very modest at the beginning but much larger after World War II.

The beginnings of the library's organization are associated with the efforts of Dim. Iarcu, its first librarian and bibliographer, who also published the first printed catalog (1871). But the modern organization and development of the Romanian Academy Library was due to a great personality of Romanian science and culture, the Transylvanian scholar Ioan Bianu. He was a member and president of the Romanian Academy, and was the library's head for more than 50 years (1884–1935). He promulgated in 1884 the *Regulation of the Romanian Academy's Library,* prepared with the assistance of other great scholars such as the famous bibliographers Nerva Hodosh (1891–1913), Al. Sadi Ionescu (1902–1926), Dan Simonescu, G. Nicolaiasa, G. Baiculescu, and I. Lupu; the numismatist C. Moisil;

and the geographers I. Băcilă and Ioan Bianu—after visiting the most modern national libraries of the world. This work established the modern principles of management and development for the library.

After the incorporation of the Central State Library of Bucharest (1901), new alphabetical catalogs were begun: in 1903 for periodicals, and in 1905 for books. After an experience of some years using Otto Hartwig's Classification System (1908–1914), in 1915 the Universal Decimal Classification was adopted. The UDC had been developed by the International Institute of Bibliography (IIB, today the International Federation for Documentation, FID). The other components of the scientific catalog system of the Romanian Academy Library were gradually realized: the public catalogs in 1936–1937 (managers: Tr. Popovici, I. Lupu, G. Baiculescu, I. Vasilescu, and C. Holban); the manuscript catalog, after 1931 (managers: G. Nicolaiasa and G. Strempel); the geographical collection catalog, after 1952 (manager: I. Băcilă); the numismatic collection catalog, after 1952 (managers: C. Moisil and O. Iliescu); the engraving, drawing, and photograph catalogs, after 1952 (managers: Remus and Hellen Niculescu, Hellen Ceornea, and others); and the UDC and geographical catalogs of periodicals, after 1952 (manager: V. Moldoveanu). In this way the Library of the Romanian Academy became a proper scientific and cultural laboratory, with its special research and documentary tools.

Another primary mission of the Romanian Academy Library was the elaboration of the Romanian National Bibliography. A basic Bibliographic Plan was drawn up by Ioan Bianu and approved by the Romanian Academy in its sessions of 1894 and 1895. The plan contained a set of bibliographical works, such as:

1. *The Bibliography of the Romanian Books*, in three parts:
   a. *The Old Romanian Bibliography* (1508–1830)
   b. *The Romanian Modern Bibliography* (1831–1918)
   c. *The Romanian Contemporary Bibliography* (1919–)
2. *The Bibliography of the Romanian Periodicals*, in several parts: Vol. 1 (1820–1906); Vol. 2 (1907–1918); Vol. 3 (1919–)
3. *The Analytical Bibliography of the Romanian Periodicals*, i.e., the bibliography of articles, items, etc., contained in all Romanian periodicals (1820–)
4. *The Catalog of the Manuscripts Extant in the Romanian Academy Library Collection*, in several parts:
   a. *The Catalog of Romanian Manuscripts*
   b. *The Catalog of Slav Manuscripts*
   c. *The Catalog of the Greek Manuscripts*
   d. *The Catalog of the Manuscripts in Oriental Languages*
5. *The Accession Bulletin* [Cresterea colectiilor] (1904–) which plays the role of a periodical national bibliographical record

To carry out this vast bibliographical plan, the Romanian Academy Library organized a nationwide campaign in order to complete the gathering of bibliographical data necessary to the elaboration of the Romanian bibliography, simultaneously with the collecting of the books and manuscripts. The entire country took part in this big national task. In 1903 the first volume of *The Old Romanian Bibliography* (1508–1830), prepared by Ioan Bianu and Nerva Hodosh, was published. It was a great national and international bibliographical success. The other three volumes were published over a period of years: Volume 2, elaborated by the same authors, in 1910; Volume 3, prepared by Ioan Bianu, Nerva Hodosh, and Dan Simonescu, in 1912–1936; and Volume 4, by Dan Simonescu, in 1944. In 1913 the first part of *The Bibliography of the Romanian Periodicals* was published: Vol. 1 (1820–1906), prepared by Nerva Hodosh and Al. Sadi Ionescu, with an introduction by Ioan Bianu. The first volume of *The Catalog of the Romanian Manuscripts,* elaborated by Ioan Bianu, was printed in 1907; the second volume (prepared by Ioan Bianu and Remus Caracas) was published in 1913; and the third (prepared by Ioan Bianu and G. Nicolaiasa), in 1931. The first volume of *The Catalog of the Greek Manuscripts,* prepared by Constantin Litzica, was published in 1909. In 1904 the Romanian Academy Library also began publishing *The Accession Bulletin* [Cresterea colectiilor], a regular current national bibliographical record. The preparation of all these bibliographical tools, which are of the utmost national value and importance, continued after World War II.

At its beginning, the small collection of the Romanian Academy Library was installed in a single room at Bucharest University. Then, in 1891 the Romanian Academy moved into its own residence (125 Calea Victoriei), and the library was transferred to some rooms of Cesianu House. But the library's collection was developing more and more, and required a special building. The statistics show that, while in 1868 the collection contained only 73 volumes, in 1879 there were 6,000 volumes of books, and in 1885, 30,000 volumes. In 1905, after the incorporation of the Central State Library of Bucharest (1901), the collection grew to 145,000 books, 6,500 periodicals, and 53,250 pieces in special collections: manuscripts, maps, engravings, coins, etc. In 1918 the Library of the Romanian Academy contained 200,000 books, 15,000 periodicals, and 64,000 other pieces (manuscripts, historical documents, maps, musical scores, engravings, drawings, photographs, coins, etc.). The necessity for a new, special building was obvious. The library's own building was constructed in 1927–1929 and expanded in 1936–1937. Parallel with the later increase of the collection, supplementary wings and new buildings were designed and erected, beginning in 1963.

The library of the Romanian Academy has a complex character; it is both a scientific/academic and a national library. It has continued to develop its collection and activities and has become, after a century of existence and progress, one of the biggest and the most important European libraries. As a national library and as a scientific-documentary unit assisting the Romanian Academy's research plans, it has developed studies and researches in matters of library and information science, becoming the most important library in Romania and the center of Romanian librarianship.

DEVELOPMENT OF URBAN AND RURAL PUBLIC LIBRARY NETWORKS

The economic, social, and cultural development of the Romanian people in the 19th century created an increasing need for knowledge, for books, and for libraries. Although private libraries were in fashion and became very numerous, they were not sufficient to fill this need.

Reading Halls [Cabinete de Lectură] connected to bookshops were founded, especially in Wallachia and Moldavia. The first one in Wallachia was the Walbaum and Weise Court Bookshop Reading Hall, founded in Bucharest in 1826. It contained more than 1,000 volumes, and its first *Catalog* was published in 1836. It was followed, in 1843, by the Bucharest Commercial Society Reading Hall, which specialized in periodicals, and by some others. The most important was the Reading Hall founded by C. A. Rosetti and E. Winterhalder. Its stock of more than 3,000 titles of books and periodicals was presented in several *Catalogs*, published successively in 1846, 1847, 1850, 1857, and 1860.

In Moldavia, the first Reading Hall was founded by Ioan Bogusz in 1836, followed by that of Adolf Hennig (which presented its stock of about 2,000 volumes in a *Catalog* printed in 1843), and by that of F. Bell and Company. The most important was the Th. Codrescu, Petrini and Company Reading Hall; this housed more than 3,500 volumes, listed in a *Catalog* published in 1858. All these Reading Halls were similar to library societies and were supported by general subscriptions paid by members.

In Transylvania, many libraries were found in a great variety of forms, called Reading Societies [Societăţi de Lectură]. There were, for instance: the Romanian Reading Societies in Cluj, Lugoj, Orăştie, Timişoara, Oravitza, Câmpeni, Caransebech, Abrud, etc.; and the Romanian Students Reading Societies in Blaj, Sibiu, Gherla, Arad, Beiush, Brashov, Cluj, Alba-Iulia, Oradea, Satu Mare, and Baia Mare (*40*). The use of these libraries was free, and they were very much like public libraries.

However, one of the barometers of the general Romanian cultural growth was the public library network. This developed concomitantly with and after two other events: the organization of the four great provincial Central State Libraries (which exercised the functions of a national library in Wallachia and in Oltenia, Moldavia, and Transylvania), and the foundation of the Romanian Academy Library (the first proper Romanian National Library). The network of public libraries was created by several legislative acts. Of course, in its first stage, the development of the public libraries was closely related to the growth of the educational library network.

The first modern law mandating the organization of a public library network within the framework of a national library system was the Regulation for Public Libraries of 1864 (nicknamed "Nicholas Kretzulescu's Law"). Three categories of libraries were provided, of which two were public: (*a*) the Central State Libraries, (*b*) the communal libraries (urban and rural), and (*c*) the special didactic libraries.

Even before this law, libraries with a public character had been set up. In 1840 libraries with a double character—educational and public—had been founded in all district and residential towns of Wallachia. Such municipal semipublic libraries were organized in the towns' secondary schools; they were created by the Department of Home Affairs, in cooperation with the Schools' Ephors [Eforia Scoalelor] and with the help of local authorities.

The Regulation for Public Libraries Act of 1864 mandated the founding of popular libraries "for the public use," to be closely related to the schools and the popular museum in each urban and rural commune. The Central State Libraries (receiving special grants from the state as well as legal deposit copies of all Romanian publications) were required to endow all urban and rural communal libraries of the country with books. The communal libraries were allowed to buy books and periodicals, too; but their purchasing lists, as well as other activities, were sponsored and controlled by the Education Department. Special annual allowances were stipulated for the development of the public libraries of the largest towns: Galatzi, Brăila, Craiova, Bîrlad, Botosani, Ploiesti, Buzău, and Rîmnicu Vîlcea.

The Regulation for Public Libraries Act of October 28, 1864, together with the Public Education Law of November 25 of the same year, initiated a new, modern trend and started a real national campaign toward democratization and dissemination of Romanian culture. The principles of both laws—free compulsory education, and the endeavor to put free libraries and other cultural institutions at the disposal of the population in all the urban and rural communities of the country—were continued in several subsequent laws, in 1898, 1912, 1922, and 1932. At the outset, when the public libraries functioned as special sections within the secondary schools, their development was closely dependent on the schools. After this first stage, however, libraries independent of the schools were founded, first in urban communes.

In this way, public libraries in several towns used stocks of books either transferred from schools or donated by the Education Department. They also received gifts from various individuals. For instance, in 1881 a public library and a municipal museum (each having its own statute and regulations) were created in Brăila. Public libraries were begun in the following towns: Botosani, in 1882; Craiova, in 1884 (this library was organized by Michael Strajan and Avram Vasculescu between 1884 and 1914); Galatzi, in 1890; Timisoara, in 1904; Bîrlad, in 1906; Craiova, in 1908; Suceava, in 1920; Ploiesti, in 1921; Brashov, in 1926, etc. In Galatzi the local public library was founded on the basis of a stock of about 35,000 volumes donated by V. A. Urechia. Later, the "V. A. Urechia" Library received the third copy of the legal deposit publications, offered as a gift by the Romanian Academy Library in return for a very precious collection of old Romanian books transferred from the "V. A. Urechia" Library to the Romanian National Library.

Another law, the Regulation for the Functioning of the Popular Libraries of 1898 (nicknamed "Spiru Haret's Law"), brought public libraries to all Romanian villages. With the support of Education Minister Spiru Haret (also author of the Law for the Secondary and Higher Education of 1898), 320 rural libraries were founded—10 libraries in each district. A special institution was also established: the Schools' House [Casa Scoalelor], which was entrusted with the assistance and endowment of all educational units. These so-called popular libraries were, in fact, public reading sections functioning within the rural communal schools, and containing literature necessary both for the educational process and for scientific–cultural needs. The Schools' House provided the initial library collections as well as the publications necessary for further development. By 1931 the Schools' House had endowed 7,523 popular libraries.

Another important factor for library development was individual initiative. There were many rural schoolteachers who took the initiative of founding and endowing libraries. Statistics show that in 1904 in Bacău district, there were already 59 such libraries, among which 20 were founded by the Schools' House and 39 by local teachers. In 1906 in Argesh district, there were 96 libraries; 20 set up by the Schools' House and 76 by individual teachers. In Buzău district, in the same year, there were 95 libraries; 20 created by the Schools' House and 75 by teachers. Generally, the first two decades of the 20th century represented a period of enhancement of both the urban and the rural public library network. It is in this respect that we can understand Nerva Hodosh's proposal of 1906 for "founding a public library in each secondary school having more than 1,000 volumes of books."

World War I and the achievement of the Greater Romania state, including all Romanian provinces, enlarged the territorial framework of Romanian public libraries. Several laws unified and extended the public library legislation to the entire territory of Romania, but the most important one was the Law for the Organization of the Communal Public Libraries and Museums, of 1932 (nicknamed "Nicholas Jorga's Law"). This law was based on the same modern principles as the law of 1864, but there were great differences between the law of 1864 and that of 1932. While Article 3 of the Regulation for Public Libraries of 1864 provided that "the Councils of the urban and rural communes will be invited to found popular libraries," the first item of the Law for the Organization of the Communal Public Libraries and Museums of 1932 stated: ". . . . each municipality, as well as each urban and rural commune is obliged to found at least one public library for general use." Towns having more than 10,000 inhabitants were required to have a central library with several branches. Communes having more than a 30% foreign minority population were, in addition, required to have a special public library in the language of the minority group. All the municipalities and all urban and rural communes were obliged to provide funds for the creation and normal development of their libraries, to pay for the necessary buildings and staff, and to provide a permanent sum especially stipulated in the budget. The law of 1932 stated that: "The Department of Home Affairs will not approve a communal budget if it has not provided the special sum for the development of libraries." The rural communes were also obliged to allot some agricultural land in order to obtain the necessary revenues for their popular libraries. Other articles of the law of 1932 detailed the necessary specialized personnel, the forms of management, and the activities of the public libraries. A Special Council of the Education Department, composed of the Central State Libraries' directors and the Education Department's delegate, surveyed and controlled the public libraries.

The two decades between the First and the Second World Wars represented a period of development for Romanian scientific–cultural information. New forms of organizations and activities were created and developed, such as atheneums, cultural clubs, and popular libraries, as well as libraries belonging to cultural associations, societies, and other organizations. The most important category was the latter one, which included the library networks of the Transylvanian Association for the Romanian Literature and the Culture of the Romanian People—ASTRA; that of the League for the Cultural Unity of All the Romanians (Cultural League), led by the great historian Nicholas Jorga; and the library of the Cultural Foundation "Charles II," started by the great sociologist Dimitrie Gusti.

The League for the Cultural Unity of All the Romanians was founded in Bucharest on December 15, 1890, and began its work on January 24, 1891; its activities ceased in 1940. Until 1918 the main purpose of the association was the cultural and political support of the Transylvanian Romanians fighting for their liberation from the Austro–Hungarian yoke; but the general aim of the league was "the enhancement of all Romanians' solidarity consciousness" by cultural means. Therefore, the league had to found libraries and to organize conferences, meetings, congresses, etc. Between 1906 and 1940, the leader and main force in the League for the Cultural Unity of All the Romanians was Nicholas Jorga. In order to assist the league's activities, Jorga founded the Popular University in Vălenii de Munte (1908) and the Cultural League's Theater in Bucharest (1935). Among the various cultural activities of the league, library activity took first place, but there were also lectures and scientific conferences, summer or holiday courses in Vălenii de Munte, printing and publishing, and theater performances. From the very beginning, libraries of the league were created in such towns as Turnu Severin, Pitesti, Craiova, Slatina, Ploiesti, Giurgiu, Brăila, Galatzi, Focsani, Buzău, Alexandria, and Turnu Magurele. In Transylvania the activity of the league was closely related to ASTRA's branches and libraries. After Nicholas Jorga's election (first as general secretary and then as the league's president), hundreds of "popular libraries" were founded in towns and villages throughout Romania. The libraries of the league network started with Jorga's gift of about 14,000 volumes of books and periodicals. Some of these made up the stock of the league's Central Library; others were intended for town and village libraries "in order to set up new public libraries." A special "Appeal to the public libraries created on particular initiative" encouraged their cooperation with the Cultural League's activity. Generally, the league's libraries were open in the evenings, which were free time for most Romanians. In the popular libraries, numerous conferences, exhibitions, and theater performances were organized. Many great personalities lectured about the people's scientific and cultural concerns. Among the lecturers were the geologist G. Munteanu-Murgoci, the physician I. Cantacuzino, and the historians Vasile Pârvan, Al. Xenopol, N. Jorga, and Simion Mandrescu.

The Cultural Foundation "Charles II" (set up by Dimitrie Gusti) also developed a complex cultural activity, based on the "cultural country clubs," as they were called. A cultural club had different sections: artistic (choirs and artistic groups for amateurs), ethnographic (including popular creative circles), and scientific–cultural propaganda (through conferences, exhibitions, films). The foundation also set up numerous popular and rural libraries. Statistics of the Cultural Foundation reveal that in 1938 a network of 2,034 cultural country clubs was functioning, as well as 1,358 popular libraries and about 1,500 rural libraries. A special *Catalog of the Popular Library* (published by the People's Education Section of the Department for Education, Culture and Arts) and the special publications in *The Cultural Country Club Book Series* helped the activity of the entire foundation network.

Before World War II, Romania's public library network developed primarily on the basis of state grants, but also with individual initiative and support. In 1938 there were 3,100 public libraries containing 1,132,000 volumes (*41*). Generally, each town had a network comprising several types of libraries, including at least one public library. At the same time, the cultural activity of the Romanian villages was augmented by 2,836 libraries, containing 565,000 volumes (*42*). However, about 300,000 of them were destroyed during World War II.

GROWTH OF THE EDUCATIONAL LIBRARY NETWORK

Romania was one of the first countries in the world to introduce compulsory and free education. It was the Public Education Law of November 25, 1864, that introduced these generous ideas. This modern principle has been maintained ever since and is the basis of all subsequent Romanian education laws.

Generally, the same legislation already mentioned in the previous section (dedicated to the growth of the public library network) provided the legal basis for the parallel development of the school libraries too. This seems quite natural, as the public libraries were, in their first stage of existence, distinct entities within the framework of the elementary and secondary schools. There were, however, some special education laws of the second half of the 19th and the beginning of the 20th centuries that introduced two new and modern elements in the Romanian educational system: the regular high schools and specialized education, both with their corresponding library networks.

According to the Princely Decision of October 21, 1857, Professor G. Costa-Foru, the public library director, was sent to the West-European countries in order to study their public educational organization and to draw up "a project for a systematic and selective library, suited to Romanian schools." Consequently, the Regulation for Public Libraries of 1864 provided for the special didactic libraries, as one of the three categories of units within the national library system. Article 2 of this law stipulated that such libraries were to be founded "in each elementary and secondary school of the country," primarily for the needs of poor pupils. The special didactic libraries functioned under the school director's supervision and were supplied with books by the Central State Libraries. A special article was created in the Education Department's budget in order to provide the necessary books for school library development. For instance, in the 1864 budget, a sum of 10,000 lei was provided for setting up town didactic libraries as follows: in the "Saint Sava," "Matei Basarab," and "G. Lazăr" gymnasiums of Bucharest; in other secondary schools of Craiova, Bîrlad, and Botosani; in all extant theological seminaries (including that founded in 1804 at Socola, near Jassy); and in all elementary schools of Bucharest and Jassy. The growth of the village schools and libraries became very pronounced. Statistics show that in 1866 in Tara Românească there were already 1,966 village schools, and that the founding of 234 additional units was planned. Many of these schools already had didactic libraries. There were not only state schools, but also private ones. In this respect, other statistics (*43*) affirm that in 1861/62 there were 87,485 pupils in state schools and 3,892 pupils studying in private schools. All these kinds of schools had at least a nucleus of a library: a collection of books meant for teachers' and pupils' use. These collections continued to grow, satisfying not only the needs of the educational process but also the necessities of the extrascholastic activities. Subsequent education laws of 1893, 1896, 1898, and 1912 also contributed to the strengthening of the primary and secondary schools and their libraries.

In Transylvania, the situation was similar. The Resolution of Blaj (adopted on the Plain of Liberty by the 40,000 Romanian participants in the Revolution of 1848) stipulated "the foundation of Romanian schools in each Transylvanian town and village, and the creation of special educational institutes for technical and ecclesiastical purposes, as well as the creation of a Romanian university." The realization of the policy of Romanian cultural development, in order to strengthen national unity, was not possible without the establishment of schools and libraries—as many as possible of all kinds at every level. The development of Romanian Transylvanian libraries in the second half of the 19th and beginning of the 20th centuries was most impressive: in the elementary schools (parochial and laical); in the secondary schools, gymnasiums, lyceums, and seminaries; and in normal schools, or "Preparanida"—all this parallel with the enhancement of the ASTRA popular libraries, with the reading society libraries, and with the libraries of the professional and women's organizations (see the following section). For instance, while in 1848 there were only 370 Transylvanian parochial schools, by 1911/12 their number had grown to 1,550. All types of schools developed book collections. A great variety of school libraries came into being: in elementary schools (in Lugoj, Orăstie, Sighisoara, and in many other towns and villages); in gymnasiums (in Beiush, Brashov, Blaj, and Năsăud); in normal schools (in Arad, Oradea, and Făgărash); and in seminaries (in Arad, Caransbesh, and Gherla). Different sections in the same school library were developed for teachers, for pupils, and also for adults. Studies and projects were also developed in order to examine the activities of different kinds of educational libraries. In this respect, we can mention the Regulations' Projects prepared by Simeon Popescu, who in 1897 tried to realize a "scheme" for each type of school library, in order to carry out a unitary, global system. But it must be stressed that the development of Romanian school libraries in Transylvania, until World War I, took place in very difficult political conditions. The Austro–Hungarian authorities were not at all interested in promoting Romanian schools and culture; on the contrary, they tried to stop this educational development. For instance, after the Appony Law of 1907, about 350 Romanian schools, together with their libraries, were forced to close their doors. Only after the end of World War I and the disintegration of the Austro–Hungarian Empire did the Transylvanian schools and libraries take their place in the general developmental process of the schools and libraries of the Greater Romania state.

After World War I the most important legislative acts in matters of school libraries were: the Law for the Organization of the Primary and Normal–Primary Schools (1924), the Law for the Secondary Schools' Organization (1928), the Law for the High Schools' Organization (1932), and the Law for the Organization of the Industrial (Technical) Education (1937). From 1921 to 1931, 12% of the Romanian state's general budget was allocated for the educational process, to the schools and to educational library activity and development. In 1938/39, the number of the general schools was 13,654, with 1,575,477 pupils and 39,935 teachers. There were also 142 technical schools, with 14,746 pupils and 3,871 teaching staff; 224 vocational–technical schools, with 39,250 pupils and 896 teachers; and 55 pedagogical schools, having 5,537 pupils and 1,076 didactic staff (*44*). Each school had at least a small library, but many of them had large libraries containing thousands of volumes of books and periodicals.

LIBRARIES OF THE HIGHER EDUCATION SYSTEM

The creation and the development of the regular high schools and the specialized educational system were the most important events in the Romanian educational process of the second half of the 19th and the first decades of the 20th centuries.

On October 26, 1860, Prince A. I. Cuza founded the University of Jassy (Moldavia); on July 4, 1864, the University of Bucharest (Muntenia) was created; in 1872 the University of Cluj (Transylvania) was established, at which Romanians formed a special section for the study of the Romanian language and literature, called "Iulia"; and on October 4, 1875, the University of Czernowitz (Bucovina) was set up, in conditions similar to those in Cluj.

Initially, each university had three or four faculties. Soon, more and more specialized sections were created: chairs, lectures, the so-called seminaries, laboratories, and clinics. The Law for the Secondary and University Education of 1898 and that of 1912 consolidated the organization of Romanian high schools. These laws defined more accurately the place, role, and organization of the specialized "faculty annexes," seminaries, laboratories, clinics, research institutes, museums, and libraries. Under such favorable managerial conditions, outstanding Romanian personalities of worldwide fame developed their scientific and didactic activity.

At the same time, on the basis of different laws, central university libraries were organized in Jassy, Bucharest, Cluj, and Czernowitz, along with specialized university library branches. The latter were mainly founded and developed on the basis of teachers' donations and state grants. For instance, the University of Bucharest was founded in 1864, initially with only three faculties (Law, Letters, and Sciences) and a theological section. After 3 years, in 1867, the High School of Medicine and Surgery was incorporated as the university's Faculty of Medicine. In each faculty there took place a process of scientific and technical specialization within the different sections, chairs, lectures, seminaries, and laboratories. (This process is studied in the next section.) Parallel with this didactic and scientific process, general and specialized libraries were founded and developed.

The Central University Library of Bucharest

In 1864, when the University of Bucharest was created, there was no central university library; it was founded later, in 1895. However, between 1864 and 1895 the Central State Library of Bucharest played the role of university library. Therefore, the Central State Library was moved to and housed in the university building, and it was specially reorganized for the university's needs by the scholar August Treboniu Laurian (1867). The university character of the Central State Library of

Bucharest (until 1895) was obvious. The library was governed by a special university committee (including the rector, the faculties' deans, the Schools Ephor, and the librarian-in-chief as secretary), and the deans were always consulted for selection and purchasing. In spite of these factors, the need for a proper central university library became more and more evident.

The real Central University Library was founded in 1895 as the Library of the University Foundation "Charles I." It began with an initial stock of 3,400 volumes of books and periodicals. The collection grew: in 1899, to 7,264 volumes; in 1914, to 31,080 volumes; and in 1944, to 91,000 volumes. Later, in 1949 (after its reorganization in 1948 as the Central Library of Bucharest University), the collection contained 516,916 volumes; in 1960, about a million; in 1970, more than 2 million volumes.

Parallel with the development of the Central Library of the university, a more complex network of specialized library branches was developed. For example, the Library of the Law Faculty was founded in 1873–1876 (based on Professor Al. Lahovary's donation of books); in 1884 the Archaeological Seminary's Library was established (started through Professor Gr. Tocilescu's grant); and in 1892 the Library of the Slavic Languages Seminary began (founded on the basis of I. Bogdan's donation). These libraries functioned within the Faculty of Letters. In the Sciences Faculty specialized libraries were also founded, such as: the Mathematical Seminary's Library, after 1890; the Laboratory for Animal Physiology Library, in 1892 (on the basis of Professor Al. Vitzu's grant); the Laboratory for Plant Morphology Library, in 1893 (using Professor D. Voinov's donation of books), etc. The Faculty of Medicine had, until 1869, only the customary collection, but by 1884 it had a well-organized, specialized library.

Generally, all these libraries were founded and developed using teachers' donations, state grants, and (after 1890) a percentage, usually 10%, from tuition paid by the students.

The Central University Library of Jassy

Carrying on the tradition of the activity and fame of the old library of the Vasilian High School [Scoala Vasiliană], founded in 1640, the Central University Library of Jassy was established November 8, 1839, and opened on November 23, 1841. Functioning closely with the Michaelean Academy [Academia Mihăileană] founded in 1835, the library had the double character of a school library and a public library. In 1860, when the academy was transformed into the new University of Jassy, the library became the Central University Library of Jassy. But the university character of the library was soon changed again; in 1864 the Regulation for Public Libraries transformed it into the Central State Library of Jassy, with a national library profile but also playing the role of a university library. This double character continued until 1916, when the library once again became the Central Library of the University of Jassy.

The University of Jassy had only three faculties when it was founded: Law, Philosophy, and Science (not counting the theological section). The process of scientific and technical specialization of the different sections within the faculties began almost at once. After several management proposals made by D. Gusti (in 1913 and 1914), the library was reorganized in 1932, according to the system proposed by B. Harms and W. Gülich. The library was once again reorganized after World War II, in 1948. This reorganization had become quite necessary since, from the first 600 volumes, the library's collection had gradually increased to 1,500,000 volumes. Such famous men as M. Eminescu (the greatest Romanian poet) and B. P. Hasdeu (prominent linguist and historian) worked for a time as librarian-in-chief of the Central University Library of Jassy.

The Central University Library of Cluj

This library was founded in 1872, at the same time as the University of Cluj. The initial bookstock, about 18,000 volumes, was made up by gathering the collections received from the Law Academy of Sibiu, the Medical School and the Government Archives of Cluj, and also those of Iosif Benigni's rich private collections. In 1873/74 the Transylvanian Museum was transferred to the Central University Library. Its library had been founded in 1859, as the Library of the Society of the Transylvanian Museum, on the basis of the donations and grants of the Metropolitan Bishops Andrei Saguna and Alex. Sulutziu and those of Count Emeric Mikó. In 1860 the Library of the Transylvanian Museum had been declared "public" and open for the use of citizens; but soon after (in 1873/74) it was transferred to the university and was moved to a location near the Central University Library. Although housed in the same building, these two large libraries grew independently of each other for about half a century. After World War I, when the Austro-Hungarian Empire ended and the Romanian unitary state was created, the old dream of a Romanian university was finally realized. The new Romanian University was founded in 1920; it used the existing Central University Library and the Library of the Transylvanian Museum, still separate institutions. (They merged after World War II, in 1948.) The new university was endowed with legal deposit copies and was supported by permanent state grants. Many Romanian institutions (the Romanian Academy, the Education Department, the University of Bucharest) contributed to the rapid development of the Central University Library of Cluj. The Romanian Academy Library endowed the Central University Library of Cluj with Romanian publications. The first *University Report,* of October 10, 1920, mentioned only "the solemn promises" of the Romanian Academy, but the *Report* of the 1921/22 school year reported a donation of about 30,000 volumes, most of them offered as gifts by the Romanian Academy Library. On September 26, 1923, another collection of about 4,000 volumes was transferred from the Romanian Academy. The same specialization process of both faculty sections and library branches took place within Cluj University as had evolved in the Bucharest and Jassy Universities. The collections of the Central University Library of Cluj and its specialized library network reached 580,000 volumes in 1938; after World War II it was second only to the two National Libraries, with more than 2,000,000 volumes of books and periodicals.

The University Libraries of Czernowitz and Kishinew

After World War I, the Romanian provinces of Transylvania, Bucovina, and Bessarabia finally became part of Romania.

Courses at the University of Czernowitz, all conducted in the Romanian language, began on November 1, 1919. The old university originally founded in 1875 had only three faculties: Theology, Law, and Philosophy; when the new Romanian University was reorganized in 1923, the Faculty of Philosophy was divided into the Faculty of Letters and Philosophy and the Faculty of Sciences.

The Central Library of the University of Czernowitz and its library branches were systematically and massively endowed with Romanian books and periodicals, both current and back issues. Such important men as the librarian Dr. Eugen Păunel developed the library network of the university and its activity on a scientific basis.

In 1926 the Theological Faculty of Kishinew (Bessarabia) was created as a branch of Jassy University. The new Faculty of Kishinew was endowed with a specialized library, whose development and activity continued until the eve of World War II.

SPECIALIZED SCIENTIFIC-TECHNICAL LIBRARIES

In Romania the process of library specialization kept pace with the development of the various scientific and technical disciplines. Specialized schools flourished: secondary and high schools, technical and vocational schools, and agricultural and commercial schools, and they provided the necessary staff for industry, agriculture, commerce, and other modern activities. New, modern state institutions and services evolved—in means of transportation (railroad, water transport), mail, meteorology, metrology, statistics—and archives were organized for these areas. Scientific and technical studies and researches were promoted in connection with the capitalistic industrial development. All these needed documentation; hence, specialized libraries.

Generally, the Romanian special libraries that developed in the second half of the 19th and the beginning of the 20th centuries were either private libraries (belonging to Romanian scholars, scientists, engineers, and technicians) or libraries of societies and state institutions (organized and functioning on the basis of different laws, regulations, and statutes of the parent organizations). The oldest specialized libraries were, however, not scientific or technical ones; they were theological libraries.

Beginning with the 14th century, all monasteries had libraries specializing in theology—especially the large ones like Mărgineni, Cozia, Bistritza, Hurez, and Polovraci in Tara Românească (Wallachia); Doljesti, Neamtz, and Putna in Moldavia; and Prislop and Saint Nicholas in Scheii (Brashov) in Transylvania—as well as all bishoprics of Argesh, Rîmnic, Buzău, Rădăutze, Oradea, and Blaj; and the Metropolitan Bishoprics of Bucharest and Jassy. For instance, the library of the Metropolitan Bishopric of Bucharest contained more than 8,000 volumes in 1836. All these libraries were the result of the development of the monastic, church, and cultural activities carried on in these religious and cultural institutions in the period from the 14th to the 18th centuries. That is why these libraries contained not only theological and ritual books, but also lay publications, classical works, calendars, almanacs, and popular books. What the 19th century introduced was the transfer of nontheological books from the secularized monasteries to the Central State Libraries in Bucharest and Jassy and the transfer of theological books from those institutions to the church-based libraries.

In the matter of organization of theological specialized libraries, we can mention the Regulation for the Monastic Discipline of 1873, which required each monastery to have a specialized theological library. At the same time, the Law Regarding the Lay Clergy and Theological Seminaries—followed by several regulations (of 1906, 1909, 1910, etc.)—stipulated the requirement for a theological library in each parish throughout Romania. Generally, these libraries were small: for example, the library of the Theological Seminary of Socola, near Jassy (founded in 1803), in 1848 had 1,425 volumes and 55 maps; and the library of the Central Seminary of Bucharest (begun in 1868) listed in its catalog (printed in 1890) 2,411 books and periodicals and 343 manuscripts. Other large libraries were: that of the Faculty of Theology in Bucharest, founded in 1877/78; and that of the Theological Faculty of Kishinew, created in 1923.

There were also large private theological libraries belonging to prelates, who finally donated their collections to various institutions: to the Central State Library of Jassy, for example, by Metropolitan Bishop Calinin Miclescu; or to the Library of the Romanian Academy, for instance, by Bishop Dionisie Romano of Buzău (73 volumes, in 1867), the Archimandrite Ghenadie Popescu (1,214 volumes, in 1877), Bishop Melchisedec (2,511 books and 82 volumes with manuscripts, in 1892), and the Metropolitan Bishop Iosif Naniescu (8,000 volumes with manuscripts and documents, in 1894).

The first scientific libraries in Romania were those that specialized in medicine and natural sciences; these subjects were initially combined but were later separated. In 1830 the first Medical Reading Circle of Jassy was founded. In 1833 it became the Medico–Naturalistic Society of Jassy, and in 1833/34 it set up the so-called Cabinet of Natural History, which had a library, as its third section.

At the same time, the Zoological and Mineralogical Museum was created in Bucharest (1834). From 1873 it had a big library. It was this museum that became, about 20 years later, the National Museum of Natural History "Gr. Antipa," which had, from 1893, the best Romanian library specializing in biology.

In Bucharest, two institutions were founded: in 1864, the Society for Natural Sciences and, in 1891, the Botanical Institute. Both had specialized libraries.

At the University of Jassy (founded in 1860), the Scientific Section initially had five laboratories, but only three libraries: those of the Botanical Laboratory, the Zoo–Physiological Laboratory, and the Laboratory of Morphology. In 1913 all five laboratories had their own libraries.

As private special libraries, we can mention Boleslas of Hizdeu's Botanical Library in Vienna, whose collection (containing about 700 volumes) was donated in 1886 to the Library of the Romanian Academy; and the library of the great scholar Gr. Antipa, which was a big collection specialized in ichthyology and aquatic biology.

The first proper medical library was that founded in Bucharest in 1855 by Dr. Carol Davila, affiliated with the School for Minor Surgery [Scoala de Mică Chirurgie]. It became, in 1857, the National School of Medicine and Pharmacy, with a library of about 6,000 volumes; and in 1867, the Faculty of Medicine of the University of Bucharest. The central library of the Faculty of Medicine already contained 11,751 volumes in 1914. There were also two other specialized libraries in the same faculty: those of the Department of Histology (founded in 1879) and of the Department of Descriptive Anatomy (1880). Other medical libraries in Bucharest were those belonging to the School of Veterinary Medicine (1856), the "Victor Babesh" Institute of Pathological Anatomy (1888), the Medico-Legal Institute (1892), the Ophthalmological Clinic (1895), and the Dermatological Clinic (1900). The latter two belonged to the Coltzea Hospital and the Laboratory for Experimental Medicine (1901).

During the second half of the 19th and the first decade of the 20th centuries, specialized libraries of various medical societies were also created such as: the library of the Society of Medical Students in Bucharest (founded in 1875), which contained in 1892 more than 8,000 volumes, and in 1903, 15,776 volumes; and the libraries of the Medico-Scientific Society of Romania, the General Society of Physicians in Romania, the Surgical Society of Bucharest, the Romanian Society of Neurology and Psychiatry, and the Museum of Anatomy, all located in Bucharest.

There were several medical libraries in Jassy also, such as the library of the Faculty of Medicine (founded in 1879), which contained 1,681 volumes in 1897/98 and 2,730 volumes in 1903; and the libraries of the Medico-Military Society and the Society of Medical Students in Jassy.

As early as the mid-19th century, agricultural libraries were also developed.

In 1853, Prince Stirbei Voda founded the Agricultural Institute in Pantelimor, with a special library. In 1869 the institute was transformed into the Central Agricultural and Forestry School and it was then moved to Herestreu. In 1893 the school was divided into two sections: the Agricultural School, functioning in Herestreu; and the Forestry School, performing its functions in Brănesti. Both had their own specialized libraries. The Agricultural School of Herestreu was later transformed into the Academy of Agriculture and then into the Agronomical Institute of Bucharest. Other agricultural schools were founded in Craiova (Oltenia), Roman (Moldavia), Feldioara (Transylvania), etc.

In 1927 G. Ionescu-Sisesti founded the Romanian Institute for Agricultural Research, which had the largest and most important agricultural library in the whole country.

Other special libraries in related fields were organized, beginning with the Romanian Society of Geography in 1875. Its library was destroyed by fire in 1884, but was afterward restored so that in 1906 its collection already contained more than 7,000 volumes and an important collection of maps.

The first geological and mineralogical library was set up in 1893, near the Faculty of Sciences of the University of Bucharest. Others were those of the Laboratory of Geology and the Laboratory of Mineralogy and Petrology, both belonging to the University of Jassy.

In 1884 Professor St. Hepites founded the Meteorological Institute and in 1908, the Astronomical Observatory. Both were in Bucharest and had large specialized libraries that were developed especially as a result of international publication exchange. The Meteorological Institute Library, after only 4 years of activity had regular publication exchanges with 42 foreign observatories and institutions (in 1884).

Mathematical, physical, and chemical libraries were also developed. The earliest ones were private libraries. The most important mathematical libraries of wide European fame were those of the Mathematical Seminary at the University of Bucharest, founded in 1890, and of the Mathematical Seminary of the University of Jassy, created in 1910.

In both Bucharest and Jassy there were physical and chemical special libraries, such as, in Bucharest, those of the Electrotechnic University Institute (founded in 1913, close to the University Department for Heat and Electricity Application) and of the Laboratory of Mineral Chemistry (whose collection in 1900/01 contained 1,202 volumes of books and periodicals); and the Laboratory for Heat and Electricity of the University of Jassy. In 1913 all six laboratories of the University of Jassy already had their own libraries.

Libraries specializing in social sciences were created in the 19th and the beginning of the 20th centuries which were primarily dedicated to the historical sciences. The revolutionary movements of 1821 and 1848 stirred Romanian national feeling and awakened a national desire to study Romanian history. Toward the middle of the 19th century the national desire for knowledge of the glorious history of the Romanian people became very intense.

All the great Romanian historians had large private, specialized libraries, for instance, Michael Kogălniceanu, who was obliged to sell his in 1845 to the Michaelean Academy; and Nicholas Bălcescu, whose library was scattered after his death. Other important historical private libraries included that of Constantin Hurmuzaki (numbering 7,461 volumes; this collection was donated and transferred in 1871 to the Central University Library of Jassy), the library of D. C. Sturdza-Scheianul (containing 7,431 volumes of books and periodicals and 142 volumes of manuscripts; it was transferred in 1885/86 to the Library of the Romanian Academy), and that of Al. Odobescu (containing, in 1858, 1,050 titles of historical, archaeological, mythological, and numismatic works, as well as Greek and Latin classics). The Odobescu library was partially shifted to the Library of the Romanian Academy and to the Library of the National Museum of Antiquities.

In 1864 the National Museum of Antiquities was founded, but its extensive library was organized only much later, after 1881, by Professor Gr. Tocilescu.

Another large and important library, which functioned in affiliation with the Seminary for Ancient History of the University of Bucharest, unfortunately was completely destroyed by fire during World War I.

Other important historical libraries were those of the Historical Society (created in 1894), the Romanian Numismatical Society (started in 1903), the Numismatical Section of the Romanian Academy (founded in 1910 as a special department of the Library of the Romanian Academy), and the South-East European Institute (set up in 1914 by Nicholas Jorga). This great scholar established many other historical libraries, such as: the library of the Institute for the Study of the World History, which was founded in April 1937 on the basis of Jorga's generous donation of 50,000 volumes (about 37,000 titles); and also the libraries of the Institute for Balkan Studies and Researches, the Institute of National History, and the Romanian Institute of Byzantinology and Turcology.

The founding of the State Archives and their libraries was also very important for the study and development of the historical sciences. In 1831 the State Archives of Bucharest were established, and in 1832 the State Archives of Jassy were set up; both were merged in 1862 as the State Archives General Office [Directia Generală a Archivelor Statului]. Special training courses in archives, paleography, and librarianship were organized by D. Onciul, Al.- Sadi Ionescu, and A. Sacerdoteanu, among others. All these courses were intended for the improvement of the staff working in the State Archives Library (founded in 1866) and in other Romanian libraries and archives.

The first juridical libraries were those of the Law Faculties of Bucharest (founded in 1859) and of Jassy (set up in 1876). Other law libraries were: the library of the Ministry of Justice, founded in Bucharest in 1860; the library of the Court of Cassation of the Romanian Principalities; and the Juridical Library of Craiova, founded in 1884.

At the same time, the development of technical libraries was very important for the progress of the economy of Romania. Generally, the second half of the 19th and the beginning of the 20th centuries represented a period of full industrial development, which required technical schools and libraries for the training of the specialized staff and for their documentation needs. The Law for the Industrial Trade Education of 1893 and the Regulation for Industrial Trade High Schools of 1900 included some articles about the organization and activity of the industrial trade libraries. Professional technical and vocational schools were founded in all the Romanian provinces. In 1841 the first so-called Professional School for Arts and Industrial Trade was set up in Jassy, with its own specialized library. A similar school was built in Bucharest in 1850. In Transylvania, the first technical and vocational schools had been created much earlier, in the 18th century; they began with the mining schools, which had their own specialized technical libraries.

In 1867 the Technical High School for Mine, Bridge, and Highway Construction was founded in Bucharest, with a specialized technical library. In 1881 the Polytechnical Society of Bucharest was created; its first library catalog was printed in 1892, and reprinted in 1896.

Also, the Technical State Departments set up their own specialized technical libraries, which were necessary for the documentary support of their staffs' activity. For example, in 1891 the General Railroad Office's Library published its first catalog; the second one, written by R. Grabowski and printed in 1911, listed 6,172 volumes of books and periodicals. Another important technical library, a section of the Public Works Department (there were also four other branch libraries in the same department) published its first catalog in 1904.

In addition, in the fields of architecture and fine arts, specialized libraries were founded in schools and other organizations. The Romanian Architects' Society, which had its own library, was created in 1891. However, before that, early in 1864, the first Romanian Fine Arts School had been set up in Bucharest, and it had its own specialized library. The Regulation for Fine Arts Schools of 1909 contained several articles (No. 67–71) about libraries for these schools.

There were also private fine arts libraries, for instance, the personal libraries of two great Romanian painters: Theodor Aman (1831–1891), who was also the Fine Arts School director and whose library was incorporated into the "Theodor-Aman" Museum in Bucharest; and Gh. Tattarescu (1821–1894), whose library is now in the "Gh. Tattarescu" Museum in Bucharest.

Commerce was also developed during the second half of the 19th and the first decades of the 20th centuries. In 1855 Prince Stirbei Voda personally drafted a law for the creation of the first Romanian Commercial School in Bucharest; however, it was not until about 6 years later (after planning two other projects, in 1857 and 1864) that the Commercial School of Bucharest was founded. At the same time, the Commercial School of Galatzi began its activity. Both had specialized libraries; in fact, in 1867 the Commercial School of Galatzi had two libraries. Another library, that of the Commercial School of Craiova, was founded in 1877. The Commercial School of Jassy, set up in 1880, had a collection containing about 1,500 volumes in 1906.

Other specialized commercial libraries were those at the Association of Commercial Schools' Graduates, the Society of "State Sciences" Students, the Circle of the Romanian and Foreign Commercial High Schools' Graduates, and the Chamber of Commerce.

In 1913 the first Romanian commercial high school was founded in Bucharest: the Academy of High Commercial and Industrial Studies. Its library would become the largest and most important economic library of the country. It incorporated several important private libraries that had belonged to Professor Virgil Madgearu, P. S. Aurelian, C. Băicoianu, N. Filipescu (partially), I. Gr. Dimitrescu, and H. Herktener; as well as the libraries of the Romanian Social Institute and the Academies of Commerce of Cluj, Brashov, etc. While its first printed catalog (1918) contained only 1,000 works, in about 1,300 volumes, 50 years later a complex catalog system showed a collection of more than 500,000 volumes.

Parallel with the development of the economic organizations, schools, and libraries in Romania, modern state institutions and libraries were also created, directly connected with the socioeconomic process. For example, in 1859 the Statistical Central Office was founded; it had a large library whose collection contained more than 20,000 volumes of books and periodicals in 1906. In 1889 the Central Office of Metrology and its specialized library were created.

Government and legislative libraries were also developed, as well as libraries specializing in the so-called military sciences. After the middle of the 19th century, a number of documentary libraries were established, which functioned closely with state legislative bodies. In 1859 the Elective Assemblies of both Moldavia and Tara Românească [Wallachia] set up their own libraries. Similarly, the Central State Commission created and developed its documentary library; it is very significant that in 1861 this library bought books valued at 15,750 lei.

Other governmental libraries were those of the General People's Assembly of Romania, whose catalog was published in 1861; the State Council, founded in 1864; the Senate, created in 1866; the Chamber of Deputies; and the Ministry of Foreign Affairs.

In 1847 the Cadets School was founded in Bucharest, and it had its own library. At the same time, the library of the Moldavian Militia was opened in Jassy. In 1860 in Bucharest, there was created the library of the Romanian Army General Staff, whose catalog was printed in 1898. Another, similar library was that of the Defense Department, whose catalog was published earlier, in 1867.

There were also libraries for various military units (for example, the library of the Second Infantry Regiment in Craiova); and there were military private libraries, such as the previously mentioned library of Major Dimitrie Gusti, whose collection of books on mathematics and military sciences was donated in 1859 to the Military School of Jassy.

LIBRARIES OF UNIONS, SOCIETIES, AND OTHER ASSOCIATIONS

We have already presented some categories of libraries belonging to certain types of societies: the cultural and scientific ones. This section deals with the other categories: the libraries of professional organizations (unions of artisans, teachers, priests, etc.), the libraries of political associations, women's society libraries, and libraries for sports.

After the middle of the 19th century, unions of artisans (also called, in Transylvania, unions of *sodalii*) began to be founded in Romania. From their very beginning they had libraries, which were necessitated by the professional and cultural needs of their members. The first, founded in Transylvania in 1867, was the library of the Artisans Union [Reuniunea Sodaliilor] of Sibiu. Others were the library of the Agricultural Mechanics Society of Romania [Societatea Mecanicilor Agricoli din România] in Bucharest (Muntenia), the library of the Constructors Union [Corporatia Constructiorilor] in Craiova Oltenia), and the library of the Artisans Union [Corporatia Mestesugarilor] in Tîrgu Ocna (Moldavia). Generally, the collections of these libraries contained various technical (sometimes even scientific) works, historical books, and literature; and in Transylvania, also plays for theater amateurs.

In Transylvania, the Artisans Union of Sibiu had a library containing about 1,000 volumes, most of them purchased on the basis of a weekly "2 kreutzers" (2 penny) "reading tax." The lending section of the library was open three days a week. Other Transylvanian libraries were those belonging to: the Romanian Artisans Union [Reuniunea Meseriasilor Români] of Bistritza, founded in 1895, which had an initial collection of about 500 volumes; the Romanian Artisans Society called "The Light" [Societatea Sodaliilor Români "Lumina"], founded in 1896 in Brashov; the Reading and Singing Union of the Romanian Artisans and Treasurers [Reuniunea de Citire si Cîntare a Economilor si Meseriasilor] of Alba-Iulia, set up in 1901; the Artisans Society [Societatea Meseriasilor] of Blaj, founded in 1902/03; and the Romanian Artisans Union [Reuniunea Sodaliilor Români] of Cluj. We must also mention the Artisans Library [Biblioteca Meseriasilor] of Bistritza, which was available not only to artisans—members of the union—but also to all other town citizens.

Another kind of professional union library included those belonging to Teachers Unions [Reuniunea Invătătoresti]. In Transylvania, these libraries were very important not only because of their number and quality, but also because they succeeded in drawing a great number of members, local and regional, to lectures on Romanian literature. Unfortunately, these Transylvanian unions contained only parochial school teachers, so they were divided into two separate and "rival" groups: orthodox and uniate.

One important library of this type was that of the orthodox Teachers Union "Gh. Lazăr" [Reuniunea Invatătoresacă "Gh. Lazăr"] of Făgărash, founded in 1869. It received several donations from great Romanian personalities, including Michael Kogălniceanu, Ion Codru Drăgusanu, C. Esarcu, and G. Baritziu, so that by 1886 the number of its publications had already doubled.

Other orthodox Teachers Union libraries were: that of the Diocese of Caransebesh [Reuniunea Invătătorilor din Dioceza Caransebesului], founded in 1871 and developed as a network (with a central library and nine town section libraries); the library of the Central Primary Schools Union [Biblioteca Scoalelor Primare Centrale] of Brashov, set up before 1870 (in 1915 it contained about 2,000 volumes); that of the Diocese of Arad [Reuniunea Invătătorilor Români Greco-Ortodoxi din Dioccsa Aradului, Districtul de Dreapta Muresului], founded in 1891 (its collection of pedagogical, historical, and literary books was available to all teachers of the Arad, Radna, Siria, Ienopolea, Halmagiu, Giula, and Ketégyház "circles" areas); and the libraries of the Teachers Unions of Timisoara, Belint, Comlosul Mare (Big Comlosh), and Lipova [Reuniunea Invătătorilor Ortodoxi din Protopopiatele Timisoara, Belint, Comlosul Mare si Lipova], which was a network of four libraries.

The most important uniate Teachers Union libraries were the following: That of Blaj [Reuniunea Invătătorilor Greco-catolici Arhidiecezani din Blaj]; it was founded in 1897 and had a central library with 27 branches (in Aiud, Mediash, Morlaca, Uioara, Sibiu, Turda, and Făgărash). Its printed catalog of 1913 contained more than 1,000 works. The library of Lugoj [Reuniunea Diecezana (a învătătorilor) din Lugoj] had in 1912 about 500 works; and that of Gherla [Reuniunea Invătătorilor Romani Greco-catolici din Jurul Gherlei], founded in 1877, had about 600 works (its collection was presented in a printed catalog in 1907). The library of Hatzeg [Reuniunea Invătătorilor din Vicariatul Hategului] was set up in 1890, and that of Simlău (Sălaj) [Reuniunea Invătătorilor Sălăjeni] was founded in 1870.

Priests also had their "professional" organizations, especially in Transylvania. They were organized on the basis of "archpriests districts" (called *tracte*) and always had libraries. Unfortunately, these organizations and libraries were also divided into two competitive groups: orthodox and uniate.

There were such orthodox libraries in Brashov, Turda Făgărash, and Oravitza-Montana; and there were uniate libraries in Alba-Iulia, Ciacova (Chacova), Cluj, Făgărash, and Gherla.

Another important category of union, society, and organization libraries was formed by those belonging to political associations: the libraries of political editorial offices, of political clubs, and of various political societies.

The first of this group was the library functioning in Wallachia, associated with *The Historical Magazine for Dacia* [Magazin istoric pentru Dacia], which was set up by Nicholas Bălcescu and which played a very important role in the revolutionary movement of 1848. Another was the library of the editorial office of *The Official Gazette* [Monitorul oficial], founded in 1859.

In Moldavia in 1860, preparations were made for the foundation of a library affiliated with the Conservatory Party official newspaper.

In Transylvania, there were such libraries too. They functioned in connection with the most important political newspapers, such as *The Transylvanian Gazette* [Gazeta transilvaniei] in Brashov, *The Flag* [Drapelul] in Lugoj, and *The Romanian Telegraph* [Telegraful român] and *The Tribune* [Tribuna], both in Sibiu.

There were various clubs sponsored by the different political parties: Constitutional, Conservatory, and National–Liberal. All had a so-called club library, which generally contained political, historical, juridical, and even literary works. Such political clubs and libraries functioned throughout the second half of the 19th century and the first four decades of the 20th century, until World War II.

Very interesting because of their good organization and efficiency were the libraries of the Socialist Workers Clubs, founded in the last decade of the 19th century and afterward. As the Romanian proletariat became a more sizable and aware social class, and as Marxist literature became more popular, such Socialist Workers Clubs were created in the most important Romanian towns. All of them developed their own libraries, quite necessary tools for their political and cultural propaganda. The most important one was the Bucharest Workers Club Library, or Reading Hall, founded in 1890; it had great importance for the spreading of socialist ideas through the working class movement in Romania.

At the same time, and especially after the creation of the Romanian Socialist-Democratic Workers Party [Patridul Muncitoresc Social-Democrat din România] in 1893, socialist political clubs were set up. By January 1899 about 230 such socialist political country clubs had already been founded, and all these clubs had their own small libraries. In a club statute of 1898 it was stated: "For the workers' use, the Club will continue to provide reading books as well as newspapers fighting for the workers' interests and benefit." All these libraries were confiscated in January 1899, when all socialist country clubs were dissolved by state authorities.

The Bucharest Workers Club Library (Reading Hall) was founded in March 1890. Article No. 7 of this club's "Statute" stated: "The Club will organize a library, subscribing to all foreign newspapers regarding working class movements, in order to enlighten the Club's members about their actual situation and the way of improving it." In addition to these subscriptions to foreign newspapers, the library collection also grew through book donations from many socialist personalities such as C. Dobrogeanu-Gherea, C. Mille, I. Nădejde, Panait Musoiu, I. Catina, Zamfir Filotti, S. Grossman, and C. Z. Buzdugan. In this way, the bookstock increased very quickly, for example, from about 250 volumes in March 1891, to about 500 in November of the same year. This library did not have a large collection, although it was a very active one; it had a lending section that was open all day long. The library collection contained books on politics, history, law, social science, medicine, and literature; and it included works in five languages: Romanian, French, German, Russian, and Greek.

In matters of politics, the library contained, first of all, classical Marxist books (i.e., the works of Marx, Engels, and Lenin), and publications written by Romanian socialist leaders. In the first category we can mention: Engels's *Utopian and Scientific Socialism* (translated into Romanian in 1891), and Marx and Engels's *Manifesto of the Communist Party* (translated and published in Bucharest, 1892). From the second category we can cite, for instance, C. Dobrogeanu-Gherea's works: *The Actual Socialist Organization's Analysis; Slavery and Socialism; What Do the Romanian Socialists Want?—An Explanation of Scientific Socialism and the Socialist Program; The Neo-Serfdom* [Neoiobăgia]; and *Literary Critical Studies.*

The collection also contained literary and artistical books, which is not surprising, as a large group of literary and artistic personalities were carrying on an important part of the club's activity. In this respect we can mention the poets Dimitrie Anghel, St. O. Iosif, Traian Demetrescu, and Ion Păun Pincio; the prose writer Anton Bacalbash; and the painter St. Popescu.

The library contained not only books, but also periodicals, Romanian and foreign. For instance, there were current French periodicals, such as *La Revue anarchiste, Le Socialiste, La Question sociale,* and *La Tribune des peuples,* as well as other newspapers and reviews illustrating the Paris Commune events.

The library's activity was very efficient; its collection was publicized—together with other cultural activities—in the club's official newspaper *Labor* [Munca] and in its supplement *Literary and Scientific Labor.*

What was the fate of the Bucharest Workers Club Library? In 1892 news about the club's library was scant, and in 1893 . . . none. On the eve of the First World War, the painter St. Popescu wrote on his return from Munich: "There have disappeared the library, as well as the funds of the Club, that I left on my departure from Bucharest in 1893." Most probably, after the foundation in 1892 of another club with its own library, the old collection of the club was gradually transferred to the new library.

Other workers' organization libraries were those of the trade unions and other similar organizations, all of which had large, active libraries. For instance, the libraries of the Typographers' Society of Transylvania and Banat [Societatea Muncitorilor Grafici din Ardeal si Banat] and of the Unitary Trade Unions [Sindicatele Unitare] of Timisoara also had their catalogs printed, the first in 1927 and the second in 1928.

The Romanian women's society libraries, mostly in Transylvania, were a means for cultural activity and for political involvement.

The oldest women's society library was that of Turda [Reuniunea Femeilor din Turda], founded in about 1860–1862. Its statute of 1874 provided the position of "woman librarian." The library's collection had about 750 works in 1914, and there was a printed catalog in 1910.

Another such library was that of the Romanian Women's Society of Hunedoara County [Reuniunea Femeilor Române din Comitatul Hunedoara], founded in 1886 in Deva. About another, the Library of the Romanian Ladies and Misses of Brashov [Biblioteca Damelor si Domnisoarelor Române din Brasov], *The Transylvanian Gazette* said that it was "very intensively used." It had been created about 1883 by "the Romanian ladies and misses" who, in one of their "literary meetings," decided to pay a "participation tax." This was to support "the creation of a lending library. . . . The foundation of such Romanian libraries is a real necessity."

As we have already cited the library of the Reading and Singing Union of the Romanian Artisans and Treasurers in Alba-Iulia, we must also mention the category of music and singing society libraries. In this field, we can at least mention the Amateur Musicians' Society called "The Progress" [Progresul], founded in 1884 in Făgărash. Its library was still functioning on the eve of World War I.

Sports associations' libraries were also set up in Romania, especially at the beginning of the 20th century. For instance, both the Romanian Royal Motor-Car Club [Automobil Clubul Regal Român] and the Romanian Civil Aviation Club [Aero-Clubul Român], set up in 1906, had specialized libraries containing technical and economic books, tourist information, maps, etc.

SOME CONCLUSIONS

This enumeration of the various libraries extant in Romania in the 19th and the first four decades of the 20th centuries is not complete. There were also other libraries, not named here, in various domains and in many institutions, as well as numerous other private libraries and collections. In the so-called Project for a Formulation of Romania's Endeavors (submitted to Count Walewcki in 1856), Thouvenel incorrectly stated that Romania was "totally deprived of libraries" (*45*). This has never been the case—not in 1856, not at the beginning of the 20th century (*46*), and not even on the eve of World War II, as was erroneously asserted in some works published after 1944 (*47*). *Romanians have always had libraries,* even from the beginning of this millenium, and they have always taken care of them and progressively developed them, up to the end of the fourth decade of this century and afterward. It would be a mistake to assert the contrary.

In fact, at the beginning of World War II, Romania, although it did not have a general basic law sanctioning a real national library network, nevertheless had a complex library system. The amplification, strengthening, and development of this library system—in order to set up a real national library network interconnected with the Romanian documentation network—took place after World War II, under the new economic, social, and political circumstances of the years 1944–1974.

Romanian Libraries After World War II

Generally, we can distinguish two periods in Romania's postwar development. The first was that of the years 1945–1947, a period of recovery. During this time the state had at its disposal only meager economic possibilities, mainly limited to income and other direct and indirect taxes. This situation made large investments in the economy impossible, and temporarily excluded the possibility of full library development. The second period, beginning in 1948 (the year of the nationalization of Romania's principal means of production), was characterized by the state appropriation of all production of Romanian factories, plants, banks, agricultural production units, commercial enterprises, etc. The state has therefore had great opportunity to realize big investments in the economy and also in culture, including libraries. The realization of Romania's library system of today became possible in this way.

The first period (1945–1947) was marked, at the beginning, by the return of books dispersed in the war and by the reopening of libraries closed during the war. Afterward, a full-scale movement for creation of new libraries took place, especially of many little libraries for the masses.

In this respect—as a result of the initiative of trade unions and other democratic mass organizations such as the Patriotic Defense [Apărarea Patriotică], youth and women's organizations, and scientific and cultural associations—many books were collected and numerous trade union libraries and other public libraries were created, primarily in towns. The number of trade union libraries increased from 80 in 1948, to 3,400 in 1947. Libraries were opened in the villages also, generally set up in the Houses of Culture or elsewhere by the Ploughmen's Front [Frontul Pulgarilor], the Village Youth Organization [Organizația Tineretului de la Sate], and other associations assisting in the cultural development of the peasants.

On the whole, many libraries were created in the first period, as an expression of people's thirst for culture; but they were "poorly organized, supplied with books haphazardly because of the under-developed editorial output. They were staffed with voluntary librarians, enthusiastic but untrained. Nevertheless, those libraries played an outstanding role in encouraging the masses to take up reading" (*48*).

The second period (1948–) has been a time during which scientific and cultural activity—through the instrument of libraries—developed year after year, concurrently with the progress of the general spiritual life of the country. The period has been marked by the following characteristics: (*a*) New economic and political conditions are assured by the People's Democratic State, founded on a socialist economy. This was set up through the nationalization of the principal means of production and was developed by state appropriation of all their revenues and by planning all investments and other principal state activities. (*b*) An educational system based on a democratic foundation has been established, "opening the gates of schools to the children of the working class" (*48*), fighting for the elimination of illiteracy, and organizing mass-scale cultural and educational activity. (*c*) There is increased publishing activity, in editions far larger than ever before. When making their editorial plans, the publishing houses have to take into account the requirements of libraries. (*d*) New institutions specializing in matters of culture and libraries have been created. For example, the Committee for Cultural Establishments, founded in 1949 (later on it became the Council for Culture and Socialist Education) and attached to the Council of Ministers, has the task of organizing and coordinating the activity of mass-scale cultural and educational institutions, including the libraries. Four new institutions were also set up: the State Book Fund, the Library Supply Shops, the Book Chamber of the Romanian People's Republic, and the Central State Library of the Socialist Republic of Romania.

The State Book Fund (founded in 1951) played an outstanding role in endowing the libraries with old and current books, and in ensuring that the collections were properly managed and preserved.

The Library Supply Shops, created in 1951, consist of a network of special bookshops, providing the libraries with new publications.

The Book Chamber of the Romanian People's Republic was set up in 1952. Its task was to register all printed matter issued in Romania and to publish *Bibliographic Bulletins* listing them.

Both the State Book Fund and the Book Chamber were later incorporated into the Central State Library of the Socialist Republic of Romania, the new National Library founded in 1955.

The most important legal instruments concerning libraries under the conditions of the new social order in Romania were Decision No. 1542 of the Council of Ministers (issued on December 1951), which laid down measures for improving the activity of libraries; and Decree No. 703 (issued in 1973), which established uniform standards for the structure of the cultural–educational institutions.

Decision No. 1542 was of vital importance for the perfecting of the new library organizational system. It created new conditions and mapped out a clear path for the development of the whole library system. This decision facilitated the transformation of the problem of public libraries into a state problem, a component part of the cultural policy of the country. The decision emphasized the special importance of the book, as one of the principal factors of the cultural revolution, and of libraries, as real foci of cultural diffusion. Starting from the premise that "in the work of educating the masses, in forming the new social consciousness of working people, *books* are of an outstanding importance, and the distribution of books among the masses is one of the main factors of the cultural revolution now unfolding in the country," the decision went on to define the role and purpose of libraries in the country's cultural life. "Libraries are called upon to contribute to an increasing extent to the development of interest in reading among the masses, to the widespread distribution of books and to satisfying the thirst for culture among the masses." By this decision, as well as by subsequent regulations, the material resources for the development of public libraries and their financing by the state were secured.

Decision No. 1542 has served to provide the requisite material conditions for the functioning of libraries, for their staffing with trained librarians, for the preservation of books, and for service to readers. It had the effect of initiating many other vital measures in matters of library management and bibliographical activity. Thus, in order to ensure a systematic supply of books for the libraries, a specialized network of bookshops was created, the Library Supply Shops. At the same time, the technical and editorial standards of publications intended for the libraries were improved. A long-term plan was drawn up that made the necessary provisions for the creation of libraries with salaried staff in the villages, as well as for the creation of children's sections in the regional and district libraries in the larger towns.

It was by virtue of the same decision that the State Book Fund was established.

This was created "in order to ensure that the newly opened public libraries were provided with adequate collections and to organize exchanges of duplicates between libraries."

Concomitant with the bibliographical tasks assigned to the newly founded Book Chamber of the Romanian People's Republic, the decision also stated other steps in matters of bibliographic activity: the obligation of scientific institutes and of the university and reference libraries to elaborate and regularly publish specialized lists of books.

Finally, Decision No. 1542 stated measures for the organization of activity in the field of library science studies and research aiming toward the achievement of a proper system of libraries—one integrated into a single organization and with subordinate sections corresponding to the different state departments and public organizations.

All these measures, transformed into reality under the conditions of rapid development of the publishing industry, have secured for all the inhabitants of the country the possibility of using the book. This is made possible through the instrument of a vast network of libraries of various categories and types, all of them placing their collections freely at the disposal of their readers. The wide accessibility of the library, the free use of its collections, and the subordination of its organization and activity to the interests of the readers are the main characteristics of Romania's libraries of today.

Decree No. 703, issued in 1973, established standards for the structure of all cultural–educational institutions, which attested to the realization of the modern Romanian library system.

The decree set up five categories of state libraries: national libraries, higher education libraries, school libraries, specialized libraries, and public libraries (of different types, i.e., district libraries, municipal or town libraries, and commune or village libraries). For all these library categories and types, the decree set up structural standards. By realizing an improvement of the whole library network—unified as far as management and techniques are concerned, but diversified in matters of organizational structure—Decree No. 703 also enabled the development of some new, modern features and trends, such as the concentration of financial resources, services, and even institutions (*49*); the increasing specialization of the libraries (*50*); and the creation of new possibilities for future library automation.

The results of 30 years of endeavors in matters of library development (1944–1974) can be expressed by the following statistical data on Romania's library system at the beginning of the year 1975: a total of 21,643 libraries, including 2 national libraries, 46 higher education libraries, 10,689 school libraries, 4,331 specialized libraries, and 6,575 public libraries (*51*). Tables 1–5 present the main features of and data on Romanian library development in these three decades (*52*).

THE ROMANIAN LIBRARY SYSTEM AT THE PRESENT TIME

On July 1, 1975, Romania had a population of 21,028,841 inhabitants (*53*) and possessed 21,643 libraries, containing 135,156,000 books (*54*). The ratio was one library for every 971 inhabitants, or 642 books for each citizen.

TABLE 1

Progress of Romania's Library Network

Library category and type	Number of library units				Number of volumes (thousands)			
	1949	1960	1971	1973	1949	1960	1971	1973
National libraries	7 [a]	2	2	2	1,590	8,328	11,010	11,705
Higher education libraries	56	36	47	48	2,668	7,845	13,468	14,479
School libraries	14,862	5,762	9,804	10,748	3,909	10,539	30,948	34,776
Specialized documentary libraries (in enterprises, institutions etc.)	1,113	5,023	4,573	4,395	736	9,662	14,826	16,865
Public libraries (total)	14,352	14,407	8,042	6,675	5,641	31,859	48,756	51,225
District, municipal, and other town libraries	— [b]	286	223	226	—	6,745	11,078	12,509
Communal or village libraries	—	8,004	2,704	2,704	—	14,679	23,022	24,552
Libraries of producers' cooperatives	—	180	190	178	—	589	985	1,119
Trade union libraries	—	4,582	4,919	3,560	—	9,221	13,674	12,973
Total	30,390	0	22,468	21,868	14,544	68,233	119,008	129,050

[a] The statistics include all libraries receiving legal deposit copies.

[b] No statistical data available.

TABLE 2

Library Statistics According to Size of Collections

Library category (according to collection size)	Percentage of total number of libraries 1960	1973
500 volumes or less	30.6	20.2
501-1,000 volumes	26.1	12.3
1,001-3,000 volumes	27.9	31.5
3,001-5,000 volumes	6.0	8.9
5,001-10,000 volumes	6.2	14.2
More than 10,000 volumes	3.2	12.9

TABLE 3

Growth of the Average Number of Volumes per Library, by Library Category

Library category	Average number of volumes per library 1949	1960	1971	1973
Higher education libraries	47,642	217,916	286,553	301,652
School libraries	263	1,829	3,156	3,236
Specialized documentary libraries (in enterprises, institutions, etc.)	661	1,822	3,242	3,838
Public libraries (total)	393	2,211	6,062	7,674
District, municipal, and other town libraries	—[a]	23,583	49,677	55,352
Communal or village libraries	—	1,833	8,514	9,080
Libraries of producers' cooperatives	—	3,272	5,184	6,291
Trade union libraries	—	2,012	2,779	3,644
Average number of volumes per library, for all categories	475	2,703	5,296	5,901

[a] No statistical data available.

TABLE 4

Number of Readers Subscribing to All Libraries (by Library Category) and Average Number of Readers per Library

Library category	Number of readers subscribing to each library category 1955	1973	Average number of readers per library 1955	1973
Higher education libraries	137,000	190,000	3,425	3,953
School libraries	1,424,000	2,494,000	91	232
Specialized documentary libraries (in enterprises, institutions, etc.)	470,000	734,000	101	167
Public libraries (total)	3,292,000	4,653,000	167	697
District, municipal, and other town libraries	455,000	875,000	2,031	3,870
Communal or village libraries	1,648,000	2,549,000	136	943
Libraries of producers' cooperatives	59,000	139,000	106	780
Trade union libraries	1,038,000	1,085,000	204	305
Total number of readers for all libraries	5,395,000	8,098,000	—	—
Average number of readers per library	—	—	135	370

TABLE 5

Number of Volumes Delivered to Readers by All Libraries (by Category) and the Average Number of Volumes Delivered per Library

Library category	Number of volumes delivered by all libraries (thousands) 1955	1960	1973	Average number of volumes delivered per library 1955	1960	1973
Higher education libraries	7,628	7,524	11,952	190,000	209,000	248,791
School libraries	3,755	6,211	18,278	241	1,077	1,700
Specialized documentary libraries (in enterprises, institutions, etc.)	1,628	3,553	6,028	352	706	1,371
Public libraries (total)	15,642	37,949	45,172	795	2,634	6,767
District, municipal, and other town libraries	5,406	11,822	15,701	24,133	41,335	69,473
Communal or village libraries	6,392	19,515	22,236	530	2,438	8,223
Libraries of producers' cooperatives	144	500	1,018	259	3,111	5,718
Trade union libraries	3,462	5,261	6,112	683	1,226	1,714
Total/average	29,494	56,251	82,652	738	2,228	3,779

During 1974—at which time 7,360,000 readers were registered in all libraries of the country—approximately 75,344,000 volumes were loaned (*54*); that means 1,024 volumes for every hundred readers. It must be pointed out that these readers did not pay any fee for the books they requested from the libraries; the new organizational system has done away with all charges.

It must also be mentioned that all the funds for supplying books for libraries were provided by the state. Thousands of trained librarians were available to serve the readers, and the libraries also played an active educational role. These are some general aspects and statistical data valuable in considering the entire Romanian library system.

The most important libraries in present-day Romania are discussed in the following sections, by category: national libraries, school libraries, etc.

NATIONAL LIBRARIES

There are two national libraries in Romania: the Library of the Academy of the Socialist Republic of Romania (founded in 1867) and the Central State Library of the Socialist Republic of Romania (founded in 1955).*

Both are equally entrusted with the collection, organization, and proper account-

* There also are a few other large libraries having only some characteristic features of national libraries (they share in the national publications fund—general or limited to a certain specialized domain—and they receive legal deposit copies). These libraries are: the Central University Libraries of Bucharest, Cluj, Jassy, Craiova, Timisoara, and Brashov; and the Central Libraries of the Medical–Pharmaceutical Institute, the Polytechnical Institute, and the Academy of Economic Studies—all in Bucharest.

ing of the national fund of publications—which includes all works printed in Romania and those works published abroad by Romanians or concening Romania and its people. These two major institutions cooperate in carrying out three important tasks: (*a*) the National Bibliography (for instance, the Library of the Academy of the Socialist Republic of Romania compiles the *Retrospective Bibliographical Repertories* and the Central State Library of the Socialist Republic of Romania prepares the *Current National Bibliography*); (*b*) the National Union Catalogs System and other information tools; and (*c*) the research and methodological activities and publications in the field of library and information science.

The Library of the Academy of the Socialist Republic of Romania
[Biblioteca Academiei Republicii Socialiste Romania]

This is the largest of Romania's national and scientific–academic libraries, dedicated to documentation in all branches of science as well as to the study of the economic, cultural, and scientific development of the Romanian people. It is located in Bucharest: Calea Victorieilas. The academy library is the national legal depository for all Romanian and United Nations publications, and it is the National Center for Academic Publications Exchange (with about 10,000 partners from more than 100 countries). It also serves as the Center for National Retrospective Bibliography and as the National Center for Union Catalogs and other scientific information tools, as well as for study and research in library and information science. The library was founded in 1867. Its collections include about 7,000,000 volumes of books and periodicals, and other special collections (containing different types of documents), among which are about 85% of the Romanian national incunabula and other old and rare books. Special collections are: that of Romanian, Latin, Greek, Slavonic, and oriental manuscripts; the special collection of engravings, drawings, photographs, etc.; the special collection of maps, geographical atlases, etc.; the special collection of musical documents, scores, and different kinds of recordings; and the special collection of numismatic and philatelic pieces, etc. The publications of the academy library are:

La Bibliothèque de l'Académie de la République Socialiste de Roumanie, 1968.

The Library of the Academy of the Socialist Republic of Romania, 1867–1967, 1968 (in Romanian).

Centennial Anniversary Volume [of] the Library of the Academy of the Socialist Republic of Romania, 1867–1967, Studii si cercetări de documentara si bibliogie. No. 2/3, 1967 (in Romanian).

The Romanian Retrospective National Bibliography

The Old Romanian [Books] Bibliography [Bibliografia românească veche], 1508–1830, Vols. 1–4.

The Romanian Periodicals [Bibliography] [Publicațiile periodice românesti]. Vol. 1, 1820–1906; Vol. 2, 1907–1918.

The Catalog of the Romanian Manuscripts [Catalogul manuscriselor românesti], Vols. 1–4.

The Catalog of the Slav Manuscripts [Catalogul manuscriselor slave], Vols. 1 and 2.

The Catalog of the Greek Manuscripts [Catalogul manuscriselor grecesti], Vols. 1 and 2.

The Catalog of the Oriental Manuscripts [Catalogul manuscriselor orientale den Biblioteca Academiei Române], Vol. 1.

The Accession Bulletin [Cresterea colectiilor], 1904–.

The Romanian Mathematical Bibliography [Bibliografia matematică în România], for 1591–1950, 1972.

The Bibliography of Mechanics in Romania [Mecanica în România bibliografie], for 1840–1950, 1974.

The Romanian Agricultural Bibliography [Bibliografia agricolă românească], for 1944–1966, Vols. 1–6, 1971.

The Bibliography of the Romanian Literature [Bibliografia literaturii române], 1948–1960.

A series of Biobibliographies [Biobibliografii] of Romanian scientists.

Documentary Guides

Medical Sciences. Agricultural Sciences. Social Sciences [Ghid de documentare în stiintele medicale. Ghid de documentare în stiintele agricole. Ghid de documentare în stiintele sociale].

Union Catalogs

The General Repertory of the Foreign Scientific and Technical Periodicals Extant in the Romanian Libraries, 1665–1956 [Repertoriul general al periodicelor stiintifice si tehnice străine aflate in principalele biblioteci din România]: Vol. 4, *Medical Sciences;* Vol. 5, *Chemistry* (the other sections of this Union Catalog are on cards).

Current Union Catalog of Foreign Books: Mathematics. Physics. Linguistics. Literature [Cărti străine intrate în bibliotecile din România: Matematică. Fizică. Lingvistica. Literatura], monthly, 1968–.

Studies and Researches in Library and Information Science [Studii si cercetări (de documentare si) bibliologie], 1955–.

Central State Library of the Socialist Republic of Romania [*Biblioteca Centrală de State a Republicii Socialiste România*]

This is a national library as well as the biggest public library of the country, dedicated to documentation of the economic, cultural, and scientific development of the Romanian people. Its location is Bucharest, Str. I. Ghica 4. It is a national legal depository and establishes the statistics on Romanian production of books and other documents. The library is the National Exchange Center, the Centralized Cataloging Unit, and the Center for National Current Bibliography as well as for Union Catalogs and bibliographical researches. It serves as the Information and Documentation Center in matters of culture, as the Center for Methodological Guidance for all Public Libraries and for studies and research concerning library and information sciences, and as the Central Laboratory for Book Preservation and Restoration. The Central State Library was founded in 1955. Its collections include more than 6,800,000 volumes of books and periodicals; important collections of manuscripts, incunabula, and other old and rare books; and scores, recordings, photographs, maps and drawings, etc. The library's publications include:

The Romanian Current National Bibliography

Bibliography of the Socialist Republic of Romania: Books, Albums, Maps [Bibliografia Republicii Socialiste România: Cărți, albume, hărți], fortnightly.

Bibliography of the Socialist Republic of Romania: Articles, and Other Items, Issued in the Romanian Periodicals and Other Serials [Bibliografia Republicii Socialiste România: Articole din publicații periodice si seriale], fortnightly.

Bibliography of the Socialist Republic of Romania: Scores and Musical Recordings [Bibliografia Republicii Socialiste România: Note muzicale, discuri], quarterly.

Yearbook of the Romanian Books [Anuarul cărții din Republica Socialiste România].

Repertory of Unpublished Bibliographies [Repertoriul bibliografiilor nepublicate].

Union Catalogs

Union Catalog of the Foreign Books Extant in the Libraries of the Socialist Republic of Romania [Catalogul colectiv al cărților străine intrate în Bibliotecile din Republica Socialiste România], 1957–1967.

Current Union Catalog of Foreign Books: General (Science and Culture). Biology. Botany. Geology. Geography. Socio-Political Sciences. History. Philosophy. Fine Arts, Sports [Cărti străine intrate în bibliotecile din România. Generalia (Știință si Cultura). Biologie. Botanica. Geologie. Geografie. Științe Social-Politice. Istorie. Folozofie. Artă. Sport], monthly, 1968–.

Current Repertory of the Foreign Periodicals in the Libraries of the Socialist Republic of Romania [Repertoriul periodicelor străine din Republica Socialiste România].

Cultural Information Bulletins

Bulletins include: *Cultural Politics; Permanent Education; Literature; Theater; Music; Fine Arts; Museums; Historic and Artistic Monuments; Publishing Activity; Libraries*, etc. [Buletine de informare in domeniul culturii: Politică a culturii; Educatie permanentă; Literatura; Teatru; Muzică; Arte plastice; Muzee si monumente istorice si de artă; Activitate editoriala. Biblioteci etc.].

Library and Information Science

Information Bulletin [Buletin de informare în bibliologie], monthly.

Abstracts Review [Revista de referate în bibliologie], quarterly.

Book Preservation Problems [Probleme de patologie a cărții].

Cultural Anniversaries [Aniversări culturale].

HIGHER EDUCATION LIBRARIES

The development of this category of libraries took place as a natural consequence of the great upsurge in university-level education in Romania. While in 1938, the university libraries contained approximately 1,500,000 volumes for about 26,000 students, in 1959, more than 67,000 students were using 7,531,610 volumes (*55*), and at the beginning of the year 1975, they were using 15,028,000 volumes (*56*).

The system of higher education libraries comprises 46 library networks, that is, those of the Central University Libraries of Bucharest, Cluj, Jassy, Timisoara, Craiova, and Brashov; the Central Libraries of the following institutes: Polytechnical, Construction, Architecture, Mining, Oil, Gas and Geology, Agricultural and

Forestry, Economic, Medical–Pharmaceutical, etc.; the libraries of the conservatories (musical academies) and Fine Arts Institutes; and the libraries of the 3-year Pedagogical Institutes, etc.

Statistics show that in 1974 the higher education libraries functioning in the Socialist Republic of Romania served about 193,000 readers and that more than 11,759,000 volumes were supplied (*56*).

Some of the most important higher education libraries are the following:

The Central University Library [Biblioteca Centrală Universitară]: Bucharest

It was founded in 1891 (opened 1895) and reorganized in 1948. (Location: Bucharest, Str. Onesti 1.) The library incorporates a central library and a network of 20 faculty, chair, laboratory, and student hostel libraries. The collection includes about 2,000,000 volumes of books, periodicals, microfilms, engravings, photographs, etc., on philosophy, history, literature, linguistics, art, and other subjects. It has an important collection of Romanian publications (including old Romanian books) and old and rare books (from the 16th to 18th centuries). The library's publications include:

Biobibliographies of professors and other great cultural personalities (Tudor Vianu, Traian Savulescu, among others).

Bibliographical Guide for Romania's History [Ghid bibliografic in istoria României].

Bibliographies

The Higher Education System [Invățămintul superior].

Scientific Knowledge and Research Logic [Logica cunoasterii si cercetării stiințifice].

The Social Progress [Progresul social].

The Romanticism in the Romanian Literature [Romantismul in literatura română].

The Modernism in the Romanian Literature [Modernismul în literatură română].

The Romanian Literature Abroad [Literatura română peste hotare].

Union Catalogs

Union Catalog of Foreign Books Acquired by the Higher Education Libraries (1963–1967) [Catalogul colectiv al cărtilor străine intrate în bibliotecile de învatamint superior (1963–1967)].

Current Union Catalog of Foreign Books—Education [Cărți străine intrate în bibliotecile din România—Seria educație–invățamînt], 1968–.

Union Catalog of Mathematical Periodicals [Repertoriul periodicelor de matematică].

Union Catalog of Physics Periodicals [Repertoriul periodicelor de fizică].

The Central University Library [Biblioteca Centrală Universitară]: Cluj-Napoca

This library was established through the merger of the Cluj University Library (founded 1872) and the Library of the Transylvanian Museum (founded 1859). (Location: Cluj-Napoca, Str. Clinicilor 2.) It incorporates a central library and a large network of faculty, chair, laboratory, and student hostel branch libraries. Its collections include about 2,750,000 volumes of books, periodicals, and manuscripts; and also maps, engravings, musical documents, medals, coins, etc. The library has an important collection of Romanian publications; it contains more than 3,000 old and rare Romanian books; 2,000 engravings, drawings, etc., illustrating the Romanian people's history; incunabula and rare foreign books; and an important collection of publications (Romanian and foreign) concerning Transylvania's history. Among its publications are:

Information Bulletins [Informații si semnalări bibliografice].

Bibliographical indexes of the reviews: *Transylvania* (1895–1906), *Familia* [The Family] (1865–1906), *România literară* [Literary Romania], etc.

Union Catalogs

Union Catalog of Foreign Scientific Periodicals Entered at the Cluj Libraries: 1945–1958; 1959–1962; 1963– [Catalogul colectiv al revistelor stiințifice străine intrate în bibliotecile din Cluj în anii 1945–1958; Catalogul colectiv al revistelor stiințifice străine intrate în bibliotecile din Cluj în anii 1963–].

The "M. Eminescu" Central University Library [Biblioteca Centrală Universitară "M. Eminescu"]

This library was founded in 1640 and reorganized in 1835, 1860, 1864, 1848, and 1932. (Location: Jassy, Str. Păcurari 4.) It incorporates a central library and a large network of faculty, chair, laboratory, and student hostel branch libraries. The collections include about 1,750,000 volumes of books, periodicals, manuscripts, maps, engravings, musical scores, and other kinds of documents. It is an important national publications collection, especially for works concerning Moldavia's history; the library holds more than 1,000 manuscripts (of the Moldavian chroniclers from the 17th and 18th centuries, among others). It also includes rare Romanian books, maps, albums, engravings and other arts pieces, and a vast collection of correspondence of the Romanian writers of the 19th century and the first half of the 20th century; and incunabula, foreign manuscripts from as early as the eighth century, old and rare foreign books, etc. Publications of the library include:

Bibliographical indexes of the reviews *Viața Românească* [The Romanian Life], *Dacia literară* [The Literary Dacia], *Propășirea* [The Progress], *Adevărul literar si artistic* [The Literary and Artistical Truth], etc.

Union Catalogs

The Jassy Libraries Current Books Accession Bulletin [Buletinul bibliografic al cărților intrate în bibliotecile din Iasi].

Union Catalog of the Current Foreign Periodicals Entering the Jassy Libraries [Repertoriul colectiv al revistelor străine intrate în bibliotecile din Iasi], 1965–.

The Central University Library [*Biblioteca Centrală Universitară*]*: Timisoara*

Founded in 1958, this institution incorporates a central library and several faculty, institute, and student hostel libraries. (Location: Timisoara, B-dul V. Par-van 4.) The collections include more than 350,000 volumes of books and 35,000 periodicals, old and rare books from the 16th to the 18th centuries, and manuscripts and documents concerning Romanian history in Transylvania and Banata. Its publications include:

Annals of the Timisoara University—Series: Mathematics; Physics-Chemistry; Philology; Economic Sciences [Analele Universitătii din Timisoara—Seriile: Stiinte matematice; Stiinte fizico–chimice: Stiinte filologice; Stiinte economice].

Literary Folklore [Folclor literar].

The Central University Library [Biblioteca Centrală Universitară]: Craiova

This library was founded in 1966 and incorporates a central library and several branch libraries. (Locations: Craiova, Str. A. I. Cuza 13; and St. Libertății 27.) The collection includes more than 400,000 volumes of books and periodicals.

The Central University Library [Biblioteca Centrală Universitară]: Brashov

Founded in 1948, this institution incorporates a central library and six branch libraries. (Location: Brashov, B-dul Gh. Gheorghiu-Dej 3.) The collection includes about 45,000 volumes of books and periodicals, mainly in the fields of technology, mechanics, technology of mechanical engineering, forestry, wood industry, chemistry, physics, mathematics, statistics, economy, political science, etc. The library publishes the *Bibliographical Bulletin* [Buletin bibliografic] on an irregular schedule.

The Library of the "Gh. Gheorghiu-Dej" Polytechnic Institute
[Biblioteca Institutului Politehnic "Gh. Gheorghiu-Dej"]

Founded in 1811, the library was reorganized in 1920 and 1948. (Locations: Bucharest, Str. Polizu 1; and Splaiul Independenței 311.) It incorporates a central library and a large network of faculty, chair, laboratory, and student hostel branch libraries. Its collections include about 1,000,000 volumes of books and periodicals, 100,000 standards and patents, microfilms, and other kinds of documents on various technical–scientific subjects. The library has an important national collection of publications on Romanian science and technics and of old and rare foreign technical books. It publishes *Bibliographic Bulletins* and *Union Catalogs*, among other works.

The Library of the Polytechnic Institute [Biblioteca Institutului Politehnic]

See under the Central University Library [Biblioteca Centrală Universitară]: Brashov.

The Library of the Polytechnic Institute
[Biblioteca Institutului Politehnic]: Cluj-Napoca

Founded in 1948, this library is continuing the activities of the Technological Museum's library (1882–1883) and the Industrial School's library (1884). (Location: Cluj-Napoca, Str. Emil Isac 15.) It incorporates a central library and several faculty and student hostel libraries. The collection contains 300,000 volumes of books and periodicals, mainly on metallurgy, mechanical, electrotechnical, and building subjects. The library publishes *Technical Information and Documentation Bulletin* [Buletin de informare si documentare tehnică], etc.

The Library of the Polytechnic Institute [*Biblioteca Institutului Politehnic*]: *Jassy*

This library was founded in 1949 and is continuing the activity of the library of the former Agronomic Institute (set up in 1937). Location: Jassy, Calea 23 August 11–12.) It incorporates a central library and several branch libraries. It has a collection of about 500,000 volumes of books, periodicals, standards, microfilms, etc. Its publications include *Technical Information and Documentation Bulletin* [Buletin de informare si documentare tehnică] and other materials.

The Library of the Polytechnic Institute
[*Biblioteca Institutului Politehnic*]: *Timisoara*

Founded in 1920, the library was reorganized in 1948. It incorporates a central library and several chair and student hostel libraries. Its collection numbers about 200,000 volumes and periodical units. (Location: Timisoara, Str. Piatra Craiului 8.)

The Bucharest Branch of the Ploiesti Library of the Oil and Gas Institute
[*Biblioteca Institutului de Petrol, Gaze, Geologie— Filiala Bucuresti*]

Founded in 1948, this institution incorporates a central library and several branch libraries. (Location: Bucharest, Str. Traian Vuia 6.) It has a collection of about 150,000 volumes of books, periodicals, microfilms, etc., mainly on geology, oil, and gas subjects.

The Library of the "Nicolae Balcescu" Agronomic Institute
[*Biblioteca Institutului Agronomic "Nicolae Balcescu"*]

The library was founded in 1948. (Location: Bucharest, B-dul Marasti 59.) It incorporates a central library and several faculty, chair, laboratory, and student hostel libraries. The collections include more than 400,000 volumes of books, periodicals, etc., mainly in the fields of agronomy, horticulture, animal husbandry, biology, rural economics, land reclamation, fiction, and the social sciences.

The Library of the "Dr. Petru Groza" Agronomic Institute
[*Biblioteca Institutului Agronomic "Dr. Petru Groza"*]

Founded in 1869, the library incorporates a central library and several faculty, chair, laboratory, and student hostel libraries. (Location: Cluj-Napoca, Str. Mănăstur 3.) The collections number about 150,000 volumes of books, periodicals, etc.

The Library of the "Ion Ionescu de la Brad" Agronomic Institute
[Biblioteca Institutului Agronomic "Ion Ionescu de la Brad"]

Founded in 1933, the library was reorganized in 1949 and 1955. (Location: Jassy, Aleea M. Sadoveanu 3.) It incorporates a central library and several faculty, chair, laboratory, and student hostel libraries. The collections include more than 100,000 volumes of books, periodicals, microfilms, etc.

The Library of the Agronomic Institute
[Biblioteca Institutului Agronomic]: Timisoara

Founded in 1946, the library incorporates a central library and several faculty, chair, laboratory, and student hostel libraries. (Location: Timisoara, Splaiul Tudor Vladimivescu 14.) The collection numbers more than 10,000 volumes of books, periodicals, etc., mainly on agronomy, animal husbandry, etc.

The Library of the Construction Institute [Biblioteca Institutului de Constructii]

The library was founded in 1948 and incorporates a central library as well as several faculty and student hostel libraries. It has a collection of more than 400,000 volumes of books, periodicals, microfilms, etc. (Location: Bucharest, B-dul Republicii 176.)

The Library of the "Ion Mincu" Architectural Institute
[Biblioteca Institutului de Architectură "Ion Mincu"]

This library was founded in 1910. Its collections include about 10,000 volumes and pieces: books, periodicals, standards, photographs, etc. (mainly on architecture, construction, etc.); old and rare books; and a collection of photographs of national architectural monuments. (Location: Bucharest, Str. Biserica Evei 1–5.)

The Library of the Medical and Pharmaceutical Institute
[Biblioteca Institutului Medico–Farmaceutic]: Bucharest

Founded in 1857, the library was reorganized in 1869, 1870, and 1948. It incorporates a central library and 110 faculty, chair, laboratory, clinic, and student hostel branch libraries. (Location: Bucharest, B-dul dr. Petru Groza 9.) Its collection contains about 1,000,000 volumes of books, periodicals, engravings, microfilms, and other kinds of documents. The library is an important national publications fund for works concerning medicine and related subjects. It also holds old and rare Romanian and foreign books, manuscripts, etc. The library publishes bibliographic bulletins, union catalogs, etc.

The Library of the Medical and Pharmaceutical Institute
[Biblioteca Institutului Medico–Farmaceutic]: Cluj-Napoca

Founded in 1948, this institution continues the activity of the library of the Medical and Surgical School (1775) and that of the Medical Faculty of Cluj University (1872). It incorporates a central library and 75 branch libraries. The collection numbers more than 250,000 volumes of books and periodicals. The library publishes *Clujul medical* and other items. (Location: Cluj-Napoca, Piata Libertătii 10.)

The Library of the Medical and Pharmaceutical Institute [Biblioteca Institutului Medico–Farmaceutic]: Jassy

The library was founded in 1879 and reorganized in 1949. It incorporates a central library and 62 branch libraries. The collection contains about 300,000 volumes of books and periodical pieces. (Location: Jassy, Str. V. Alecsandri 7.)

The Library of the Medical Institute [Biblioteca Institutului de Medicină]: Timisoara

Founded in 1945, this institution incorporates a central library and several laboratory, chair, clinic, and student hostel libraries. Its collection includes about 200,000 volumes of books, periodicals, etc. (Location: Timisoara, Piața 23 August 2.)

The Library of the Medical and Pharmaceutical Institute [Biblioteca Institutului Medico–Farmaceutic]: Tîrgu Muresh

This library was founded in 1945 and reorganized in 1948. It incorporates a central library and several chair and clinic libraries. Its collections include about 200,000 volumes of books, periodicals, microfilms, etc. (Location: Tîrgu Muresh, Str. Gh. Marinescu 38.)

The Library of the "Ciprian Porumbescu" Conservatory [Biblioteca Conservatorului "Ciprian Porumbescu"]

Founded in 1834, the library was reorganized in 1864, 1910, and 1948. Its collections include about 200,000 musical works, scores, records, tapes, etc.; a collection of old Romanian scores, manuscripts of the earliest Romanian musicians, and recordings of musical folklore; and an important collection of books and periodicals about musicology, etc. (Location: Bucharest, Str. Stirbei Vodă 33.)

The Library of the "George Enescu" Conservatory [Biblioteca Conservatorului "George Enescu"]

The library was founded in 1961. It has a collection of about 50,000 books, periodicals, musical recordings, scores, etc., and a collection of the works of Moldavian musicians. (Location: Jassy, Str. Cuza Vodă 29 and 33.)

The Library of the "Gh. Dima" Conservatory [Biblioteca Conservatorului "Gh. Dima"]

Founded in 1918, the library was reorganized in 1919 and 1949. Its collections include about 100,000 volumes and periodicals; manuscripts, scores, musical recordings, etc.; and rarities from the 18th century. (Location: Cluj-Napoca, Str. 23 August 25.)

The Library of the "Nicholas Grigorescu" Institute of Fine Arts [Biblioteca Institutului de Arte Plastice "Nicholas Grigorescu"]

This library was founded in 1864 and reorganized in 1948. It has a collection of about 100,000 volumes of books and periodicals, photographs, slides, etc., on fine arts and other related subjects. (Location: Bucharest, Str. dr. Sion 2–4.)

The Library of the "Ion Andrescu" Institute of Fine Arts [Biblioteca Institutului de Arte Plastice "Ion Andrescu"]

The library was founded in 1950. Its collection contains more than 50,000 volumes of books and periodicals, slides, photographs and other special collection pieces, recordings, etc. (Location: Cluj-Napoca, Str. Matei Corvin 6.)

The Library of the "I. L. Caragiale" Institute for Theatrical and Cinematographic Arts [Biblioteca Institutului de Artă Teatrală si Cinematografciă "I. L. Caragiale"]

This library was founded in 1948. Its collections include about 100,000 volumes of books and periodicals, photographs, tapes, films, and other kinds of documents on the theater and motion pictures. (Location: Bucharest, B-dul Schitu Magureanu 1.)

For more details and other aspects of the libraries listed here, as well as other higher education libraries, see *Romania's Libraries Guide,* which is listed in the Bibliography.

SCHOOL LIBRARIES

After the educational reform of 1948, a very large network of school libraries was developed in Romania.

At the beginning of 1975 there were 10,689 school libraries, containing 36,644,000 volumes of books and periodicals. In 1974, there were 2,487,000 readers, for whom 18,347,000 volumes were supplied (*57*).

Intended for the use of teachers and pupils, the school libraries have as their principal purpose the assistance of the educational process, by helping the pupils to assimilate and develop the knowledge acquired in the classroom.

Today, Romania's school libraries system comprises several categories of units, as follows: (*a*) libraries of the general 10-year schools; (*b*) libraries of the general cultural and specialized secondary schools (industrial, agricultural, musical, etc.); (*c*) libraries of the technical–vocational schools (industrial, agricultural, etc.); (*d*) libraries of the postsecondary specialized schools, etc.

Since it is not possible to present the numerous school libraries of Romania in this article, some data about the Central Pedagogical Library are given here.

The Central Pedagogical Library [Biblioteca Centrală Pedagogica] is located in

Bucharest (Str. I. Zalomit 12). Founded in 1949, the library was reorganized in 1959. It functions as the central unit for supplying books to all school libraries and other educational libraries in the whole country. Its collection includes about 300,000 books and periodicals, and rare books from the 16th to 18th centuries. The library has an important lending collection. Its publications include:

The Romanian Pedagogical Bibliography [Bibliografia pedagogică românească], 1948–.

Problems of Contemporary Pedagogy [Probleme de pedagogie contemporana].

Modernization of the Educational Process [Modernizarea invățămîntului].

DOCUMENTARY LIBRARIES

The rapid development of Romanian industry, agriculture, science, technology, and culture after August 23, 1944, had as one effect a substantial increase in documentary libraries.

Among the factors that resulted in the creation of a vast network of reference libraries were the following: the reorganization of the Romanian Academy in 1948 and the organization of new academies—i.e., the Academy of Agriculture and Forest Sciences, the Academy of Medical Sciences, the Academy of Social and Political Sciences, etc.—the creation of numerous research institutes, dependent on the new ministries, departments, and other state central bodies; the tremendous development of production units (factories, plants, and other types of enterprises); and the organization of new health, social, and cultural institutions.

At the beginning of 1975 there were 4,331 documentary (scientific, technical, economic, etc.) libraries in the Socialist Republic of Romania. They held 18,531,000 volumes of books, periodicals, and other types of documents; and they had in 1974 supplied 5,888,000 volumes to 735,000 specialists (*57*).

This entire library network is interconnected with the documentation system of the country. For instance, the Central Library for Construction, Architecture, and Urbanistics is at the same time the library of the Information and Documentation Office for Construction, Architecture, and Town Planning.

Some of the most important Romanian documentary libraries are the following:

The Library of the Academy of the Socialist Republic of Romania [Biblioteca Academiei Republicii Socialiste România]

See under National Libraries.

The Library of the Cluj-Napoca Branch of the Academy of the Socialist Republic of Romania [Biblioteca Filialei Cluj-Napoca a Academiei Republicii Socialiste România]

The library was founded in 1950 by merging the following collections: the Central Library of Blaj [Biblioteca Centrală din Blaj], which had been set up in the 18th century; the manuscripts fund of the Greek-Catholic Bishopric of Oradea (of the same century); the collection of the former Museum for the Study of the Romanian Language [Muzeul Limbii Române]; the private library of the Romanian scholar Emil G. Racovitza; the archival collection of the Transylvania Museum [Muzeul Ardelean]; and several collections of former laical and ecclesiastic libraries of Transylvania. (Location: Cluj-Napoca; Str. M. Kogălniceanu 12.) Its collection includes about 600,000 volumes of books and periodicals, especially on the humanities and social sciences. The library is an important national collection of publications concerning Transylvania's history. It also contains incunabula; old and rare Romanian and foreign books (Latin, Slavonic, Hungarian, German, etc.); an important collection of Orientalia (from the private library of the Romanian scholar Tomotei Cipariu); an important collection of manuscripts from the Transylvania School [Scoala Ardeleană]; and archival materials (more than 2,000,000 pieces) from the Transylvania Museum. Publications of the library include:

Bibliographical Indexes of the reviews *Floarea darurilor, Viața socială* [The Social Life], etc.

Bibliography of the Publications Issued by the Cluj–Napoca Branch of the Academy of the Socialist Republic of Romania [Indicele bibliografic analitic al revist lor editate de către Filiala Cluj–Napoca a Academiei Republicii Socialiste România].

The Anglo-American Literature in Romania (1960–1966) [Literatură Anglo-Americană în țara noastră in perioada (1960–1966)].

The Bibliography of the Biological Sciences in Romania [Bibliografia istorici stiintelor biologice din România].

Also, a biobibliography, *Prof. Emil Pop (1923–1966)*, union catalogs, and other works.

The Central Library of the Academy of Agricultural and Forest Sciences [Biblioteca Centrală a Academiei de Stiinte Agricole si Silvice]

Founded in 1927, the library was reorganized in 1938, 1955, 1962, 1965, and 1973. (Location: Bucharest, B-dul Măvăsti 61.) It incorporates a central library and several branch libraries. The collection numbers more than 200,000 volumes of books, periodicals, etc., on agriculture, biology, animal husbandry, and related subjects. Publications include:

Accession Catalog [Catalog de crestere a colectiilor].

New Foreign Publications Catalog [Catalog al publicatiilor străine recent apărute].

Current Union Catalog of Foreign Books: Agriculture [Cărti străine intrate in bibliotecile din România. Agricultura].

The Central Library of the Academy of Social and Political Sciences [Biblioteca Centrală a Academiei de Stiinte Social si Politice]: Bucharest.

See the Library of the Academy of the Socialist Republic of Romania [Biblioteca Academiei Republicii Socialiste România].

The Central Library of the Academy of Medical Sciences [Biblioteca Centrală a Academiei de Stiinte Medicale]

See the Central Medical Library [Biblioteca Centrală Medicală]: Bucharest.

The Central Medical Library [Biblioteca Centrală Medicală]: Bucharest

Founded in 1951, the library was reorganized in 1973. (Location: Bucharest, Splaiul Independentei 48.) It incorporates a central library and several branch libraries. The collection includes about 500,000 volumes, periodicals, microfilms, and other types of documents in all branches of medicine and related subjects. Its publications include:

Medical Bibliographical Bulletin [Buletin bibliografic medical].

Current Union Catalog of Foreign Books: Medicine [Cărti străine intrate în bibliotecile din România: Medicina], monthly.

L'Information medicale Roumaine.

The Documentary Library of the History of Medicine [Biblioteca Documentară de Istorie a Medicinii]

The library was founded in 1953, and reorganized in 1958. (Location: Bucharest, Str. dr. Leonte 1–3.) Its collections include about 35,000 volumes of books and periodicals; 3,500 manuscripts and documents; about 10,000 theses; more than 5,000 engravings, medals, and museum pieces; rare books from the 15th to the 18th centuries; and an important collection of old Romanian medical books. Among its publications are:

Studies and Researches of Medical History [Studii si cercetări de istorie a medicinii].

Romanian Medical Iconography [Icongrafia medicală românească].

The Central Library of the Academy of Economic Studies [Biblioteca Centrală a Academiei de Studii Economice]

Founded in 1913, the library was reorganized in 1948 and 1967. (Location: Bucharest, Piata Romană 6.) It incorporates a central library and a large network of faculty, chair, and student hostel branch libraries. The collection contains about 750,000 volumes of books, periodicals, manuscripts, and other kinds of documents. The library is an important national collection of publications concerning economics and related subjects. It is also an important collection of social publications, especially of works from the former library of the Romanian Social Institute and documentation publications from the former Romanian Center for Documentation (1940–1945). The library also holds old and rare Romanian and foreign books on economics, etc. Publications of the library include:

Economic Documentary Bulletins (for Romania and Abroad) [Buletine de documentare economică (română si străină)].

Bibliographic index of the review *Independenta economică* [The Economic Independence] and others.

The Romanian Economic Literature until 1918 [Literatura economică română aparuta pîna în anul 1918].

The Economic Bibliography (Romanian and foreign publications).

Bibliographic Bulletin [Buletinul bibliografic], 1962–.

Economic Studies and Researches [Studii si cercetări economice].

The Central Technical Library for "Finance – Credit" of the Ministry of Finance [Biblioteca Centrală Technică "Finante – Credit" a Ministerului de Finante]

This library holds an important collection of books, periodicals, and other types of documents on economic sciences, law, state administration, bookkeeping, and related subjects. (Location: Bucharest, Str. Sinirdan 5.)

The Central Library for Construction, Architecture, and Town Planning [Biblioteca Centrală pentru Constructii, Arhitectură si Sistematizare]

The library is located in Bucharest (B-dul 1848 No. 10). The collection of this library includes about 50,000 volumes of books, periodicals, microfilms, etc., on construction, architecture, town planning, and related subjects. The library's publications include:

The National Bibliography "Construction" [Bibliografia national "constructii"].

Current Union Catalog of Foreign Books, Construction [Cărti străine intrate în bibliotecile din România. Constructii].

See also the Library of the Information and Documentation Office for Construction, Architecture, and Town Planning.

The Library of the National Institute for Information and Documentation [Biblioteca Institutului National de Informare si Documentare—INID]

Founded in 1949, the library was reorganized in 1973. Its collections include about 200,000 volumes of books, periodicals, microfilms, etc.; and an important collection of bibliographies, translations, syntheses, and other materials on technical and related subjects. The library publishes *Information and Documentation Problems* [Probleme de informare si documentare] and other materials. (Location: Bucharest, Str. Cosmonautilor 27–29.)

The Documentary Library of the Central Office of State Archives [Biblioteca Documentară a Directiei Generale a Arhivelor]

The library was founded in 1862. It has an important collection of books and periodicals—on archives, history, and related subjects—as well as manuscripts, documents, microfilms, etc. It publishes the *Archives Review* [Revista arhivelor] and other items. (Locations: Bucharest, B-dul Gh. Gheorghiu-Dej 29; and Str. Arhivelor 2.)

The "Timotei Capariu" Documentary Library
[Biblioteca Documentară "Timotei Capariu"]

This library was founded in 1747. It has a collection of about 20,000 volumes on the humanities and rare and ancient books on the history of the Romanian people. (Location: Blaj, Str. Republicii 7.)

The Năsăud Documentary Library [Biblioteca Documentară Năsăud]

The library was founded in 1931. Its collection contains about 50,000 volumes of books and periodicals, an important collection of old Romanian books, and manuscripts and ancient documents. (Location: Năsăud, B-dul Republicii 41.)

"Batthyaneum" Library [Biblioteca Documentară "Batthyaneum"]

Founded in 1794, the library was reorganized in 1798. The collection includes about 60,000 volumes of books, manuscripts, and other kinds of documents, dating from the 9th century ("Codex aureus") to the 18th century. It holds incunabula, old and rare books, and an important numismatic collection. There is an astronomical observatory (from the 18th century) near the library. It also has an important archival collection concerning Transylvania's history. (Location: Alba-Iulia, Str. Bibliotecii 1.)

"Teleki–Bolyai" Library [Biblioteca Documentară "Teleki–Bolyai"]

The library was founded in 1962, by merging the "Teleki" Library (founded 1802) and the "Bolyai" Library (founded 1557). Its collection contains about 200,000 volumes of books and periodicals, as well as manuscripts and other kinds of documents, on the natural and social sciences. The library also holds old and rare books from the 16th to 18th centuries, and an important collection of publications concerning Transylvania's history. (Location: Tîrgu Muresh, Str. Bolyai 17.)

Library of "Bruckenthal" Museum [Biblioteca Muzeului "Bruckenthal"]

The library was founded in 1777–1787 and opened in 1817. The collection includes about 300,000 volumes of books, periodicals, manuscripts, and other kinds of documents; incunabula; old and rare books and manuscripts from the 14th to the 18th century; and old and rare Romanian books. It is an important collection of publications on Transylvania's history, and especially on the history of arts in this Romanian province. (Location: Sibiu, Piata Republicii 4.)

"Bethlen" Library [Biblioteca Documentară "Bethlen"]

Founded in 1622 in Alba-Iulia, the library was reorganized and moved to Aiud in 1661. Its collection includes about 70,000 volumes of books, periodicals, and other kinds of documents concerning philosophy, history, literature, etc.; incunabula; old and rare books from the 16th to the 18th centuries; and an important collection of periodicals from the 18th to the 19th centuries. The library has an important collection of works concerning Transylvania's history. (Location: Aiud, Str. Gh. Gheorghiu-Dej 1.)

PUBLIC LIBRARIES

Two basic characteristic features of public library organization in the Socialist Republic of Romania are: (*a*) the assumption by the state of this fundamental cultural unit; and (*b*) the organization of a complete urban and village public library network, in accord with the administrative structure of the country.

Every district (county), municipality or other town, and each commune or village has its public library network or unit, supported cooperatively by central and local state authorities, for the benefit of all citizens.

At the beginning of 1975 there were 6,575 public libraries, containing 52,882,000 volumes. During 1974, 38,483,000 volumes were supplied for the use of 3,918,000 readers (*57*).

The Council of Culture and Socialist Education is the central state and political organ for library problems. Methodological guidance for public libraries is accomplished through the Central State Library of the Socialist Republic of Romania.

Some of the most important public libraries are the following:

Arad County Library [Biblioteca Judeteană Arad)

The library was founded in 1888. Its collection contains about 270,000 volumes of books and periodicals, incunabula, old and rare books (from the 16th to the 18th centuries), and an important collection of books about the Romanian people's history. (Location: Arad, Piata George Enescu [Palatul Culturii].)

Bacău County Library [Biblioteca Judeteană Bacău]

This library was founded in 1950. (Location: Bacău, B-dul 6 Martiel.) It has a collection of about 260,000 volumes of books and periodicals, recordings, albums, maps, etc., including old Romanian books. The library's publications include:

Bibliography of the Periodicals of Bacău (1867–1967) [Publicatiile periodice băcăuane (1867–1967)].

Local Union Catalog [Catalog colectiv local].

Brashov County Library [*Biblioteca Judeteană Brasov*]

The library was founded in 1926 as the Branch Library of the Transylvania Association for Romanian Literature and the Culture of the Romanian People [Asociatiunea Transilvană pentru Literatura Română si Cultura Poporuliu Român—ASTRA]. (Location: Brashov, B-dul Gh. Gheorghiu-Dej 33–35.) Its collection includes about 350,000 volumes of books, periodicals, manuscripts, and other kinds of documents; an important collection of publications concerning Transylvania's history; manuscripts from the 16th to the 18th centuries; and incunabula and old and rare books. Among its publications are:

Bibliographies on *Old Romanian Books in the Library's Collection.*

Folklorists from the Brashov Region [Folcloristi de seamă din regiunea Brasov].

The Ethnographical Bibliography of the Brashov Region [Bibliografia etnografica a Tării Bîrsei].

Bibliophilic Rare Pieces in the Library's Collection [Valori bibliofile în Biblioteca judeteană Brasov].

Municipal Library "Mihail Sadoveanu" [*Biblioteca Municipală "Mihail Sadoveanu"*]

This library was founded in 1935 and incorporates a central library and 63 branch libraries. Its collection includes about 1,150,000 volumes of books and periodicals, and an important collection about the history of Bucharest. The library issues the quarterly publication *Bucharest's Bibliography* [Bibliografia orasului Bucuresti] and other materials. (Location: Bucharest, Str. Nikes Beloiannia 4.)

Cluj-Napoca County Library [*Biblioteca Judeteană Cluj-Napoca*]

The library was founded in 1945; it incorporates a central library and several branch libraries. The collection contains about 250,000 volumes of books and periodicals, and an important collection of books about the history of the town Cluj-Napoca. Among its publications is the *Bibliography of Cluj-Napoca County* [Bibliografia judetului Cluj]. (Location: Cluj-Napoca, Piata Stefan cel Mare 1.)

Constanta County Library [*Biblioteca Judeteană Constanta*]

Founded in 1935, this institution incorporates a central library and several branch libraries. It has a collection of about 250,000 volumes and periodicals, and a complete collection of the publications issued on Dobrudja territory. The library publishes the annual *Bibliography of Dobrudja Region* [Bibliografia Dobrogei] and other items. (Location: Constanta, B-dul Republicii 7 bis.)

Dolj County Library [*Biblioteca Judeteană Dolj*]

The library was founded in 1908. It has a collection of about 170,000 volumes of books and periodicals, old and rare books (from the 16th and 17th centuries), and an important collection of publications issued on Oltenia's territory or concerning Oltenia. (Location: Craiova, Str. M. Kogălniceanu 9.)

Mehedintzi County Library [*Biblioteca Judeteană Mehedinti*]

This library was founded in 1921. Its collection contains about 120,000 volumes of books and periodicals, old and rare books (from the 16th and 17th centuries), 17th-century manuscripts, microfilms, etc. The library publishes the *Regional Bibliography* [Bibliografie a regiunii] and other materials. (Location: Drobeta-Turnu Severin, B-dul Republicii 2.)

Vrancea (Franchea) County Library [*Biblioteca Judeteană Vrancea*]

Founded in 1910, the library was reorganized in 1927 and 1950. Its collection includes about 100,000 volumes of books and periodicals, and an important collection of publications issued on Vrancea territory. (Location: Focsani, Str. M. Kogălniceanu 12.)

The "V. A. Urechia" County Library [*Biblioteca Judeteană "V. A. Urechia"*]

Founded in 1890, the library was reorganized in 1940 and 1946–1951. Its collection includes about 350,000 volumes of books, periodicals, manuscripts, drawings, engravings, and other kinds of documents; an important national publications collection; incunabula; old and rare Romanian and foreign books and periodicals; and microfilms, musical records, etc. The library publishes bibliographical works on *Old and Rare Romanian Books in the Library*, *Bibliography of Galatzi Region*, *Local Personalities*, etc. (Location: Galati, Str. Mihai Bravul 16.)

The "Gh. Asachi" County Library [*Biblioteca Judeteană "Gh. Asachi"*]

Founded in 1920, this library was destroyed during World War II and reestablished in 1950. (Location: Jassy, Str. Palatului 1 [Palatul Culturii].) It incorporates a central library and several branch libraries. The collections include about 300,000 volumes of books and periodicals, engravings, maps, microfilms, recordings, etc.; incunabula; old and rare books (from the 16th and 18th centuries); and an important collection concerning Moldavia's history. Its publications include:

Accession Catalog [Cresterea fondului de publicatii în anii 1963 . . .].

Regional Bibliography [Contributii la bibliografia regiunii Iasi], 1959–.

Bishor (Bikhor) County Library [*Biblioteca Judeteană Bishor*]

The library was founded in 1950. Its collection contains about 350,000 volumes of books, periodicals, manuscripts, maps, and other kinds of documents; an important collection of Romanian publications concerning Transylvania's history;

incunabula; and old and rare Romanian and foreign books (from the 16th to the 19th centuries). It carries on bibliographical activity. (Location: Oradea, Piata Victoriei 3.)

Argesh County Library [Biblioteca Judeteană Arges]

This library was founded in 1950. It has a collection of about 150,000 volumes of books, periodicals, and other kinds of documents; old and rare Romanian books (Location: Pitesti, Str. Victoriei 8 [Palatul Culturii].)

The "N. Jorga" County Library [Biblioteca Judeteană "N. Jorga"]

The library was founded in 1921. Its collection includes about 250,000 volumes of books, periodicals, and other kinds of documents; old and rare Romanian books and periodicals; an important collection of publications issued in the Prakhova region; old and rare foreign books (from the 17th century); and "ex libris" from the private libraries of Nicholas Jorga, N. Titulescu, Andre Maurois, Vasile Alecsandri, Ion Heliade Rădulescu, M. Sadoveanu, among others. The library publishes the *Bibliography of the Prakhova Region* [Bibliografia prahovei] and other bibliographical works. (Location: Ploiesti, Str. N. C. Krupskaia 1.)

"ASTRA" Sibiu County Library [Biblioteca Judeteană "ASTRA"—Sibiu]

This library was founded in 1861 as the Central Library of the Transylvanian Association for Romanian Literature and the Culture of the Romanian People [Asociatiunea Transilvană pentru Literatura Română si Cultura Poporului Român—ASTRA], and it had the role of Romanian National Library for Transylvania. Its collection includes about 500,000 volumes of books and periodicals, manuscripts, and other kinds of documents; an important national collection of publications concerning Romanians' life in Transylvania; old and rare Romanian books; and an important collection of periodicals. The library also has a most valuable collection of manuscripts and historical documents concerning the Romanian people's history; literary manuscripts of prominent Romanian writers (M. Eminescu, I. L. Caragiale, V. Alecsandri, G. Cosbuc, Al. Vlahutză, B. P. Hasdeu, I. Slavici, St. O. Iosif, Duiliu Zamfirescu, C. Negruzzi, Titu Maiorescu, etc.); and old and rare foreign books and periodicals. It carries on very valuable bibliographic activity. (Location: Sibiu, Str. Gh. Baritiu 5.)

Suceava (Sucheava) County Library [Biblioteca Judeteană Suceava]

Founded in 1950, this library is continuing the activity of the former town public library, set up in 1920. Its collection contains about 170,000 volumes of books and periodicals, and old Romanian books and other publications concerning Suceava territory. (Location: Suceava, Str. V. I. Lenin 4.)

Timish County Library [*Biblioteca Judeteană Timis*]

The library was founded in 1904. (Location: Timisoara, Piata Libertătii 3.) It has a collection of about 500,000 volumes of books, periodicals, manuscripts, and other kinds of documents; an important Romanian publications collection concerning the history of Transylvania and Banat; and old and rare books. The library's publications include:

Bibliographies on *Mihai Eminescu in Banate* [Mihai Eminescu în Banta]; *Dimitrie Tichindeal;* and *Vasile Alecsandri—75 Years After His Death* [La 75 de ani de la moartea scriitorului Vasile Alecsandri].

Bibliographic Index of the review *Orizont*.

Muresh County Library [*Biblioteca Judeteană Mures*]

Founded in 1913, the library was reorganized in 1951. Its collection includes about 400,000 volumes of books, periodicals, and other kinds of documents; an important Romanian collection of publications; old and rare foreign books (from the 16th to the 19th centuries); and modern works in Romanian, Hungarian, German, Russian, etc. The library is engaged in bibliographical activity. (Location: Tîrgu Muresh, Str. George Enescu 2.)

All county, municipal, and other town libraries serve as methodological guidance centers for the public libraries functioning within the respective territory.

For other public libraries see *Romania's Libraries Guide* (listed in the Bibliography).

TRADE UNION LIBRARIES

Organized in all kinds of production enterprises (factories, plants, etc.) and in all big institutions, the trade union libraries have multiple purposes: (*a*) to provide an adequate professional documentation; (*b*) to carry on an efficient cultural and political education; (*c*) to supply books to the staff of the enterprises and institutions, and to their families; (*d*) to popularize literature and arts, and to promote cultural activities.

In order to answer all these purposes, the trade union library collections contain publications from a wide variety of fields, that is, technical books meant to support the respective production processes, and also books on politics, economics, science, literature and art, etc.

As criteria for the organization of trade union libraries, the geographical and the work-place principles are applied. In this respect, all trade union libraries function in—or in the neighborhood of—the respective enterprise or institution. Another managerial principle is that of close cooperation between this library category and the trade union clubs.

At the beginning of 1974, 3,560 trade union libraries (containing 12,973,000 volumes) were functioning in the Socialist Republic of Romania, and the average collection size was 3,644 volumes per library. In 1973, for a total number of 1,085,000 readers (i.e., an average of 305 readers for each library), 6,112,000 volumes were supplied (i.e., 1,714 volumes per library) (*58*).

It must be pointed out that, while they were initially scattered among numerous small enterprises and institutes, the trade union libraries are now reorganized on the basis of new, modern principles (the criteria of centralization and specialization).

PRODUCERS COOPERATIVES' LIBRARIES

This library category is somewhat similar to that of the trade union libraries. The producers cooperatives' libraries are organized in towns (close to the craft cooperatives) and in villages (close to collective farms), and generally have the same purposes as the trade union libraries. The producers cooperatives' libraries are supported by members' contributions, as they function for the benefit of the members and their families.

Organized on the same managerial criteria as the trade union libraries (the geographical and work-place principles), the producers cooperatives' libraries usually contain both scientific–technical publications concerning current production problems, and a general collection of political, economic, and cultural books.

Initially scattered among numerous small cooperative units, the producers cooperatives' libraries were subjected to a rationalization, centralization, and specialization process during the recent period.

At the beginning of 1974, there were 178 producers cooperatives' libraries functioning in the Socialist Republic of Romania; they contained 1,119,000 volumes (i.e., an average stock of 6,291 volumes per library). During 1973, these libraries served 139,000 readers, and 1,018,000 volumes were supplied (an average of 5,718 volumes per library) (*58*).

Generally, the trade union libraries and the producers cooperatives' libraries perform a very important mission, backing up and complementing the complex work of the public and scientific–technical libraries.

SPECIAL LIBRARIES

The name of this category designates two types of libraries: (*a*) libraries with a special position and status; and (*b*) specialized libraries, which have a special nature and function. The main subcategories of Romanian special libraries are: the armed forces libraries, the church–theological libraries, foreign libraries in Romanian territory, and Romanian libraries in foreign territories.

Some of the most important special libraries are the following:

ARMED FORCES LIBRARIES

See also *Romania's Libraries Guide*, pp. 70–72.

The Central Library of the National Defense Ministry
[Biblioteca Centrală a Ministerului Apărării Nationale]

Founded in 1845, this library has been reorganized several times. It incorporates a central library and several branch libraries. Its collection contains more than 250,000 volumes of books, periodicals, and other types of documents, especially concerning military art, science, and technics; and an important collection of old and rare books (beginning with the 16th century), including the first Romanian publications concerning military problems. The library issues bibliographic bulletins and numerous other publications. (Location: Bucharest, B-dul Gh. Gheorghiu-Dej 2.)

The Library of the Military Academy [Biblioteca Academiei Militare]

The library was founded in 1899. It has a collection of about 200,000 volumes of books and periodicals concerning military art, science, and technics, as well as Romanian military history. (Location: Bucharest, Soseaua Panduri 68–72.)

The Library of the Central Military Museum [Biblioteca Muzeulu Militare Central]

The library was founded in 1924. Its collection includes more than 50,000 volumes of books, periodicals, manuscripts, maps, and other kinds of documents concerning military history, art, science, and technics. (Location: Bucharest, Str. Izvor 137.)

CHURCH–THEOLOGICAL LIBRARIES

The Library of the Romanian Patriarchate [Biblioteca Patriarhiei Române]

Founded in 1930, the library was reorganized in 1940–1941 and 1952. It has a collection of about 100,000 volumes of books and periodicals, manuscripts, and other types of documents, especially on theology; church ritual books; incunabula; an important collection of old Romanian books; and old and rare foreign books (from the 16th century and later). (Location: Bucharest, Str. Patriarhiei 2; and Str. Antim 29.)

The Library of the Moldavian Metropolitan Bishopric
[Biblioteca Mitropoliei Moldovei]

The collection of this library includes an important fund of books and periodicals, manuscripts, and other types of documents, especially on theology; church ritual books; an important fund of Romanian old and rare books, particularly concerning Moldavia's history; and rare foreign books. It is located in Jassy.

The Library of the Metropolitan Bishopric of Sibiu [Biblioteca Mitropolitană Sibiu—Tutelată de Arhiepiscopia Ortodoxă Române de Alba-Iulia si Sibiu]

The library was founded in 1850. It has a collection of about 60,000 volumes of books and periodicals, manuscripts and other types of documents, especially on theology and other related fields; church ritual books; and an important collection of old Romanian books (from the 16th and 17th centuries) concerning Romanian history, etc. (Location: Sibiu, Str. 1 Mai 20.)

The Library of the Romanian Orthodox Archiepiscopate of Timisoara and Caransebesh [Biblioteca Arhiepiscopiei Ortodoxe Române a Timisoarei si Caransebesului]

The library was founded in 1940, continuing the activity of the libraries of the Romanian Bishoprics of Lugoj (1856) and Caransebesh (1865). Its collection includes about 50,000 volumes of books, periodicals, and other kinds of documents, especially works concerning theology; church ritual books, etc.; and an important collection of publications regarding the history of the Romanian province of Banat. (Location: Timisoara, Str. Nikos Bieloiannis 7.)

The Library of the Romanian Orthodox Bishopric [Biblioteca Episcopiei Ortodoxe Române]

This library was founded in 1921. Its collection contains an important fund of books and periodicals concerning theology and history, as well as church ritual books and old and rare Romanian books (from the 17th century and later), especially regarding Transylvania's history. (Location: Cluj, Piata Victoriei 18.)

The Library of the Romanian Orthodox Bishopric of Arad [Biblioteca Episcopiei Ortodoxe Române a Aradului]

Founded in 1840, the library was reorganized in 1885 and 1927. The collection includes an important fund of books, periodicals, manuscripts, etc., on theology and related subjects; and old and rare books, particularly works regarding Transylvania's history. (Location: Arad, Str. 7 Noiembre 60–62.)

The Diocesan Library of the Romanian Orthodox Bishopric of Buzău [Biblioteca Eparhială a Episcopiei Buzăului]

The library was founded in 1925. Its collection includes an important fund of books and periodicals on theology and related subjects; works on history, etc.; church ritual books; and old and rare Romanian publications regarding the Romanian people's history. (Location: Buzău, Aleea Episcopiei 3.)

The Library of the Orthodox Diocese of Roman and Hush
[Biblioteca Eparhiei Romanului si Husilor]

The library was founded in 1932. The collection is an important fund of books and periodicals concerning theology, history, and related fields; and also church ritual books, etc. (Location: Roman, Str. Alexandru cel Bun 5.)

The Library of the Theological Institute [Biblioteca Institutului Teologic]

Founded in 1887, the library was reorganized in 1927 and 1948. Its collection numbers about 100,000 volumes of books and periodicals, especially those concerning theology, history, social sciences, literature, etc. (Location: Bucharest, Str. Sf. Ecaterina 2.)

The Library of the Theological Faculty of the Protestant Church
[Biblioteca Facultătii de Teologie Reformată]

The library was founded in 1895. The collection includes more than 50,000 volumes of books, periodicals, etc., particularly on theology, history, and related subjects. (Location: Cluj, Piata Malinovski 13.)

FOREIGN LIBRARIES IN ROMANIA

In order to promote international cultural relations, there are special Romanian libraries, such as the Library of the Romanian Institute for Foreign Cultural Relations [Biblioteca Institutului Român pentru Relatii Culturale cu Străinătatea—IRRCS], located at B-dul Dacia 35, Bucharest.

But there are also *foreign libraries* (organized by other countries in Romania) and there are *Romanian libraries organized with foreign assistance*—all carrying on some complex documentation functions. The most important among them are the following:

United Nations Organization's Library and Information Center in Bucharest [Biblioteca si Centrul de Informare al Organizatiei Natiunilor Unite], Bucharest, Str. Aurel Vlaicu 16.

United Nations Organization's European Center for Higher Education—Centre Européen pour l'Enseignement Supérieur de l'Organisation des Nations Unies [Centrul European pentru Invătămîntul Superior al Organizatiei Natiunilor Unite], Bucharest; Stribei Vodă 39.

The Library of the Romanian UNESCO Commission [Biblioteca Comisiei Nationale a Republicii Socialiste România pentru UNESCO], Bucharest, Str. M. Eminescu 8 (Piata Romană).

The UNESCO Special Reading Room of the Central State Library of the Socialist Republic of Romania [Sala de Lectură UNESCO a Bibliotecii Centrale de Stat a Republicii Socialiste România], Bucharest, Str. I. Ghica 4.

The American Library [Biblioteca Americană], Bucharest, Str. Al. Sahia 7.

The Central Library of the Romanian-Soviet Relations' Association [Biblioteca Centrală ARLUS], Bucharest, Str. Batiste 14.

The French Library [Biblioteca Franceză], Bucharest, B-dul Dacia 27.

The Italian Library [Biblioteca Italiană], Bucharest, Str. Nuferilor 27.

The [German] Library of the "Fr. Schiller" Culture House [Biblioteca (de limba germană) a Casei de Cultura "Fr. Schiller"], Bucharest, Str. Batiste 15 (Romanian Library of German Language).

The [Hungarian] Library of the "Petöfi Sándor," Bucharest, Str. I. Zalomit 6 (Romanian Library of Language).

ROMANIAN LIBRARIES IN FOREIGN COUNTRIES

Two Romanian libraries are now functioning abroad, in the United States and in Italy.

The Romanian Library [Biblioteca Română de la New York], 866 Second Avenue, Hammarskjöld Plaza, New York, N.Y.

The Romanian Library—Biblioteca Romena, Accademia de Romania [Biblioteca Română de la Roma], Piazza Jose de San Martin 1, Valle Giulia 00197, Rome.

We should note that other, similar libraries will most probably be created in other countries in the future.

NOTE: We have presented only a few of the Romanian libraries functioning at present. For other libraries, as well as for more details on the organization, collections, and activities of the libraries listed here, see *Romania's Libraries Guide*, which is listed in the Bibliography.

Information and Documentation Activity in Romania

GENERAL INFORMATION

The history of Romanian science and culture would not exist and could not be explained without the existence of a parallel history of Romanian documentation. Continuity is the most important characteristic feature of Romanian history, and documentation is a permanent way to show this fact. This is evident in matters of both culture and science. In fact, modern Romanian documentation has always been based on an advanced conception of the direct connection between science and culture, on the one hand, and between documentation and libraries, on the other hand.

This reality was evident in the past, too. For instance, in the 16th and 17th centuries, the Moldavian chroniclers made all the necessary documentary investigations and studied all earlier historical sources in order to prepare their chronicles. This also was obvious in 1688, when—preparing the manuscript of the first complete Romanian Bible for printing—Serban Cantacuzino and other learned men strove to discover, study, and put together all the fragments of the Bible formerly translated into Romanian from the Greek, Slavonian, and Hebraic languages.

This is evident in matters of science, too. The interdependence between Romanian science and documentation is very understandable. The highest scientific work is research, which provides results that can be utilized to carry discovery and invention further. Fruitful research can only be performed in specially equipped institutes with laboratories and documentation services. Romania is no exception to this rule.

Great Romanian scholars and cultural personalities—such as Ioan Bianu, Emil G. Racovitză, Demeter Gusti, and Paul Negulescu—were creators in matters of documentation too.

For instance, Ioan Bianu (member and president of the Romanian Academy) was the founder and organizer of the largest and oldest National Library of Romania—the Romanian Academy Library, and he was its director for more than 50 years. The great historian Nicholas Jorga said:

> It is there, at the Academy, where carefully preserved is our most precious documentary treasure, without which it would be impossible to write anything about the Romanian people, that a man sacrificed himself and dedicated all his life to a great work: setting up of 'The Romanian Academy Library'. . . . He came young to this job, and when he died, he left us as legacy a splendid documentary institution, in which we can all work quietly, in good order, in excellent scientific conditions, as in every civilized country.

Another outstanding Romanian scholar and documentalist, Emil G. Racovitză (founder of a new science, "biospelaeology," and participant in the famous Antarctic expedition on the ship *Belgica*), was also the creator of new conceptions, forms, and techniques in matters of documentation.

Emil G. Racovitză expressed his documentary conception as follows: "In order to enable us to cope with the tremendous multitude of specialized publications, permanently increasing in number, as well as to be informed about the most recent results of the science, the scientific researcher needs *good libraries*, well equipped and fitted up, accurate bibliographic and information instruments, as well as special archives and files, all organized in a scientific manner."

Before coming to Cluj from Paris, Racovitză worked with the French scholar Joseph Deniker in the French Museum of National History in Paris, where he intended to create a union catalog of scientific periodicals. However, he completed the task in Romania, and he published the *Catalog of the Scientific and Medical Periodicals Extant in Cluj* [Catalogue de revues scientifiques et médicales de Cluj] in 1920–1926—at the same time as the French *Inventaire de périodiques scientifiques de bibliothèques de Paris*, prepared by Alfred Lacroix and Léon Bultingaire.

E. Racovitză also created some original documentary techniques for the filing and preservation of biological documents, photographs, and preparations. Racovitză founded all his documentary activity—in fact, a real "documentology"—on a very modern basis.

One of his ideas was that the modern scientific researcher needs not only "bibliographic documentation" but also other, new forms of documentary activity, which use a great variety of documents: "iconographic" ones (i.e., photographs, stereotypes, films, slides, microfilms, etc.); collections of drawings, maps, and engravings; and collections of microscopic preparations, museum collections, etc. It is the organization of all these types of documents that is the object of different sections of scientific documentation; and this is a proper new *technica culturalis*, a real science founded on the principle "time is money"—and money is the unique requirement for normal existence in this period of development of our so-called civilized society.

Racovitză made three documentary studies concerning his new method of vertical filing of large-sheet documents, stereotypes and other photographic documents, and microscopic preparations. Their originality consists of the extension of the method of filing cards of standardized formats, in order to realize a modern and systematic organization (filing, preservation, and manipulation) of all kinds of materials used in biological documentation. In this way, the resulting card indexes and photograph library indexes can be used at the same time for *storage* and for *catalog* purposes.

Another of Racovitză's original conceptions was that concerning the new solution to the so-called bibliographic problem. His *Bibliographic Policy*, which was conceived on a scientific, cooperative spirit, is based on some new and original ideas: (*a*) to create union catalogs; (*b*) starting from these, to organize (by purchases of material, by subscriptions, exchanges, etc.) a unique, complete, and rational acquisition policy common to all participating scientific, cultural, and economic organizations, in order to provide complete documentation available to all participant units; (*c*) to use together all documentation acquired in this way.

These ideas were initiated and realized by Racovitză in the town of Cluj (Transylvania) in 1920–1926; their extension to Bucharest was then proposed by Simion Tzovaru in 1927, by St. Vencov in 1932, and to the whole country by St. Motash in 1939. These very advanced ideas can be found again, about 25 years later, in the Farmington Acquisition Plan of the United States and in the Deutsche Forschungsgemeinschaft plans of West Germany.

Another prominent Romanian scholar and documentalist was Demeter Gusti, the founder of modern Romanian sociology. The Documentation Center of the Romanian Social Institute of Bucharest (1919) and the United Nations Social Institute of New York (1947) were planned and realized on the basis of his original ideas.

Other Romanian scientists worked directly with the International Institute of Documentation, for example, Paul Negulescu and C. Dimitrescu-Iasi, among others.

George Cristescu, having been sent by Paul Negulescu to participate in the International Congresses of Administrative Science (held in Brussels in 1910 and

1923), visited the International Institute of Documentation (at that time called the International Institute for Bibliography). Afterward, he wrote:

> Visiting the International Institute for Bibliography, I had the honour to make the acquaintance of Mr. Paul Otlet and Mr. Henri de Lafontaine. I must point out that both were acquainted with Romanian documentation activity. For instance, Paul Otlet showed me all the data in his special documentary file about Paul Negulescu's activity, admiring very much the Romanian original idea of creating a School for Documentation and Administrative Sciences (1928). . . . Paul Otlet also revealed his active cooperation with C. Dimitrescu-Iasi, the Rector of the Bucharest University, concerning what the scientific documentation system meant to the Romanian students. . . . He showed me his ample correspondence with his Romanian friend and collaborator. . . .

Such international relations became traditional among Romanian documentalists. Today, the National Information and Documentation System of the Socialist Republic of Romania is affiliated with many international documentation forums and systems, such as the International Federation for Documentation (FID), UNISIST, the International Center for Documentation of the Socialist Countries in Moscow, the International Atomic Agency in Vienna, the Food and Agriculture Organization (FAO) in Rome and Frankfurt, the World Health Organization in Geneva, Le Bureau de Documentation de l'Union Internationale des Chemins de Fer in Paris, and the Shared Cataloging System of the Library of Congress in Washington, D.C.

As in the beginning of this century, when Romania actively cooperated with the International Institute for Documentation, the actual national information and documentation system of the Socialist Republic of Romania has continued its international contacts and has become a more active and efficient partner of the worldwide information activity of UNISIST, and of other international macrosystems.

BRIEF HISTORICAL SURVEY OF DOCUMENTATION DEVELOPMENT IN ROMANIA

The beginning of documentation activity is connected with Romanian book history, the circulation and use of foreign books in Romania, and Romanian library development. In all of Romania's provinces, libraries (together with printing houses) represented the first documentation sources. The documentary efficiency of Romanian libraries was completed by acquiring information from abroad by means of correspondence, as well as by visiting and utilizing foreign libraries (59).

Early Romanian documentation activity began by using the catalogs of printing houses, bookstores, and libraries. This "catalog period" lasted approximately until 1860. When printing houses were managed by Romanian scholars such as I. Eliade Rădulescu, G. Asachi, and M. Kogălniceanu, and when libraries became necessary for the rapidly developing intellectual social class, the "bibliographical period" began.

Beginning with the second half of the 19th century, after the founding of the modern Romanian state (1864) and the establishment of the institutions of higher learning, Romanian documentation activity developed in four main directions: (*a*) the documentation needed for Romanian historical studies and for compilation of the general bibliography of Romania's culture; (*b*) the documentation required by Romania's economic and technical growth; (*c*) the documentation in support of Romanian scientific development; and (*d*) the documentation involved in the process of Romania's interaction with worldwide technology and civilization. In the last two decades of the 19th century another, fifth, direction of activity was added: library and information science.

Documentation for Historical Studies

About a century ago, the great historians Nicholas Bălcescu and M. Kogălniceanu called on the Romanian people for a spiritual revival and also for the recovery of the consciousness of their historical rights: ". . . by means of documentation." "All we can and we must do now," said Bălcescu in the prospectus for the review *The Historical Magazine for Dacia,* "is to gather our historical documents and make a collection which will enable us to write Romania's history."

Documentation for Economic and Technical Development

The documentation for Romania's economic and technical growth developed after the Peace Treaty of Andrianople (1829), which abolished the Turkish monopoly on Romanian foreign trade; and after the War for Independence (1877/78), which established Romania's full suzerainty. A period of powerful economic and technical development followed, stimulated by the new foreign trade demands. Parallel with the growth of traditional agriculture, the first steps toward a national industrial policy took place in Romania. Special laws were created promoting and protecting the development of capitalism in Romania. The development of agriculture and industry created the need for well-trained technical staff and for adequate documentation. For that purpose, specialized institutions like the Polytechnical High School (1881), the Faculty of Veterinary Medicine (1860), and the National School for Medicine and Surgery (1857) were founded, all of which had specialized libraries and carried on different forms of documentary activity.

Documentation for Scientific Development

The documentation for Romanian scientific development was conducted both by institutions and by individuals, generally scholars performing scientific tasks.

After the foundation of the Universities of Bucharest, Jassy, Cluj, and Czernowitz and the establishment of their specialized faculties, and after the establishment of seminaries, clinics, and laboratories, a proper documentation activity was begun in each specialized library in support of the scientific activity of university professors. These scholars also worked individually, in various fields of natural and social science, using private documentation.

Documentation for Worldwide Contacts

Concomitant with the growth of documentation activity of the country's technical and economic progress, the documentation involved in the process of Romania's interconnection to worldwide technology and civilization began to be developed.

As the Romanian capitalist economy developed, including home and foreign trade, Romania was obliged to set up a series of institutions and activities quite indispensable for modern life and international cooperation. All these institutions had specialized boards performing current documentary activities. In this respect we can mention the foundation of the Central Meteorological Institute in Bucharest (1885); the Astronomical Observatory, in Bucharest (1875), and later in Jassy (1918) and Cluj (1924); the Metrological Board (1889); the Office for Rationalization and Standardization and the Office of Industrial Property (1906). All of these had their documentation section and activities.

Gradually, Romania was to be linked to all international organizations and conventions regulating the services of every modern country, such as post and telecommunications, telephone and radio, and banking. Of course, all these modern activities required the establishment of specialized documentation boards.

Documentation for Library and Information Science

As Romanian library, bibliographic, and documentary units and activities were organized, they began to be influenced by similar foreign institutions, by their studies and researches carried on abroad, and particularly by the modern theories of library and information science. This new discipline of library and information science began to be cultivated and applied in Romania.

For instance, it was under the influence of Paul Otlet's ideas that Ioan Bianu organized the Romanian Academy Library using very modern principles. In this respect, Bianu—aiming to create a proper Romanian documentary center, not merely a library—gathered during his more than 50-year directorate all kinds of documents concerning the Romanian people's life and history. Further, he organized the documents separately, according to type, in the general Publications Fund (books, periodicals, etc.) and in the five so-called Special Cabinets (for manuscripts; engravings, drawings, and photographs; maps; musical documents; and numismatic and philatelic pieces).

The standardized catalog, bibliographic, and information cards; the bibliographic description rules; and Universal Decimal Classification were adopted as a result of the influence of Paul Otlet. For example, the first volume of Romanian National Bibliography—*The Old Romanian Books Bibliography*, published by Ioan Bianu—represented a very great success both in Romania and in the international milieux. Actually, the scientific ideas of the International Institute for Bibliography directly or indirectly influenced the general conceptions of all Romanian scholars, as well as their documentary activities.

Generally, scientific, technical, economic, and cultural documentation development in the 20th century followed the same main directions, but under more complex and modern conditions.

As pointed out in D. Dragulanescu's report, presented at the Fourteenth Conference of the International Federation for Documentation (Oxford, 1938), "parallel with the development of the libraries belonging to the higher learning organizations, numerous institutions for study, research and development, and documentation in all scientific, technical, economic, and social fields" were created in Romania.

In all institutions, as well as in the ministries and the large business enterprises, so-called Study and Documentation Offices [Servicii de Studii si Documentare] were created.

The full industrialization of Romania during the first four decades of the 20th century and the specialization and diversification of science determined the establishment of a great variety of research institutes, for example: the Geological Institute [Institutul Geologic] (1906), the Institute for Agricultural Researches [Institutul de Cercetări Agronomice] (1927), the Forestry Research Institute [Institutul de Cercetări Forestiere], the Romanian Energy Institute [Institutul Român de Energie], the National Institute of Technological Research [Institutul National de Cercetări Technologice], the Romanian Economic Institute [Institutul Economic Românesc] (1921), and the Romanian Institute for Labor Organization [Institutul Românesc de Organizare Stiintfică a Municii]—all in Bucharest.

Also, in matters of social sciences, similar research institutes were created, such as: the Institute for Study and Research of National History [Institutul de Istorie Natională] in Cluj (1920), the Institute for Literary Studies [Institutul de Literatură] (1921), the Institute for Southeast European Studies [Institutul de Studii Sud-Est Europene] (1913), and the Romanian Social Institute [Institutul Social Român] (1919)—all in Bucharest. In addition, foreign institutes were set up, including L'Institut Français des Hautes Études en Roumanie (1924) and L'Istituo de Cultura Italiana.

All these institutions—which used and originated new documentary materials, including synthesis and different kinds of secondary documents in their respective special fields—had documentation offices working closely with their specialized libraries.

Besides these documentation and library units, archives and museums were also organized and developed.

As a result of such an abundant documentary activity, two main trends became more and more evident: the tendency toward a greater specialization of the documentary units; and, later on, a powerful endeavor toward the development of a complete national documentation system.

The first professional institution in matters of documentation was the High School of Documentation and Administrative Science, founded by the Institute of Administrative Sciences (under Professor Paul Negulescu) in 1928; and the first specialized documentation center was the Documentation Center of the Romanian Railways, set up in 1937/38.

Concern for the realization of a Romanian national documentation system using uniform means and methods began in 1931, when the Congress of the Association of Engineers passed a resolution proposing the dissemination of technical information in modern, standardized forms. It occurred again in 1935, when a draft of a statute was elaborated, providing for the creation of a National Documentation Committee.

In 1937 the first Romanian abridged UDC version was published by D. Dragulanescu; and 8 years later a full Romanian UDC edition for "Electrotechnics and Related Fields" was issued by Al. T. Popescu.

However, the most important event in Romanian documentation development preceding World War II was the creation of the Romanian Center for Documentation [Centrul Român de Documentatie].

THE ROMANIAN CENTER FOR DOCUMENTATION

Founded on May 22, 1940, the Romanian Center for Documentation (RCD)* was concerned with the development and organization of the production, collection, classification, and dissemination of information and documents throughout Romania, and with the creation of a national documentation network, to be provided with branch offices in all scientific and cultural centers of the country.

Its headquarters were in Bucharest (Piatza Romană 6), and the Romanian Center for Documentation included 87 members: 60 individuals and 26 institutions and enterprises.

The staff of the center—including both specialists in matters of science, technology, and culture, and those in library and information science—was organized in several specialized "committees." These included the following groups: Normalization and Terminology (A. Avramescu), Bibliography and Abstracting (N. Georgescu-Tistu), and Classification and Coding (D. Dragulanescu). The Romanian Center for Documentation represented Romania abroad at all meetings of the International Federation for Documentation and other international forums.

The RCD issued its own specialized journal, intended to popularize important documentary sources, materials, and methods. The *Bulletin of the Romanian Center for Documentation* [Buletinul C(entrului) R(oman de) D(ocumentatie)] (1941–1945) contained rich and varied material meant for all categories of users involved in library and information activities. Among the most important items published in the *Bulletin*, we can cite: "The Scientific Research Organization" (D. Dragulanescu); "Stages in Putting the Science into Practice" (J. Holstrom); "The Efficiency of the Documentation Activity" (S. H. Bradford); "Principles for Documents' Classification" (Al. T. Popescu); "Documents' Cataloging and Classification" (D. Dragulanescu); "How to Organize a Bibliographical Information Industry" (E. Iasunskaia); and "The Great Importance of the Union Catalogs for Periodicals" (A. Avramescu), among other articles.

The Romanian Center for Documentation was asked to assist in many and

* The founders of the Romanian Center for Documentation were: Eng. D. Dragulanescu, Eng. A. Avramescu, Prof. A Sacerdoteanu, G. Baiculescu, Prof. N. Georgescu-Tistu, Barbu Theodorescu, Th. Ludu, P. P. Dulfu, V. V. Protopopescu, among others. Other members, after 1944, included: Prof. St. M. Milcu, Prof. M. M. Bercovici, Prof. A. Săiăgeanu, and P. Năvodaru.

varied practical matters, from simple advice concerning the organization of the libraries of the Public Health Institute and of the Documentary Office of the Ministry of Finance, to actual cooperation in the compilation of several UDC editions: for "Medicine and Connected Domains" and for "Electrotechnics and Related Fields." Similarly, RCD took part in the compilation of a "schema" for "Law Materials' Classification" and was consulted with regard to the foundation of a National Scientific Research Center.

During its brief existence (1940–1945), the Romanian Center for Documentation accomplished a modern Romanian conception of documentation, as well as a theoretical basis for the future national documentation system. Its activity, representing the beginning of a nationwide scientific organization of documentation in Romania, was continued and developed further after World War II.

DOCUMENTATION IN ROMANIA AFTER WORLD WAR II

Romania's great transformations in matters of politics, economy, science, culture, and education after World War II were based on a corresponding development of information and documentation activity. After a period of about 25 years (1949–1974)—during which numerous specialized documentation centers, offices, and boards were created—a modern national documentation structure was set up: the Romanian National Documentation System.

Among the most important documentation units created during this period are the following documentation institutes, centers, and offices, listed chronologically.

After the foundation of the Central Institute for Technical Documentation on January 1, 1949—when only one information center, i.e., the Documentation Center of the Romanian Railways (1948), was functioning in Romania—numerous documentation branch centers and offices were set up: Construction, Architecture, and Town Planning (1953); Chemistry and Oil Industry (1956); Forestry Economy (1960); Machine Construction Industry (1963); Metallurgical Industry (1964); Natural and Social Sciences (in the Scientific Documentation Center of the Academy of the Socialist Republic of Romania) (1964); Agriculture and Forestry (1965); Energetics (1966); Mining and Geology (1966); Light Industry (1967); Labor Problems (1968); Hydro-Technics (1968); Social and Political Sciences (in the Documentation Center of the Academy for Social and Political Sciences) (1969); Education (1971); Culture (1971); Laws and Other Normative Acts (1971); and Nuclear Physics (1972).

Each such information and documentation center or office performed the tasks of a technical publishing house in its specialized field, compiling and publishing secondary documents, information bulletins, and abstracts reviews, as well as tertiary documents: "Synthesis," "Current Trends in . . . ," etc. Each was also a guidance center for all library and information units in the respective departmental network, and a training board for the staff required by library and information activities.

Parallel with the proliferation and the specialization of departmental information and documentation centers and offices (along with their network of documentation boards functioning within enterprises and institutions) the development of a modern specialized library system took place. Developments in this field are discussed in the section on Special Libraries.

A very important event for the progress of Romanian documentation activity was the organization in 1966 of the National Council for Science and Technology [Consiliul National pentru Stiinta si Tehnologie]—initially the National Council for Scientific Research. Two significant events took place under the sponsorship of the National Council for Science and Technology: (*a*) the transformation of the Central Institute for Technical Documentation into the National Institute for Information and Documentation (on October 16, 1972), and (*b*) the reorganization of all of the documentation units of the country and the organization of a proper national information and documentation system (from May to December 1974).

ORGANIZATION OF DOCUMENTATION IN ROMANIA TODAY

A rational information and documentation system, organized on a modern basis and using both centralization and decentralization principles, is now functioning in the Socialist Republic of Romania. For instance, the coordination—on a national level—of all acquisitions of foreign books, periodicals, etc., is a *centralized* function; while the varied activities of the numerous production, research and development, design, education, and other units in matters of information and documentation are *decentralized*.

All Romanian documentation activity is coordinated by the National Council for Science and Technology [Consiliul National pentru Stiinta si Tehnologie], a central state body acting under the sponsorship of Romania's Council of Ministers.

The basic official document behind the organization and functioning of the scientific, technical, economic, cultural, and educational information and documentation system is Decree No. 138 of May 1974, which established the standard structure of all information and documentation units. This decree specified the structure of Romania's national information and documentation system, organized on three levels and consisting of: the central coordination unit, that is, the National Information and Documentation Institute—NIDI [Institutul National de Informare si Documentare]; 23 information and documentation offices, specializing in various branches and domains of activity; and the information and documentation boards of different production, research and development, design, education, and other units, working in all branches and domains of activity.

The National Information and Documentation Institute—NIDI is the organ of effective central coordination in matters of information and documentation activity. It has a juridical character and is subordinate to the National Council for Science and Technology.

NIDI is entrusted with the following tasks:

1. To put at the disposal of all central lending boards and staff of the Socialist Republic of Romania, all necessary kinds of information and documentation materials and activities, including documentary translations.

2. To assist, together with the information offices, the documentary activity of all units of production, research and development, design, education, etc., in the whole country.
3. To realize, on a nationwide level, the coordination of acquisitions of foreign publications (books, reviews, etc.) and other kinds of documents. All book orders, as well as all publication exchanges with foreign institutions, must be arranged only after consulting the National Council for Science and Technology.
4. To realize, together with the information offices, international cooperation activities in the documentation field.
5. NIDI is also concerned with the promotion of modern technical documentary means and methods in the Socialist Republic of Romania.

The information and documentation offices are sponsored by different ministries, departments, and other central state bodies; by the academies of science; and by central research institutes.

The main tasks of the information offices are the following:

1. To provide all necessary information and documentation materials and services (including documentary translations) for the lending boards and staff of each branch.
2. To organize, direct, and coordinate the activity of the central library of the ministry, academy, or central research institute.
3. To guide and assist the documentary activity of all production, research and development, design, and education units, acting within the network of the branch or field.
4. To assure the compilation of the studies, articles, and items meant to be published in the information and documentation reviews, as well as the scientific–technical, economic, etc., publications of the respective ministry, department, or other central state body, etc.

The information and documentation offices operating today in the Socialist Republic of Romania are the following:

The Information and Documentation Office for Chemical Industry [Oficiul de Informare Documentară pentru Industria Chemical], sponsored by the Central Institute for Chemical Researches, Bucharest, Calea Plevnei 139.

The Information and Documentation Office for Agriculture, Food Supply Industry, and Forestry [Oficiul de Informare Documentară pentru Agricultura, Industrie Ailmentară si Silvicultura], sponsored by the Ministry of Agriculture and Food Supply Industry, Bucharest, B-dul Mărăsti 61.

The Information and Documentation Office for Heavy Machine Construction Industry [Oficiul de Informare Documentară pentru Industria Constructiilor de Masini Grele], sponsored by the Ministry of Heavy Machine Construction Industry, Bucharest, Calea Victoriei 133.

The Information and Documentation Office for Machine-Tools Construction and Electric Industry [Oficiul de Informare Documentară pentru Industria Constructiilor de Masini-unelte si Electrotehnicii], sponsored by the Ministry of Machine-Tools Construction and Electric Industry, Bucharest, Calea Victoriei 133.

The Information and Documentation Office for Transport and Telecommunications [Oficiul de Informare Documentară pentru Transporturi si Telecomnicatii], sponsored by the Ministry of Transport and Telecommunications, Bucharest, Calea Grivitei 193 B.

The Information and Documentation Office for Education [Oficiul de Informare Documentară pentru Invătămint], sponsored by the Ministry of Education, Bucharest, Str. Nuferilor 30.

The Information and Documentation Office for Light Industry [Oficiul de Informare Documentară pentru Industria Usoară], sponsored by the Ministry of Light Industry, Bucharest, Str. I. Ghica 13.

The Information and Documentation Office for Metallurgical Industry [Oficiul de Informare Documentară pentru Industria Metalurgică], sponsored by the Ministry of Metallurgical Industry, Bucharest, Str. Academiei 7.

The Information and Documentation Office for Mining, Oil Industry, and Geology [Oficiul de Informare Documentară pentru Mine, Petrol si Geologie], sponsored by the Ministry of Mining, Oil Industry, and Geology, Bucharest, Str. Mendeleev 36–38.

The Information and Documentation Office for Energy [Oficiul de Informare Documentară pentru Energetică], sponsored by the Ministry of Power Engineering, Bucharest, B-dul Gen. Magheru 33.

The Information and Documentation Office for Forestry Economy and Construction Materials [Oficiul de Informare Documentară pentru Economia Forestieră si Materiale de Constructii], sponsored by the Ministry of Forestry Economy and Construction Materials, Bucharest, B-dul Gen. Magheru 31.

The Information and Documentation Office for Nuclear Physics and Energy [Oficiul de Informare Documentară pentru Fizică si Energie Nucleara], sponsored by the State Committee for Nuclear Energy, Communa Magurele, Bucharest.

The Information and Documentation Office for Medicine [Oficiul de Informare Documentară pentru Medicina], sponsored by the Ministry of Health, Bucharest, Str. Ilfov 4.

The Information and Documentation Office of the Ministry of National Defense [Oficiul de Informare Documentară al Ministerului Apăraii Nationale], Bucharest.

The Information and Documentation Office of the Ministry of Internal Affairs [Oficiul de Informare Documentară al Ministerului de Interne], Bucharest.

The Information and Documentation Office for Technical Material Supply, and Control of Capital Investment Management [Oficiul de Informare Documentară pentru Aprovizionarea Tehnico–materială si Controlul Gospodăririi Fondurilor Fixe], sponsored by the Ministry of Technical Material Supply, and Control of Capital Investment Management, Bucharest, Calea Victoriei 152.

The Information and Documentation Office for Construction, Architecture, and City Planning [Oficiul de Informare Documentară pentru Constructii, Arhitectură si Sistematizare], sponsored by the Ministry of Construction Industry, Bucharest, B-dul 1848 No. 10.

The Information and Documentation Office for Management and Information Science [Oficiul de Informare Documentară pentru Conducere si Informatică], sponsored by the Central Institute for Management and Information Science, Bucharest, Str. Racota 21.

The Information and Documentation Office for Social and Political Sciences [Oficiul de Information Documentară pentru Stiintele Sociale si Politice], sponsored by the Academy for Social and Political Sciences, Bucharest, Str. Moxa 5; and Str. Onesti 11.

The Information and Documentation Office for Labor Problems [Oficiul de Informare Documentară pentru Problemele Muncii], sponsored by the Ministry of Labor, Bucharest, Str. Scaune 1–3.

The Information and Documentation Office for Home Trade [Oficiul de Informare Documentară pentru Comertul Interior], sponsored by the Ministry of Home Trade, Bucharest, Str. Doamnei 12.

The Information and Documentation Office for Foreign Trade [Oficiul de Informare Documentară pentru Comertul Exterior], sponsored by the Ministry of Foreign Trade and International Economic Cooperation, Bucharest, B-dul Republicii 12–14.

The Information and Documentation Office for Hydro-Technics [Oficiul de Informare Documentară pentru Hidrotecnică], sponsored by the National Water Council, Bucharest, Splaiul Independentei 294.

There are many information and documentation boards functioning within the various units for production, research and development, design, education, etc., throughout Romania. In fact, almost every institution, enterprise, etc., has, in connection with its library, at least a small information and documentation section, office, or sector that acts in support of the respective production, research and development, design, and educational activities.

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   1508: The first book printed on Romania's territory: *The Slavonic Prayer Book,* Tîrgoviste (Wallachia).
   1544: The first printed book in Romanian: *The Calvinist Catechism,* Sibiu (Transylvania).
   1640: The first laical book printed in Romania: *The Code of Laws (Pravila) of Govora* (Oltenia).
   1642: The first Greek book printed in a Romanian printing house: *Patriarch Partenie's Decree,* Jassy (Moldavia).
   1643: The first book published in Moldavia: Metropolitan Bishop Varlaam's *Homilies.*
   1688: The first complete edition of the Bible in Romanian.
   1698: The first printing of a philosophical treatise (a Romanian one), in Jassy: Dimitrie Cantemir's *Divan.*
   1699: The first spelling book printed in Romanian: *The Primer of Balgrad,* Alba-Iulia (Transylvania).
   1702: The first book printed in Arabic: a *Prayer Book,* Bucharest. (The Romanians later printed a *Psalter* in Aleppo, in 1706.)

1703: The first use of Latin characters in Romanian books: Petru Canisius's *Catechism* (translated into Romanian), Cluj (Transylvania).
1709: The first Georgian book printed by a Romanian disciple of the Metropolitan Bishop Antim Ivireanu: Mihai Istvanovici, in Tiflis (Georgia).
1789: The printing of the English, French, German, and Russian translations of Dimitrie Cantemir's works: *System of the Mohammedan Religion*, Saint Petersburg, 1722; *The Ottoman Empire's History*, London, 1734; Paris, 1743; Hamburg, 1745; *Descriptio Moldaviae*, Frankfurt and Leipzig, 1711; Moscow, 1789, etc.
1790: First issue of the periodical *Courier de Moldavie* [Moldavia's Courier].
1838: First issues of the periodicals *The Romanian Chrestomathy*, by Theodore Rakoce (Czernowitz, 1820); *The Romanian Courier*, by Ioan Heliade Rădulescu (Bucharest, 1829); *The Romanian Bee*, by Georges Asachi (Jassy, 1829); and *The Transylvanian Gazette* (Brashov, 1838).

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47. "Although the Romanian bourgeois–landlord regime issued some laws, regarding the libraries and meant to improve the libraries' management—some of which even propagated progressive ideas in support of the dissemination of books in broader social environments, this regime *never took care of the library development;* and even the laws which passed never applied, remaining 'on paper,' lying unused in the files, covered with dust." (Mircea Tomescu, "An Introductory Study" to *The Libraries' Guide of the Romanian People's Republic*, Bucharest, 1958, p. 21.
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VALERIU MOLDOVEANU

ROSARY COLLEGE GRADUATE SCHOOL OF LIBRARY SCIENCE

History

The Rosary College Graduate School of Library Science began as a senior undergraduate department of the college in 1930. The first graduate degree (B.A.L.S.) was awarded in 1938. Rosary's president, Sister Ruth Davlin, and Sister Reparata Murray, librarian, inaugurated the department in response to the great need for professionally educated librarians for Catholic schools, colleges, and universities. At that time there was no library school in a Catholic institution, and many religious persons, particularly sisters, were not permitted to attend secular schools. The earliest goals of the department were broadly conceived to encourage scholarship in Catholic institutions and to serve the Chicago metropolitan community generally in educating librarians and influencing the development of good libraries.

Rosary College is operated by the Dominican Sisters of the Congregation of the Most Holy Rosary. The congregation was founded in 1847 in Sinsinawa, Wis., by a Milanese missionary, the Very Reverend Samuel Mazzuchelli, O.P. The present 4-year liberal arts college is an outgrowth of St. Clara Academy (founded 1848), which became St. Clara College in 1901. In 1923 the college accepted Cardinal Mundelein's invitation to move to Chicago. It chose a site in River Forest, a Chicago suburb, and changed its name to Rosary College.

In planning its library science department, Rosary sought the advice of Dr. William Randall of the Advisory Group on College Libraries of the Carnegie Corporation in New York; of Dr. P. L. Windsor, librarian and director of the Library School at the University of Illinois; and of Miss Sarah Bogle, secretary of the American Library Association's Board of Education for Librarianship (BEL). Rosary was officially accredited by the BEL in 1938 as a Type III library school.

Sister Reparata Murray was the first director of the Department of Library Science (1930–1949). Under her leadership a branch summer school was opened at the University of Portland (Ore.) in 1944, and students continued to be admitted to the program until 1949 when it was decided to discontinue the affiliation and turn the program over to the university, which has continued it. The last degrees under Rosary auspices were granted in June 1952. Between 1948 and 1952, 61 professional degrees (B.A.L.S. or B.S.L.S.) were conferred from the Portland campus.

In 1949 Sister Reparata, recognizing the new trends in librarianship, moved to establish a curriculum leading to a master of arts in library science. During these early years of experimentation with the fifth-year master's programs the ALA was drafting new standards. In July 1951 its council adopted new criteria for accreditation, superseding the 1933 minimum requirements. In February 1954 the BEL visited Rosary and voted not to accredit the Department of Library Science under these new standards. The change became effective at the close of the 1954/55 academic year and summer session.

Under Sister Luella Powers, who became director in September 1949, the college began to correct weaknesses noted by the visiting team. A reaccreditation visit was requested in 1962, and the announcement of reaccreditation was made in June 1962 at the ALA convention in Miami.

The decade following saw remarkable growth and development of the department under the leadership of Sister Peter Claver Ducat (1958–1967). From a full-time-equivalent student body of 26, and full-time faculty of three, it grew to 200 FTE students and eight full-time faculty. Course offerings increased from 20 to 45, and provided for specialization in various types of librarianship and library services. The department was one of the earliest to offer a course in Data Processing and the Library (1964), and it instituted the first seminar in the Chicago area on automation. The proceedings were published in 1966.

Sister Lauretta McCusker was appointed director in June 1967. At that time she chaired the college's library building committee. Rosary obtained a Title I grant of $770,000 from the U.S. Office of Education (USOE), and in 1970 constructed a new building to house the library school and the college library. The library science school occupies the lower level of the three-story building. Facilities include five classrooms, a spacious student lounge, an audiovisual production laboratory, a computer terminal room, and faculty and administrative offices.

The department became the Graduate School of Library Science in 1970, the title of director was changed to dean, and the school formulated its own faculty bylaws, which were ratified by the Board of Trustees in 1972. As the only graduate school on campus, the administrative structure is a simple one. The dean is directly responsible to the president, who approves faculty appointments. The dean and an elected faculty member serve on the college administrative board's subcommittee on retention, promotion, and tenure. Library science faculty members serve on all important college committees, and full-time faculty have a voice in the Academic Council on matters pertaining to the college as a whole.

A nonjurisdictional Advisory Board for the Graduate School of Library Science was formed in 1973, composed of leading librarians in the Chicago area who serve in consulting and advisory capacities. The Advisory Board participated in the self-study review conducted in preparation for the visit of the ALA Committee on Accreditation team in 1975. In July 1975 Rosary was notified of its accreditation under the new standards adopted by ALA in 1970.

The growing need for continuing education for librarians led to the development of a sixth-year program, and in October 1975 Rosary's Board of Trustees approved a sixth-year, 36-hour specialist program to culminate in a Certificate of Advanced Study (CAS). The program, which began in September 1976, with seven Rosary students enrolled, cooperates with Concordia Teachers College, DePaul University, Roosevelt University, and Northwestern University. Admission requirements are a master's degree from an ALA-accredited program and 2 years of successful library experience. Fifteen semester hours of work must be taken at Rosary College and the remaining hours in a subject or professional discipline at one of the cooperating institutions. The CAS program is under the direction of Associate Professor Eileen Noonan at Rosary.

Special Programs and Institutes

In cooperation with the Thomas More Association of Chicago, a series of symposia on cultural and intellectual subjects was sponsored, bringing outstanding speakers to the campus. These symposia were annual events from 1958 to 1966.

Rosary offered four institutes under the auspices of the USOE (Higher Education Act, Title IIB): Institute for School Library Supervisors (1967), Institute in Systems Analysis as Applied to Libraries (1968), Institute in Reclassification for Libraries (1969), and Institute in "People Handling" (1974).

A 2-year program, funded by the USOE, was undertaken in cooperation with the Concordia College Graduate School of Education to recruit students of strong liberal arts background and prepare them for school librarianship. Students earned the M.A.L.S. degree and met state certification requirements under a 58-credit-hour program which included student teaching.

Special courses and workshops for continuing education were given in collaboration with the Illinois State Library. Among these were a one-semester pilot institute in continuing education for public librarians serving grades 6 to 10 (1972), and a two-day workshop on Chapter Six of the ALA rules for cataloging (1976).

Rosary offers a great many institutes and workshops under its own auspices, such as the early ones in automation (1965 and 1966) and the more recent workshops on program planning and budgeting.

In 1973/74 Rosary cooperated with the American Library Association in a special Minorities Manpower Project funded by the Illinois State Library. Ten students were enrolled in the program, which included a cooperative internship with the Chicago Public Library and with libraries in the North and West Suburban Library Systems. The program was continued in 1974/75 under the auspices of USOE.

HEALTH SCIENCES LIBRARIANSHIP

A cooperative program in medical librarianship was developed in 1972/73 with the Stritch Medical School of Loyola University, aided by a grant from the Illinois State Board of Higher Education. The grant covered the first 2 years of operation, and the program is now a part of Rosary's regular curriculum.

THEOLOGICAL LIBRARIANSHIP

For many years Rosary offered a specialization in seminary libraries, but with the trend toward consolidation of seminaries, interest in the program waned and the course was dropped in 1969/70. In 1971/72 the McCormick Theological Seminary entered into a cooperative program with Rosary which provides a combined professional curriculum terminating in the M.A.L.S. from Rosary and a Master of Divinity from McCormick. The McCormick student attends Rosary for a full library science course, and Rosary students go to McCormick for the course in theological librarianship.

Preparation and publication of the *Catholic Booklist* was an important project carried on by Rosary for almost 30 years (from 1942 to 1970, with the exception of 1950–1956). It was begun by the college but taken over by the Catholic Library Association in 1960, and the title was changed to *Catholic Library Association Booklist.* Sister Luella Powers, Sister Anne Schaudenecker, and Sister Lauretta McCusker served as editors.

Faculty

Five Dominican sisters comprised the faculty of the Department of Library Science during the first decade: Sisters Mary Reparata Murray, Mary Serena Reynolds, Winifred Mary Carmody (a noted paleographer), Mary Stephana Cavanaugh, and Mary Luella Powers. Sister Luella is currently professor emeritus. Sister Anne Schaudenecker served as acting director of the department in 1954/55 and in 1962.

Currently the school has 11 full-time faculty in addition to the dean and placement officer. Patrick Williams acts as admissions officer in addition to teaching. Muriel Howick is placement director. Among full-time faculty holding long service records at Rosary are: Sister Luella Powers, William Brace, Richard Li, Eileen Noonan, Patrick Williams, Ann Goodrich (library science librarian), Sister Anne Schaudenecker (retired), and Dorothy Cromien (deceased, August 1974). Newer faculty members are: Pauline Angione, Richard Davis, John Hortin, Gertrude Koh, and Theodore Spahn. With its location in the metropolitan area, the school is in an enviable position to draw upon well-qualified librarians as part-time lecturers, and many teach at Rosary on a regular basis. Dr. Fritz Veit, former director of libraries at Chicago State University, joined the adjunct faculty in 1949. Hillis Griffin, director of the Library Services Department at Argonne National Laboratories, and Ray Erbes, head librarian, Reavis High School, have taught at Rosary since 1965/66.

The Student Body

In the first decade 118 students completed the program, 25 of whom were sisters. By the close of the decade 33 graduates were working in college and university libraries, 33 in school libraries, and the remainder of those active in library careers were in public or special libraries.

In 1977 the library school enrollment was 279, with 83 full-time and 196 part-time students. In addition to the daytime program, classes are scheduled four evenings a week for the convenience of students who are employed.

From 1972 to 1975, with a total of 582 degrees, Rosary ranked eighth among accredited library schools in the number of M.A.L.S. degrees awarded (*1*). As of August 1977 there were 2,986 on the alumni rolls with graduate degrees in library science.

The student body is cosmopolitan, including students from several foreign countries and many states. Approximately one-third of the students are Roman Catholic, one-third Protestant, and one-tenth Jewish.

The Library Science Student Government Association was formed in 1971 to provide liaison between administration and students. Students sit on various college committees with voting privileges, are represented on two subcommittees of the Board of Trustees, and send a delegate to Graduate School faculty meetings.

The Curriculum

The library school curriculum is built around a core of subject matter which applies to all types of libraries. This includes reference, selection, technical services, and administration. Upon completion of the core, the student is encouraged to choose an area of concentration and is assigned to an adviser who is a specialist in that field. Librarianship programs include college and university, public (with a concentration in work with children and young people or with adults), school, and special. Students who select special librarianship may concentrate on law, music, theological, archival, or medical librarianship.

Rosary's major areas of concentration over the years have been technical services, college and university librarianship, and school librarianship. Public and special librarianship programs are being strengthened and expanded. The program for school media specialists was greatly strengthened by the designation of Associate Professor Eileen Noonan as chairman of the program in 1970.

Additions and deletions to the curriculum have occurred over the years, and students may now select from 50 courses in the master's program. These are offered on a regular basis, with most courses scheduled evenings as well as in the daytime.

The goals of the graduate school are periodically reexamined, and all courses are evaluated in the light of updated goals. Students, faculty, and alumni are engaged at the present time in such a revision, and special attention is being given to developments in the fields of information science, management, and personnel.

In 1974 installation of a Texas Instrument 700 data terminal gave the school on-line access to a computer at Concordia College. An OCLC (Ohio College Library Center) terminal was installed in 1975, and a ComData 933 terminal in 1977. Additional terminals are anticipated as the computer science programs expand under a projected plan for all students to become familiar with computerized data bases and methods of access.

Conclusion

The special apostolate of the Order of Preachers, to which the Sinsinawa Dominicans belong, is centered on education. The college announces its mission as "a community of persons engaged in a serious effort to understand and participate effectively in a complex, changing world" (*2*), under a double motto: *Veritas* (truth) and *Caritas* (love). It is in this context that the Graduate School of Library Science strives to provide education and leadership for the library profession.

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SISTER LAURETTA MCCUSKER

THE ROUNCE AND COFFIN CLUB

The Rounce and Coffin Club was founded in the 1930s; it included among its early members printers, booksellers, and librarians, such as the late Saul Marks (Plantin Press), Grant Dahlstrom (Castle Press), Ward Ritchie, Joseph Simon, and Gregg Anderson (Anderson, Ritchie and Simon). Jake Zeitlin represented bookselling, and Lawrence Clark Powell represented the librarians. These same categories are still found in the club, but the mix today tends perhaps more in the direction of librarians and booksellers.

Early organization of the club was quite casual and unstructured. Bylaws were formulated in the 1940s, but as with most small, personalized organizations, these are seldom referred to. The club is governed by a self-perpetuating Board of Governors, five in number. The board appoints a secretary and a treasurer, who serve indeterminate terms. The club was initially and until recently a male preserve, but women are now accepted into membership. There are three categories of members: active, nonresident, and honorary. Active membership is accorded local residents who have evinced an interest in fine printing, have attended at least two club meetings, are proposed for membership by an active member, and are approved by the Board of Governors. Nonresident members include local residents who have moved away and well-known printers and collectors who have been approved by the board. There are only a few honorary members, all of whom have been proposed by the Board of Governors. There are presently some 47 active members, 23 nonresident members, and 4 honorary members.

Meetings are held irregularly, at least four times a year. They are usually program meetings and often are held when some interesting figure in the world of printing is in town.

The main activity of this Los Angeles-based club is sponsorship of the annual Western Books Exhibition. This was first held in 1939, and except for a hiatus of several years during the Second World War, it has been mounted each year since. The idea of the show is to encourage higher standards of design and printing in books published in the western states of the United States. The "Call for Books" is issued in December each year, with judging held in early January. Two shows are circulated each year, beginning toward the end of February and continuing for some 18 months. A catalog has been printed for each show, most of which are still available.

MICHAEL C. SUTHERLAND
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ROUND TABLE ON INTERNATIONAL COOPERATION FOR LIBRARY AND INFORMATION SERVICES IN LATIN AMERICA

Books and libraries have been the concern of representatives of the American nations from the time of the first inter-American conference in 1889/90, which created the Columbus Memorial Library in the Pan American Union. The importance of libraries in the social, cultural, and economic development of the Americas was reaffirmed in the goals of the Alliance for Progress, as formulated in the Punta del Este Charter in 1961. Included among the educational goals in the charter was a specific one calling for the "development of public and school libraries as one of the most effective means of supplementing and strengthening education, and of enriching and disseminating knowledge of the artistic and cultural heritage."

In recent years, librarians in Latin America (as elsewhere) have been confronted, on the one hand, by the exponential increase of literature in all fields and, on the other, by growing user demands. The situation in Latin America has been made more difficult by the following factors: the widespread lack of financial and technical resources; the paucity of trained library personnel; and a tradition of sporadic, isolated library development, which has been more often the result of individual persistence than of coordinated planning. In short, there is an absence of a viable library infrastructure in Latin America. Thus, the growing awareness among librarians of the urgent need for a reevaluation and restructuring of library services, combined with the spirit embodied by the Alliance for Progress, provided a backdrop for the Round Table on International Cooperation for Library and Information Services in Latin America, held in Washington, D.C., September 31–October 2, 1965.

The meeting, planned by the Library Development Program of the Organization of American States, was called to review existing technical and financial assistance being given for the improvement of library and informational services in Latin America, to explore the principal needs of Latin American library and information services which could be met by increased assistance and international cooperation, and to strengthen formal organizational methods for increased cooperation among librarians.

Notwithstanding the diversity of libraries in Latin America, certain problems and needs were found to be common to virtually all libraries. In many cases these obstacles, whether financial or technical, proved to be insurmountable for an individual library. Recognizing these areas of common concern, the Round Table focused on problems to which outside assistance could most effectively be applied.

Participants in the Round Table included some 42 librarians from Latin America and over 100 persons representing 80 agencies that offered programs of benefit (either directly or indirectly) to libraries. Thus the Round Table provided an effective forum, enabling these two groups to discuss areas of mutual interest and concern.

After an opening welcome address by Dr. Jaime Posada (then assistant secretary for Cultural, Scientific, and Educational Affairs, OAS, and executive secretary of the Inter-American Cultural Council), panels of representatives from U.S. and international agencies (both governmental and private) reviewed the many programs offered for the benefit of Latin American libraries. Among the participating institutions were: U.S. agencies—United States Information Agency, Library of Congress, and National Science Foundation; educational institutions—University of Pittsburgh and University of Texas; foundations—Rockefeller Foundation, Ford Foundation, and Council on Library Resources; associations—American Library Association and Association of American University Presses; international organizations—UNESCO, Interamerican Development Bank, and CARE—to mention only a few.

The discussion of programs with the librarians from Latin America revealed the wide range of assistance then available, in such forms as: advisory services for planning, administrative, and technical services; aid in the production of bibliographic tools for librarians, such as the compilation, publication, and translation of reference and library science works; the exchange and donation of books and periodicals; scholarships for library education within Latin America and in foreign universities; exchange and training programs for librarians; and grants and loans for library construction and collection development.

Working papers presented by five distinguished Latin American librarians served as core topics for panel discussions on the second and third days of the meeting, again providing a forum for dialogue between the providers of aid and the potential recipients. The papers and the ensuing discussions covered five aspects of library management and librarianship, with an eye to the most effective utilization of outside assistance:

Organization of Libraries, by Emma Linares, Fundación Torcuato di Tella, Buenos Aires, Argentina

National Library Planning, by María Teresa Sanz, Universidad Católica de Chile, Santiago, Chile

Professional Education, by Maria Luisa Monteiro de Cunha, Universidade de São Paulo, São Paulo, Brazil

Selection and Acquisition of Library Materials, by Abner L. C. Vicentini, Universidade de Brasília, Brasília, Brazil

International Library Cooperation, by Olga Lendvayova, Instituto Interamericano de Ciencias Agrícolas, Turrialba, Costa Rica

A recurrent theme that arose from each of the five topics was the need for libraries to enter into cooperative undertakings (locally, nationally, and internationally) for the integration and coordination of all library services, leading to a more efficient use of available facilities and resources. Additionally, through such a unity of effort (especially at the national level) librarians would be able to work more effectively for the inclusion of library development in national planning.

Recommendations of the Round Table

After three days of productive discussion and interchange of ideas, the Round Table concluded with recommendations embracing four main areas meriting the further attention of librarians in Latin America in planning and developing library services, and that of U.S. and international resource persons in evaluating candidate programs for technical or financial assistance.

EDUCATION FOR LIBRARIANSHIP

As stated by Ms. Linares in her working paper, Latin America is rich in human potential, which in many circumstances offsets handicaps created by a lack of material resources. Therefore, professional library training was seen as one of the keys to the development of improved library services. Library schools in Latin America, it was noted—though they vary greatly according to level and quality of instruction—suffer generally from severe shortages of facilities and bibliographic and training tools. Outside assistance was seen as most effectively applied to: promotion of faculty exchanges; development of a coordinated publications program of reference and professional tools, in Spanish and Portuguese, both as translations and as original works; publication of a serious journal of librarianship in Latin America; establishment of scholarships to permit full-time study of library science; and support of regional and international library schools.

LIBRARY COLLECTIONS

The principal problems outlined in the discussion of library collections involved budgetary constraints, bureaucratic red tape hampering foreign purchases, and the lack of selection aids and reference works in Spanish and Portuguese. Recommendations included the establishment of criteria to be applied to book donations, the promotion of translation programs of scientific and reference books into Spanish and Portuguese, and the support of publications programs for reference tools for Latin America. To facilitate the purchasing of foreign materials, the recommendations called for intensified use of UNESCO coupons as well as the maintenance of a fund solely for the purpose of purchasing library materials.

BIBLIOGRAPHIC COMPILATION

Addressing the lack of bibliographic tools for Latin America, recommendations were made to establish an Inter-American Bibliographic Institution to coordinate and stimulate the publication of national and subject bibliographies for Latin America. Also stressed was the need for selection aids, specifically in the areas of university libraries and children's collections.

NATIONAL PLANNING FOR LIBRARY DEVELOPMENT

In order to promote the inclusion of library development in national planning, the recommendations urged that international agencies give top priority to aid for those library programs related to national plans and those requiring international planning and cooperation. It was noted that librarians should seek the collaboration of educators, economists, sociologists, and other professionals to assure that library services would be related to the general conditions of the country and fit into the overall planning for social and economic programs. It was concluded that outside assistance could be effectively applied to the planning process, training of personnel, provision of materials and equipment, construction of buildings, etc.

Support programs for national library planning were outlined in the recommendations. These included the establishment of regional courses in national planning to assure the availability of trained personnel for implementing national programs; publication of a manual of basic concepts in national planning; development of pilot libraries at different levels in each country; maintenance of facilities for centralized library services and the provision of equipment necessary to that end; provision of basic abstracting and indexing services to networks of specialized libraries; support for production of books, journals, and audiovisual materials in Spanish and Portuguese; and support of the Library Development Program of the Organization of American States.

It was noted that library associations in Latin America play an important role in cooperative efforts and in the dissemination of bibliographic information. Their activities could be expanded, to the benefit of librarianship throughout the hemisphere, with assistance from outside sources.

Conclusion

The Round Table on International Cooperation for Library and Information Services in Latin America provided a needed forum for discussion, on a hemispheric scale, of common problems and needs calling for outside assistance (financial and technical) for their resolution. It also considered those areas of library service most suited for cooperative endeavors. Throughout the three-day meeting, participants articulated their awareness that libraries could no longer afford to develop along isolated courses. Through united efforts, libraries will be able to fulfill their crucial role in the economic, social, and cultural development of Latin America.

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ALICE C. KEEFER

ROYAL LIBRARY, HAGUE

See *Koninklijke Bibliotheek, the Netherlands*

THE ROYAL SCHOOL OF LIBRARIANSHIP, COPENHAGEN

Origins of Library Training in Denmark

The first training of persons in charge of public libraries can be traced back to 1918, when Professor Andreas Schack Steenberg (1854–1929), famous Danish library organizer, opened the first Danish course in librarianship in Copenhagen with a class of 15 students. The course was organized so as to provide theoretical training intended for the optimistic pioneers who might think of applying for positions at the emerging municipal libraries. This first and basic course of 3 months' duration was implemented under the auspices of the Government Public Library Committee [Statens Bogsamlingskomité].

In connection with the implementation of the important Public Libraries Act of 1920 it was stipulated that the professional training of staff attached to public libraries should be organized under the management of the director of the Inspectorate for Public Libraries. A formal school was established, named the State Library School [Statens Biblioteksskole], and a training program consisting of 5 months' training at the school and 4 months' additional practice in a public library was elaborated and effected for the first time in 1920. In 1938 a comprehensive set of regulations was framed implying a restructured and extended course. It was stated that the required length of training should normally be 4 years, of which the first 3 years were to be spent at a library. During the years of apprenticeship the students were supposed to acquire a rather extensive fund of general knowledge and absorb the elements of librarianship through local training provided by the libraries and through independent studies. The fourth year of this training program was devoted to theoretical studies at the library school in Copenhagen; however, the admission of students to the school was restricted by an examination.

The leading person during the 1930s and the first half of the '40s was Robert L. Hansen (1890–), library director, who possessed vision and expressed clear-cut views in the field of library education, often drawing upon his comprehensive knowledge of international developments. The local training was a heavy burden for the working librarians, and as the standards differed, students did not enter the library school with a uniform background. Furthermore, it was considered that there was a disproportion between the long period of practice and the too-short formal training. Hansen's successor, Erik Allerslev Jensen (1911–), later director of the State Library Inspectorate, strongly advocated improvements in the field of library education.

During the mid-1950s reorganization efforts within the State Library School were coupled with plans and discussions concentrating on the problems of training encountered within the research library sector. These institutions had frequently emphasized the need for an adequate training scheme intended for the staff employed at the major research libraries.

At that time librarians were appointed to posts at research libraries (e.g., the Royal Library and the university libraries), provided that they possessed an academic degree (i.e., 6–8 years of study at a Danish university or institute of higher learning). The appointees' academic background, which was often compatible with or relevant to some subject specialty within the library's acquisition scheme (subject specialists), was then amplified through the guidance and instruction of senior members of the staff. The in-service training thus provided was confined to specific functions and competencies in a library setting. A pronounced need for theoretical instruction in library science gradually manifested itself, and this led to an experimental course for junior librarians at the Royal Library and the University Library (1950). The program was initiated by Svend Dahl (1887–1963), who was national librarian and a distinguished scholar.

The semiprofessional staff members assisting the librarians (library assistants) were employed on the basis of a university entrance examination [studentereksamen], and they were trained during a period of 4 years. The training received was often limited to a single library department.

The approaches to library education occurring within both library sectors converged, negotiations were initiated, and the joint efforts materialized with the establishment of the Royal School of Librarianship (1956). This was accomplished through Act No. 132 of May 25, 1956, according to which a joint college was set up as an independent institution under the jurisdiction of the Ministry of Education (now the Ministry of Cultural Affairs). The school was intended to meet educational requirements in the field of public libraries and in the research library sector. The act stipulated that the school should exist for the purpose of providing the requisite professional education to students who were qualified for positions in both types of libraries. In addition, it should promote research in the various fields of librarianship. According to an order of the Education Ministry, the school was divided into two sections with different orientations: Section I, the public libraries, and Section II, the research libraries.

Regulations were also established concerning the criteria for admission, the curricular content, examinations, etc. Preben Kirkegaard (1913–) was appointed rector of the Royal School of Librarianship in 1956. After the restructuring of the public library program the trainee service still exceeded the time spent at the library school (1½ years), although the practical training (2½ years) did incorporate some elements of theoretical studies. Section II was organized as follows: a course intended for research librarians (graduates) comprising about 300 periods, together with a training scheme for library assistants covering about 200 lessons. A prerequisite for admission to the Section II courses was employment at a research library.

The subsequent decennium was devoted to the development and expansion of educational activities within the new institutional framework. During this phase pioneering efforts were made by the small but steadily growing full-time teaching staff, assisted by a number of part-time lecturers, to organize the curriculum for an increasing student body. Over the years, profiles of core subjects emerged (e.g., Reference Works, Bibliography, Knowledge of Books, Classification, Literature, Sociology of Libraries), and a set of new instructional approaches evolved. In this connection, mention should be made of the short treatise by one of the senior lecturers, Mr. Knud Larsen, entitled "On the Teaching of Bibliography with a Survey of Its Aims and Methods" (1961), which had a considerable impact and attracted the attention of professionals and library school teachers in other parts of the world.

The Act on the Royal School of Librarianship was revised during the Parliament Session 1965/66 and was replaced by Act No. 232 of June 8, 1966, which came into force on July 1, 1967. During the initial phase of discussions for revision of the law, round table presentations and preparatory work underlined the necessity for a considerable extension and improvement of the public library-oriented curriculum, together with the need for an increase in the annual output of candidates so as to provide a solution to the envisaged shortage of librarians. Attention had especially centered on the value and length of the apprenticeship period, which in the library educators' opinion should be reduced considerably to allow an expansion and strengthening of the theoretical element of the program. According to the new act, which maintained the existing division in two sections, students are now admitted directly to the school.

The restructured educational scheme enabled the school to give the students a uniform grounding, distinct from the previous situation, which had been characterized by diversity in the qualifications acquired by the students during their initial period of trainee service in different libraries. The revision also made it possible to develop new areas such as audiovisual aids and to elaborate traditional subjects which had earlier been treated more superficially.

Also affected by the 1966 act were the programs in the field of university, research, and special libraries. As a consequence of the revision of the library school act, a ministerial committee was set up to consider the training of library assistants. The findings of the committee—embodied in Report No. 462—led to a transformation of the library assistant course into a program aimed at educating professional librarians for the research library sector. It was proposed that the length of training should be 4 years, including 2 years of organized practical work in libraries and 2 years of theoretical study at the library school. Furthermore, the professional training of graduate librarians (now called research librarians) was updated, and a new course was started in March 1969.

Connected with the Royal School of Librarianship Act are the order of December 18, 1967, detailing the scope, purpose, activities, government, and organization of the school; and a set of orders concerned with the curriculum and examination system relating to each of the three educational programs offered by the school.

In January 1972 a ministerial committee that had been set up in 1971 to prepare the revision of the 1966 act submitted a report to the ministry. The report recommended that the annual intake of students in the Section for Public Libraries (Section I) be increased by 100 and proposed that this extension of the educational capacity be effected through the creation of a library school branch in the provinces. The establishment of a library school branch in Aalborg (Jutland) was provided for in the budget for 1973/74, and the branch (whose course offerings are limited to the Section for Public Libraries) was inaugurated on September 3,

1973. This event was paralleled by an expansion of the educational capacity of Section II at the school in Copenhagen.

The steps thus taken to increase the annual output of graduates were to some degree based on a reexamination of the assessments and forecasts embodied in a ministerial recommendation of 1971: "Betænkning vedrørende behovet for bibliotekarer 1970–1985: En prognose" [Report on the Need for Librarians 1970–1985: A Prognosis].

A minor revision of the Library School Act was effected in 1976 (effective July 1) in order to provide for a formalization of the administrative arrangement of the school.

A more thorough alteration of the Library School Act has been postponed until a working commission for the whole field of libraries terminates its work.

Present Status of the Royal School of Librarianship

AIMS AND OBJECTIVES

The Royal School of Librarianship is an independent state college of librarianship with nationwide educational responsibilities. Thus, it is the only chartered authority in Denmark in charge of educational activities in the various fields of librarianship.

The legislative basis of the work of the Royal School of Librarianship is the act of June 8, 1966, which came into force on July 1, 1967. The rules concerning the school's purpose and scope of activities are detailed in the Order on the Royal School of Librarianship of December 18, 1967, according to which the school exists for the purpose of educating librarians for the different types of libraries, and for the training of other categories of staff, including paraprofessional and nonprofessional library personnel and also staff members of the public archives. In addition, it is concerned with postgraduate studies and continuing education course work relevant to the needs of practicing library professionals and other equally skilled staff. Moreover, the school is under the obligation to promote research and theoretical studies in the field of library science. No fees are to be paid by the students; tuition is free.

STRUCTURE

Under the Royal School of Librarianship Act, the school (which is administered by the Ministry of Cultural Affairs) is divided into two sections. Section I is in charge of the education of students qualifying for positions as librarians in public libraries, together with the public library-oriented continuing education course work and other public library courses. Section II provides education for students qualifying for positions in university, research, and special libraries and organizes the program for research librarians. Also offered within the sphere of Section II are short courses and seminars aimed at the different categories of research library staff.

The library school branch in Aalborg (active from September 1973) offers only the course for public librarians and the educational activities pertaining to Section I.

PROGRAMS

The programs offered by the Royal School of Librarianship are of a broad and all-round nature, implying flexibility and extensive vocational applicability. They do, however, have their specific orientations, which are to a great extent determined by the existing sectoral division of libraries in Denmark.

The course offerings encompass the core of librarianship studies such as bibliography, reference, documentation, cataloging, classification, book selection, library history, library administration, audiovisual media, electronic data processing, and computer applications in libraries and library buildings. In addition, the syllabi include a range of subjects, some of which relate solely to one of the three programs. For example, dissemination of culture, library sociology, children's librarianship, and literary history fall under Section I; whereas formal instruction in Russian and treatment of specialized subject bibliography are included in the 4-year program offered in Section II.

Also pursued within the body of major subjects is a wide range of courses grouped under the overall heading "Organization of Knowledge and Subject Literature," and aimed at public library students. A more detailed treatment is given to this curricular component in a later section.

ENTRANCE REQUIREMENTS

The recruitment of candidates for the two 4-year programs is based on common criteria for admission. To be considered for admission, applicants must meet one of the following requirements. They must have passed one of four examinations: Studentereksamen (university entrance examination), Hojere Forberedelseseksamen (theoretical qualification a little below the level of university entrance examination), Højere Handelseksamen (examination qualifying for entering Commercial College), and final examination from a teachers' college; or they must hold a degree in engineering from a technical school or a degree from a university or institute of higher learning.

The criteria for admission are maintained so as to ensure that the students possess a basic theoretical background before entering library school. It should be added that knowledge of three foreign languages (normally English, German, and French) is a prerequisite of entry to the school.

So far the Danish Library School has encountered no difficulties in recruiting apt and qualified students for the courses on librarianship. Many young people find a library career attractive and apply for admission to the library school. It is a characteristic feature that the number of applicants far exceeds the allocation permitted by the present training capacity of the school. Hence, it has been necessary to maintain a numerus clausus system, and a quota of students has been assigned to each of the two sections of the school. About 300 students are admitted annually to Section I, allocated as follows: Copenhagen, 200; Aalborg, 100. The annual enrollment for the librarians' Section II program totals 60–70 students, the quota being fixed on the basis of the number of trainee jobs available in Danish research libraries. It is a ruling principle that admission is determined by examination results. The condition for admission to the course for graduate librarians (research librarians) is possession of an academic degree, together with an appointment for a post in a research library or a documentation center. Courses for research librarians are initiated according to requirement, that is, when the requisite number of appointees from research libraries—normally 15–20—want to enroll for a course.

A general feature of the student body at the Danish Library School is that the admittees are talented young people with a comprehensive theoretical background, often acquired during one or more years of university studies.

THE PUBLIC LIBRARY PROGRAM

The initial part of the program—comprising two semesters of theoretical study—provides students with a basic and well-balanced introduction to the main areas of librarianship. Subsequently, students will leave the library school and start their first period of supervised trainee service (of 5 months' duration), organized so as to ensure that they are introduced to the activities and operations of public libraries. During this period students are required to write a paper on a topic related to the subject of the Dissemination of Culture and Danish Library Organization.

During the second part of the theoretical studies, provision is made for specialization. This is accomplished through the offering of a wide range of optional courses which are studied concurrently with a series of compulsory subjects. The options comprised under the designation Organization of Knowledge and Subject Literature cover the whole universe of knowledge (e.g., disciplines like art, history, philosophy, music, law, technology, and science); and they can be viewed as a further development of the instruction in reference works, bibliography, and book selection, aimed at training the student in selection of literature and other materials (within individual disciplines) relevant to the needs of public library users. In addition, the student shall be trained in collection building and the care of the book stock, and in guidance for the different categories of borrowers. With a view to enabling students to perform these functions, they are introduced to the terminology, organization, and literature of a number of self-chosen disciplines, as well as to the relationships to the adjacent subject fields and reference materials (bibliographies, journals, handbooks, institutions, etc.). This is intended to develop a critical knowledge of a subject background. Each option is evaluated according to a system based on points determined by the number of lessons assigned, and all students are required to select options equivalent to a fixed sum of points. The possibility of studying elective courses has also been extended to coverage of the field of literary history.

Before starting on the third part of theoretical studies, students spend another period of practical training in a library (5 months). During this time students should improve their knowledge of the different fields of library service with which they have become acquainted during the first period of their trainee service, and they should be able to perform library work in a more professional way.

The third section of the program allows students to devote part of their time to a subject selected for special study that has already been anticipated and prepared for during the preceding practicum. The specially studied subject is pursued simultaneously with compulsory courses in library administration, library legislation, and library history. The students also concentrate on the elaboration of a "main exam paper" on a theme which normally forms part of their specially studied subject, as selected by themselves. The student papers are in many cases of high quality, and sometimes the dissertation level is reached. The third part ends with a final oral examination.

THE 4-YEAR PROGRAM FOR RESEARCH LIBRARIANS

Although differently structured, the program for librarians in research libraries and that for public library education have much in common. For example, the courses dealing with general bibliography and reference works are almost identical. The main features of divergence that can be identified relate to the field of special bibliography (commensurate with the field of organization of knowledge and subject literature taught to public library students) and the concern for foreign languages.

Thus, students receive instruction in Russian (120 lessons) during the first year of theoretical studies that precedes the period of trainee service. During the subsequent period of 2 years, students are attached to research libraries with educational authorization. The practical training is organized so as to ensure that the trainees obtain an all-round introduction to the most important fields of library service, and that they are trained in libraries specializing in the humanities and the social sciences as well as in libraries whose fields are science or technology. During the period of practice students are allowed to devote a number of hours per week to theoretical studies. A period covering about one month is to be spent in a library belonging to an alternative category (e.g., a public library, an institute library, or a company library). During recent years several internees have preferred to spend this month in libraries abroad. In connection with the theoretical studies pursued during the fourth year of education, students are required to produce a paper for which material may be collected during the practice period. The second theoretical year finishes with a final examination.

DIPLOMAS

Diplomas are awarded to successful candidates of the two 4-year programs. The diplomas of the Royal School of Librarianship are recognized educational qualifications that enable the newly "hatched" librarians to apply for any post in Danish public libraries and research libraries, respectively. Thus, no further certification requirements are to be met by the young librarians entering the library field.

RESEARCH LIBRARIANSHIP PROGRAM

The course on library science intended for research librarians comprises 300–350 periods equivalent to 14 weeks of instruction, which is completed by a field trip to libraries and related institutions abroad, usually for the purpose of studying a special theme selected by the participants. There is no final examination, but students who have attended regularly receive a diploma.

FORMS OF INSTRUCTION

During recent years, seminars, informal lessons, and dialogue approaches have gained a footing in many instructional settings at the school. The teaching of classes (usually numbering 18–20 students) now dominates; the more formal lectures addressed to a large forum of students only occur incidentally. Moreover, consideration is given to students' elaboration of papers and reports and their work with cases. Another feature occurring in the teaching situations is the students' collection of data in libraries, which are used as a means of amplifying and illustrating the phenomena covered in the classroom. Also, allowance is made for individual, supervised student projects in some contexts.

Several innovative features in the instructional activities have emerged. This applies, for instance, to the teaching of reference works and bibliography, in which the emphasis has shifted, resulting in a reduction of more formal course work for the sake of students' independent work with the reference materials. Within this disciplinary framework that treats bibliography and reference as a coherent whole, the teachers' role has also changed, implying that they now act chiefly as advisers to the students. Cross-disciplinary cooperation with a view to teaching also occurs in other subject contexts, and initial steps toward the adoption of proper problem-oriented instruction and project work have been taken within some subject fields.

In order to ensure that the practicing professionals are kept informed of the developments in the field of library education, efforts are made to maintain close contacts with the profession. This is accomplished mainly through so-called contact committees, which include members of the profession as well as teachers and students of the school, and through meetings in various forums. In addition, the touring of library school representatives in the provinces has been used as a means of communication.

PLANS FOR NEW STRUCTURES IN THE FIELD OF LIBRARY EDUCATION

For some years the Royal School of Librarianship has been the center of efforts and discussions focused on revisions and reorientation aiming at changed educational conceptions and reshaping of programs. The innovating schemes for library education which have been devised are derived from a recommendation entitled "Betænkning om de bibliotekariske uddannelser" [Report on Educational Programs in Librarianship], Report No. 671, dating from 1973. This publication embodies the considerations and proposals of a committee set up by the Ministry of Cultural Affairs. Two new educational structures are outlined: (*a*) a common 4-year program oriented toward public libraries as well as research libraries—implied in this conception is an integration of the courses at present offered within the two separate sections of the school; and (*b*) a 2-year basic university education (located in the recently erected university centers in Denmark) combined with a superstructure emphasizing library science and documentation (of 2 years' duration). Finally, the report considers the restructuring of the research librarianship program, together with the introduction of advanced studies and degrees (e.g., a doctorate and a licentiate degree) in the field of library science and documentation. The reading of the Bill in the Danish Parliament (on which the implementation of the envisaged educational schemes depends) has, however, been postponed, and at present the prospects of realizing the proposed programs—wholly or partly—are uncertain.

A recent development in the field of curriculum building is the discussion of plans relating to the creation of an experimental education consisting of 1 year of basic university education (to take place at the University Center of Aalborg) and 3 years at the library school. The program will, assuming that it is implemented, only be oriented toward the public libraries, and the location will be the Aalborg Branch of the Danish Library School.

CONTINUING EDUCATION AND COURSES FOR SPECIAL CATEGORIES OF LIBRARY STAFF

The Danish Library School offers an extensive program in the fields of further and continuing education. Included in this program are the seminars, institutes, workshops, conferences, and public lectures of varying duration for professional librarians and others with equal skills. Some of the longer seminars sponsored by Section I (3–4 months) can be viewed as supplementary courses to the 4 years of training. They are given in such subjects as children's libraries, music libraries, hospital libraries, and library administration, and introduce the participants to a specialization for which a more comprehensive background of training is desirable. Course activities covering themes such as information work, record collections, technology collections, computerization of library operations, local history collections, public relations, library buildings and equipment, libraries and film, reprography, etc. (1–4 weeks) are also offered. They are organized to meet the expressed needs of staff members in libraries, and they should enable participants to keep abreast of new developments and achievements in librarianship and related areas.

Regular courses are held, usually in the provinces, for the librarians of the smaller, part-time libraries that still operate in rural districts. In addition, the school conducts seminars for library technical assistants in public libraries, and basic courses are organized for clerical staff operating in research libraries and special libraries. The training responsibilities of the Danish Library School also cover the field of public archives, and courses intended for staff attached to institutions within the archival sector are held as required.

Courses for school librarians are not organized by the school of librarianship, but by the Royal Danish School of Educational Studies.

RESEARCH

Since the 1950s the Danish Library School has been the object of expansion and a rapid development of educational activities. Thus, research efforts have been oriented toward the educational functions of the institution, and a major target for research has been the evolving of an adequate body of knowledge for the consolidation and enrichment of the activities in educational contexts. A considerable number of textbooks and compendia have emerged from this sort of applied research.

However, the volume of research of a more fundamental nature is still modest, chiefly due to the lack of formalized arrangements for the support of R&D activities in the fields of library science and documentation. When engaging in research work, the faculty members generally have to rely on the school's own institutional resources, which are rather limited. Among the individual research interests of the present faculty are: user–librarian negotiation of technical subjects, bibliometric studies of social science literature, subject organization, and studies of readers' classification of fiction and their criteria for choice.

In order to promote and stimulate research efforts within the institution, a research committee has been set up, and a research secretariat has been established to perform the administrative functions related to research activity. This mechanism also maintains the files and collections pertaining to the school's function as a National Information Transfer Center (NITC) operating within UNESCO's International Information System on Research in Documentation (ISORID).

PUBLICATIONS PROGRAM

Over the years numerous publications have been issued by the Danish Library School, ranging from textbooks and in-house-produced compendia, to treatises, Festschriften, general library publications, and student papers.

Two publication series constitute the nucleus of the school's publications program. One series is *Danmarks Biblioteksskoles skrifter* [Publications of the Royal School of Librarianship]; it includes library science treatises and textbooks. The second series is *Studier fra Danmarks Biblioteksskole* [Studies from the Royal School of Librarianship], which covers high-level papers prepared by library school students in connection with their final examination. This series also includes compendia elaborated by faculty members and related publications when they are estimated to have any public interest. The body of literature includes, inter alia, items concentrating on the description of reference works and bibliography, information work, and Russian for librarians.

A recent publication deals with the libraries of ancient Rome, and there is a collection of exercises in the registration of gramophone records. A number of valuable bibliographies have been published, and also a set of student papers that treat themes such as card catalog use in public libraries, experimental library work in a factory, mobile libraries, and the history of printing.

RESOURCES AND POTENTIAL OF THE SCHOOL

The library of the Royal School of Librarianship has a double function as a reference and lending library for the teaching staff and the students, and as the central library in Denmark for literature on library science. The 65,000 volumes and journals of its stock are distributed among an open-access collection of library science literature (publicly available) and 15 laboratory collections, which make up a system of departmental collections pertaining to different subjects in the curriculum. The library resources form the backbone of the teaching and research facilities at the school.

In 1967 a new, large library school building located on the island of Amager, close to the central part of the city, was opened for use. The building in which the school in Copenhagen is accommodated has approximately 150,000 square feet of floor space. It includes classrooms, lecture rooms, laboratories, rooms for typing, offices, a conference room, central library facilities, rooms for smaller groups, music room, canteens, etc. In addition, the Students' Union has clerical facilities at its disposal. Also included in the school's facilities are equipment for copying, duplicating, and offset printing, together with microfilm readers, audiovisual media to be used in instruction, and a computer laboratory with 4 UNISCOPE terminals (including printer and tape) connected to a UNIVAC 1110 computer at the regional electronic data processing center of the University of Copenhagen. Also included is a teacher terminal system. There is another terminal at the Aalborg Branch. In addition, an on-line facility providing access to internationally available retrieval services (for instance, Lockheed/DIALOG) has been installed.

The Aalborg Branch (inaugurated in September 1973) is equipped with rooms for classes and groups, collections of reference works and bibliographies, study collections pertaining to the subjects in the curriculum, library facilities, offices, a canteen, and reprographic devices, plus presently unused space. When fully developed the Aalborg Branch is expected to have about 50,000 square feet of floor space.

At present the teaching staff of the school numbers about 66 full-time faculty members. The full-time personnel—including heads of departments, associate heads of departments, senior lecturers, and lecturers—are assisted by a large group of adjunct lecturers (about 400). The teaching staff are attached to 20 departments according to the subjects taught (e.g., the Department of Cataloging, the Department of Literature, etc.).

The school has succeeded in developing an outstanding and highly competent faculty by attracting well-qualified library professionals and graduates from other professions.

There is a variety of professional backgrounds represented in the present faculty's library school specialities, ranging over Master of Arts, Ph.D., Master of Science, librarian, graduate in political science and economics, Bachelor of Divinity, and graduate engineer, among others. Since the library school is a state institution, some of the faculty members are employed as civil servants. Also attached to the school is a group of staff that performs the clerical, technical, and administrative functions.

THE GOVERNMENT OF THE SCHOOL

The school is managed by a rector, in cooperation with the Board of the School and the administrator. Each of the two sections is managed by a head, who assist the rector in the execution of his educational and administrative tasks, especially as concerns the organization of teaching and examinations, the supervision of the daily work, etc.

The Board of the School consists of the rector (chairman), the heads of sections, the administrator, the head of the library of the school, members elected by the Teachers' Committee, members elected by the Students' Union, and representatives of the other groups of staff attached to the school. The Board of the School, which recruits members from both the school in Copenhagen and the Aalborg Branch, is in charge of such matters as the rules applying to the school and its organs, curricula, fundamental issues regarding teaching, examinations, research, budgets, grants, expansion of various activities, appointments, the nomination of heads of sections, the election of representatives of the school for committees and organs, etc.

Study Boards have been established for each of the two sections, and including the Aalborg Branch. Representatives of the teachers and the students participate in the work of these organs, which concentrate on issues related to teaching activities.

Subject field committees consisting of teaching staff and student members may be created from time to time in order to discuss specific issues relevant to subject fields. Such committees may comprise one or both sections.

The Students' Union is acknowledged by the school as representative of all categories of students enrolled at the Royal School of Librarianship; it represents the students externally as well as internally. The members of the union's governing committee are elected by and from the students admitted to the two sections of the school.

International Aspects

INTERNATIONAL INVOLVEMENT

Although the school has no formalized program for stimulating and promoting contacts and relations on an international scale, a growing awareness of the developments on the international library scene has manifested itself in various ways during the last several years. A feature reflecting this concern is the faculty members' visits to other countries and their participation in conferences, seminars, etc.

In addition, several members of the teaching staff maintain informal contacts with library school teachers and library professionals in foreign countries. A forum for communication between library schools in Scandinavia was instituted in 1974, when a Scandinavian conference for library school teachers took place for the first time. It is envisaged that joint conferences of this nature will constitute a regular feature in the cooperation among Scandinavian library schools. Similar events are organized for the students' unions at the library schools.

Furthermore, it deserves mention that an increasing number of foreigners pay visits to the school, and a series of lectures delivered by foreign visiting lecturers is offered as a supplement to the formal tuition. Seminars conducted by foreign experts have also been organized.

The planning and realization of a study tour abroad for students is a recurrent feature in the system of studies of the school. In addition, several foreign library schools make visits to the Danish Library School as part of their study program in Denmark. The school has assisted foreign library schools in the preparation of study tours to Denmark, and regular contacts with schools in, for instance, West Germany, Holland, the United Kingdom, and the Scandinavian countries have emerged from these cooperative efforts.

Within the framework of Section II, several students have been enabled to spend a month of their trainee service period in libraries abroad; no doubt such placements constitute a valuable element in the overall study program.

INTERNATIONAL COURSES

In 1966 the Danish Library School offered an international course devoted to fundamental training in librarianship; this course was followed by two programs, in 1968 and 1970, organized to train teachers of librarianship from developing countries. The courses were sponsored by UNESCO, with financial aid from the Danish Board of Technical Cooperation with Developing Countries.

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PREBEN KIRKEGAARD

RUBAKIN, NIKOLAI ALEKSANDROVIČ

Nikolai Aleksandrovič Rubakin (1862–1946), Russian bibliographer, writer, and theoretician on self-education, was born to a timber merchant family in Oranienbaum, near Saint Petersburg. His father wanted him to become a merchant, but from early childhood on Rubakin was obsessed with books. His mother, Lidija Terent'evna Rubakina, was devoted to books herself and encouraged her son's interest. She opened the L. T. Rubakina Library in Saint Petersburg in 1875, which Rubakin eventually took over and made into the best private library in Russia.

His father had not intended him to have a university education, so Rubakin had to prepare himself; he mastered the curriculum of the classical gymnasium on his own, and in less than 1 year he matriculated with honors for admission to Saint Petersburg University. There he studied natural sciences, but he attended as many lectures in other fields as he could manage. Starting with his own little journal at the age of 13, Rubakin wrote hundreds of articles, books, and brochures. Many of these were popularizations of scientific subjects, written in a simple style for newly literate readers. All his writing, his compiling of bibliographies, his development of libraries, was done with one aim: to make books available and interesting to the great numbers of new and potential readers throughout Russia. In Rubakin's view, the people were not fools in need of special, patronizing treatment, they were merely poor and in need of cheap books, appropriately written. He conducted a massive correspondence with people all over the country and set up about 15,000 individual programs of reading and self-education, which he followed up and conducted personally. Between 1889 and 1915, he corresponded with over 10,000 readers.

Rubakin was involved with revolutionary groups during the last two decades of the 19th century and the first years of the 20th century, a time of severe repression in Russia. He was arrested in 1887, kept under police surveillance for years, and exiled to the Crimea from 1901 to 1903. His first marriage, in 1889, ended in divorce in 1902. His second wife, a musician, went with him into exile in 1907, when it had finally become clear to Rubakin that he might be arrested at any time and that he could no longer do his work in Russia. With great regret he presented his library of about 130,000 volumes to the Saint Petersburg League of Education, and he went to Switzerland to continue his work.

For the rest of his life Rubakin lived in Clarons, near Lausanne, in a house overlooking Lake Geneva. Here he built up a new library of almost 100,000 volumes. He maintained all his ties with publishers in Russia, who continued to send him everything they published, and he kept up his voluminous correspondence. Here he wrote the second edition of his great bibliographic work, *Among Books* [Sredi knig; Vols. 1–3, Part 1, Moscow, 1911–1915; first edition, Moscow, 1906]. This recommendatory bibliography, unique in Russia and possibly anywhere, is an attempt to guide the reader through Russian literature in all areas and help him establish his own course of self-education. Different types of readers can find books suitable to their abilities and interests. *Among Books* is an extension of Rubakin's thousands of individualized programs of study, developed into a general, comprehensive program adaptable to the widest possible audience.

In addition to the bibliographic section of *Among Books*, there is a large section in which Rubakin expounds his theory of "bibliopsychology," a complex study of the relationship between books and readers. In 1916 he established the Section of Bibliopsychology at the Institute J. J. Rousseau in Geneva; the section was moved to Lausanne in 1922 and named the Institute of Bibliopsychology.

Rubakin never emigrated in the true sense—he always remained a Russian citizen, and was later a Soviet citizen. From 1930 on he received a pension from the Soviet government. But he never felt that he could return home. After his death, in accordance with his will, his library was shipped to Moscow and deposited in the Lenin Library, where it remains today. Libraries all over the world tried to obtain the collection, including the U.S. Library of Congress and the New York Public Library, but Rubakin was adamant: his books should return to Russia where his own people could use them.

The man is something of an enigma; he lived in lonely, self-imposed exile from his country, yet he continued to devote all his superhuman energy to the cause of educating its people. Many influential Russians of the time were his friends, including Lenin. Inevitably, however, Rubakin alienated partisans of various political positions, because he encouraged readers to study both sides of an issue and arrive at their own conclusions. Books, he once wrote, are "the mightiest weapon in the struggle for truth and justice."

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MARIANNA TAX CHOLDIN

RUSSIA – U.S.S.R., BOOK PRINTING AND LIBRARIES *

Historical Background

The U.S.S.R.—the Union of Soviet Socialist Republics—the first socialist state in the world, occupies a vast territory (21 million square kilometers). The population of this largest country in the world is about 250 million people.

Being one of the most developed countries of the world, the U.S.S.R. possesses enormous information potential. Three hundred and sixty thousand libraries and a ramified network of scientific and technical information function here. The high scientific and cultural level of the U.S.S.R. is the result of its historic development over a long period of time and of its especially rapid progress in the last six decades, the years since the socialist revolution of October 1917.

Over 100 peoples and nationalities, rich in cultural traditions, live in the territory of the Soviet Union.

It so came to pass that Russia became the historical center of economic and political integration of all peoples and nationalities populating the U.S.S.R. Contemporary Soviet culture and science have assimilated all things of greatest value that had in the past been produced by the culture and science of the Russian people and the other peoples of the land.

The appearance of the written language in Russia goes back to the 7th–8th centuries A.D. After Christianity was adopted in Ancient Rus (A.D. 988), two alphabets, the Glagolitic and Cyrillic, were used. The contemporary Russian alphabet is based on the Cyrillic alphabet. Literacy was already relatively widespread in Novgorod in the 11th century. That this was indeed so is borne out by numerous birch-bark charters that represent texts of official letters written on pieces of birch bark, which have been discovered during excavations. The most ancient monuments of the Russian written language—the annalistic code *Povest' vremennyh let* [Narrative of the Passing Years], *Izbornik* [The Manual] by Prince Sviatoslav, *Russkaja pravda* [The Russian Truth; a code of Old Russian legal regulations], etc.—pertain to the 11th–13th centuries. The Tataro-Mongolian dominion (from the middle of the 13th century to the end of the 15th century) seriously impeded the

* This article was written by a number of specialists in book and library sciences. The introduction (Historical Background), introductory sections on libraries (Historical Background, Soviet Libraries Today), and the sections on the National Library of the U.S.S.R. and International Relations of Soviet Libraries were written by B. P. Kanevsky, who also compiled the Bibliography. The author of the section on Book Printing is N. M. Sikorsky; on Public and School Libraries, E. A. Fenelonov; on Republic and Regional Libraries, I. K. Nazmutdinov; on Academic, University, and Special Libraries, B. N. Bachaldin; on Bibliography in the U.S.S.R., Library Education, and Soviet Library Organizations, G. P. Fonotov; and on the Bibliothecal–Bibliographical Classification (BBK), N. P. Zhurzhalina. The list of the largest Soviet libraries was compiled by I. A. Skvortsova. V. V. Serov also participated in the preparation of this article.

economic and cultural development of Russian lands. In the last years of the 15th century Moscow became the cultural center of these lands and the nucleus of their integration.

As a result of bitter political strife and a number of wars, a centralized Russian state was finally established in the early 17th century. The feudal landowners were the ruling class in the state while the majority of peasants were serfs. Serfdom in Russia was abolished only in 1861. The struggle against this system left a deep imprint on the entire history of Russia and represented the main content of the progressive and democratic trends in Russian culture in the second half of the 18th century and the first half of the 19th century.

In the 17th and 18th centuries absolutism became firmly established in Russia and elements of the capitalist system penetrated into the economy of the country.

A number of political, economic, and cultural problems, which had become especially pressing in the late 17th century, were solved during the reign of Peter the First, who substantially contributed to the development of Russian culture (the establishment of secular schools and of the Academy of Sciences, the founding of the first Russian newspaper, the generation of a simpler Russian civil type, the publishing of secular literature, the establishment of economic and cultural links with countries of Western Europe, etc.). Notwithstanding the economic backwardness and the reactionary character of the political strategy of autocracy, science and culture continued to develop in 18th-century Russia. The democratic line of this development found its most graphic expression in the book of the first revolutionary-republican, A. N. Radishchev: *The Journey from St. Petersburg to Moscow*.

In the 19th century, especially after serfdom had been abolished, capitalism rapidly developed in Russia: industrial and commercial establishments sprang up, railways were built, and capitalist relations penetrated into agriculture.

In the 19th century the culture of the country developed under the influence of growing national consciousness. Yet its main social content was the struggle against absolutism and the rule of landowners. In the history of 19th-century Russia this struggle found expression in the revolt of the nobiliary revolutionaries (the Decembrists) on December 14, 1825, and in the revolutionary activities of A. I. Herzen, and later of N. G. Chernyshevsky and other revolutionary democrats of the 1860s and 1870s. The works of the great Russian classical writers of the 19th century and early 20th century—Pushkin, Lermontov, Gogol, Turgenev, Tolstoi, Nekrasov, Dostoevsky, and Chekhov—were permeated with democratic ideas. The high artistic merit, subtle psychologism, and democratic content of their works are qualities that made Russian literature of the 19th century a remarkable phenomenon of world culture. In the late 19th century and early 20th century the Russian proletariat and its revolutionary political party (Social Democrats—Bolsheviks), headed by V. I. Lenin, took the lead in the struggle against autocracy and the growing oppression of capitalism. Tsarism and the ruling classes of prerevolutionary Russia failed to solve a single vital problem with which the country was faced. The bulk of the population lived in extreme poverty and lacked culture. In the late 19th century and early 20th century, 72% of the people (60% of the men and 72% of the women) in the age group from 9 to 49 years could neither read nor write. The national minorities were subject to cruel oppression and had no access to culture whatsoever. In the territory of contemporary Tajikistan, illiterate people made up 98%; in Kirghizia, 97%; and in Uzbekistan, 96%. Over 40 nationalities had no written languages of their own. The social, economic, and cultural development of the country was slow. Class struggle became still more aggravated during the first Russian revolution (1905–1907), and in October 1917 it led to the downfall of the rule of landowners and capitalists and to the formation in Russia of a socialist state, the first socialist state in the world.

Although in the years 1918–1922 Soviet Russia had to uphold her right to existence in armed struggle with the counterrevolution and foreign intervention, from the very first days of the existence of the young socialist republic all revolutionary reforms were attended by the cultural revolution. The main aims of this revolution were: the education of the working masses in the spirit of Marxism-Leninism; the rooting out of the survivals of capitalism from people's minds; the promotion of civic awareness and a creative attitude to production in people of a new cast, who would play an active part in the government; and the establishment of a qualitatively new socialist culture of the highest order. This revolution stood for the bringing of culture within the reach of the broad masses, the eradication of illiteracy, and the raising of standards of education and culture of workers and peasants. Special attention was paid to the wiping out of illiteracy and to the development of culture in national regions and rural districts. In 1922 the Soviet republics were brought together within the Union of Soviet Socialist Republics. The period 1922–1941 was marked by peaceful construction, fundamental reorganization of the entire social order of the country, and the building of a socialist society. This period was also marked by the establishment of a powerful modern industry and collective agriculture, and by the intensified development of science, culture, and education.

On June 22, 1941, Hitlerite Germany attacked the U.S.S.R. and the Great Patriotic War began (1941–1945). The fascist invasion caused great damage: in the 4 war years over 20 million Soviet people perished; Hitlerite troops destroyed hundreds of cities, over 70,000 villages, about 32,000 industrial enterprises, and over 100,000 collective and state farms. Many cultural treasures of great value were irrevocably lost; 43,000 public libraries, 82,000 school libraries, 334 university libraries, and many other libraries were looted and destroyed by the fascists. The victory, gained by the anti-Hitlerite coalition with the decisive participation of the Soviet Union, was a victory of worldwide historical significance. Fascism was completely defeated.

Corrupt reactionary regimes, which had disgraced themselves by collaborating with the enemy, collapsed. In a number of countries of Central and Southeastern Europe new people's democratic states, the peoples of which took the road of socialism, came into being. The struggle for national independence of the peoples of Asia and Africa, which brought about the disintegration of the colonial system and the emergence of many young developing states, became more active.

The augmented economic and technical potential of the U.S.S.R. and the selfless toil of the Soviet people made it possible by the early 1950s to restore all that had been destroyed in war time and to develop national economy, science, and culture with heightened speed. Within a historically short span of time, beginning with October 1917, the U.S.S.R. made a rapid leap from the slough of benighted ignorance to progress. In the U.S.S.R. today there are no illiterate people, inequality in the cultural development of nationalities has been done away with, cultural and professional standards of workers and peasants have grown immeasurably, a multinational people's intelligentsia has crystallized, and high cultural values have been created.

The high standard of Soviet science, technology, and culture is well known. The systematic and planned character of their development finds reflection in the five-year programs (the 10th Five-Year Plan of development of the national economy of the U.S.S.R. was approved by the 25th Congress of the CPSU in March 1976).

The system of book publishing and library service in the U.S.S.R. that exists today was built up in the postwar years.

Book Printing

HISTORICAL BACKGROUND

Book printing in the U.S.S.R. goes back to March 1, 1564, when the first precisely dated Russian book, *Apostol* [Acts of the Apostles], was issued. The book was prepared for publication and supplied with an epilogue by the first Russian printer of books, Ivan Fedorov.

Prior to Ivan Fedorov some books, printed in Cyrillic characters, had been issued by other printing houses. Four such books (*Osmoglasnik, Chasoslovec, Triod' postnaja*, and *Triod cvetnaja*) were published in Krakow by Swainpolt Fiol in 1491. The first printed book in the Russian language, *Psaltyr'*, published by the Byelorussian printer Georgij Skorina, appeared in Prague in 1517. This book was the first in a series consisting of many volumes called *Biblia ruska* [The Russian Bible]. In later years G. Skorina opened a printing house in Vilnius (Lithuania), where he printed the *Apostol* and a prayer book.

In the late 1550s the following anonymous publications (without the printer's imprint) appeared in Moscow: three *Yevangelie* [Gospel], two *Psaltyrs* [Psalm Books], and two *Triodi* [Triodion].

Thus, by the time the *Apostol* appeared in 1564 the printed book was no novelty in Moscow.

Nevertheless, the importance of Ivan Fedorov's contribution to Russian culture should not be underestimated. It was with him that book printing, as a new branch of public education activity, emerged on the Russian scene. He supplied the *Apostol*, a book of religious character, with a secular epilogue and edited the text seeking to simplify the difficult language of the source.

In 1574 Ivan Fedorov issued the first Russian book printed in Lvov, the *Apostol*, and he supplied this new edition with a preface in which he formulated his aim in the following words: "I want to supply everyone with spiritual food." At the same time he published the first secular book in the Russian language, *Bukvar'* [A-B-C Book], that included the Slavic alphabet, elementary grammar, and some exercises. It served as a model for many other alphabet books published in subsequent decades.

The venture of the first Russian printer was first continued in Moscow; then, in the early 18th century, printing houses were set up in St. Petersburg and other cities of Russia.

Although in the 16th century only 50 titles of books were published, as early as the 17th century about 700 titles were printed in Russia. The bulk of these books were of a religious character, but among them were a few secular books, such as, for example, *Azbuka* [ABC] by Vassily Burcev, the alphabet book by Karion Istomin, *Bukvar jazyka Slovenska* [A-B-C Book of the Slovenian Language] by Simeon Polocki, *Slavianskaja grammatika* by Meletij Smotricskij, and *Arfmetika* [Arithmetic] by Leonti Magnickij.

In the 18th century over 15,000 publications were printed in Russia. The most remarkable event in the history of 18th-century book printing was the introduction in 1708 by Peter the First of a new civil type that made reading available to a greater number of people. This type, modified in later years, is used in the U.S.S.R. to this day. The first Russian newspaper, *Vedomosti* [Gazette], came out in 1702 and the first journal, *Primecanija* [Notes], in 1728.

In those days the major printing house of the country was that of the Academy of Sciences in St. Petersburg. Here works of the celebrated Russian scientist M. V. Lomonosov and of other outstanding naturalists such as L. Eiler, S. P. Krasheninnikov, P. S. Pallas, V. M. Severgin, I. I. Lepekhin, and S. S. Gmelin, and of such major writers and statesmen as V. K. Trediakovsky, V. N. Tatishchev, Feofan Prokopovich, and A. D. Kantemir were published. This printing house also issued calendars, textbooks, and dictionaries. The editions of the academy printing house were noted for their high culture and were popular in many countries. This printing house boasted of a unique collection of types that made it possible to print books in 356 languages.

In the late 18th century the tsarist government, fearing the penetration of the ideas of the French Revolution into Russia, shut down all private printing houses. The progressive representatives of Russian culture were persecuted and the eminent publisher of the late 18th century, N. I. Novikov (who together with A. Radishchev and D. Fonfizin published about a thousand titles of books and journals) was obliged to discontinue his publishing activities. Following the revolt of the Decembrists in St. Petersburg in 1825 and the revolutions in Europe in 1830 and 1848, the authors and publishers of books containing progressive ideas were subject to oppression.

Beginning with the 19th century, book printing in Russia began to develop on capitalistic lines. In those days numerous private publishing houses came into being, and the competition among them was very strong. And if in the first 5 years of the 19th century about 2,000 titles were published (approximately 400 titles annually), then in 1913 the figure soared to 30,000. The total number of titles published in the 19th century and the first years of the 20th century (prior to 1917) was 500,000.

The most prominent publishers of the first half of the 19th century were: A. F. Smirdin, who published the works of such Russian classical authors as A. S. Pushkin, N. V. Gogol, I. A. Krylov, M. V. Lomonosov, etc. (for the first time these works were printed in relatively inexpensive editions and were, therefore, available to people of modest means); V. A. Plavilscikov (textbooks in different subject fields); I. V. Slenin (books on history); I. P. Glazunov (publications concerning geography, agriculture, medicine, and fiction); A. P. Plushar (*Encyclopediceskij leksikon*, one of the first encyclopedias to be printed in Russia, and books on art); S. A. Selivanovsky (scientific works and fiction); and others.

The leading publishers of the second half of the 19th century were M. O. Wolf, A. S. Suvorin, and A. F. Marx. Their publishing houses issued books of universal character. In the 1870s there emerged on the book-publishing scene the most prominent Russian publisher of the prerevolutionary period: I. D. Sytin (1851–1934). He began his career by establishing a lithography which issued cheap popular prints but later turned to publishing textbooks, encyclopedias, fiction, and calendars. He was the founder of one of the major printing houses in Moscow (it is now known as the First Model Printing House). By 1913 Sytin published 25% of all books printed in Russia, and as his editions were usually moderately priced, this favored their wide distribution.

I. D. Sytin's services in the field of popular education were highly appraised by the Soviet government and people and today the apartment in which he lived is a memorial museum. Publishers of revolutionary orientation such as N. A. Serno-Solovievich, I. P. Ogryzko, N. L. Tiblen, V. O. Kovalevsky, N. P. Poliakov, F. F. Pavlenkov, and others deserve special mention. They were closely associated with revolutionary democrats and published works of oppositionally minded writers, works of philosopher-materialists, and progressive publications on economic problems.

In the 1850s the Russian illegal revolutionary press came into being. The founder of the free Russian press was the outstanding novelist and revolutionary A. I. Herzen. Persecuted by the tsarist government, he emigrated to London in 1847. Five years later the printing house he set up there began to function. In 1855 Herzen began to publish the literary almanac *Poliarniaja zvezda* [The North Star], and 2 years later, in cooperation with N. P. Ogarev, he started to issue the famous journal *Kolokol* [The Bell] in which for many years the most progressive revolutionary ideas were propounded. Other publications of Herzen's Free Printing House included works of Russian authors banned by the tsarist government. Herzen's publications were illegally sent to Russia where they were widely read by all sections of the population.

In Geneva, in 1833, G. V. Plekhanov and the group "Osvobozhdeniye Truda" [Emancipation of Labor] initiated the publication of Russian Marxist literature. This group published a series of books under the title *Biblioteka sovremmenogo socializma* [Library of Contemporary Socialism] that included over 10 works by K. Marx and F. Engels, the works of French socialists P. Lafargue and J. Guesde, and of members of the Emancipation group: G. V. Plekhanov, P. B. Alexandrov, and V. I. Zasulich. Another series published by the group was called *Rabocaja bibliotheka* [The Worker's Library]. The publishing activities of the Emancipation of Labor group promoted the dissemination of Marxism in Russia. Taken as a whole, in the 19th century and early 20th century Russian book publishing, as the social life of the country in general, reflected two trends, one of which was progressive and the other reactionary.

The progressive trend found expression in the publication of works of such outstanding Russian researchers as Lobachevsky, Mendeleyev, Miklukho-Maklai, Sechenov, and many others; and of works of Russian classical authors, including writers notable for the democratic character of their creative work such as Nekrasov, Saltykov-Schchedrin, Leo Tolstoi, Chekhov, and other authors, who represent the pride of Russian literature. The publishing of such works entailed great difficulties and, at times, even personal risk and self-sacrifice. This was especially so in cases when works of the Russian philosophers and revolutionaries Herzen, Belinsky, Chernyshevsky, Dobrolubov, revolutionary narodniks, and revolutionary-Marxists—who played a significant role in the struggle against tsarism and the preparation of the socialist revolution—were published. And, finally, this progressive tendency was evident in the activities of many 19th-century publishers, who aspired to bring the finest works of Russian and foreign scientific literature and fiction within the reach of wide circles of democratically minded readers.

Its ideological antithesis—the reactionary trend—manifested itself in the printing of Black-Hundred and chauvinistic publications and books, written by obscurantists who advocated serfdom, glorified tsarist autocracy, and stirred up national hatred, playing upon the most brutish instincts of man.

Reactionary-minded and conservative publishers—who persecuted Pushkin and first reviled the Decembrists and then Herzen, the revolutionary narodniks, and socialists—received a powerful backing from the tsarist government. It also gave support to all publishers who came out against the realistic trend in Russian belletristics.

This reactionary bent manifested itself in the activities of many commercial publishers, who in pursuit of gain, flooded the book market with pulp literature, books on palmistry, and black magic, shamelessly using the printed word for the dissemination of mysticism, sensuality, pornography, prejudice, and superstition.

But regardless of different kinds of oppression and, in some cases, of violent persecution on the part of the tsarist government, it was the progressive tendency and with it the progressive book—which helped people to acquire contemporary knowledge and expand their horizon—that conquered in the long run.

With time, especially in the second half of the 19th century, the underground revolutionary press and Marxist literature came to occupy a more prominent place. Russia was the first foreign country to publish the translation of K. Marx's *Capital*. In the late 19th century and the early 20th century the published works of V. I. Lenin and the Bolshevik newspapers *Iskra, Pravda*, etc., which greatly contributed to the preparation for the Great October Socialist Revolution, were widely spread.

SOVIET BOOK PUBLISHING

A new era in the development of book publishing in Soviet Russia (from December 1922, the U.S.S.R.) was ushered in by the Revolution.

Book printing was given a prominent place in the program of the cultural revolution, mapped out by the Communist Party with V. I. Lenin taking an active part in the enterprise. In his opinion book printing was meant to help overcome the backwardness of the population, wipe out illiteracy, and bring people culture and education. From the very first days of Soviet rule, V. I. Lenin closely followed all developments in book printing; he guided the discussion of problems dealing with the publication and selling of books in the land, which were held at meetings of the government. He always showed a deep interest in problems dealing with the publishing of books on a large scale. The nationalization of printing shops, paper-mills, book storehouses, and shops, that is, of all the principal means of book production, was a measure that greatly promoted the development of book publishing in the land.

Soviet books publishing is based on a number of principles, of which its Party spirit, public and democratic character, and international approach are the main ones.

The Party spirit of book publishing was formulated by V. I. Lenin as early as 1905. In present-day conditions the application of this principle brings about the active participation of Soviet publishing houses in the implementation of plans of economic, social, and cultural development of the country; their extensive activities in the popularization and realization of the policy of the CPSU directed toward the many-sided education of people living in a communist society; and the satisfaction of the growing cultural demands.

The lucid ideological trend in the work of Soviet publishing houses is the major quality that distinguishes them from the private commercial publishing houses of prerevolutionary Russia and of contemporary capitalist countries. Soviet book publishing is book publishing of a new type.

The democratic principles upon which Soviet book publishing is founded and its public character permit it to serve all people. Here the term "public character" should be perceived as a yardstick for the measuring of the breadth and depth of the connection of book publishing with the life of the people and of the extent to which published literature is brought within the reach of the broad masses. This principle obliges Soviet publishers, when making decisions on what to publish, to approach this question, foremostly, from the standpoint of its usefulness for the general cause of socialist construction. In Soviet publishing houses these decisions are made collectively, that is to say, thousands of people, who are not professionally involved in book publishing, take part in the solving of these problems. Among these people are authors, who sum up practical experience; and reviewers and critics, who participate in the discussion of manuscripts and works that have already been published.

The public character of Soviet publishing is also identified with the low prices of books; they have been stable for a number of decades now and are eight or nine times lower than the prices on the world book market.

Soviet book publishing is multinational both in structure and form; it is international in its content and relations. The Soviet book displays esteem for cultural achievements of all nations and solidarity with peoples of all countries of the world in their fight for peace and social progress.

According to UNESCO data the Soviet Union occupies the leading place in the publication of translated literature. In 1975 books and pamphlets translated from 56 languages were issued in the U.S.S.R. Soviet readers have access to translations of the finest works of writers of Asia, Africa, America, Europe, and Australia.

The fact that there are no private publishing houses in the country also speaks of the public character of Soviet book publishing.

All publishing houses belong to the State and public organizations (trade unions, professional associations of writers, journalists, etc.) and work on planned lines. Precise planning and coordination of publishing activities throughout the entire country make it possible to work out a long-term publishing policy that favors the sound organization of a nondeficient book industry.

One of the outstanding traits of Soviet book publishing is its centralization. All the major publishing houses function within the system of the State Committee for Publishing, Printing, and the Book Trade under the U.S.S.R. Council of Ministers [Goskomizdat of the U S.S.R.], a governmental body responsible for the overall management of book publishing. Publishing houses not subordinate to this committee must, nevertheless, coordinate their main plan indicators with it.

Book publishing activities in the U.S.S.R. flourish on a large scale. In 1975 alone 1,800 million copies of books, or 7 copies per capita, were published. The books were issued in 145 languages, including 89 languages of the peoples of the U.S.S.R. (43 of which had no written form before the Great October Socialist Revolution). The total number of titles of books printed in 1975 is over 80,000. All in all, from 1918 to 1975, over 2,771,400 titles were published.

In 1975 there were 236 publishing houses in the U.S.S.R.; 25% of these publishing houses are of central and Union subordination, 50% operate at the republic level, and the rest are local institutions.

Among the central publishing houses are the following: "Avrora" [Aurora], publishing house of the "Novosti" press agency, "Atomizdat" [Atomic Energy], "Vneshtorgizdat" [Foreign Trade], "Voenizdat" [Military Science], "Vyshaya shkola" [High School], "Hydrometeoizdat" [Hydrology and Meterology], "Detskaya literatura [Children's Literature], "Izvestia" (publishing the newspaper of the same name), "Izdatelstvo standartov" [Standards], "Izobrazitelnoye iskustvo" [Imitative Arts], "Kniga" [Book], "Kolos" [Agriculture], "Legkaya industrija" [Light Industry], "Lesnaya promyshlenost'" [Timber Industry], "Malysh" [Little One], "Mashinostoreniye" [Engineering Industry], "Medicina" [Medicine], "Mezhdunarodnye otnosheniya" [Foreign Relations], "Metallurghiya" [Metallurgy], "Mir" [World], "Molodaya Gvardiya" [Young Guards; teenage books], Publishing House of the Moscow University, "Muzyka" [Music], "Mysl" [Thought], "Nauka" [Science], "Nedra" [Mineralogy], "Pedagogika" [Pedagogics], "Pishchevaya promyshlennost'" [Food Industry], "Planeta" [Planet], "Politizdat" [Political Literature], "Pravda," "Preiskurantizdat" [Pricelists], "Progress," "Prosvescheniye" [Enlightenment], "Profizdat" [Trade Unions' Publishing House], "Russkiy Yazyk" [Russian Language], "Sviaz'" [Communications], "Sovetskaya Rossia" [Soviet Russia], "Sovetskaya encyclopedia" [Soviet encyclopedia], "Sovetskiy kompositor" [Soviet Composer], "Sovetskiy Pisatel'" [Soviet Writer], "Sovetskiy khudozhnik" [Soviet Painter], "Sovetskoye radio" [Soviet Radio], "Statistika" [Statistics], "Stroiizdat" [Building and Construction], "Sudostroeniye" [Shipbuilding], "Transport," "Fizkultura i sport" [Physical Culture and Sport], "Financy" [Finance], "Khimiya" [Chemistry], "Khudozhdestvenaya literatura" [Fiction], "Ekonomika" [Economics], "Energia" [Energetics], and "Yuridicheskaya literatura" [Literature on Law].

Each central publishing house specializes in the publication of literature in certain subject fields. Thus, "Politizdat" [Political Literature Publishing House] publishes books, collections of articles and speeches, complete works of the classics of Marxism-Leninism, and the works of outstanding leaders of the CPSU and of communist parties of other countries and the international working-class movement. It also publishes documents and materials dealing with the history of the CPSU and the Soviet State, books and booklets on practical problems of Party activity in present-day conditions, and everyday activities of Party organizations; popular political literature on the building of communism and the formation of communist public relations; textbooks on Marxism-Leninism; and visual aids for those studying the theory of Marxism-Leninism.

"Nauka" [Science Publishing House] publishes scientific literature and reference works in different subject fields that are the object of research in numerous institutes and agencies of the Academy of Sciences of the U.S.S.R., popular science literature, and educational literature in physicomathematical fields for higher education institutions and special secondary schools.

The "Mysl" Publishing House publishes books on the history of philosophy; studies and monographs written by leading sociologists, economists, and philosophers; and literature on economic and physical geography. It also issues authors' abstracts, dissertations, collections of scientific works, monographs and studies, methodological and educational literature for Party schools, popular science books, reference works, and manuals dealing with major problems of economic, philosophical, and historical sciences.

The "Mir" Publishing House puts out textbooks and instructional aids in foreign languages in technology and the humanities. It also organizes the translation and publication of scientificotechnical literature and translations into Russian of the more important works of foreign authors.

The "Progress" Publishing House publishes books in foreign languages in all fields of science and technology and fiction. Its output embraces works of classics of Marxism-Leninism, literature on the history of the Party, textbooks on Marxist-Leninist theory, and scientific and popular political literature on the most important contemporary problems; books on philosophy, theory of scientific communism, international relations, history, sociology, law, youth movement, geography, economy, pedagogics, linguistics, aesthetics, sport, etc.; and works of classic and contemporary fiction of peoples of the U.S.S.R., children's literature, books on art, photo albums, guides for people traveling in the U.S.S.R., and literature in foreign languages, especially for those who study languages. It also publishes Russian translations of important books in the social sciences by foreign authors, documents and materials of communist and workers' parties, and new foreign fiction.

The "Soviet Encyclopedia" Publishing House publishes universal and special encyclopedias, encyclopedic dictionaries in various subject fields, and encyclopedic reference works of different kinds.

The "Khudozhevstvenaya Literatura" Publishing House publishes works of classics of the peoples of the U.S.S.R. and foreign countries, the finest works of Soviet authors and of contemporary foreign writers translated into Russian, and monographs and popular science books on problems of science, history, the theory of literature, and on Marxist-Leninist aesthetics.

The output of the "Medicina" Publishing House includes scientific, educational, and popular literature dealing with questions of medicine and public health, manuals and aids for physicians and other medical personnel, monographs, collections of scientific works, and proceedings of all-Union conferences of physicians.

The "Kniga" Publishing House issues literature on bibliology, book publishing, printing, bookselling, librarianship, and the theory, history, and methodology of bibliography. It also issues selected, auxiliary, and State bibliographies and bibliographical journals.

Every Union republic has its own publishing houses. They publish literature in the languages of the peoples populating the republics, and books of local authors. The major republic publishing houses are the following: "Radianska shkola," "Vyshcha shkola," "Dnipro" (Ukrainian S.S.R.); "Narodnaya asveta," "Mastatskaya literatura" (Byelorussian S.S.R.); "Yosh Gvardiya" (Uzbek S.S.R.); "Zhazushi" (Kazakh S.S.R.); "Ganatleba" (Georgian S.S.R.); "Irfon" (Tajik S.S.R.); "Liesma" (Latvian S.S.R.); "Lumina" (Moldavian S.S.R.); "Vaga" (Lithuanian S.S.R.); "Eesti raama" (Estonian S.S.R.); "Maarif" (Azerbaijan S.S.R.); "Mektei" (Kirghiz S.S.R.); "Aiastan" (Armenian S.S.R.); "Turkmenistan" (Turkmen S.S.R.).

In 1974 the republic publishing houses issued 23,707 titles of books and pamphlets accounting for 27.3% of the total number of titles published in the country. All printing houses in the U.S.S.R. also belong to the State. They are independent organizations and their relations with publishing houses are based on contracts.

In 1976 the Soviet Union had over 3,200 printing houses and over 3,600 reprographic centers. A new phase in the development of the Soviet printing industry began in the 1950s, when many specialized groups of polygraphic enterprises were built, among them the Kalinin Chromatic Printing House, Saratov Textbooks Printing House, Kalinin Printing House for Children's Literature, and the Chekhov and Yaroslav printing works.

The construction of new printing houses and fundamental reconstruction of existing printing enterprises continued in the years of the Ninth Five-Year Plan (1971–1975), when the Mozhaisk Printing House, Smolensk Textbooks Printing House, Book Factory in Tbilisi, Tselinograd Regional Printing House, and a number of other large polygraphic establishments were put into service.

Today the Soviet printing industry is switching to electronic methods of production of printing plates, intended for different printing techniques. Photographic composition is being introduced, and highly productive web-fed printing machines are being installed more and more widely.

In order to stimulate the work of printing houses and designers, directed toward the improvement of the artistic layout and polygraphic quality of their editions, a special annual competition for the finest books was founded in 1959. Usually this competition results in the selection of a hundred titles of books that have been recognized as the finest. Designer-artists, publishers, and printers who took part in the production of these books are then awarded prizes.

In recent years the following books were awarded Ivan Fedorov Diplomas and First Class Diplomas: *Complete Works of V. I. Lenin* in Vietnamese (published by "Progress" and printed by the Moscow Printing House No. 7); the album *St. Petersburg–Leningrad in the Engravings of A. P. Ostroumova-Lebedeva; Levsha* by N. S. Leskov, with illustrations by the Kukryniksy Group of artists; *The Divine Comedy* by Dante Alighiere, designed by artist M. I. Pikov and supplied with his engravings; *Fairy Tales* by A. S. Pushkin with illustrations by T. A. Mavrina, etc.

We will now examine the main types of printed matter.

The Sociopolitical Book

The place of books of this type is in the general flow of publications; their character and great social significance are determined by the role these books play in the communist education of the working people, in the propagation of the ideas of scientific socialism.

For many years now sociopolitical books have occupied one of the leading places in terms of the number of titles issued. In 1974 alone, 12,296 titles of books and pamphlets dealing with sociopolitical subjects, with an overall circulation of over 257 million copies, were printed in the U.S.S.R. Sociopolitical editions include works by the founders of scientific communism, K. Marx, F. Engels, and V. I. Lenin, which continue to belong among the most widely read books in the country; and collections of documents of the Communist Party and Soviet State, books by leading political figures, manuals and guides in social and political sciences, and mass publications intended for wide circles of readers.

The Soviet sociopolitical book, no matter to what category of reader it is addressed, is essentially truthful and candid in its class and Party attitude, for it expresses and asserts the interests of all working people.

Sociopolitical books are issued by many publishing houses, the most important of which are: "Politizdat," "Mysl," "Yuridicheskaya literatura," "Mezhdunarodnye otnosheniya" (Moscow); "Politizdat" (Kiev); and many universal publishing houses such as "Lenizdat" (Leningrad), "Belarus" (Minsk), "Azerneshr" (Baku), etc.

Scientific, Scientific Information, and Popular Science Literature

It is characteristic of Soviet book publishing that scientific literature is being issued on an ever-growing scale. This impressive increase in the printing of scientific publications is stimulated by the significant role science plays in the life of socialist society. As compared with the publication of books in prerevolutionary Russia (1913), the average annual indexes of overall book production in the U.S.S.R. have increased 2.5 times, and in terms of circulation, 12.1 times. Literature on natural sciences has increased eightfold in the number of publications, and its circulation, 140 times.

The principal publisher of scientific books in the country is the "Nauka" Publishing House, which annually produces over 2,000 titles of books and over 2,000 issues of journals, the total volume of which is 50,000 publisher's signatures. The publishing house has branches in Leningrad and Novosibirsk. Scientific books are also published by all publishing houses of the Republic Academies of Science and by numerous central, regional, and local publishing houses both of the universal and specialized types.

Educational Literature

Practically every fourth book (in the total printing) published in the country is an educational one. This category of books embraces textbooks and study aids for higher schools, special secondary institutions, and general and vocational schools, etc. Instructive literature is also issued by such specialized publishing houses as "Prosveschcniye," "Pedagogika," and "Vysshaya shkola" (Moscow), in the Union and autonomous republics, and by many universal publishing houses in the capital and other cities.

Professional and Technical Literature

This literature embraces all branches of industry, construction, transport, and agriculture and is intended for people engaged in the sphere of material production. The main types of publications here are industrial manuals, practical instructions and aids, short monographs, works devoted to the pooling of professional experience, etc. Books of this kind make up, on the average, 35–40% of the total number of titles and account for 10–15% of the total printing. Such books are published by specialized publishing houses ("Mashinostroeniye," "Transport," "Khimiya," "Legkhaya promyshlenost'," "Sviaz," etc.) and by universal publishing houses in the capital and the republics.

Reference works are very important and are also published on a large scale. To this category of books belong different dictionaries and encyclopedias. The main publishing house that produces such books is "Sovetskaya encyclopedia." There are publishing houses of encyclopedic literature in all the Union republics; some reference works are also published by universal and specialized publishing houses in Moscow and other cities. The following figures give some idea of the volume of these activities. The *Soviet Encyclopedia*, in the 50 years of its existence (1925–1975), has published 80 universal and special (subject) encyclopedias (over 500 volumes), based on original material and reflecting the newest achievements in the fields of natural and social sciences. Thus, the circulation of the third edition of the *Great Soviet Encyclopedia* is 630,000 copies. The publication of this 30-volume work was completed in 1977. This edition is being translated into English.

Fiction

One-third of all books published in the U.S.S.R., in terms of circulation, and approximately 10% of all titles published (about 7,000) are works of fiction. In comparison with prerevolutionary times the total printing of fiction has increased 33 times. The broad scope of this work is stipulated by the role progressive fiction plays as a means of spiritual enrichment of man; it brings with it aesthetic enjoyment and knowledge of the world in general. Overall literacy and the high educational and cultural standards of the overwhelming majority of Soviet people have created conditions for the spreading of the habit of reading within all social strata of Soviet society.

The leading publishing houses in this field are "Khudozhdestvenaya literatura" and "Molodaya Gvardiya" in Moscow, specialized publishing houses in the capitals of the Union republics ("Dnipro" in the Ukraine, "Vaga" in Lithuania, "Irfon" in Tajikistan, "Khelovneba" in Georgia, etc.), and universal publishing houses in many regional centers.

Fiction is also issued by publishing houses of writers, "Sovremennik" and "Sovetskiy pisatel' " (Moscow); the publishing house of trade unions, "Profizdat"; and the publishing house of the armed forces, "Voenizdat," etc.

Publishing of fiction is an activity notable for the diversity of authors, titles, themes, forms, and types of publications. The titles of some important series being published at the present time are: *Library of World Literature, Library of Ancient Literature, Literary Monuments, Library of the Literatures of Socialist Countries, Treasury of Lyrical Poetry, The Poet's Library, Library of Historical Novels, Library of Siberian Novels, Foreign Fiction of the 20th Century, Library of Latin American Poetry, Foreign Prose of the Orient, Popular Library, School Library,* etc. Many titles are printed in millions of copies; and though they are frequently reprinted, the demand for fiction is constantly growing and at times publishing houses cannot fully satisfy it.

Children's Books

Among works of fiction, children's books occupy a prominent place. Annually about 3,000 publications of this kind, with the total printing reaching 360 million copies, come out in the country. "Detskaya literatura" is the major publishing house for children's literature and many prominent writers and artists work in close cooperation with it.

The output of this publishing house is highly diverse, it includes fiction, books on history, science fiction, biographies of outstanding people, classical works, and works of contemporary authors. The "Malysh" Publishing House also contributes to the production of children's books; its main output consists of picture books, albums for coloring, books-toys, and serial publications for little children.

Books on Art

Art books (imitative art, theater, films, music), which enjoy wide popularity, deserve special mention. The main publishing houses specializing in literature of this kind are: "Iskusstvo," "Sovetskiy khudozhnik," "Izobrazitelnoye iskusstvo," "Avrora," "Plakat," "Muzyka," and "Sovetskiy kompozitor" in Moscow, and special publishing houses in the republics. The outstanding traits of their activities are the broad range of themes with which their publications are concerned, scientific study and popularization of masterpieces of world and national art, and the great attention they pay to the development of the art of the peoples of the U.S.S.R.

MAIN CHARACTERISTICS OF BOOK TRADE IN THE U.S.S.R.

The Soviet book trade ensures a wide dissemination of books and various other publications through the bookshops. It represents a special branch of culture and is perceived as an effective means of ideological education.

After the Great October Socialist Revolution the book trade passed into the hands of the State and public organizations. At present there exist two main systems of book distribution: the State system and the cooperative system. The former system is responsible for the selling of books in the cities and the latter system, in rural districts. The State system is controlled by the Central Department for the Selling and Propaganda of Books that is subordinate to the State Committee for Publishing, Printing, and the Book Trade. The selling of books in rural districts is controlled by the Tsentrkoopkniga [Central Office of the Cooperative Book Trade] that is one of the branches of the Central Union of Soviet Cooperative Societies [Tsentrosoyuz]. The leading Soviet foreign-trade organization exporting Soviet publications is the "Mezhdunarodnaya kniga." It exports Soviet scientific and technical literature, fiction, newspapers, and journals and fulfills orders of foreign subscribers of Soviet books and periodicals. The firm "Mezhdunarodnaya kniga" has its agencies and representatives in many countries, including the United States, Great Britain, and Canada.

In 1975 there were over 15,000 bookstores and over 35,000 bookstalls in the country. The bulk of the publications are sold through these channels. Bookstores and other book-selling enterprises study the demand for literature and on the basis of such surveys, orders to publishing houses are mapped out; they also take part in determining the themes and circulation of the publications and popularize books through the press, TV, and radio. Special bibliographical aids are also used to this end.

Many volunteers take part in the dissemination of books throughout the country. They work in numerous bookshops and bookstalls, and peddle books. This mass movement of book enthusiasts helps to bring the book to every enterprise and organization, to the most remote corners of the country. The leading organization in this field is the All-Union Voluntary Society of Bibliophiles, founded in 1974.

Soviet book-trade organizations are also responsible for the provision with books of all libraries of the country through library collectors, special shops that supply libraries of a given region with new books. Such distributing centers function in Moscow and all the capitals of the Union and autonomous republics and in all large industrial cities. The selling of books through the mail, accomplished by a network of specialized bookstores, "Kniga pochtoi," is also a popular enterprise.

Libraries

HISTORICAL BACKGROUND

The oldest libraries in the territory of the U.S.S.R. date from the 4th–5th centuries A.D. They were libraries of monasteries, situated in Georgia and Armenia. Some evidence has reached us that manuscript repositories existed in the 10th century in Bukhara and Merv (Central Asia).

In Ancient Rus the first library was founded by Yaroslav the Wise at the St. Sophia Cathedral in Kiev in 1037. In the 11th to 12th centuries libraries attached to monasteries and cathedrals were established in Novgorod, Chernigov, and Vladimir. With the expansion of the Moscow Principality from the 15th to the 17th centuries, libraries began to appear in Moscow. Book depositories that belonged to the Moscow tsars, higher church and state authorities, and private book collectors came into being.

The collections of manuscript books in the libraries of the Troitse-Serghievskaya, Solovetsky, and Belozersky monasteries are well known. The holdings of these libraries were usually made up of religious books. The first libraries of secular and scientific character originated under Peter the First in the 18th century. In 1714 he founded a large book collection that in later years became the core of the library of the Academy of Sciences. (It is now known as the Library of the Academy of Sciences in Leningrad.) In Moscow the library of the Moscow University was founded in 1755.

In 1795 the Imperial Public Library in St. Petersburg was established. Inaugurated in 1814, it was the largest library in prerevolutionary Russia. One of the largest book depositories in the world, it is now known as the Saltykov-Shchedrin State Public Library in Leningrad. In the late 18th century the first subscription libraries emerged on the Russian book scene.

The number of university libraries began to visibly increase in the first half of the 19th century, and libraries appeared in the chief towns of provinces and districts. But, on the whole, tsarist authorities impeded the development of public libraries, especially in the period of reaction (the 1840s).

Beginning with the 1860s, librarianship in Russia began to develop with heightened speed, and public libraries were opened in many cities of the country. In 1862 the Public Library of the Rumiantisev Museum, now known as the State Lenin Library, was inaugurated. The late 19th and early 20th centuries were marked by the fruitful activities of such distinguished specialists in librarianship as V. I. Sobolshchikov, L. B. Khavkina, N. A. Rubakin, and others. In 1908 the Society for Librarianship was set up and the journal *Bibliotekar* [The Librarian] was put out (from 1910 through 1915). The First All-Russian Library Conference took place in 1911; 2 years later library courses began to function in Moscow.

In prerevolutionary Russia the activities of libraries invariably met with many obstacles put in their path by the ruling classes, who were wholly indifferent to public education in general. The bulk of the population, as was mentioned earlier, remained illiterate. By 1914 there were 76,000 libraries, of which 60,000 were small collections of textbooks held by parish schools, while the number of inhabitants had already reached 160 million. The tsarist censorship and police controlled the composition of all library holdings and the activities of public libraries in general. The few scientific libraries then existing in the country catered to the needs of an exclusive circle of researchers and scholars. The population of national regions, especially in Central Asia and Kazakhstan, lacked any library service whatsoever. In 1914 there was not a single public library in the territory of the contemporary republics of Uzbekistan, Kirghisia, Tajikistan, and Turkmenia. In Georgia, Azerbaijan, Lithuania, Moldavia, and Armenia there were but very few public libraries.

The socialist revolution in Russia (November 7, 1917) and the social and cultural reforms that followed it radically changed the state and status of libraries. V. I. Lenin and the Communist Party and Soviet State, which he headed, turned their attention to librarianship from the very first days of Soviet rule. N. K. Krupskaya also greatly contributed to the development of Soviet libraries.

V. I. Lenin signed the first decrees of the Soviet government concerning librarianship: "On the Organization of Librarianship" (1918), "On the Preservation of Libraries and Book Depositories of the R.S.F.S.R." (1918), and other documents. The decree signed by V. I. Lenin on November 3, 1920, "On the Centralization of Librarianship in the R.S.F.S.R.," was of signal importance. This law envisaged the organization of an integral library network, availability of libraries, and the provision of books along planned lines.

In this decree, as in other documents (articles, speeches, notes) pertaining to 1917–1923, V. I. Lenin formulated the following main principles of Soviet librarianship: the Party character of library activities, broad access to public libraries and their democratization, the organization of a library network on planned lines and of a State system of bibliography and acquisition, and the wide participation of the population in the solving of problems connected with library activities.

From the start, the leading trend in Soviet librarianship was the emphasis on development of libraries situated in formerly backward regions and rural districts. This endeavor reflected such socialist principles as the rendering of fraternal aid to nationalities and those sections of the public that had been underprivileged in the past, the eradication of cultural inequality, and the gradual elimination of distinctions between the cultural standards of the city and village.

The First Library Conference of the R.S.F.S.R. took place in 1924. In the same year, the journal *Bibliotekar* was founded (from 1924 to 1946 it was published under the title *Krasniy bibliotekar*). In the late 1920s and the 1930s the number of libraries in the country increased impressively, their collections were incessantly replenished, and all library work became more active. That period was marked by rapid development of the technical libraries network and an increase in the number of public and scientific libraries. In those years libraries were organized at state agricultural enterprises (sovkhozes). Large republic libraries, that held all publications issued in a republic, were organized in Union republics that hitherto had no national libraries. In the same period the Central Committee of the Communist Party of the Soviet Union and the Soviet government passed a number of decrees on librarianship, of which the most significant were the Decree of the Central Committee of the CPSU (Bolsheviks), "On the Improvement of Librarianship" (October 3, 1929), and the Decree of the Central Executive Committee of the U.S.S.R., "On Librarianship in the U.S.S.R." (March 27, 1934).

The wiping out of illiteracy, the rapid raising of the cultural standards of the population, the marked increase in the number of cities and of the urban population, the rapid pace of industrial development, the extension of networks of institutions and scientific organizations, and the sweeping educational program that the Soviet state implemented were all factors that made book reading a habit with Soviet people. This, in its turn, brought about increasing demands upon library service. The 1930s have gone down in Soviet library history as a period of intensive development of Soviet libraries. The Decree of the Central Executive Committee of the U.S.S.R. (March 27, 1934) made it possible to further improve library management and the training of librarians. An all-Union library census was conducted. In 1936 the All-Union Conference on Theoretical Problems of Librarianship and Bibliography was held. By 1941 the Soviet Union already had a ramified system of libraries of all types, embracing 277,000 libraries that were used by a substantial part of the population. Libraries actively contributed to the development of industry, agriculture, and science and promoted political self-education of the people.

In the years of the Great Patriotic War (1941–1945) Soviet libraries turned to tasks connected with the defense of the country and the routing of the fascist invaders. Endeavoring to contribute to the war effort, libraries published numerous reference and bibliographical indexes of books on military weapons and equipment and disseminated military patriotic literature and publications dealing with the common cause of the anti-Hitlerite coalition.

The ravages of war were great and many libraries were destroyed and looted by the enemy. Nevertheless, thanks to extraordinary measures taken by the Soviet government, with the liberation of Soviet territory and especially after the war ended, the public libraries network was rapidly restored, and by 1950 the number of libraries increased by 12% as compared with prewar years.

After the war, librarianship in the U.S.S.R. developed rapidly, apace with the growing demand of the population for information and library service, the leading tendency being the organization of libraries in republics that had been backward before the Revolution, and in rural districts. Due to this policy the difference in the standards of library service for the urban and rural populations was gradually obliterated.

SOVIET LIBRARIES TODAY

A developed socialist society—characterized by a high level of development of economy, science, technology, and culture, and by the intellectualization of labor—was built in the U.S.S.R. By 1975 there were 5,269 scientific organizations and nearly 1.2 million scientific workers in the country; 11.3 million people had a higher education and about 8 million a specialized secondary education; 68% of the urban population and 35% of the rural population had a higher or secondary education.

Universal compulsory 10-year schooling has now been introduced in the country. The spreading of education creates an ever-growing demand for scientific-technical and political literature and fiction; it also makes higher demands of libraries. Concrete sociological surveys show that reading is extremely popular in the U.S.S.R., bearing out L. I. Brezhnev's statement: "It is rightly regarded that the Soviet people read more books than any other nation in the world."

There are over 200 million library users in the country.

The data in Table 1 demonstrate library development in the Soviet Union through the years. A certain reduction in the number of libraries occurred, mainly owing to the amalgamation of small public and school libraries into larger libraries.

The postwar period of library development was, foremostly, marked by expansion of the library network in rural districts (from 1953 to 1963 over 32,000 State rural libraries were organized), increase in the number of readers, intensified accumulation of bookstocks, activization of reference and bibliographical service, and construc-

TABLE 1

	1941	1961	1975
Libraries of all types			
Number of libraries (in thousands)	227	282	360
Stocks: number of copies of books and journals (in millions)	527	1,890	3,600
These totals include:			
Public Libraries			
Number of libraries (in thousands)	95	136	130
Stocks: number of copies of books and journals (in millions)	185	845	1,507
Libraries of schools, children's homes			
Number of libraries (in thousands)	164	196	170
Stocks: number of copies of books and journals (in millions)	68	277	493
Technical and other special libraries			
Number of libraries (in thousands)	18	50	60
Stocks: number of copies of books and journals (in millions)	274	768	1,600

tion of new library buildings and the improvement of their technical equipment. The major scientific libraries carry out methodological and scientific work (for example, they organize sociological surveys on problems of book reading).

General library service to the population is provided by the public libraries of the U.S.S.R. Ministry of Culture. The structure of the public libraries network is based on the territorial principle: each of the 15 Union and 20 autonomous republics has its own republic library and a number of regional libraries (in 1975 there were 152 libraries of this type); and also district libraries (4,137), city libraries (7,974), rural libraries (80,134), independent children's libraries (7,376), and libraries attached to clubs (1,318). In 1975 the overall number of personnel working in public libraries was 175,000 people; the number of public library users was 130 million, and the total annual circulation within this network reached 2 milliard copies of books, pamphlets, and journals. The overall stocks of public libraries are extremely rich, 5 volumes per capita. Over 3,200 public libraries belong to collective farms and upwards of 25,600 to the trade unions.

Apart from this the Academy of Sciences of the U.S.S.R., the academies of sciences of the Union republics, specialized academies (academies of medical, pedagogical, and agricultural sciences, academies of art), and the ministries have their own library networks: Ministry of Higher and Specialized Secondary Education (university libraries and libraries of other higher educational institutions), Ministry of Education (school libraries), Ministry of Health, and Ministry of Agriculture. All ministries without exception have their own scientific libraries or institutes of scientific and technical information. Plants, large transport offices, design bureaus, and specialized research institutes also have their own technical and special libraries.

All important aspects of library service in the Soviet Union were profoundly affected by the Decree of the Central Committee of the CPSU entitled "Methods and Means of Improving Library Services in the Country" (it was promulgated in September 1959). This document, while dwelling on the achievements of Soviet librarianship, at the same time brought to light a number of shortcomings and suggested ways and means of overcoming them. Special heed was given to inadequate material and technical equipment of libraries and the shortage of trained librarians in public libraries. The Central Committee of the CPSU recommended a number of measures directed toward the further improvement of library services, including the following: expansion of construction of library buildings; improvement of the supply of libraries with furniture, equipment, and new books; and expansion of professional library training in order that in a few years time every populated area and Soviet family would have access to library service. This decree ensured the reinforcement of the material resources of existing libraries and promoted the building of new libraries: between 1959 and 1975, 50,000 libraries were set up in new buildings and in premises of new dwelling houses. New buildings of the following libraries deserve special mention: the Public Scientific and Technical Library of the Siberian Branch of the Academy of Sciences in Novosibirsk (1965), the All-Union State Library of Foreign Literature in Moscow (1967), Institute of Scientific Information on Social Sciences (INION) of the Academy of Sciences in Moscow, the

Scientific Library of the Turkmen S.S.R. in Ashkhabad, and republic libraries in Lithuania, Kazakhstan, Azerbaijan, and Moldavia. The provision of libraries with literature, reprographic equipment, and furniture took a turn for the better; the redistribution of duplicates became more active; and the guidance of library services became more profound. Many public, scientific, and special libraries (approximately 70,000) are now making wide use of the interlibrary loan system. Libraries have expanded their bibliographical activities and pay more attention to the popularization of books. They also contribute to the aesthetic education of young people, widely utilizing modern audiovisual materials.

By the early 1970s the Decree of the Central Committee of the CPSU was, in the main, implemented. It further became necessary to determine the future trends of development of Soviet libraries in conditions of a developed socialist society. With this aim in view the Central Committee of the CPSU adopted a new decree, "On the Raising of the Role of Libraries in the Communist Education of Working People and Scientific and Technical Progress," which gives a profound analysis of the results of library development in the U.S.S.R. and is best described as being a 10-year program of library activities in the U.S.S.R. It is stated in the decree that "the main object of Soviet library services is the active propaganda of the policy carried out by the Communist Party and Soviet State, and a more extensive utilization of book collections in order to mold civic awareness and equip people with knowledge and heighten the speed of scientific and technical progress." The decree further indicates the necessity of expanding the activities of scientific, technical, and public libraries directed toward the dissemination of scientific and technical knowledge, for the active provision of specialists in the field of national economy with technicoscientific information by organizing a differentiated readers' service that would take into account their educational level, professional interests, and age-group characteristics. The decree envisages the centralization (amalgamation) of State public libraries (city and district libraries) by uniting them into an integral network with a common staff, pooled bookstocks, and centralized book acquistion and processing. Public libraries of other systems also will be centralized. The supply of libraries will be improved: the publishing of popular books intended for distribution among libraries will increase in volume, and centralized processing of literature in special bookstores (book collectors) that supply libraries with new publications will be introduced. The decree emphasizes the necessity of organizing depository libraries for literature that is rarely used by readers and thus relieve other libraries of many passive publications. In order to better coordinate the activities of libraries of different systems, the State Interdepartmental Library Committee has been set up by the U.S.S.R. Ministry of Culture. The decree pays special attention to the library service for the rising generation (it called for the organization, in 1974–1976, of republic and regional juvenile and children's libraries in the chief towns of districts). This document also includes major decisions on the improvement of research in the field of library science and theory of bibliography, training of librarians, improvement of the financial position of library workers, and the construction and technical equipment of libraries.

The outstanding importance of the Decree of the Central Committee of the

CPSU (1974) lies foremostly in that it defines the targets, content, and principles of library activities in a developed socialist society and in conditions of the present-day phase of the scientific and technical revolution. Scientific information functions are identified in the decree as an element of the general activities of the public library. At the same time it is suggested that scientific and technical libraries should not confine themselves to the scientific-information service of specialists, but should also contribute to the cultivation of communist awareness in Soviet people. All these recommendations call for profound qualitative changes in the activities of Soviet libraries of all types. The decree also introduces major changes in the organization of the library system of the country, envisaging its reorganization on lines of centralization, an important phase in the generation of an integral system of libraries of different types.

Both the practical and theoretical activities of Soviet libraries are directed toward the implementation of the extensive program for 1976–1980 mapped out in the decree of 1974. Special attention is focused on the raising of standards of library service, a fuller utilization of library stocks, the improvement of the quality of acquisition, popularization of books, and the betterment of reference and bibliographical service.

The centralization of the public libraries network, envisaged in the decree, is now actively being accomplished; in some cities, regions, and republics about 400 centralized systems have already been established and function successfully. Work connected with the setting up of depository libraries is now in full swing. Computers are used in reference and bibliographical services, and registration and management have been computerized in such large libraries as the State Lenin Library, State Public Scientific and Technical Library, the All-Union Book Chamber, and in other institutions. To sum up, today the activities of Soviet libraries are directed toward the raising of standards of readers' services. The main goal is to make the book an inseparable element of the labor and life of every Soviet citizen.

Public and School Libraries

PUBLIC LIBRARIES

In the Soviet Union today public libraries represent the main social institution that meets the reading demands of wide sections of the population. Initially set up as organizations of universal knowledge, public libraries are (with the growth of the book collections and development of interlibrary cooperation) turning into complex library institutions, capable of satisfying demands for information in well-nigh all subject fields with admirable exhaustiveness.

The important social role of public libraries in socialist society is determined by their impressive contribution to the formation of a scientific outlook in Soviet people, the raising of their cultural standards, their many-sided spiritual development, and improvement of their professional skills.

Nearly 80% of all public libraries are State public libraries supported by the State. They are under the jurisdiction of the U.S.S.R. Ministry of Culture and ministries of culture of the Union and autonomous republics. The rest of the libraries are supported by trade unions, collective farms, and different associations.

The library network is built on the territorial principle, in accordance with the existing division of the territory into districts in terms of library service. Nevertheless, public libraries that belong to trade unions are, as a rule, established in different plants and organizations, supplementing in this way the service rendered by the local public libraries.

Each year new public libraries are set up throughout the country in accordance with the national economy plan. Between 1971 and 1975, 12,500 new libraries were established in the country. Today there are 130,000 public libraries and 300,000 branches evenly distributed throughout the land. Bibliobuses (bookmobiles) are now being used on a wider scale. In fact, there is a library service point no further away from the place of residence of a Soviet citizen than 1.5 km.

The public libraries system represents a relatively complex structure. In each, even the smallest, administrative territorial unit (for example, the village Soviet or town) there exists at least one public library. If the village Soviet or town has a population of over 2–3,000 people and is situated in a territory the radius of which is over 3 km, then two or three public libraries are organized. According to standards valid in the U.S.S.R., a library service can be set up in rural districts that have over 1,000 inhabitants and in urban districts with over 10,000 inhabitants. The distance between libraries must not be less than 1 km and 1.5 km, respectively. If a Soviet town or village has a number of libraries, one of them is singled out as the leading one.

Each district has a central library to which other libraries of the district are subordinate. Each region, an administrative unit that represents the next step of the administrative hierarchy, has a regional library that functions as the main library to which all other libraries on this and a lower level are subordinate. The next step of this ladder is the central library of a Union republic.

In this way, apart from a large number of subordinate libraries, there exist on different levels libraries that are responsible for the coordination of library activities and they, to a certain extent, unite and direct the work of all libraries subordinate to them. These central libraries, within the boundaries of a given administrative territorial unit, also perform the functions of depositories for books rarely demanded by readers.

All people, adults and children alike, have access to the public library. Here books are issued for reading within the library itself and for reading at home. The development of the public libraries network brought with it the differentiation of readers' service, mainly in accordance with the age groups to which the users belong. This, naturally, led to the formation of a variety of library services. Thus, there are now over 7,000 independent children's libraries, including republic, regional, and district children's libraries. Today juvenile libraries are being established in the chief towns of regions and republics.

Besides this the public libraries system includes libraries for the handicapped (blind people, deaf-mutes, etc.).

The majority of the public libraries are under the jurisdiction of the local authorities—the Soviet of Working People's Deputies. These libraries enjoy greater independence, as compared with other libraries. Nevertheless, the centralization of libraries is now in full swing and will involve all libraries. Within the boundaries of districts and cities, large library amalgamations, at the head of which stands the district or the central city library, are being created. The rest of the public libraries are being turned into branches, and in terms of jurisdiction they become units of the centralized library system of the city or district.

The main objects of centralization are to create favorable conditions for the efficient management of library resources of the region and to eliminate parallelism and duplication in library activities, and yet more greatly specialize the work of library personnel and thus make it more productive.

Today over 175,000 full-time librarians, of whom more than half have a higher or secondary education, work in public libraries.

The majority of libraries (village, city, and district libraries) are open to the public not less than 35 hours a week.

Thousands of public libraries are housed in spacious and comfortable quarters with good lighting and equipment. About 2,000 new library buildings are built every year.

The book collections of public libraries are very rich; they total over 1.5 milliard volumes (6 volumes per capita, or 5.6 volumes in the cities and 6.5 in the countryside). In 1974 the average holdings of a rural library amounted to 7,000 volumes, the figure for a district or city library was 28,000, and that for the regional library, over 5 million volumes.

In the collections of rural, city, and district libraries fiction accounts for 40–60% of the stocks, popular political and popular-science literature for 25–30%, special (professional) literature for 2–10%, scientific literature for 3–6%, and textbooks from 1.5 to 5%.

The composition of the collections of Soviet public libraries permits the population to acquire many-sided knowledge. In these collections readers find reflected the newest achievements in science and culture; libraries have books suitable for readers of different levels of education and professional training. Acquiring books for the library, its personnel aims to select such new publications that will be especially popular with the inhabitants of their region and such titles that will promote the solving of local problems in the fields of economy and culture. Regional libraries are provided with the opportunity of acquiring a substantial part of the literature published in the country through the system of centralized distribution known as the "system of paid deposit copy." Besides this, libraries exhaustively replenish their stocks with local publications. As the size of the bookstock of a public library depends upon the number of users it serves and because the opportunities of small libraries in the acquisition of books are limited, these libraries resort to the interlibrary loan when the users' demands are of a complex nature. In this way public libraries can today fulfill practically all readers' orders.

Public libraries in the U.S.S.R. represent one of the main channels of book promotion and are capable of satisfying demands for the most popular literature in different subject fields. Public libraries are used by about 130 million readers and they annually issue 2.4 milliard copies of books, journals, and other publications.

In other words, 19 books a year are issued to one user (10 books per capita). The range of books issued by public libraries is rather diverse: about 20% of the books deal with sociopolitical subjects, over 10% of the books and journals are concerned with technology and agriculture, and about 50% are works of fiction.

More than 50% of public library users are children and juveniles under 25. Approximately one-third of the readers are schoolchildren (from the first to the eighth grade) and children under school age. Over 15 million schoolchildren and children under school age use independent children's libraries, while 16 million children borrow books in libraries for adults, frequently in special children's sections, of which there are over 1,300 in the country.

In the Soviet Union public libraries are centers that actively advocate reading and books.

These purposeful activities of libraries were duly rewarded and today there is a library user in every family and all schoolchildren actively use the library. Nearly all people engaged in the sphere of national economy are also library users. The main target today in this direction is to attract all people to the library. This problem will be solved by making the library service still more convenient for the population at large, by further enriching library collections, and by making the work of the librarian more efficient.

The history of development of Soviet public libraries is best described as being a permanent quest for the betterment of the forms and methods of their work, directed toward a fuller and more efficient readers' service. Yet the mission of a librarian of a public library is not limited to the giving out of books that the readers order or to supplying them with information on the library's collections. The ultimate goal is to help the reader choose the best books and thus contribute to the lifelong education of people. Public libraries in the U.S.S.R. work in close cooperation with libraries of other types and represent the most important element of the overall State library system. In practice this concept finds reflection in regional specialization of the acquisition policies of libraries; the interlibrary loan system; the coordination of reference, information, scientific, and publishing activities; and in the working out and implementation of integrative plans of library service and the exchange of literature on a countrywide scale.

In places where libraries of other types do not exist or their network is scant, it is the public library that performs their functions. Public libraries in such cases supply specialists in industry and agriculture with the information they need. Many public libraries have special sections which collect and popularize publications of information centers concerned with progressive methods of production and the latest achievements in science. These and similar activities favor the introduction of advanced technology into industry. For example, rural public libraries issue 10 times more books on agriculture than the special agricultural libraries and are today the chief source supplying village dwellers with professional literature. Public libraries play an important role in the dissemination of technical literature. Large city libraries, which work in close contact with territorial centers of scientific and technical information and branches of societies of rationalizers and inventors, also stimulate the development of production and research.

A characteristic feature of present-day activities of public libraries is the attention they pay to the aesthetic education of the population, of young people in particular. Special sections stocked with books on art, recordings, and pictures are being organized on a wider scale, and library service for readers who wish to acquire aesthetic knowledge is becoming more versatile every day.

Public libraries acquaint their readers with the political, economic, and cultural life of the Soviet Union and of foreign countries more fully than ever before. Collections of books and periodicals in foreign languages have impressively increased. Sections of foreign literature and special circles, organized at the libraries, help readers to master foreign languages.

Due to the methods of its work, composition of its book collections, and ready availability, the public library in the U.S.S.R. represents a truly popular institution. The activities of public libraries are carried out in the interests of the people and in close contact with the everyday life of the country, with the people themselves taking an active part in library activities. It is sufficient to say that in the public library network of the Ministry of Culture alone, 1.5 million people are active helpers of librarians and 500,000 people are members of library councils and committees. The annual reports that the library councils deliver to the representatives of the population constitute a form of public control of library activities that is widely spread in the country.

SCHOOL LIBRARIES

In 1974/75 there were over 49 million schoolchildren in the U.S.S.R. Every secondary or 8-year school, of which there are about 100,000 in the country, has a school library and either a full-time librarian or a teacher-librarian. Elementary schools have small libraries in which one of the teachers usually works on a voluntary basis. The main object of school libraries is to help pupils in their studies. The collections of school libraries are universal because the syllabus is intended to give children knowledge in many subject fields. The composition of library collections of large schools is usually more diverse and extensive than the syllabus stipulates.

Nearly all schoolchildren use not only school libraries, but local public libraries in the vicinity of their homes too. Public and school libraries situated in one administrative district usually work in close cooperation and make joint decisions concerning such problems as acquisition, book propaganda, and the promotion of the habit of reading.

The central State public children's libraries of a district, city, region, or republic are responsible for the methodological guidance of school libraries and this, naturally, furthers the coordination of all activities involved in children's library service.

The National Library of the U.S.S.R.

The State Lenin Library, the largest library in Europe and one of the leading libraries of the world, is the national library of the U.S.S.R. As of January 1, 1976, its book collections numbered 27.7 million units of printed matter (books, pamphlets, issues of journals, yearly sets of newspapers, and other materials). The library was inaugurated on July 1, 1862, as a section of the Rumiantsev Museum, housed in one of the most beautiful buildings of Moscow (the Pashkov House), situated a stone's throw from the Kremlin. It was set up on the basis of the extensive collection of books and ancient manuscripts of the eminent Russian statesman and diplomat Rumiantsev (1754–1826). From the very first days of its existence the library received a free copy of all publications put out in Russia and this was initially the main source of enlargement of its collections. Books donated to the library by Moscow scholars, writers, and prominent public figures also represented an impressive contribution. In the period 1862–1917 the library acquired about 1 million books, brochures, maps, manuscripts, and other materials, of which two-thirds were received under the legal deposit system and one-third donated. From 1862 to 1912 the number of reader visits increased from 7,000 to 121,000. Among the readers using the library were the famous Russian classicists L. Tolstoi, F. Dostoevsky, and A. Chekhov and the prominent Russian scientists D. Mendeleyev, K. Tsiolkovsky, and V. Kluchevsky, to name only a few.

Before the 1917 October Revolution the library could not develop normally because the tsarist government allocated no funds to the museum whatsoever. During 1862–1917 the staff of the library was increased by only eight librarians. It was only in 1912 that the library was given a small grant for the buying of literature, while the reading room and stacks were expanded only in 1914–1915.

The 1917 October Revolution basically changed the status of the library and the character of its activities. Even in the severe conditions of the Revolution, Civil War, and foreign intervention, the Soviet government showed concern for libraries, the library of the Rumiantsev Museum in particular. From 1918 to 1920 the library received about 7.2 million volumes of nationalized literature and by 1920 its collections increased twofold. The library was accorded the right to buy the publications it needed, including entire book collections. In the 6 months of the Revolution (by May 1918) the staff of the library increased fivefold. In 1918 the reference and bibliographical bureau began to function, and a year later a reading room for scientists was opened. The working hours of the library were augmented; its readership changed and became more democratic.

V. I. Lenin (1870–1924), the founder of the Communist Party and the Soviet state, gave much thought to the activities of the library. (He first registered as a reader here as early as the 1890s.) After the October Revolution V. I. Lenin frequently borrowed books from the library and never failed to return them by a specified date. He donated his works to the library and gave every support to its acquisition policy. On his initiative the Soviet government passed a number of decrees directed toward the improvement and extension of the library's activities and the preservation of its collections.

In February 1925 the library of the former Rumiantsev Museum was given a new name; it became known as the U.S.S.R. State Lenin Library and began to function as the national library of the country.

The period from 1925 to 1941 was marked by the intensive development of the

State Lenin Library. Its collections grew impressively; they were replenished by 3.8 million library units and by 1941 the holdings of the library reached 10 million units. The acquisition of foreign literature became more extensive. The number of reader visits increased significantly (in 1940 about 830,000 visits were registered). New trends in the library's activities emerged and new sections were organized, including the section for mass cultural work, loan section, readers' service section, section of military literature, section of international book exchange, etc. The library became the center for recommendatory bibliography and methodological guidance of other libraries in the country. The staff of the library was augmented from 305 people (in 1926) to 1,300 (in 1941). Between 1930 and 1940 the new building of the library (architects V. Shchuko and V. Gelfreich) was in construction; by 1941 the two main 19-tier stack buildings were completed.

When the Great Patriotic War broke out in June 22, 1941, all activities of the library were reorganized. As all other libraries of the country, the State Lenin Library turned to the active dissemination of political, scientific, and professional knowledge, which the population needed in war time. A significant part of the personnel went to the front and those who remained protected the library from enemy bombs and were busy evacuating and otherwise finding shelter for the most valuable collections. Even when the enemy was approaching Moscow the library was not closed for a single day. An event of import in those war days was the inauguration of the reading room for children on May 10, 1942. A year later it was transformed into the Section of Children's and Juvenile Literature (in 1972 this collection was handed over to the Juvenile Library of the R.S.F.S.R.). Displays were organized on a wide scale. The collections of the library were actively utilized by Party, State, and military bodies. The loan section was expanded. The State Lenin Library greatly contributed to the restoration of libraries that had been looted or damaged by the fascist invaders. The library turned over 350,000 books and journals to such libraries.

The Presidium of the Supreme Soviet of the U.S.S.R. decorated the library with the U.S.S.R.'s signal Order of Lenin for its meritorious services on March 29, 1945, in connection with the 20th anniversary of the day the library was made the national book depository of the Soviet Union. In 1925 the library had been accorded the right to receive three free copies of all printed matter put out in the U.S.S.R.

The three postwar decades (1945–1975) are associated with an especially intensive development of the library. By 1957 the construction of all buildings envisaged by the initial design was completed. Somewhat later the library was allotted a neighboring building for its scientific departments (building "J"; in Russian, K), and the construction of new spacious stacks was begun. The first of these stacks, capable of holding 7 million volumes, was completed in 1974. An impressive amount of reprographic technique was acquired and the largest center for microfilming in the country was set up. (Its annual capacity is 17 million microfilm images.) In 1970 a computing center, equipped with a computer of the M2000 type, was established. Book transportation facilities were improved, and air conditioners, a pneumatic tube system, and modern fire prevention equipment were installed.

The activities of the library also underwent substantial changes. Besides serving a great number of readers (about 2.5 million visits a year) and borrowers, the library now carries out research in different branches of librarianship and the history of printing, and renders methodological assistance to public libraries of the country. The library also functions as the all-Union center of scientific information on cultural problems and the center for recommendatory bibliography. In the 1960s the library completed the working out and publication of 30 volumes of the new classification scheme for large universal libraries known as Bibliothecal-Bibliographical Classification (BBK). The library's publishing activities are also impressive; annually it puts out over 350 titles, including such serial publications as *Soviet Librarianship, Librarianship and Bibliography Abroad, Annual Reports, Acts, Notes of the Manuscript Department*, etc.

According to its statutes the State Lenin Library is: the national library of the U.S.S.R.; the State depository for all printed matter of the peoples of the U.S.S.R., foreign literature, manuscript books, and materials; the center of information on problems of culture and art; the center for recommendatory bibliography; the leading research institution of the country in the fields of library science, theory of bibliography, and history of printing; and the methodological and consultation center for Soviet libraries (excluding the scientific and technical libraries).

The library is under the jurisdiction of the U.S.S.R. Ministry of Culture and is directly subordinate to it.

The main duties of the Lenin Library are: acquisition of stocks in keeping with its national book depository status (it is responsible for the permanent storage of these collections), and the wide utilization of the collections with the purpose of molding civic awareness and a communist world outlook in Soviet people. It also contributes to the development of science, culture, and national economy; renders information and bibliographical service to the major Party and government institutions; accumulates and scientifically processes information materials concerned with culture and art, and provides organizations, scholars, and specialists with this information; carries out research in the field of library science, theory of bibliography, history of printing, automation and mechanization of library and bibliographical procedures; and renders methodological assistance to the libraries of the country.

In 1976 the library had over 40 sections and other units, and the staff numbered over 3,000 people. The structure of the State Library is as follows:

I. Management
   A. Directorate (the director, five vice-directors, senior engineer, and executive secretary)
   B. Technological section
   C. Section of printed matter
   D. Personnel section
   E. Training section (within the library there are: a faculty of the Moscow Institute of Culture, advanced 1-year courses for people who have higher education, foreign language courses, and 3-month courses for new members of the staff)
   F. Planning and financial section
   G. Office

- II. Scientific and library department
  - A. Aggregate of collections and information retrieval systems
    1. Section of national acquisition and book exchange
    2. Section of acquisition of foreign books and international book exchange
    3. Section of cataloging and alphabetical catalogs
    4. Section of classified and subject catalogs
    5. Section of storage
    6. Section of book preservation and restoration
    7. Section of preprocessing and subsequent processing (after the computer)
    8. Controller's office of the information retrieval system
  - B. Aggregate of readers' services and specialized sections
    1. Section of readers' services
    2. Loan section
    3. Rare books section
    4. Newspapers section
    5. Military literature section
    6. Section of printed music and recordings
    7. Cartography section
    8. Manuscripts section
    9. Dissertations section
  - C. Information aggregate
    1. Center of information on culture and the arts
    2. Information and bibliography section
    3. Recommendatory bibliography section
  - D. Aggregate of scientific and methodological activities
    1. Section of research in library science and theory of bibliography
    2. Section of research in bibliography and history of printing ("Book Museum")
    3. Section of research in bibliothecal-bibliographical classification
    4. Section of scientific methodology (methodological guidance of public libraries)
    5. Section of organization of research (the planning and coordination of scientific activities)
    6. Section of foreign librarianship and international library relations
    7. Section of automated systems and information processing systems
    8. Section of mechanization and new techniques
- III. Computing center
- IV. Technical department
  - A. Technical section
  - B. Section of capital construction
- V. Section of microphotocopying
- VI. Maintenance department
  - A. Housekeeping section
  - B. Provision section
  - C. Section of reception and forwarding of literature

As of January 1, 1976, the overall collections of the library totaled 27.7 million stock units, including 17.5 million national publications (8.8 million books) and 10 million foreign publications (2.7 million books). The holdings of the library are made up of 22.5 million stock units of books and journals, 440,000 newspapers, 100,000 maps, 285,000 stock units of printed music, 10,000 stock units of recordings, and over 345,000 stock units of manuscript materials, including 25,000 manuscript books. Besides this the holdings of the library include over 30,000 dissertations and about 540,000 rolls of microfilm. Printed matter and manuscripts in 247 languages are represented in the library's stocks, including publications in 91 languages of the peoples of the U.S.S.R., 40 European languages, and 96 languages of Asia and Africa. Annually the stocks are replenished with 800,000 items (600,000 national items and 200,000 foreign items, including 400,000 Soviet and about 45,000 foreign books). The library receives 3,000 Soviet journals and about 6,000 newspapers, 15,600 foreign journals and serial publications, and over 600 newspapers from 115 countries. The library has 20 reading rooms, the overall seating capacity of which is 2,600. The reading rooms are specialized by subject fields or by categories of printed matter. The largest reading rooms are the following: scientific reading room No. 2 (technical, physicomathematical, and economic sciences) with 496 seats, reading room No. 3 (the humanities) with 460 seats, reading room for current periodicals with 260 seats, and reading room for dissertations with 202 seats. Sections of printed music, rare books, manuscripts, and military literature have their own reading rooms. The section of research in library science and theory of bibliography boasts of a special collection of library science and bibliographical literature, embracing over 100,000 volumes, and a reading room with 40 seats. The special reading room No. 1 is intended for doctors of sciences and academicians.

The library is open every day from 9 A.M. to 10 P.M. (From June to August the reading rooms are closed on Sundays.) The average number of reader visits is 2.5 million a year; the readers borrow over 12 million units of printed matter. The number of readers who have permanent readers' cards is over 240,000 (including 3,000 foreigners). The library is daily visited by 6–9,000 readers, who borrow 30–40,000 copies of books and journals. The collections of the library are also used by 7,500 collective borrowers (6,000 of them are situated in other cities and 350 are foreign organizations); they borrow upwards of 300,000 books annually. The library has over 400 official and public catalogs, which include over 45 million cards. The oldest catalogs are the General Alphabet Catalog, which has been maintained since 1861 (its new section has been maintained since 1927), and the General Classified Catalog, which has been maintained since 1919 (in 1969 a new section of this catalog, based on the BBK tables, was started). The State Lenin Library also has a central reference collection of works and bibliographical aids. This collection makes it possible to provide users with an information and bibliographical service that annually gives out from 10,000 to 120,000 references. Of signal informative importance are the display of recent national and foreign acquisitions, which is renewed every week, and numerous other thematic displays, of which from 300 to 350 are organized annually (some on general lines and some by the different sections).

The library carries out an impressive amount of research. The center of these research activities is the Section of Research in Library Science and the Theory of Bibliography. The main trends in the work of this section are: (*a*) the coordination and planning of research in the field of library science and theory of bibliography on a countrywide scale; (*b*) the carrying out of studies on the following problems:

the functions and aims of national libraries and the organization of their activities, the distribution of public libraries, centralization, depositories and their role in library systems, theoretical problems of bibliography, the history of librarianship in the U.S.S.R., and problems of library terminology. The sociological surveys concerned with the role of reading in the intellectual life of different strata of Soviet society that the section carries out have become well known. The results of these surveys have been published in monographs: *The Soviet Reader* (1968) and *Books and Reading in the Life of Towns* (1973). The majority of other sections carry out research projects dealing with appropriate subjects. Thus the Section of Cataloging and Alphabetical Catalogs has worked out standards for library catalog entries for all categories of publications and is now studying questions connected with the application of these standards. The Section of Storage carried out a survey of readers' demands for different parts of the main stocks that made it possible to introduce some scientifically sound changes into the storage system. The Rare Books Section ("Book Museum") prepared the *Union Catalog of 18th-Century Russian Books Printed in Civil Type: 1725–1800* (five volumes, 1962–1967; the additional, sixth volume was issued in 1975) and some other works on the history of Russian printing. At the present moment the section is busy preparing a multivolume work on the history of Soviet printing. The Information and Bibliography Section has compiled a number of scientific bibliographies on the history of the U.S.S.R.; the Manuscripts Section prepared and published a guide called *Private Archives in State Depositories of the USSR* (two volumes, 1962). This section annually publishes scientific descriptions of recent acquisitions of the library in the *Notes of the Manuscripts Section of the State Lenin Library,* 37 issues of which have already been published. The Section of Book Preservation and Restoration carries out serious research in the field of book preservation.

An outstanding feature of the library's activities, as a national library of the socialist type, is the scientific and methodological guidance it gives to other libraries of the country. Essentially this work consists of the identification, accumulation, generalization, and dissemination of advanced library methods. The Section of Scientific Methodology has contacts with all republic libraries and via their methodological sections with thousands of district, city, and rural libraries, the experience of which is diligently studied and generalized. Further, this pooled information is brought to the notice of all libraries through the universal press, library journals, special instructive materials, and lectures. The staff of the Section of Scientific Methodology appear as advocates of progressive professional experience and frequently visit libraries in all parts of the country and help them to solve their more complex problems. Recommendatory bibliographical indexes, compiled by the Recommendatory Bibliography Section, help public libraries to more efficiently popularize the most important political, scientific, and technical books and works of fiction. Many other sections of the library render methodological assistance to republic and other public libraries by sending their representatives to other areas, where they organize seminars and conferences on library problems, and by inviting trainees from other libraries to work in the section. This makes it easier to study and utilize the valuable experience of other libraries in the State Lenin Library itself.

The Section of Automation and the Computing Center of the library have worked out programs of automation of a number of library and bibliographic procedures, including the program of automated readers' service, program of control of accession of new national and foreign publications, program of retrieval of information on recent acquisitions, etc. The development of the State Lenin Library is determined by programs that are mapped out in keeping with the State plans. The current, 10th Five-Year Plan of Development of National Economy of the U.S.S.R. was adopted by the 25th Congress of the CPSU (February 24–March 4, 1976). The five-year program of the library for 1976–1980 envisages the raising of the quality and efficiency of all aspects of its activities. In order to realize this program the library has planned numerous measures, some of which are listed below.

1. *In the field of acquisition, organization, and utilization of collections* the library plans to: stabilize the acquisition of literature at its present level by selecting literature intended for permanent storage with greater thoroughness; automate acquisition procedures; raise the quality of cataloging by working out and introducing State standards into the cataloging of printed matter; improve the bibliothecal–bibliographical classification (BBK); work out a system of conjugation of different classifications; and automate the processing and retrieval of information concerned with recent acquisitions of the library.
2. *In the field of scientific and information activities* the library expects to: expand the information services rendered to central Party and government bodies; participate more actively in the publication of union catalogs of recent acquisitions, and reflect in them national and foreign publications; prepare basic retrospective bibliographical indexes more intensively; continue to work at the *Leniniana* (a bibliography of V. I. Lenin's published works and of literature dealing with his life and work); prepare indexes of books on the most urgent sociopolitical, economic, and scientificotechnical problems; begin preparations for the publishing of a multivolume catalog of 19th-century Russian books.
3. *In the field of research* the library plans to: prepare a new, supplemented edition of the collection of articles *Lenin and Librarianship* and a collection of documents and materials dealing with the activities of the CPSU and the Soviet government in the field of librarianship; work out recommendations directed toward the strengthening of social functions of Soviet libraries in conditions of a developed socialist society; map out a program of development of universal libraries and of coordination of their activities with the special libraries network; continue concrete sociological studies of reading interests of different social and demographic groups of the population and prepare two monographs: *Books and Reading in the Life of the Soviet Village* and *The Worker Reads;* work out scientific principals of division of the territory into library districts and of distribution of the library network; make a scientific analysis of the state of enumerative, informative, and recommendatory bibliography in the country.
4. *In the field of methodological guidance of public libraries* the library proposes to: actively contribute to the organization of centralized systems of State public libraries; improve the composition and structure of the collections of public and universal scientific libraries; create a network of depository libraries; introduce cooperative cataloging and classification; improve medium-term and long-term planning of library development not only on a countrywide scale, but on the regional and local levels too.

The 5-year plan also envisages the formulation and implementation of many other tasks in different aspects of the library's activities, including the working out and introduction of a number of automated systems of readers' service, transportation of books, and accumulation and control of bibliographical information; and the generation of information retrieval systems and an automated control system for administrative activities and finances of the library.

Also stipulated by the plan are such measures as the organization of a powerful computing center within the library, the development of its polygraphic facilities, the construction of a new building and two depositories, and the acquisition of new reprographic technique.

Other Large Universal and Special Libraries

An important place in the library system of the country is occupied by other large universal and special libraries. Among these libraries are republic and regional libraries of the U.S.S.R. Ministry of Culture, central libraries of the Academy of Sciences of the U.S.S.R. and the academies of sciences of Union republics, and university libraries.

REPUBLIC AND REGIONAL LIBRARIES

The State libraries of the Union republics are in the U.S.S.R. called republic libraries. Essentially they are national universal libraries, depositories of printed matter for each republic and centers of information on problems of culture and art. These libraries are also institutions of research in the fields of library science, bibliography, and printing history; and centers of methodological guidance of public libraries of the Union republics. The formation of State libraries of the Union republics represents one of the signal achievements of Soviet librarianship and is the result of the implementation of Leninist national policy. The libraries receive a priced deposit copy of all Soviet publications and a free legal deposit copy of all printed matter of the appropriate republic, and this practice allows them to advocate cultural, scientific, and technical achievements of all peoples of the U.S.S.R.

Being important ideological and scientificotechnical institutions these libraries render service to all citizens on a wide scale, paying at the same time special attention to the demands of scholars and specialists engaged in different branches of national economy, and of workers of science and culture.

The State libraries of Union republics accomplish international book exchange, thereby intensifying their information and bibliographical potential. These libraries prepare and publish retrospective and recommendatory guides and indexes of national literature, information bulletins, and lists of new Soviet and foreign publications acquired by the library. They also publish reviews and abstracts of books and other materials dealing with problems of culture and the arts.

All such libraries maintain alphabetic and classified catalogs and some of them have subject catalogs in the national language of the republic, in Russian, in the languages of other peoples of the U.S.S.R., and in foreign languages. These libraries organize book displays, bibliographical surveys, readers' conferences, oral magazines, etc. The State libraries of the Union republics profoundly study, generalize, and popularize progressive methods used in the leading libraries of the republic and promote the centralization of the public library system.

Republic and regional libraries represent the largest unit in the system of universal scientific libraries of the Soviet Union. In spite of the great difference in the level and volume of their activities, connected with the historical conditions of their origination and development, all these libraries—in conformity with the model statutes adopted in all Union republics, which are divided into regions—have been recognized as scientific libraries of the universal type. Moreover, regional libraries are the leading regional depositories of Soviet printed matter and of valuable foreign literature, and are scientific centers of methodological guidance of State public libraries. They also represent bases of coordination of activities of libraries of all systems and departments located in the territory of the region or autonomous republic.

Widely using all means at their disposal for the popularization of literature, regional libraries impressively contribute to the education of the population in the communist spirit; the development of national economy, science, and culture; and the improvement of professional skills of workers and specialists.

Today our country has, besides the all-Union universal libraries (the State Lenin Library, the Saltykov–Shchedrin Public Library, and the Library of Foreign Literature), 14 State libraries in the Union republics, 20 republic libraries in the autonomous republics, and 134 universal libraries. The system of universal scientific libraries is continually growing. In the period 1971–1975 alone, 10 regional libraries were organized in connection with the establishment of new regions in Central Asia and Kazakhstan. Apparently this process will continue to develop in the future in keeping with the further improvement of the administrative and territorial regionalization of the country. The collections of universal scientific libraries consist of domestic and foreign publications of universal character. These libraries also have a ramified reference and information retrieval system. The collections of every State republic library of a Union republic total over 2 million copies, while each of the 40 regional republics of the Russian Federation and the Ukrainian S.S.R. boasts of more than a million copies. The total number of publications held in these libraries is over 200 million copies.

The universal character of the collections and the broad functions of libraries of this type, in conditions when the volume of the printed output and the information needs of science and industry grow rapidly, call for the incessant improvement of all aspects of their activities and of the activities of local centers of scientific and technical information.

Today much attention is being paid to the optimization and coordination of the acquisition strategies of these libraries. This concept finds reflection in such measures as the decrease in the number of copies held in a library and the specialization of acquisition policies of the libraries. This makes it possible to efficiently control the acquisition of books with due regard for the future and to expand shared utilization of collections through the interlibrary loan.

The majority of the republic and regional library systems are actively putting in good order the servicing of certain groups of readers, and owing to the stabilization of qualitative indicators that such a development brings, the quality and efficiency of readers' service substantially grows. The main thing here is the coordination of group service activities with the activities of libraries of other departments, as this ensures maximum utilization of resources of each library. The largest libraries already provide scientific workers and specialists with a priority service, and today this group of readers accounts, on the average, for about 50% of all users of universal scientific libraries. In some libraries priority service is rendered to over 60%–70% of the readers (in the State libraries of the Ukrainian S.S.R., Byelorussian S.S.R., Kazakh S.S.R., and Georgian S.S.R.). In general, a wider introduction of the priority service makes it possible to pay more attention to the quality and differentiation of service to readers. This concept manifests itself in the organization of such specialized units within the library structure as sections of technical and agricultural literature, printed music and books on art, reading rooms of current periodicals, recent acquisitions, and reference and bibliographical publications.

Information service rendered to people engaged in the sphere of science, industry, and culture is also being further developed in the republic and regional library. Today more attention is being paid to the selective dissemination of information on different themes and problems and to the wider coordination of information activities of these libraries with the activities of libraries of other departments and information agencies. This service is extended to leading Party and government bodies.

The creation in 1972, within the framework of the State Lenin Library, of the Center of Information on Problems of Culture and Art stimulated the republic and regional libraries to establish special groups or sections that would render information service to officials, scholars, and specialists in the field of culture and art, for the most part employed in agencies and institutions subordinate to the U.S.S.R. Ministry of Culture.

An important factor that favored the reorganization of the work of these libraries was the intensification of their research activities. These libraries, more actively than ever before, carry out research on their own or take part in the working out and study of a broad range of complex problems dealing with the theoretical and methodological fundamentals of socialist library science and the study of the strategy of organization and improvement of librarianship.

The organizational functions of republic and regional libraries, in their capacity of methodological and coordination centers, are becoming more and more pronounced. Apart from working out short-term plans, the Union republics have already begun to map out long-term programs of the type "Principal Trends of Development of Librarianship," designed for 5-year periods. Such basic documents stimulate planning of library activities and enhance the role scientific libraries play in the national system of information, bibliographical, and library services.

The cooperation of republic libraries with major foreign libraries and centers for library science, in international book exchange, and in the organization of library conferences and seminars is incessantly expanding. Thus, the State Lenin Library of the Byelorussian S.S.R. cooperates with 172 scientific bodies in 30 countries, while the State libraries of the Union republics of General Asia and Kazhakhstan maintain contact with libraries of Asian and African countries.

LIBRARY SYSTEMS OF THE ACADEMY OF SCIENCE OF THE U.S.S.R.

In the U.S.S.R. the term "academic library" is applied both to the system of libraries that renders service to a complex scientific institution (an academy or higher educational institution), and to the library of a certain academic institution (an institute, laboratory, observatory, etc.). The academic libraries are classified as follows: libraries of the Academy of Sciences of the U.S.S.R. and of the academies of Union republics; libraries of specialized academies (for example, the Academy of Medical Sciences of the U.S.S.R.); and libraries of some higher educational institutions called academies (a case in point is the Timiriazev Moscow Academy of Agriculture). Libraries of the latter type, in the character of their activities more closely resemble libraries of higher educational institutions.

The term academic library in the professional language of librarians of the pre-revolutionary period was synonymic to the scientific library, as distinct from the public library.

In contemporary Soviet librarianship the term academic library is foremostly associated both with the system of multipurpose libraries and with the system of more specialized libraries servicing the Academy of Sciences of the U.S.S.R. and the academies of the Union republics.

The library system of the Academy of Sciences of the U.S.S.R. originated in the epoch of progressive reforms (the first decades of the 18th century). In the early 20th century the academy had only seven museums, five laboratories, and an observatory. From the first days of Soviet power the academy took on the responsibility of organizing an integral system of scientific bodies in the country. The academy also expanded the topics and geography of scientific research. By organizing a number of bases and branches in the 1930s, the Academy of Sciences of the U.S.S.R. initiated the establishment of academies of sciences in all Union republics. Today the Academy of Sciences of the U.S.S.R. embraces over 250 scientific bodies.

The libraries of the academy represent an inseparable part of its general scientific potential. The library system always developed in keeping with the evolution of academic institutions. This system is even older than the academy itself, for the alma mater of academic libraries, now known as the Library of the Academy of Sciences in Leningrad, was founded as a court library in 1714; it was passed over to the academy when it was inaugurated in 1724.

The real history of the library system of the academy began only after the 1917 October Socialist Revolution. Retaining all that was of value in the past (specialized service and direct contact with science, first of all), the academy library system entered upon the highest phase of its development. The number of academic libraries increased while their geography expanded impressively. In 1934, in connection with the transfer of the Academy of Sciences from Leningrad to Moscow, the aggregate of academic libraries covering natural sciences came into being. In 1936 libraries covering socioeconomic sciences and the humanities, headed by the

Fundamental Library of Social Sciences, were joined to the system of academic libraries.

In the 1930s and 1940s and in postwar years, numerous libraries, attached to branches and other scientific agencies of the Academy of Sciences of the U.S.S.R., were set up in different cities of the country. At the same time the system of libraries of the academies of the Union republics was founded. Libraries were established prior to 1930 only in three academies of the Union republics (in Latvia, 1924; the Ukraine, 1919; and Byelorussia, 1925). In the main, academic libraries were organized in the years 1933–1947. The central libraries (called fundamental in some republics) of the academies of the Union republics are universal or multipurpose libraries, their holdings running to many thousand units. The library system of special academies crystallized simultaneously. In 1925 the Ushinsky State Library for People's Education of the U.S.S.R. Academy of Pedagogical Sciences was organized; it was followed by the Central Agricultural Library of the All-Union Lenin Academy of Agricultural Sciences in 1930, the Fundamental Library of the U.S.S.R. Academy of Medical Sciences in 1935, the Scientific Library of the U.S.S.R. Academy of Arts in 1948, etc. The libraries of specialized academies are of a mixed character: the acquisition of their stocks is stipulated by the specialization of the academy they belong to, and due to this their acquisition policy is of a specific nature. This, naturally, draws these libraries close to special libraries. But, as a rule, libraries of specialized academies acquire literature in many subject fields that are, directly or indirectly, bound up with the main branch of knowledge, and in this way their collections take on a multipurpose character. This circumstance, and the fact that these libraries render service to scientists and highly qualified specialists, draw them close to the large libraries of the Academy of Sciences of the U.S.S.R. In 1952 the first essentially novel information body, the Moscow Institute of Scientific Information (now known as the VINITI), was organized within the Academy of Sciences system.

In 1958, in order to improve library and bibliographical service for users in the zone of intensive assimilation of productive forces (Siberia and the Soviet Far East), the Academy of Sciences began to build up the stocks of the State Public Scientific and Technical Library of the Siberian branch of the Academy of Sciences of the U.S.S.R. in Novosibirsk. In later years it reinforced the libraries of its centers in the Urals region and the Soviet Far East. In 1969 the Institute of Scientific Information on Social Sciences (INION), which incorporated the Institute of Scientific Information on Social Sciences, was organized. In 1973 the Library for Natural Sciences of the Academy of Sciences of the U.S.S.R. was set up on the basis of the Moscow sector of the special library network that had from 1934 to 1973 accomplished organizational and methodological guidance of academic libraries covering natural sciences.

In this way the contemporary structure of the library system of the Academy of Sciences is made up of two main parts: (*a*) universal and multipurpose libraries-cum-information centers (BAN in Leningrad, VINITI and BEN in Moscow, the Siberian branch of the State Public Scientific and Technical Library in Novosibirsk) that function on an equal footing; and (*b*) special libraries, attached to institutes and other scientific research bodies of the academy (situated in Moscow, Leningrad, and Novosibirsk), and special libraries of the branches of the academy and other extraterritorial agencies (for instance, limnological and biological stations, botanical gardens, expedition ships). As a rule, library systems of the academies of sciences of the Union republics and of the specialized academies of the U.S.S.R. developed on the same lines.

The information and library system of the academy, taken as a whole, represents the largest aggregate of scientific libraries and institutes of information. It includes over 500 stationary libraries and an equal number of mobile libraries of the Academy of Sciences of the U.S.S.R., the academies of the Union republics, and specialized academies. Together with other libraries of the country, this group of libraries services over 5,000 scientific institutions.

Owing to close contact, permanent cooperation, and the centralization of many labor-consuming processes—those in acquisition, processing of books, registration, compilation and publication of basic bibliographies, union catalogs, production of micro- and photocopies, book-binding, financing, supply, etc.—the academic libraries have jointly built up a unique and purposefully selected book collection and a multipurpose reference and information system.

Academic libraries acquire foreign literature that accounts for 40%–60% of their stocks with remarkable consistency. The collections of domestic and foreign periodicals, documentary sources, monographs, reference works, parliamentary publications, proceedings of international symposiums, and scientific reports are built up with special care.

The outstanding trait of the activities of the libraries of the academies of science and of the specialized academies is the organization of a stable publishing strategy: they put out indexes of literature in different subject fields (for example, *Agricultural Literature of the U.S.S.R., Agriculture in Foreign Countries,* etc.), retrospective special indexes, thematic lists of publications dealing with the most urgent problems, abstracts journals, critical and analytical reviews, annual lists of publications of academies, printed catalog cards, and union catalogs and lists. Soviet academic libraries have accumulated a vast experience in the servicing of science that speaks of the fusion and interdependent unity of all forms and methods of library and information activities.

All that was mentioned earlier explains why the libraries of the Academy of Sciences of the U.S.S.R., the academies of the Union republics, and the specialized academies are so popular with users. These libraries render service to about a million scientific workers, to the majority of the faculty members of higher educational institutions, to senior students of universities and other institutions of higher learning, and to the creative intelligentsia. Thousands of Soviet and foreign scholars and scientists use the collections of these libraries through the domestic and international interlibrary loan.

LIBRARIES OF HIGHER EDUCATIONAL INSTITUTIONS

In the Soviet Union the training of highly qualified specialists is achieved through a broad system of higher educational institutions (abbreviated to "vuz"). The system includes the following elements: universities (for example, the Moscow State

University named for Lomonosov), academies (for example, the Military Medical Academy named for Kirov), institutes (for example, the Moscow Institute of Aviation), and colleges (for example, the Bauman Technological College). Today 898 higher educational institutions function in the country (in 1914 there were 96 institutions of higher learning), including 66 universities (in 1914 there were 10). The total number of students is 4.9 million. In 1975, 993,000 students were admitted to higher educational institutions.

The term "university library," widely spread in many Western countries, is equivalent to the term "vuz library," or "library of a higher educational institution," used in the U.S.S.R. This term defines a library of any institution of higher learning, and not only of a university.

These libraries play an important role in the training of highly qualified personnel for all branches of national economy. They provide the teaching and educational process and the scientific research activities of the faculties and laboratories of higher educational institutions with books and with reference, bibliographical, and information services. These two functions distinguish these libraries from libraries of other types and determine the character of their activities.

In accordance with the content of their collections, the "vuz" libraries pertain either to universal libraries or to multipurpose libraries.

The bulk of their collections is made up of educational publications, each title of which is acquired in heavy duplication in order to meet the demands of many students. Literature of this kind is allotted to a specialized section, known as the library of instructional materials or educational library. It is then distributed among the faculties, departments, and groups; some of it is also sent to library branches attached to students' hostels. Educational literature is lent to students for long periods, with due regard for the duration of study of a certain subject.

The libraries of higher educational institutions aspire to acquire domestic and foreign scientific literature (transactions, monographs, periodicals, etc.) in the principal subject field and on problems connected with scientific research carried out by the teachers and professors, with exhaustive fullness. Scientific literature is also used for the broadening of the scientific horizon of students. It also helps the students to write their laboratory reports and diploma works.

The chief principles guiding the activities of Soviet libraries of higher educational institutions are: differentiated approach to servicing readers, close contact with the life of the institution, the availability of the libraries to all students, and the centralization of a number of expensive and labor-consuming library processes. Differentiated readers' service in libraries of higher educational institutions is accomplished either in accordance with the type of service (the separate servicing of students, postgraduates, and the teaching staff, for example, through separate reading rooms and circulation desks) or by subject fields. Subject-field differentiation has been mainly introduced in universities and other large institutions that boast of numerous branches, faculties, and departments. Such institutions have large specialized reading rooms (for instance, reading rooms covering literature on natural sciences, the humanities, and social sciences), circulation desks, and auxiliary (reference) reading rooms for students at the faculties and departments.

Being an auxiliary educational body, the library of a higher educational institute works in close contact with the rectorate, faculties, departments, laboratories, public organizations, and the entire teaching staff. This allows the library to react to all changes and innovations, such as the change in the number of staff or students, the introduction of new syllabi, etc., sensitively and operatively. The libraries of higher educational institutions are foremostly intended for students. Usually all students become users of the library from the very first days of their studies and they use the library during the entire study period. These libraries are also used by teachers and professors. Nevertheless, according to the rules adopted in the U.S.S.R., all people (employees, workers, collective farmers, pupils of secondary schools) can use these libraries (read books within the walls of the library or borrow books through the interlibrary loan) if their demands and interests coincide with the specialization of the higher educational institution. Such servicing is identified with the third principle—the availability of the university library to all people. In their turn, universal public libraries, especially the republic, regional, and city public libraries, impressively contribute to the servicing of students, who account for 40% of all users of public libraries.

The library service of a higher educational institution is organized either through one library or a system of libraries, as this depends on the structure and range of activities of the institution. Such large and multipurpose institutions as universities have, apart from the basic (central) library, specialized branches of the library that draw library service closer to the faculties, departments, laboratories, and students' hostels. In such cases all the libraries of higher educational institutions make up an entity in which the basic (central) library is responsible for centralized acquisition, centralized processing of all literature acquired by the institution, and its distribution among all units of the institution's library system. The central library also renders bibliographical and methodological assistance to the divisional libraries. The main advantages of such a form of organization of library service in a higher educational institution are that it ensures unity in the servicing of students and members of the faculty, permits rational and efficient utilization of material resources, and reduces parallelism and duplication in the activities of the libraries of the system.

The following scientific libraries of higher educational institutions, which were established long ago and are famous for their rich collections, deserve special mention: the libraries of the Lvov University (founded in 1661), Moscow University (1755), Tartu University (1802), Vilnius University (1803), Kazan University (1804), and those of other universities; the libraries of the Technological College in Moscow (1830), the Moscow Institute of Railway Engineers (1896), and the Moscow Agricultural Academy (1865), etc. Having at their disposal collections of educational and scientific literature numbering from 1 to 6 millions of volumes and more, each of these libraries serves many thousands of readers, sends a large quantity of literature to all corners of the country and the world through book exchange and interlibrary loan channels, and carries out impressive activities in the field of scientific research and organizational and methodological guidance of libraries of higher educational institutions of the country.

Special Libraries

These libraries represent a very important unit of the Soviet library and information system. To this category of libraries belong libraries attached to ministries, departments, specialized research institutes, design and planning offices; libraries of industrial, building, and transport enterprises and industrial firms; libraries at experimental agricultural and forest-protection stations, and other agricultural enterprises; libraries at hospitals and medical organizations; and libraries attached to physical culture and sport organizations. Libraries that render service to specific groups of readers (blind, deaf, and otherwise handicapped people) also belong to this category of libraries.

The main object of special libraries is the day-to-day servicing of the industrial, scientific, and educational organizations to which they belong. In order to fulfill this task and, at the same time, spend their funds economically and rationally, special libraries build up highly specialized collections of domestic and foreign literature in keeping with the special subject field covered by the organization they service.

The existence of special libraries is stipulated by the growing differentiation and specialization of science and technology.

Prior to 1917, Russia had only 3,000 special libraries, their collections totaling 15 million copies. Having increased 20-fold, this system now consists of 60,000 libraries, and their overall collections number 1.6 milliards of copies. Annually these libraries serve 40–45 million users, that is, nearly 25% of all library users in the country, and issue about a milliard publications. Today special libraries of different types are evenly distributed in the territory of all the 15 Union republics in keeping with the needs of national economy of the country and problems connected with the assimilation of its productive forces.

The establishment of a ramified system of special libraries is not only a general cultural achievement. The specific character of their activities lies in the fact that every special library is involved in the progress of that particular sphere of human activity in which it is created. For instance, the library of a plant is involved in the designing, construction, and production of a machine of a certain brand, for it supplies the people who are creating the machine with books and information. A library of a specialized or scientific institute is involved in all new experiments and research carried out by the institute. Located at enterprises and being in close everyday contact with production as such, special libraries ensure the purposeful satisfaction of the concrete demands of their users.

Within the wide range of special libraries, the dominating position in terms of number (about 25,000 libraries) and importance is held by scientificotechnical and technical libraries. The impetuous growth of the special library system is best reflected in the development of technical libraries.

Before the 1917 October Socialist Revolution only two or three scores of enterprises had technical libraries, the collections of which consisted of a meager number of reference works. Moreover, these libraries rendered service to a small circle of engineers, technicians, and officials. Among the best known libraries of this type were the libraries of the Kolomensk and Kharkov steam locomotive works, the Zlatoust metallurgic and Bezhitsk machine-building plants, the Nikolaev ship-repairing plant, the Putilovsky plant, etc. A few technical libraries were organized by technological societies and special councils.

In the years of Soviet power, the State has accomplished much in building up the special library system. The process of formation of the system goes back to the 1930s, a period that marked the beginning of technical reconstruction in the U.S.S.R. It was in these years that technical libraries began to participate in the wiping out of illiteracy, in the raising of the general cultural standards of the population, and in the improvement of professional training. The 1930s were marked by the establishment of technical libraries at numerous enterprises, especially at newly built plants, in specialized research institutes, and in designing and planning organizations.

Today the character of the activities of technical libraries has greatly changed in connection with the raising of the educational and cultural level of Soviet people. By the end of 1975, 77% of the population, engaged in the sphere of national economy, had higher and secondary education. This permits technical libraries to render assistance in the solving of scientific, technological, and organizational problems and cater to the needs of all categories of workers engaged in national economy, from the apprentice to the director, on a much more impressive scale than in the 1930s. Contemporary technical libraries, being an inseparable part of the overall State system of scientific and technical information and the base of industrial bibliothecal and bibliographical information, not only supply production with the necessary information on an ever-growing scale, but perform educational functions, too, by contributing to the improvement of professional knowledge of the working people and the dissemination of progressive methods of production.

Informative publications (abstracts journals, reviews of technological achievements, express information on foreign literature, scientific reports, descriptions of rationalization proposals, etc.), patents, standards, production instructions, industrial catalogs, and drafts make up the bulk of the stocks of technical libraries.

With the development of national economy, complication of its structure, and growth of the demand for technical literature and information, the system of special libraries, of technical libraries in particular, became more differentiated and today they are classified as follows:

1. Libraries of enterprises (plants, factories, mines, construction organizations, depots, etc.): These libraries account for 70% of the total number of technical libraries. Technical libraries, which operatively satisfy the current demands of their users and which replenish their holdings foremostly with the newest publications, are mainly organized at large enterprises or at fully automated plants. Enterprises which do not have their own libraries are serviced by territorial, specialized scientific and technical libraries, or universal public libraries (republic, regional, and city libraries).
2. Technical libraries of research institutes in the spheres of industry, transport, construction, and communications: They are distinguished from the libraries of enterprises by a more specialized and profound selection of scientific literature, and they focus their attention on information and bibliographical ser-

vicing of users. Their main object is to assist scientific activities carried out by the staff of the institute.

3. Technical libraries of designing offices and planning organizations render service to qualified specialists engaged in the working out of new designs and projects. The outstanding trait of these libraries is the regular replenishment of their collections with reference works, standards, model designs, and other special kinds of technical literature and the organization of the differentiated utilization of these materials by specialists.
4. Central scientific and technical libraries: Besides servicing readers like all libraries, these libraries are also methodological and bibliographical centers. In accordance with the character of their activities, composition of their book collections, spheres of influence, and departmental affiliation, the central scientific and technical libraries fall within the following three main categories: specialized, territorial, and multipurpose libraries. These libraries mainly came into being on the borderline of the 1930s and 1940s.

The specialized central scientific and technical libraries—each library is under the jurisdiction of one of the ministries or departments, and they have large collections numbering from 500 to 800,000 and more volumes—ensure the satisfaction of demands for books and information within the framework of an entire branch of industry. Examples of such libraries are the central scientific and technical libraries of the railway transport, oil and gas industry, ferrous metallurgy, chemical industry, light industry, etc. Every large economic region of the country has territorial central scientific and technical libraries that are called upon to satisfy the needs of specialists of a given region in scientific and technical literature and information.

The following libraries are multipurpose central scientific and technical libraries of Union significance: The All-Union Technical Patent Library (founded in 1924) possesses the most exhaustive collection of domestic and foreign patents in the U.S.S.R. and is the center of methodological guidance of work with patents for all libraries of the country. The Central Polytechnical Library (founded in 1864) disseminates technical knowledge among wide sections of the population, servicing over 50,000 users annually. The State Public Scientific and Technical Library of the U.S.S.R. (founded in 1958) is a multipurpose depository of technical literature of all kinds and the center for methodological guidance of technical libraries in the country. It is available for all people who need scientific-technical and industrial literature; annually it renders service to over 65,000 users.

Bibliography in the U.S.S.R.

Bibliography originated in Russia in the 11th century in the form of lists of manuscript books. The most remarkable model of a bibliography (prior to the 18th century) is the bibliography *Oglavlenije knig, kto ih složil* [Contents of Books and Who Wrote Them], which gives a detailed description of 1,800 original Russian and translated books.

All the main forms and branches of bibliography, including abstracts journals and indexes of literature in the fields of history, philology, geography, natural history, and technology, came into being in the 18th century. The eminent Russian scientist M. Lomonosov impressively contributed to the development of bibliography in the country.

But it was in the 19th century that bibliographical activities flourished most intensively. A remarkable event in the history of Russian bibliography was the work by V. Sopikov entitled *Opyt rossijskoj bibliografii* [Bibliography of Russia, sections 1–5; 1813–1921], which represented the most exhaustive list of printed books in Russian and church Slavonic, embracing the period from the late 15th century to the early 19th century. State registration of printed matter was begun in 1837. In subsequent decades of the 19th century and in the early 20th century scores of basic bibliographical works, dealing with different subject fields and social problems, were published. These bibliographies played an important role in the development of science and dissemination of progressive ideas. This period was also marked by certain developments in the bibliographical control of Ukrainian, Byelorussian, Georgian, Armenian, Lithuanian, Latvian, and Estonian literature. Recommendatory bibliography became an important factor in the molding of literary interests of the progressive circles of society. State registration of printed matter was promoted through the establishment in 1907 of the weekly *Kniznaia letopis* [Book Chronicles]. The most prominent bibliographers of the 19th century were V. S. Sopikov, V. G. Anastasevich, G. N. Gennadi, V. I. Mezhov, the Lambin brothers, A. N. Neustroev, N. M. Lisovsky, N. A. Rubakin, S. V. Venherov, K. N. Derunov, and I. V. Vladislavlev.

A new era in the development of bibliography was ushered in after the 1917 October Revolution. In conformity with the decree of June 30, 1920, which was worked out on Lenin's initiative and signed by him, the foundations of bibliographical control in conditions of a new society were laid down. In the same year the Russian Book Chamber (known as All-Union Book Chamber since 1936), the central bibliographical service in the country, was established in Moscow. In later years book chambers were organized in the Union republics and in a number of autonomous republics.

Development of bibliography in the U.S.S.R. is encouraged by the Communist Party of the Soviet Union and the Soviet government. In the last two decades many decrees concerning bibliography, librarianship, and scientific information were adopted and new institutions were set up. The bibliographical activities of libraries have been intensified. Apart from State (national) bibliography and scientific auxiliary bibliography, much attention is paid to recommendatory bibliography, the object of which is the raising of general cultural standards and the promotion of professional knowledge among wide sections of the population. Today the U.S.S.R. boasts of an extensive system of organizations that produce indexes of literature and render reference and bibliographical service to users. This system includes 17 book chambers, all libraries and bodies of scientific and technical information, numerous higher educational institutions, and research institutes. The activities of these institutions are well coordinated, each agency being allotted special functions. The

All-Union Book Chamber is the center of State (national) bibliography; it also achieves methodological guidance of the activities of all other book chambers in the country. The coordinating center for the compilation of bibliographical indexes of scientific and recommendatory character and of bibliographical servicing of users is the State Lenin Library. The center for bibliographies of bibliographies is the Saltykov-Shchedrin Public Library. The Library of the Academy of Sciences is responsible for bibliography of natural sciences, the State Public Scientific and Technical Library for bibliography of technology, and the Institute of Scientific Information on Social Sciences (INION) for bibliography of the social sciences.

From 7,000 to 9,000 bibliographical indexes, bibliographical journals, and bibliographical lists appended to articles and books (each containing 30 and more titles) are annually published in the U.S.S.R. These materials are listed in the annual *Bibliografija sovetskoi bibliografii* [Bibliography of Soviet Bibliographies], the first volume of which, covering materials published during 1939, was printed in 1941. In the war years the publication of this bibliography was stopped; its publication was resumed in 1948. This annual volume covered materials that were published in the years 1946 and 1947. The most harmonious system here is the system of recording bibliography that includes "letopisi," chronicles of publications of different kinds (books, periodicals, journal and newspaper articles, pictorial art, maps, musical scores, and abstracts of theses). The system also embraces chronicles of publications of the Union and autonomous republics, *Ezhegodnik knigi SSSR* [The Book Annual of the USSR], printed catalog cards for books, journal and newspaper articles, and printed union catalogs of foreign literature received by the libraries of the country (published since 1949).

Within the system of current publications of scientific and auxiliary character an important place is occupied by the *Abstracts Journal* of the All-Union Institute of Scientific and Technical Information, founded in 1952. The *Abstracts Journal* is now published in 184 series, which cover the main branches of natural sciences, technology, and industry. The *Express Information* of VINITI (over 70 series) is also a major bibliographical service. Besides this, specialized information centers produce a large number of operative bibliographical publications in appropriate subject fields (technology, agriculture, building, transport, etc.). The most significant bibliographical publications in the field of social sciences are represented by: the abstract journals of the Institute of Scientific Information on Social Sciences (INION), *Obshchestvennye nauki v SSSR* [Social Sciences in the USSR] (the series cover different sciences: history, philosophy, economy, etc., and they are published in 7 series); *Obshchestvennye nauki za rubezom* [Social Sciences in Foreign Countries], in 9 series; bibliographical bulletins of INION that list books, articles, and other materials in different fields of social sciences; the bulletin of the scientific library of the Institute of Marxism-Leninism attached to the Central Committee of the CPSU, *K. Marx, F. Engels, V. I. Lenin;* the bulletin *Literatura po pedagogicheskim naukam i narodnomu obrazovaniu* [Literature in the Field of Pedagogical Sciences and People's Education] published by the Ushinsky State Scientific Library for People's Education; and numerous other bulletins and annuals dealing with different subject fields (medicine, geology, history, natural history, countries of Asia and Africa, the U.S.A., etc.). Information and bibliographical work in the field of culture and art is carried out by the State Lenin Library.

A number of major works, created in the years of Soviet power, are devoted to the repertory of Russian books and periodicals, for instance, *Svodnyi katalog russkoi knigi grazdanskoi pechati XVIII veka: 1725–1800* [Union Catalog of 18th-Century Russian Books Set in Civil Type: 1725–1800]; *Periodicheskaja pechat' SSSR, 1917–1949: Zhurnaly, trudy i bulleteni* [Periodical Press of the USSR. 1917–1949: Journals, Proceedings and Bulletins]. The national republics also produce many union bibliographies of universal character (for example, *Azerbaijan Books, Books of the Byelorussian S.S.R., Georgian Books, Books of Soviet Kazhakstan, Chronicles of Publications of the Lithuanian S.S.R., Periodicals of the Ukrainian S.S.R.*, etc.). These works reflect the achievements of cultural development of the peoples of the U.S.S.R. including peoples that not so long ago had no written language of their own or were wholly illiterate.

In every branch of knowledge, retrospective bibliography is represented by dozens of extensive lists, including serial lists, for example, *Aktaulnye problemy tehniki* [Current Problems of Technology]. The portion of biobibliography is also substantial (the series *Materials Pertaining to the Biobibliography of Scientists of the U.S.S.R.* and other works). Many bibliographical works devoted to K. Marx, F. Engels, V. I. Lenin, and other prominent figures of the revolutionary movement have been published. Basic bibliographical indexes dealing with A. Pushkin, L. Tolstoi, F. Dostoevsky, A. Chekov, M. Gorki, V. Mayakovsky, T. Shevchenko, S. Rustaveli, J. Rainis, and many other writers, painters, composers, world classicists, and foreign writers popular in the U.S.S.R. (Dante, Shakespeare, Goethe, Balzac, Merimee, Wells, and many others, including contemporary authors) have been published. Bibliography of bibliographies, both universal and special, is also developing favorably.

In the U.S.S.R. important research in the field of history, theory, and principles of bibliography is being carried out, and efficient methods of utilization of bibliography in professional training and education of the population and in scientifico-technical progress are being worked out. The centers of such activities are faculties of bibliography of institutes of culture, the All-Union Book Chamber, the State Lenin Library, and other large scientific libraries. An impressive number of monographs and manuals have been produced. A special journal, *Sovetskayja bibliografija* [Soviet Bibliography], is published. Problems of bibliography are also examined in the collection of articles *Naucno-tehnicheskaja informacia* [Scientific and Technical Information], and in different transactions published by the leading libraries and institutes of culture. The following specialists have made an important contribution to Soviet bibliography: B. S. Bodnarsky, N. D. Zdobnov, I. F. Masanov, Y. I. Masanov, E. I. Ryskin, K. R. Simon, L. N. Tropovsky, A. G. Fomin, E. I. Shamurin, and A. D. Eichengoltz. A number of eminent scientists—V. L. Komarov, V. A. Obruchev, and others in the field of natural sciences; and C. D. Balukhaty, P. N. Berkov, N. K. Piksanov, and others in the humanities—have also contributed to this endeavor.

Thousands of people, working in book chambers, libraries, and scientific and technical information agencies, are engaged in bibliographical activity.

The Bibliothecal–Bibliographical Classification (BBK)

The necessity to classify books according to their contents made itself felt in Russia in the early 18th century in connection with the development of civil book publishing and the establishment of the first scientific libraries. The classification schemes of that period were remarkable for their unique quality, since Russian librarians and bibliographers working at them (N. N. Bantysh-Kamensky, M. I. Antonovsky, and others) aimed to reflect in them the highest achievements of scientific systematics of that time.

A number of new classification schemes were worked out in the first half of the 19th century, including the classification schemes for the Public Library in St. Petersburg (1808), the Library of Moscow University (1826; compiler, F. F. Reis), and the Library of the Kazan University (1843; compiler, K. N. Foigt).

The finest library classification of that period was the one proposed by K. E. Baer, who arranged branches of science in a sequence that reflected the history of world development.

In the late 19th century and early 20th century, the Decimal Classification (DC) evoked great interest in Russia and was being gradually introduced into library practice here. Nevertheless, the attitude of Russian librarians to it was discrepant; while recognizing the practical advantages of decimal classification numbers, they were, at the same time, aware that the DC lacked sufficient scientific grounds.

In the beginning of the 20th century an attempt to create a Russian classification based on the decimal system was made by P. M. Bogdanov. A new phase in the development of such a classification system emerged in conditions that were brought about by the building of a society of a new type, the socialist society.

The increase in the number of libraries and the expansion of their activities and collections called for the creation of such a classification system that would meet the scientific and ideological requirements of Soviet libraries. The lack of such a classification initially led to the use of adapted versions of the Universal Decimal Classification (UDC). This system was introduced into all libraries in January 1921. In the same year the first official edition of DC schedules was published. Since that time different adaptations of UDC have been widely applied in all public libraries and in the majority of scientific and technical libraries. Thus classification numbers of this system are used in the *Knizhnaya letopis* [Chronicles of Books] and in printed cards of the All-Union Book Chamber.

Nevertheless, these schedules could not meet the requirements of Soviet libraries, for they lacked subdivisions for the classification of new Soviet literature; the schedules were too brief in general and, therefore, unsuitable for augmented library collections.

As early as the 1920s the decimal classification was subject to severe criticism. At the First All-Russian Bibliographical Conference (1924) it was pointed out that

DC schedules should not be used in Soviet libraries without preliminary remodeling, and the compilation of a new Soviet library classification was strongly recommended.

In the 1920s and 1930s a number of editions of amended and more detailed DC schedules intended for large libraries were published, including schedules compiled by N. V. Rusinov (1924), E. N. Dobrzhinsky (1930), and E. I. Shamurin (1933 and 1939).

A significant development in this endeavor was the publication in 1938 of modified DC schedules compiled by L. N. Tropovsky, intended for small public libraries of the universal type. Substantial qualitative changes had been introduced into these schedules and they greatly differed from previous Soviet editions of the DC and the original Belgian source. Especially profound changes were made in the third class. L. N. Tropovsky's schedules (which in essence represent a new version of the DC) were widely applied in public libraries and in many special libraries for the classification of sociopolitical literature.

After 1945 the Interlibrary Classification Committee of the R.S.F.S.R. Ministry of Culture continued to revise the UDC and published new editions of classification schedules for public and regional libraries, edited by Z. N. Ambartsumian. (This work was achieved in the period 1955–1973.) The schedules for regional libraries (1963) manifested yet a greater deviation from the UDC and possessed certain features that drew them nearer to the new Soviet classification that will be discussed below.

Bearing in mind the importance of applying the UDC as a means of international communication in the field of scientific-technical information, the Council of Ministers of the U.S.S.R. in 1962 made it incumbent upon all scientific-technical information bodies, publishing houses, and scientific and technical libraries to classify scientific-technical and technical literature according to the UDC. Activities involved in the improvement of the UDC, carried out in the U.S.S.R., are coordinated by the Interdepartmental Cataloging Committee attached to the State Committee of the Council of Ministers for the Coordination of Scientific Research. The subject-field classes were published, and in 1969–1971 the full UDC tables for natural and technical sciences, in six volumes, were produced. In 1971–1972 supplements and a list of amendments made in the schedules were printed in the monograph *Developments in the UDC.*

Yet the use of abbreviated adaptations of UDC in the public libraries and of UDC schedules for natural and technical sciences in the technical libraries could not fully meet the requirements of all Soviet libraries, the large universal libraries in particular, nor did it solve the problem of a standard bibliothecal–bibliographical classification. It was for this reason that the generation of an integrated bibliothecal–bibliographical classification (BBK), founded upon Marxist-Leninist methodology, continued to remain the most urgent problem of Soviet library science. This problem was solved only in the 1960s when the R.S.F.S.R. Ministry of Culture united the efforts of the leading scientific libraries of the country in this field: the State Lenin Library, the Saltykov-Shchedrin State Public Library, and the All-Union Book

Chamber. Over 800 scientists took part in the compilation and approval of the BBK, which represents a system of schedules intended for different types of libraries. From 1960 to 1968, 25 issues (30 volumes) of schedules were published for large scientific libraries. Each issue was supplied with an alphabetical subject index. In 1970–1972 abbreviated schedules for scientific libraries (in 5 issues, 6 volumes), with a cumulative alphabetical subject index, were produced. In 1976 the variant of BBK schedules for public libraries was worked out, while schedules for regional libraries are still being compiled. This will make it possible to use the scheme in all public libraries of the country. The supplements and amendments to the BBK have been regularly published since 1969.

The BBK is a universal system. It covers all branches of science and practical activity reflected in printed matter and represents them as an integrated system. Its structure is based on principles of Marxist-Leninist classification of sciences and classification of substantial realities underlying phenomena. They are principles of objectivity and development, principles founded upon the doctrine "matter is primary, consciousness secondary," and principles exposing the decisive role of the basis in relation to the superstructure, universal causation of phenomena, and the Party spirit of social sciences. The grouping of sciences into classes and the distribution of the main classification numbers among them were made with due regard for the correlation of sciences that had formed by the 1960s and received wide recognition.

The BBK is a classification system of the semifacet type in which common divisions (both general and special) are broadly used. This system is flexible enough and this makes it possible to introduce new concepts into it. The main array has 21 classes, defined by letters of the Russian alphabet. The notation of the BBK is a logical, combined letter and numerical notation in which Arabic figures, arranged according to the decimal principle, prevail. Symbols and devices adherent to the UDC are widely used in the BBK. At present, studies concerning the compatibility of BBK with the UDC are being carried out.

The BBK is applied in a number of large scientific libraries of the Soviet Union and other socialist states (Bulgaria, the G.D.R., Czechoslovakia, Vietnam).

In the U.S.S.R. much attention is also given to bibliographical classification. In the majority of publications of current recording bibliography, the standard classification scheme of the All-Union Book Chamber is used, while in the abstracts journals of VINITI and of other scientificotechnical information agencies the headings of the principal information publications of the U.S.S.R., published by VINITI in 1974, are applied.

Besides classified catalogs, Soviet libraries use subject catalogs, which are, nevertheless, less widely spread. They are mainly maintained in medical and technical libraries and in some libraries covering the humanities, as, for example, in the Library of the Institute of Information on Social Sciences (INION), the Saltykov-Shchedrin State Public Library, etc. There is no standard list of subject headings for all branches of knowledge, but recently INION has put out an impressive number of lists of subject headings covering different themes.

Library Education

Prior to 1917 only short-term library courses existed in Russia. The most important courses were those affiliated with the Shaniavsky People's University in Moscow, which were organized in 1911. These courses were founded on the initiative of the outstanding specialist in librarianship L. B. Khavkina. The duration of studies at these courses was from 3 to 4 weeks. Besides this, library science and bibliology were taught on an optional basis at the Moscow and St. Petersburg Universities and at the St. Petersburg Pedagogical Academy.

After the Revolution regular professional library training became an inseparable component of the extensive program of library development, mapped out under V. I. Lenin's guidance and implemented in the process of socialist construction.

On N. K. Krupskaya's initiative, a library seminar was organized in Moscow in 1918. In the same year the Institute of Extrascholastic Education, which had faculties of bibliology and library science, was established in Petrograd. During the 1920s similar faculties, departments, and courses were set up in many cities of the country. At the same time, beginning with 1922, a number of vocational secondary education institutions (tekhnikums), which provided a lower level of library training, were established. The necessity of substantially increasing the number of professionally trained librarians was stipulated by such processes as the wiping out of illiteracy, development of people's education and publishing, and rapid growth in the number of libraries.

In Moscow, in 1930, the first institution of higher learning in the field of librarianship—the Library Institute—was founded. Two other higher educational institutions, the institutes of political education in Kharkov and Leningrad, were reorganized into library institutes (in 1934 and 1941, respectively). In the prewar period these institutes graduated an impressive number of specialists, many of whom later worked as directors of libraries. The tekhnikums also graduated many thousands of librarians.

After the Great Patriotic War ended in 1945, library institutes were established in Ulhan-Ude, Krasnodar, Cheliabinsk, Khabarovsk, and other cities. In 1964 the library institutes were reorganized into institutes of culture which, apart from the library division, have a division of cultural work that provides training of club workers. Departments and faculties of librarianship were set up in many universities and pedagogical institutes. Today (in 1976) librarians are trained on the higher level at 16 institutes of culture in Moscow, Leningrad, Uhlan-Ude, Krasnodar, Cheliabinsk, Khabarovsk, Kemerovo, Kuibyshev, Kazan, Perm, Barnaul, Kiev, Kharkov, Minsk, Tashkent, and Chikment, and at the branches of these institutes in Tambov, Orel, Nikolaev, and Rovno; at five universities, in Baku, Vilnius, Kishinev, Riga, and Ashkhabad; at five pedagogical institutes, in Yerevan, Alma-Ata, Tbilisi, Tallinn, and Frunze; and at an institute of arts in Dushanbe. As the list of cities indicates, institutions of librarianship function in all Union republics; as for the largest republic, the Russian Federation, there are library institutes in all its zones, including the North Caucasus, the Volga Region, the Urals Region, Siberia, and the Far East. The training of librarians on the lower and middle levels is provided by 123 institutions, which are also situated in the territory of all Union republics.

The impressive number of institutions and their rapid development in the last 8–10 years are factors that have ensured the training of a great number of specialists. In 1975, 14,700 librarians with secondary education and 6,300 with higher education were graduated in the country. The total number of students studying in different institutions of librarianship runs to 60,000. These institutions have day, evening, and correspondence departments. The higher educational institutions offer 4- to 5-year curricula, and the technical high schools 2- to 3-year curricula. These institutions admit high school graduates (10 grades). The institutions of higher learning also admit students who have a secondary education in librarianship. All applicants have to take examinations in the humanities, and as the competition is strong, only the most competent young people are enrolled.

These institutions are free and are supported by the State, like all educational institutions in the country. Successful students are granted scholarships and all students without exception are provided with free hostels and textbooks. The library service is also free.

The curriculum of higher educational institutions covers a broad range of subjects in the humanities and social sciences (history of the U.S.S.R. and world history, philosophy, political economy, history of literature of the peoples of the U.S.S.R. and of foreign countries, history of culture, pedagogics, psychology, etc.); history of printing and bibliology (general library science, history of librarianship, book acquisition, cataloging of printed matter, library catalogs, work with readers, etc.); and bibliography (general bibliography, bibliography of socioeconomic literature, bibliography of fiction and art, bibliography of literature on natural sciences, etc.).

Much importance is attached to the study of information science, information retrieval systems, technical facilities of library and information work, and foreign languages. In the course of their studies, students do practical work (two 6- or 7-weeks periods) in libraries during the third and fourth years.

For many years the institutions in librarianship graduated, in the main, librarians of two specialities: librarian-bibliographers for universal libraries and librarians for children's and school libraries.

Nevertheless, in recent years education in librarianship has been significantly differentiated. Today training of specialists for public, scientific, technical, and agricultural libraries is provided. In the future, training in special subject fields will also be provided and this will enable institutions to graduate specialists who will know how to work with sociopolitical, technical, and other kinds of special literature. In keeping with this concept the curriculum now includes such subjects as "Fundamentals of Contemporary Natural History," "Fundamentals of Industrial Production," etc. This, naturally, does not mean that these specialists will fully satisfy the needs of the appropriate special libraries. Many historians, philologists, engineers, agronomists, and other specialists, who have graduated from appropriate institutes and universities and finished short-term courses in librarianship, work and will continue to work in special libraries. Yet the need for librarians who have received specialized and not universal professional training is incessantly growing, especially in scientific-technical information agencies.

At the same time, training of personnel for such agencies is also provided in the country. In 1963 special courses were organized and the Institute for the Improvement of Professional Skills of Information Specialists, intended for specialists who have graduated from technological institutes and institutes in the natural sciences and who work in the field of information science, has functioned since 1972. In 1964 the faculty of scientific information was set up at the Moscow State University. Specialists in the field of mechanization and automation of information processes receive training at a number of technical higher educational institutions of the country.

A 3-year postgraduate course in library science, bibliography, and information science is offered to persons who already have the higher degree in librarianship. After the submission of a major thesis, the degree of Candidate of Sciences is granted. The next (and highest) level of training is training for research and the highest administrative positions in the above-mentioned fields, which ends with the doctorate.

The process of preparing and maintaining a thesis is an important factor not only in the training of highly qualified specialists, it is also a means of constant enrichment of library science, theory of bibliography, and information science.

Soviet Library Organizations

Over 400,000 people work in the libraries of the U.S.S.R. They are all members of trade unions. Membership of a certain trade union is determined by the special subject field that a library covers, the branch of science, industry, or sphere of social life that it services. Thus, all people working in public libraries are members of the trade union of workers of culture; people working in university libraries and libraries of the U.S.S.R. Academies of Sciences and the Union republics belong to the trade union of employees of scientific institutions and higher educational institutions, etc.

Besides membership in trade unions and other public organizations, librarians actively work in different library councils and committees on a volunteer basis. The objects of these institutions are the promotion of sharing of professional experience, improvement of professional skills, and coordinated planning of library activities and acquisition policies.

Library councils, the members of which represent libraries of all types, function in all cities and districts. These councils are divided into sections according to types of libraries (public, technical, school and children's libraries, etc.) and the problems of librarianship (servicing of workers, reading interests of young people, etc.).

On the State level there exist councils or committees that represent certain types of libraries and the integrated major body in which all types of libraries are represented. To such councils and committees belong the Library Committee attached to the State Committee of the Council of Ministers of the U.S.S.R. for Science and Technology, which unites the efforts of librarians of technical libraries in different branches of industry and workers of some scientific institutions; and the Central

Scientific and Methodological Library Committee, attached to the U.S.S.R. Ministry of Higher and Specialized Secondary Education, which encourages the initiative and spontaneous professional efforts of librarians of educational institutions.

The Library Council of the U.S.S.R. Ministry of Culture is an integrated state agency which is responsible for the coordination of activities of all libraries of the country. The council consists of representatives of library councils of the 15 Union republics, of large cities (Moscow, Leningrad, Novosibirsk, etc.), and of libraries of different types. At its plenary sessions, that take place twice a year, the council discusses the most important problems of librarianship, makes decisions, and works out recommendations for the appropriate State authorities. The bureau of the council meets once a month (sometimes twice a month) and discusses immediate tasks. The chairman of the Library Council is the director of the State Lenin Library. The council represents Soviet librarians in international library organizations and is a member of the International Federation of Library Associations, while councils and committees of the appropriate types of libraries are members of other international organizations (International Association of Agricultural Libraries, International Association of Music Libraries, etc.).

International Relations of Soviet Libraries

Soviet libraries have long-standing traditions of cooperation with libraries of other countries. Russian libraries started to exchange books with foreign libraries in the early 18th century. In the second half of the 19th century international book exchange took on a more regular quality and Russian libraries followed the development of librarianship in other countries with interest.

The peaceful policy proclaimed by the Soviet power from the very first days of its existence covered, among other things, the development of international cultural relations of Soviet Russia, including international relations of Soviet libraries. The memorandum "On the Tasks of the Public Library in Petrograd," which V. I. Lenin wrote in the first days of the 1917 October Revolution, includes instructions to resume book exchange with foreign libraries. In the early 1920s a number of international book-exchange centers already functioned in the country and the first visits of foreign librarians to the U.S.S.R. and of Soviet librarians to foreign countries also took place in this period. Soviet librarians took part in the work of library congresses held in 1929 and 1935. The international interlibrary loan began to function in the early 1930s.

International relations of Soviet libraries have become more active in the last three decades, since World War II. These relations developed on the following main lines: (*a*) cooperation in the fields of acquisition, satisfaction of readers' demands for books (international interlibrary loan of books, microfilms, and photocopies), and bibliographical information; (*b*) the sharing of professional knowledge and experience through international organizations (IFLA, FID, UNESCO) and participation in the work of conferences organized by them, and through regular cooperation with other countries (bilateral seminars and exchange of library delegations, trainees, experts, etc.).

International book exchange and international interlibrary loan flourish. In 1962 the Soviet Union signed the UNESCO Conventions on the exchange of scientific and official publications of 1958. Today over 90 large scientific libraries exchange books with over 120 countries; annually Soviet libraries send about 1.2 million copies of Soviet publications abroad and receive approximately 850,000 copies of foreign printed matter. The most active partners in this exchange are libraries of the U.S.A. The following Soviet libraries are especially active in this sphere: the State Lenin Library, the Library of the U.S.S.R. Academy of Sciences (Leningrad), the State Library of Foreign Literature, INION, the Saltykov-Shchedrin Public Library (Leningrad), State Scientific Public Library of the Siberian Branch of the Academy of Sciences (Novosibirsk), libraries of republic academies of sciences, central special libraries (the Agricultural and Medical Libraries), and the Libraries of the Moscow and Leningrad Universities. Through the international library loan system Soviet libraries send over 27,000 copies abroad and receive over 7,000 copies of foreign publications annually. Soviet libraries also satisfy very many bibliographical requests from foreign libraries and users.

Since 1959 Soviet libraries have been members of IFLA; they also cooperate with FID and international associations of musical, agricultural, and special libraries and other library organizations.

Librarians of the U.S.S.R. closely cooperate with librarians of other socialist countries. In conformity with State agreements on cultural cooperation and independent bilateral agreements between libraries, book exchange is carried out and regular visits of delegations, individual specialists, trainees, and teachers are arranged. Bilateral seminars, multilateral conferences of librarians, and joint research projects are organized.

In recent years the relations of Soviet librarians with the librarians of Asian and African countries have visibly expanded. This cooperation was stimulated by the seminars for librarians from developing countries that took place in Moscow, Tashkent, and Alma-Ata in 1973 and 1975.

International relations are coordinated by the Committee for Foreign Relations of the Library Council, attached to the U.S.S.R. Ministry of Culture.

Soviet libraries are kept aware of library development abroad through special information publications; the Russian edition of the *UNESCO Bulletin for Libraries*, which is put out by the All-Union State Library of Foreign Literature; and the serial publication *Library Science and Bibliography Abroad*, 60 issues of which have been produced by the State Lenin Library since 1958.

Major Libraries of the U.S.S.R.

A list of the largest Soviet libraries follows. These are listed in descending order, by number of library units held.

LIBRARIES OF THE U.S.S.R. WITH COLLECTIONS OVER 1,000,000 LIBRARY UNITS (as of August 1, 1976)

1. State Lenin Library, decorated with the Order of Lenin. Moscow. 27,700,000 library units.

2. Saltykov-Shchedrin Public Library, decorated with the Order of the Red Banner of Labor.
   Leningrad. 16,500,000 library units.
3. Library of the U.S.S.R. Academy of Sciences, decorated with the Order of the Red Banner of Labor (BAN).
   Leningrad. 12,148,000 library units.
4. All-Union Patent Technical Library of the Committee for Inventions and Discoveries of the U.S.S.R. Council of Ministers.
   Moscow. 1,070,000 books and periodicals; 66,000,000 units of special types of technical literature.
5. Karl Marx State Republic Library of the Georgian S.S.R.
   Tbilisi. 10,500,000 library units.
6. State Republic Scientific and Technical Library of the Ukrainian Scientific Research Institute of Scientific-Technical Information and Technical-Economic Research of Gosplan of the Ukrainian S.S.R.
   Kiev. 8,435,000 library units.
7. State Public Scientific and Technical Library of the U.S.S.R.
   Moscow. 8,000,000 library units.
8. Institute for Scientific Information on Social Sciences of the U.S.S.R. Academy of Sciences (INION).
   Moscow. 7,239,000 library units.
9. Central Scientific Library of the Academy of Sciences of the Ukrainian S.S.R.
   Kiev. 6,228,000 library units.
10. Miasnikian State Republic Library of the Armenian S.S.R.
    Yerevan. 6,109,000 library units.
11. Scientific Library, named for A. M. Gorki, of the Moscow University, named for M. V. Lomonosov.
    Moscow. 6,009,800 library units.
12. Central Scientific and Technical Library of the Lithuanian Scientific Research Institute of Scientific-Technical Information and Technical-Economic Research.
    Vilnius. 6,000,000 library units.
13. State Public Scientific and Technical Library of the Siberian Branch of the U.S.S.R. Academy of Sciences.
    Novosibirsk. 5,226,000 library units.
14. Republic Scientific and Technical Library.
    Alma-Ata. 5,150,000 library units.
15. Central Scientific and Technical Library of the Gorki Interdisciplinary Territorial Center for Scientific-Technical Information and Propaganda.
    Gorki. 4,750,500 library units.
16. Lenin State Library of the Byelorussian S.S.R.
    Minsk. 4,700,000 library units.
17. Lvov State Scientific Library, named for V. Stefanik, of the Academy of Sciences of the Ukrainian S.S.R.
    Lvov. 4,496,000 library units.
18. Scientific Library, named for M. Gorki, attached to the Leningrad University, named for A. A. Zhdanov.
    Leningrad. 4,165,000 library units.
19. Korolenko State Scientific Library.
    Kharkov. 4,096,600 library units.
20. All-Union State Library of Foreign Literature, decorated with the Order of the Red Banner of Labor.
    Moscow. 4,000,000 library units.
21. Lobachevsky Scientific Library of the Kazan University, named for V. I. Ulianov-Lenin.
    Kazan. 3,880,000 library units.

22. Republic Scientific and Technical Library.
    Riga. 3,665,000 library units.
23. Alisher-Navoi State Library of the Uzbek S.S.R.
    Tashkent. 3,550,000 library units.
24. Vilis Lacis State Library of the Latvian S.S.R.
    Riga. 3,547,500 library units.
25. Odessa State Scientific Library, named for A. Gorki.
    Odessa. 3,253,100 library units.
26. Central Polytechnical Library of the All-Union Society "Knowledge."
    Moscow. 3,241,000 library units.
27. Central Scientific and Technical Library of the North Caucasus Interdisciplinary Territorial Center for Scientific-Technical Information and Propaganda.
    Rostov-on-Don. 3,209,000 library units.
28. Georgian Republic Scientific and Technical Library.
    Tbilisi. 3,145,000 library units.
29. Central Scientific Library of the Academy of Sciences of the Kazakh S.S.R.
    Alma-Ata. 3,088,100 library units.
30. State Republic Library of the Lithuanian S.S.R.
    Vilnius. 3,022,000 library units.
31. Scientific and Technical Library of the Voroshilovgrad Interdisciplinary Territorial Center for Scientific-Technical Information and Propaganda.
    Voroshilovgrad. 2,948,000 library units.
32. Republic Scientific and Technical Library of the Armenian Scientific Research Institute of Scientific-Technical Information and Technical-Economic Research.
    Yerevan. 2,876,000 library units.
33. Library of the Tartu University.
    Tartu. 2,835,000 library units.
34. Scientific Library of Tbilisi University.
    Tbilisi. 2,790,000 library units.
35. Scientific Library of the Tomsk University, named for V. Knibyshev.
    Tomsk. 2,741,000 library units.
36. Central Scientific Library of the Kharkov University, named for A. Gorki.
    Kharkov. 2,708,000 library units.
37. Karl Marx State Library of the Turkmen S.S.R.
    Ashkhabad. 2,676,000 library units.
38. State Public Historical Library of the R.S.F.S.R.
    Moscow. 2,673,500 library units.
39. Pushkin State Library of the Kazakh S.S.R.
    Alma-Ata. 2,656,000 library units.
40. Central Scientific and Technical Library of the Khabarovsk Interdisciplinary Territorial Center of Scientific-Technical Information and Propaganda.
    Khabarovsk. 2,621,000 library units.
41. Gorki Regional Library, named after V. I. Lenin.
    Gorki. 2,600,000 library units.
42. Chernyshevsky State Republic Library of the Kirghiz S.S.R.
    Frunze. 2,588,000 library units.
43. Scientific Library of the Odessa University, named for Mechnikov.
    Odessa. 2,581,000 library units.
44. Central Scientific Agricultural Library of the All-Union Academy of Agricultural Sciences.
    Moscow. 2,559,000 library units.
45. Scientific Library of the Vilnius University, named for Kapsukas.
    Vilnius. 2,542,000 library units.

46. Kreitzwald State Library of the Estonian S.S.R.
Tallinn. 2,537,000 library units.
47. Azerbaijan State Republic Library, named for M. Akhundov.
Baku. 2,481,000 library units.
48. Republic Scientific and Technical Library of the Kirghiz S.S.R.
Frunze. 2,472,000 library units.
49. Library of the Irkutsk University, named for A. Zhdanov.
Irkutsk. 2,435,300 library units.
50. Republic Scientific Medical Library of the Latvian S.S.R.
Riga. 2,362,000 library units.
51. Central Scientific and Technical Library of the Yaroslavl Interdisciplinary Territorial Center for Scientific-Technical Information and Propaganda.
Yaroslavl. 2,243,000 library units.
52. Scientific Library of the Saratov University, named for N. Chernyshevsky.
Saratov. 2,215,000 library units.
53. Fundamental Library of the Academy of Sciences of the Latvian S.S.R.
Riga. 2,201,000 library units.
54. Republic Scientific and Technical Library.
Baku. 2,164,000 library units.
55. Scientific Library of the Lvov University, named for Ivan Franko.
Lvov. 2,103,000 library units.
56. State Republic Library of the Ukrainian S.S.R., named for the CPSU and decorated with the order of the Red Banner of Labor.
Kiev. 2,070,600 library units.
57. Central Library of the Academy of Sciences of the Lithuanian S.S.R.
Vilnius. 1,979,000 library units.
58. Central Scientific and Technical Library of the Odessa Interdisciplinary Territorial Center for Scientific-Technical Information and Propaganda.
Odessa. 1,968,000 library units.
59. Sverdlovsk State Public Library, named for V. Belinsky.
Sverdlovsk. 1,962,000 library units.
60. Scientific and Technical Library, attached to the Institute of Scientific-Technical Information and Propaganda of the Estonian S.S.R.
Tallinn. 1,924,000 library units.
61. Shevchenko Scientific Library of the Kiev University.
Kiev. 1,923,000 library units.
62. Fundamental Library of the Leningrad Polytechnical Institute, named for M. Kalinin.
Leningrad. 1,895,000 library units.
63. State Republic Library of the Tajik S.S.R., named for A. Firdousi.
Dushanbe. 1,877,000 library units.
64. Central Scientific and Technical Library of the U.S.S.R. Ministry of Railways.
Moscow. 1,857,000 library units.
65. Karl Marx Rostov State Scientific Library.
Rostov-on-Don. 1,850,000 library units.
66. Kuibyshev Regional Library, named for V. I. Lenin.
Kuibyshev region. 1,784,000 library units.
67. Central Scientific Library for the Academy of Sciences of the Georgian S.S.R.
Tbilisi. 1,782,000 library units.
68. Central Scientific and Technical Library of the Kharkov Interdisciplinary Territorial Center for Scientific-Technical Information and Propaganda.
Kharkov. 1,774,000 library units.
69. Library of the Institute of Marxism-Leninism, attached to the Central Committee of the CPSU.
Moscow. 1,714,000 library units.

70. Scientific Library of the Academy of Sciences of the Estonian S.S.R.
    Tallinn. 1,677,000 library units.
71. Fundamental Library of the Voronezh University, named for the Lenin Komsomol.
    Voronezh. 1,665,500 library units.
72. Fundamental Library of the Academy of Sciences of the Uzbek S.S.R.
    Tashkent, 1,650,000 library units.
73. Central Scientific and Technical Library of the Ivanovo Interdisciplinary Territorial Center for Scientific-Technical Information and Propaganda.
    Ivanovo. 1,631,000 library units.
74. Scientific Library of the Tashkent University, named for V. I. Lenin.
    Tashkent. 1,624,500 library units.
75. Republic Scientific and Technical Library of the Moldavian Scientific Research Institute of Scientific-Technical Information and Technical-Economic Research of the Gosplan of the M.S.S.R.
    Kishinev. 1,623,000 library units.
76. Kirov Regional Library, named for A. Herzen.
    Kirov region. 1,614,000 library units.
77. Library of the Urals Polytechnical Institute, named for S. Kirov.
    Sverdlovsk. 1,613,000 library units.
78. Fundamental Library of the Military Medical Academy, named for S. Kirov.
    Leningrad. 1,598,000 library units.
79. Library of the Chernovitsy University.
    Chernovitsy. 1,584,000 library units.
80. State Public Library of the Karel A.S.S.R.
    Petrozavodsk. 1,577,000 library units.
81. Library of the Novocherkassk Polytechnical Institute, named for S. Ordzhonikidze.
    Novocherkassk. 1,575,000 library units.
82. Scientific and Technical Library of the Kiev Polytechnical Institute, named for the 50th Anniversary of the Great October Socialist Revolution.
    Kiev. 1,550,000 library units.
83. State Central Scientific Medical Library.
    Moscow. 1,547,000 library units.
84. Scientific Library of the Latvian University, named for Peter Stuçka.
    Riga. 1,545,000 library units.
85. Fundamental Library of the Azerbaijan University, named for S. Kirov.
    Baku. 1,545,000 library units.
86. Library of the Leningrad Pedagogical Institute, named for A. Herzen.
    Leningrad. 1,538,000 library units.
87. Fundamental Library of the Academy of Sciences of the Armenian S.S.R.
    Yerevan. 1,531,000 library units.
88. State Republic Juvenile Library of the R.S.F.S.R., named for the 50th Anniversary of the YCL.
    Moscow. 1,500,000 library units.
89. Library of the Moscow Institute of Aviation, named for Sergo Ordzhonikidze.
    Moscow. 1,500,000 library units.
90. Central Scientific Library, named for N. Zheleznov, of the Moscow Agricultural Academy, named for K. Timiriazev.
    Moscow. 1,454,000 library units.
91. Scientific and Technical Library of the Moscow Institute of Railway Transport Engineers (MIIT).
    Moscow. 1,417,000 library units.
92. Perm Regional Library, named for A. Gorki.
    Perm. 1,389,000 library units.

93. Scientific and Technical Library of the Lvov Polytechnical Institute.
Lvov. 1,373,000 library units.
94. Cheliabinsk Regional Public Library, named for the 50th Anniversary of the Great October Revolution.
Cheliabinsk. 1,353,000 library units.
95. Fundamental Scientific and Technical Library of the Moscow College of Technology, named for N. Bauman.
Moscow. 1,350,000 library units.
96. Khabarovsk Territorial Scientific Library.
Khabarovsk. 1,328,000 library units.
97. Scientific and Technical Library of the Kharkov Polytechnical Institute, named for V. I. Lenin.
Kharkov. 1,326,000 library units.
98. State Scientific Pedagogical Library for People's Education, named for K. Ushinsky, of the U.S.S.R. Academy of Pedagogical Sciences.
Moscow. 1,314,000 library units.
99. Fundamental library, named for Yakub Kolas, of the Academy of Sciences of the B.S.S.R.
Minsk. 1,311,000 library units.
100. Central City Public Library, named for N. Nekrasov.
Moscow. 1,300,000 library units.
101. Republic Scientific and Technical Library of the Tajik Republic Institute of Scientific-Technical Information and Propaganda.
Dushanbe. 1,292,000 library units.
102. Library of the Moscow Energetics Institute.
Moscow. 1,289,000 library units.
103. Central Scientific and Technical Library of the Zaporozhe Interdisciplinary Territorial Center for Scientific-Technical Information and Propaganda.
Zaporozhe. 1,267,000 library units.
104. Donetsk Regional Scientific Library, named for N. Krupskaya.
Donetsk. 1,251,000 library units.
105. Fundamental Library of the Samarkand University, named for Alisher Navoi.
Samarkand. 1,245,000 library units.
106. State Central Theatrical Library.
Moscow. 1,237,300 library units.
107. Fundamental Library of the Leningrad Forestry Academy, named for S. Kirov.
Leningrad. 1,207,000 library units.
108. Central Scientific and Technical Library of the Central Chernozem Interdisciplinary Territorial Center for Scientific-Technical Information and Propaganda.
Voronezh. 1,196,000 library units.
109. Library of the Kaunas Polytechnical Institute.
Kaunas. 1,118,800 library units.
110. Lenin Republic Library of the Tatar A.S.S.R.
Kazan. 1,186,000 library units.
111. Scientific Library of the Rostov-on-Don University.
Rostov-on-Don. 1,180,000 library units.
112. Scientific and Technical Library of the Leningrad Institute of Railway Engineers, named for Academician V. Obraztsov.
Leningrad. 1,174,000 library units.
113. Krasnoyarsk Regional Scientific Library.
Krasnoyarsk. 1,173,000 library units.
114. State Republic Library for People's Education, named for Y. Gogebashvili.
Tbilisi. 1,160,000 library units.

115. Library for Natural Sciences of the U.S.S.R. Academy of Sciences.
Moscow. 1,154,000 library units.
116. Dnepropetrovsk Regional Library, named for the October Revolution.
Dnepropetrovsk. 1,145,000 library units.
117. Fundamental Library of the Georgian Polytechnical Institute.
Tbilisi. 1,140,000 library units.
118. Central Scientific and Technical Library for Building and Architecture of Gosstroi of the U.S.S.R.
Moscow. 1,140,000 library units.
119. Central Scientific and Technical Library of the Novosibirsk Interdisciplinary Territorial Center for Scientific-Technical Information and Propaganda.
Novosibirsk. 1,138,000 library units.
120. Central Scientific and Technical Library of the West Urals Interdisciplinary Territorial Center for Scientific-Technical Information and Propaganda.
Perm. 1,135,000 library units.
121. Scientific Library of the Yerevan University.
Yerevan. 1,129,500 library units.
122. Omsk Regional Scientific Library, named for A. Pushkin.
Omsk. 1,126,000 library units.
123. Kalinin Regional Library, named for A. Gorki.
Kalinin. 1,120,000 library units.
124. Scientific Educational Library of the Moscow Institute of Construction Engineering, named for V. Kuibyshev.
Moscow. 1,118,800 library units.
125. Library of the Donetsk Polytechnical Institute.
Donetsk. 1,117,000 library units.
126. Scientific and Technical Library of the Tomsk Polytechnical Institute, named for S. Kirov.
Tomsk. 1,115,000 library units.
127. Scientific Library of the Kishinev University, named for V. I. Lenin.
Kishinev. 1,112,000 library units.
128. Library of the Leningrad Mining Institute, named for G. Plekhanov.
Leningrad. 1,106,000 library units.
129. Ivanovo Regional Library.
Ivanovo. 1,105,000 library units.
130. Central Scientific and Technical Library of the Lvov Interdisciplinary Center for Scientific-Technical Information and Propaganda.
Lvov. 1,103,000 library units.
131. State Republic Library of the Moldavian S.S.R., named for N. Krupskaya.
Kishinev. 1,099,000 library units.
132. Fundamental Library of the Academy of Sciences of the Azerbaijan S.S.R.
Baku. 1,087,500 library units.
133. Fundamental Library of the Moscow Pedagogical Institute, named for V. I. Lenin.
Moscow. 1,064,000 library units.
134. Yakutsk Republic Library, named for A. Pushkin.
Yakutsk. 1,027,000 library units.
135. Ulianovsk Regional Library—Palace of Books, named for V. I. Lenin.
Ulianovsk. 1,026,000 library units.
136. Bashkir Republic Library, named for N. Krupskaya.
Ufa. 1,024,500 library units.
137. Library of the Moscow Institute of National Economy, named for G. Plekhanov.
Moscow. 1,022,300 library units.

138. Novosibirsk Regional Library.
Novosibirsk. 1,013,000 library units.
139. Saratov Regional Library.
Saratov. 1,012,000 library units.
140. Krasnodar Regional Library, named for A. Pushkin.
Krasnodar. 1,009,000 library units.
141. Scientific and Technical Library of the Moscow Institute of Steel and Alloys.
Moscow. 1,009,000 library units.
142. Scientific and Technical Library of the Moscow Institute of Chemical Technology, named for D. Mendeleyev.
Moscow. 1,006,000 library units.
143. Library of the Byelorussian Polytechnical Institute.
Minsk. 1,003,000 library units.
144. Voronezh Regional Library, named for I. Nikitin.
Voronezh. 1,002,000 library units.
145. Library of the Academy of Social Sciences, attached to the Central Committee of the CPSU.
Moscow. 1,000,000 library units.
146. Moscow Regional Library.
Moscow. 1,000,000 library units.

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RUTGERS – THE STATE UNIVERSITY OF NEW JERSEY, GRADUATE SCHOOL OF LIBRARY AND INFORMATION STUDIES *

History

The original objective of the Rutgers University Graduate School of Library Service (GSLS) was to establish a center of graduate study to meet the shortage of librarians in New Jersey. This objective became the genesis of a basic curriculum of professional study leading to the M.L.S. Begun in 1954, the M.L.S. program was accredited by the American Library Association (ALA) in 1956. In this year the initial objective of the program was being met and, at the same time, the school was organizing on-the-job training for New Jersey librarians from the subprofessional through the administrative levels.

From these early beginnings evolved a series of programs leading to the M.L.S. and the Ph.D., and also Professional Development Studies. Through the years significant changes in admission requirements and curriculum affected the size, character, and caliber of the student body as well as the content and level of the teaching program. Mindful of the continuing changes in the library profession, GSLS chose to emphasize quality, rather than quantity, in its programs.

One of the early characteristics of the school was its connections with the practice of librarianship in New Jersey. It was supported through legislative action by the New Jersey Library Association (NJLA), and "trainee" jobs were established in many libraries specifically to support students at Rutgers GSLS. Additionally, the school conducted many instructional programs off campus for a good many

* Note added in proof: On July 1, 1978, the Graduate School of Library Service of Rutgers University was renamed the Graduate School of Library and Information Studies. The change was made in recognition of the increasing emphasis on information technologies in the library profession as well as the school's academic and professional programs.

years, which were aimed at improving competence on the part of practicing librarians. Ties with the state library were close, the Martin–Gaver plan* provided the basis for the state's program of aid to libraries and library users. These ties have continued; indeed, they have defined, through action, a role for the mature library school dealing with the problems of librarianship within the state and the nation.

By 1967 the needs of a complexity of programs had outgrown the confines of the original library school building. A new building was begun adjacent to the major research library of Rutgers. This building was designed to house the most modern tools of the library profession in an atmosphere highly supportive of creative teaching and learning.

As construction of the new GSLS facility neared completion, the concerns of the school were evolving into other areas. Among these was a continuing commitment to research. In 1957/58 the school had launched a research program assisted by a substantial grant from the Council on Library Resources. This initial research focused on "Targets for Research" in librarianship. The Carnegie Corporation also subsidized a special seminar for advanced administrators in research libraries. Directed by Keyes Metcalf, the program (in conjunction with eight northeastern research libraries) was designed to prepare, on an annual basis, from eight to ten experienced research library administrators for major posts in university and research libraries.

By 1967 these developments, along with others, led to a firm commitment by GSLS to basic library research carried on in an interdisciplinary atmosphere. Several years later a full-scale sixth-year program of advanced work in areas of specialization within the library field was implemented. The rationale for the program was the school's commitment to fulfilling its educational function and to the maintenance of meaningful working relationships within the library field.

In 1971, as in previous years, the ALA Committee on Accreditation again vested its confidence in the Rutgers GSLS. Particularly noted by ALA was the GSLS curriculum review study, with its sensitive attention to changing needs and student involvement in the library profession. Approval was also voiced for the increased administrative staffing, the high caliber of GSLS faculty, the activities of the Bureau of Library and Information Science Research, and the widening scope of GSLS interests beyond regional considerations. Through a succession of deans—ranging from the imaginative foresight of Lowell Martin, through the compassionate intellectual autocracy of Ralph Shaw, to the interdisciplinary approaches of Neal Harlow and the present dean—the Rutgers GSLS has become a major force in the advancement of library education.

Today the Rutgers Graduate School of Library Service, located in its own building adjacent to the Alexander Research Library, contains classrooms, faculty offices, research areas, student lounges, and a number of laboratories for teaching information science, educational media, and librarianship. Its faculty and student body have markedly increased over previous years without diluting either the high standards of the school or the attention to intellectual development within the li-

* Lowell A. Martin and Mary Virginia Gaver, *Libraries for the People of New Jersey or Knowledge for All*, NJLA Library Development Committee, 1964.

brary profession. Currently, the mission of GSLS is focused on education, research, and professional development. The philosophical basis for the present goals and objectives of Rutgers GSLS is the knowledge that educational programs for librarianship and information science should provide for lifelong learning and that professional education does not end with the awarding of the degree.

The M.L.S. Program

The Rutgers Graduate School of Library Service attempts to offer a Master of Library Service degree internationally recognized for its excellence. There are a number of areas in which the student can specialize. These are:

INFORMATION SCIENCE

The structure of the courses in the information science area has been commended by the ALA Committee on Accreditation as being well conceived and well organized. Introduction to library automation, programming theory, computer-based retrieval systems, and information science theory are focal points for study in this specialty. The Information Handling Laboratory, a key concept in information science education, is an integral part of Rutgers GSLS course work.

EDUCATIONAL MEDIA

With the advent of new state certification requirements for educational media specialists, the school reevaluated its school librarianship program and modified the curriculum. Addition of media courses and establishment of a media resource center that includes two completely equipped television studios have figured in this reassessment. As a result the school now offers an educational media specialist program that is fully approved by the state certification agency.

LIBRARY ADMINISTRATION

A major effort of the GSLS has been to increase the effectiveness and efficiency of the library manager through research and classroom instruction. Students are exposed to techniques and theory in the strategy and tactics of library administration and service development. The aim of the specialty is not only to produce librarians who are conversant with the techniques of management but who are also able to creatively think through the exponential changes in library management occurring in an era of rapid change.

LIBRARY SERVICES

In addition to traditional service offerings, increased attention is being given to the myriad problems of library automation. This new interest rounds out the area of library services, which provides a wide range of career choices relative to services in academic, public, school, and special library/media/information centers. New techniques and approaches in the teaching of library services, such as emphasis on interpersonal communication skills in the reference process, are constantly being emphasized.

The Ph.D. Program

The Ph.D. in Library Service is a degree awarded by the Graduate School of Rutgers University. It is a rigorous degree designed to be completed in a clearly delineated time period. Three components make up the Ph.D. program. Initially, the student takes a series of seminars which serve as an introduction to the issues prevalent in various areas of librarianship; the student then takes a series of qualifying examinations testing his or her comprehension of the entire field of librarianship; upon completion of these examinations, the student is eligible to become a candidate for the Ph.D. degree. Upon admittance to candidacy, the student completes a dissertation which makes an original contribution to the field.

The possibilities for study at Rutgers at the Ph.D. level are not limited to any closed, predetermined curriculum. Students may take any courses offered by the Rutgers Graduate School, with the advice and consent of GSLS faculty. From 2 to 3 years of full-time study may lead to the degree, but part-time study is also emphasized. In keeping with GSLS's interdisciplinary approach to library education, current talks are underway with the Department of Human Communication of Rutgers, with a view toward integrating components of human communication into the doctoral program. The Ph.D. program in library service is directed by a highly competent faculty which maintains close connections with students in the program. The program is thought by many students to be an invigorating one. Graduates of the program now hold leadership positions in the library profession and are continuing to engage in the basic research in librarianship so much emphasized in the GSLS Ph.D. program.

The Bureau of Library and Information Science Research

The bureau has been designated as the formal research arm of the Graduate School of Library Service. Since 1969 the bureau has expanded both its functions and its interests to include studies in the social sciences, an involvement in the instructional aspects of the GSLS, and a commitment to developing the research capacity of the library profession. Two central purposes now guide the activities of the bureau: (*a*) to provide a research capacity within New Jersey for the study of library services and information science; and (*b*) to stimulate the research efforts of the faculty and graduate students of the GSLS toward advancing knowledge in the field.

The bureau has developed a full-time staff of trained research personnel who both conduct research and give technical assistance to persons (faculty and students primarily) who desire such assistance. The bureau staff is considered to be a ready resource, one that assists when asked. The bureau is capable of managing research efforts in addition to conducting research or giving assistance. All of these services are available to the GSLS, the university, and the profession at large.

Various important studies have been completed or are in the final stages of completion by the bureau. Among the most recent of these is the development of measures of effectiveness of public library service. Other projects are being contemplated which will have equal impact on the library profession.

In addition to its contract research, the bureau's staff gives technical assistance to a number of doctoral students when they encounter problems in their research. The staff has also provided assistance to master's students, particularly those who are doing independent study. Current efforts are underway to give the bureau an even wider role in the intellectual and scholarly life of the GSLS and of the university.

Professional Development Studies

This encompasses the Sixth-Year Specialist program as well as various special programs, institutes, seminars, and workshops conducted in collaboration with the University Extension Division and other groups. The Professional Development Studies program therefore assures a viable source of continuing education for practicing librarians and media and information specialists. Alumni–faculty symposia and other educational opportunities offer avenues for continuous updating of knowledge to interested professionals.

Not merely a source of improvement for the professional librarian, the Professional Development Studies program seeks to assist the individual in assessing his or her career goals. Applicants are encouraged to enroll in post-master's courses that will contribute to their overall career plans. Others may evidence interest in a particular independent study project and be urged to apply for the Sixth-Year Specialist program.

The Faculty

The faculty of the Rutgers Graduate School of Library Service is outstanding in reputation and competent in scholarship. Nearly all members of the GSLS faculty, and all members of the Ph.D. program faculty, have earned doctorates, not necessarily in library service. Interests of the faculty range from information science to evaluation and planning of library services, with a multitude of diverse disciplines represented in between.

From its inception the GSLS has attracted scholars of renown. Although it is impossible to list all of them, mention of some may be in order. The deans of the GSLS have reflected the leadership in the profession as well as the continuing changes in librarianship. Lowell Martin, the first dean, is well known for his attention to public library service development, administration, and evaluation. Ralph Shaw, dean of the school from 1959 to 1961, led the profession in the development of bibliographic and information science techniques. Neal Harlow, dean from 1961 to 1969, provided substantial input in the developmental aspects of library education. The present dean, Thomas H. Mott, Jr., assumed office in 1969 and provides continued leadership in the integration of information science, human communication, and library service while seeking to enhance professional development education at the school.

At various times in the history of the school, distinguished faculty members have contributed to the education of oustanding librarians and to the development of high standards in scholarship. Richard Shoemaker's contributions to the field of bibliography through *American Bibliography* (coauthored with Ralph Shaw) are well known. Mary Gaver's contributions to school librarianship are equally distinguished. Paul Dunkin's fundamental contributions to library technical services through such writings as *Cataloging U.S.A.* are familiar to generations of librarians.

It is difficult to single out any one member of the present GSLS faculty. Together they represent a group committed to the quantitative and qualitative increase in fundamental library research. Ralph Blasingame is well known for his iconoclastic writings in the field of urban librarianship and library administration. His *Research in Library Service in Metropolitan Areas* remains a primary source for such study. Susan Artandi's *An Introduction to Computers in Information Science* is generally considered to be the basic textbook in the field. Her contributions to the periodical literature have been extensive and of equal importance. Henry Voos, specialist in information science and technical services, is presently in charge of the Bureau of Library and Information Science Research. His contributions to a diversity of library fields have been extensive. Ernest DeProspo is the present director of the Ph.D. program. His concern with the effective performance of libraries has resulted in the production of vital publications in the profession, among which such works as *Performance Measures for Public Libraries* represent groundbreaking contributions. Thomas H. Mott, Jr., the dean of the school, has attempted to integrate the techniques of computerization with the needs of librarians through such writings as *Introduction to PL/1 Programming for Library and Information Science* (with S. Artandi and L. Struminger). Space requirements preclude the mention of other faculty of the GSLS but all are well versed in one or more areas of librarianship and supporting disciplines.

The Future of the School

It would seem that those responsible for training librarians must, for the future, take major cognizance of one or more ongoing developments: the increasing impact of technological advances on librarianship; the evolving of media, information, and computer sciences; society's rapid change; and the emergence of new economic realities that threaten the progress if not the well-being of the library profession.

In facing an uncertain future, library schools should continue to teach certain basic skills and facts about librarianship while urging the profession to attack at least its technological problems through broad and comprehensive programs of scholarship and research. This implies, for library schools, not merely initial programs of study for beginning librarians but continuing education programs and programs of research as well. Needed in tomorrow's libraries will be professionals who are knowledgeable—and are kept informed through continuing education—about information needs, means of information transfer, and the latest technologies for managing and handling these. But needed just as much is an investment in research to ensure that the technologies that are deemed relevant to library service are indeed applied skillfully and with the expectation that the practice of librarianship will thereby be truly enhanced. Ideally, to train the professionals and engage in such research calls for a close partnership between libraries and library schools.

For its part, the Rutgers Graduate School of Library Service stands ready to heed the call.

THOMAS H. MOTT, JR.
EDITH H. ANSELMO
ALAN R. SAMUELS

RUTGERS UNIVERSITY LIBRARIES

The University

On November 10, 1766, New Jersey Governor William Franklin granted a charter for Queen's College in the name of King George III of England. Named in honor of Charlotte of Mecklenburg (the royal consort), the college, located in New Brunswick, was the eighth collegiate institution created in the American colonies and the first to be affiliated with the Dutch Reformed Church. There is no extant copy of the original charter, but it provided for a Board of Trustees, and meetings were held. At the trustees' request, a second charter was issued by Governor Franklin in 1770, and under its provisions the institution was governed for nearly two centuries, with almost no regulatory changes.

The first classes opened in 1771 on a makeshift campus in a tavern in New Brunswick. The first two decades were as turbulent for the college as they were for the nation. Queen's College was located in one of the principal theaters of the Revolutionary War; faculty and students often were forced to flee to neighboring villages and many interrupted their academic activities for military service. It was not until the installation of Jacob Rusten Hardenbergh as its first president in 1786 that the college achieved a semblance of stability. In 1808 the present Queen's Campus was acquired and construction was begun on Rutgers's oldest existing college structure, Old Queen's, now the University Administration Building. The handsome three-story brownstone is one of the fine architectural examples of its day.

In 1825 the trustees renamed the institution Rutgers College in recognition of the philanthropist Colonel Henry Rutgers, a wealthy New York landowner and Revolutionary War soldier who had given the college modest financial assistance and the bell which still hangs in the cupola of Old Queen's. For nearly a century the college was oriented toward providing a classical or liberal education, like most other colleges of the period. There was from 1807 to 1857 a merger of the college and the Theological Seminary of the Dutch Reformed Church. The college grew quickly in the second half of the 19th century. In 1864, with the organization of the Rutgers Scientific School (including the departments of agriculture, engineering, and chemistry), Rutgers was designated by the state legislature as the Land Grant College of New Jersey.

The New Jersey College for Women was founded in New Brunswick in 1918. New Jersey had been particularly backward in the field of higher education, and this was especially evident with respect to facilities for women. As early as 1881 the Rutgers faculty had proposed to the trustees that young women should be admitted, but this overture was rejected.

The State Federation of Women's Clubs at a district meeting in 1911 began the first effective move for a women's college when they urged the admittance of women to Rutgers College. Mrs. Mabel Smith Douglass, president of the College Club of New Jersey, was present at the federation meeting and she soon became chairman of the committee to work in behalf of the cause. Mrs. Douglass was a Barnard graduate and a woman of extraordinary energy and capacity. She was able to collect relevant information from all parts of the country and to enlist the support of numerous men throughout New Jersey; this resulted in the formation of an impressive advisory council, arousing a great deal of popular support.

University President William Demarest took the position that, while coeducation was out of the question, Rutgers would look with favor on the establishment of an affiliated women's college, provided the necessary funds could be assured from private or public sources. Demarest urged the trustees to adopt this position and at the same time he offered encouragement to Mrs. Douglass. In 1914 the trustees approved in principle the plan for an affiliated women's college and formed an Advisory Committee to meet with Mrs. Douglass and her associates. In meeting with Mrs. Douglass the trustees learned that, while public interest had been aroused, little money had been raised. Late in 1914 the prospects brightened when James Neilson offered a small tract of land and a house in New Brunswick across town from Rutgers College. The women tried once again to raise $75,000 to launch the college, again unsuccessfully. In 1915 ill health caused Mrs. Douglass to withdraw from the movement, and the enthusiasm she gave it was greatly missed.

Organizations throughout New Jersey—including the State Grange, the New Jersey Education Association, and the State Board of Education—endorsed the women's college movement. Federal financial assistance and the availability of the

Carpender estate finally led to the founding of the New Jersey College for Women. In 1917 the Smith–Hughes Act promised federal financial assistance for home economics courses. The Carpender estate, located near the College Farm, was a choice site for the women's college. President Demarest urged the trustees to proceed without regard to the availability of funds. On April 12, 1918, a resolution was adopted: "That the Trustees of Rutgers College do establish a Woman's College as a department of the State University of New Jersey maintained by the Trustees."

Working with unusual speed, the trustees agreed that the college should open in September 1918. Mrs. Douglass was invited to be the first dean. The Carpender estate was purchased, and also a nearby estate.

The New Jersey College for Women opened on September 18, 1918, with 54 students. As it had no faculty of its own, Rutgers faculty members volunteered to teach the young women. The name of the college was changed to Douglass College on Founders Day, April 16, 1955, to honor its first dean.

The university continued to expand in New Brunswick. In 1921 the College of Agriculture—which was to become known as the College of Agriculture and Environmental Sciences, and later still (in 1972), as Cook College—drew together into one unit the State Experiment Station, resident instruction, and the extension programs. In 1924 the College of Engineering and a School of Education (which later became the Graduate School of Education) were founded, and the Board of Trustees authorized the title Rutgers University. Two years later the University Extension Service was organized.

The College of Pharmacy, established in 1892, was incorporated into the State University in 1927 and moved from Newark to the Busch Campus in 1971.

In 1945 the New Jersey State Legislature affirmed state support for the university and the entire institution was "collectively designated as the State University of New Jersey." Eleven years later the legislature changed the name to Rutgers–The State University and created a Board of Governors to serve as its governing body.

The University of Newark became a part of Rutgers in 1946, adding a College of Arts and Sciences, a School of Law, and a School of Business Administration (which later became a graduate school). In 1951 the College of South Jersey in Camden was incorporated into the Rutgers structure as the School of Law–Camden and the Camden College of Arts and Sciences.

The Institute of Microbiology was founded in 1949 following the discovery of streptomycin by Selman Waksman, which earned him a Nobel Prize. The Graduate Faculty became the Graduate School in 1952; the Graduate School of Library Service (1953) and that of Social Work (1954) were established; and in 1957 a College of Nursing was organized in Newark.

Urban growth and its attendant problems were factors in the 1969 founding of Livingston College, an undergraduate school emphasizing the urban environment. Problems of contemporary and future survival were recognized also at Cook College by increased emphasis on environmental sciences and liberal arts, and a growing interest in two other disciplines resulted in the opening in 1974 of graduate schools in Criminal Justice at Newark and for Applied and Professional Psychology in Piscataway.

The university in 1976 enrolled over 46,000 students and employed a faculty of 2,500 members. Rich in history, Rutgers is the only institution in the country to boast the heritage of an 18th-century colonial college, the land grant tradition of the 19th century, and development as a modern state university.

History of the Library

Like the college, the library got off to a slow start. Library problems apparently were not discussed during the turbulent war years following the college's founding in 1766. There was no separate library building, and it can be assumed that tutors Frederick Frelinghuysen, John Taylor, and John Bogart, and President Jacob R. Hardenbergh possessed most of the books used at the college. These books were probably theological in nature.

The first bequest for what was to become the Rutgers University Libraries was made in 1792 by the Reverend Peter Leydt, an early graduate. During the next 15 years the number of volumes increased slowly. Then, following an agreement made in 1807, the library of Queen's College merged with that of the Theological Seminary of the Dutch Reformed Church. The first librarian was appointed in 1814.

In 1825, when the Old Queen's building was occupied, the library (which was to be housed on the second floor) consisted of a few old books in Dutch and the remnants of some "philosophical apparatus" acquired years earlier: a large spy glass, or telescope.

During the early 1800s formal education was largely dependent upon the study of assigned texts, but modest use was also made of the library that jointly served the college and the seminary. The library was open for one hour a week, on Friday mornings, with one of the senior theological students in charge. From ledgers he maintained (listing books borrowed by each student) it is evident that general works of literature and theological treatises were most in demand.

Certain accessions of books in the early 1830s significantly augmented the library's holdings. Notable additions were the books of Dr. John Clark, Mrs. James Bogart, Jr., and Professor DeWitt. A donation from Dr. Ritchie of Scotland provided for the purchase of theological literature.

The library had books representing every branch of knowledge being taught at the college, although books on theology were predominant. The authorities took pride in publishing a printed catalog of the entire library, which amounted to 2,254 volumes.

University Historian Dr. Richard McCormick, writing about the library, reports:

> The conditions under which the library operated left much to be desired. A new set of rules adopted in 1835 provided for the appointment of a faculty member as librarian, and it was his obligation to arrange the books in proper order, maintain registers of loans and acquisitions, and serve borrowers while the library was open, now only a half hour a week. Members of the faculty had virtually unlimited

> privileges, but students could not withdraw at one time more than one folio, two quartos, and two octavos or smaller volumes at one time. Folios might be kept for five weeks, octavos for but three weeks. Each student paid one dollar semi-annually "for the use and increase of the library." When the new incumbent, Professor Alexander McClelland, took charge, he found the books in complete disorder—"Owen on Communion with God was found with Tristram Shandy on one side and Woodbridge's Geography on the other"—and a substantial number were missing. Methodically, he arranged all the volumes into ten classes, each of which occupied a separate portion of the shelves, and with the assistance of a theologue endeavored with moderate success to enforce system and order. Housekeeping, rather than building, was the chief preoccupation of the librarian, with the result that as late as 1845 the total collection numbered no more than 5,000 volumes (*1*).

During this period the Philoclean and Peithesophian literary societies were formed by students, aided and encouraged by professors. The societies were secret but not exclusive, and, in time, nearly all undergraduates were elected to one or the other. Each society compiled its own library featuring works of literature, biography, history, and travel as well as the leading periodicals. These supplemented the meager and more academic holdings of the college library and thus provided for a more comprehensive selection of titles. Their collections also provided the basis for a very different kind of intellectual experience.

The success of the literary societies was due in part to the new facilities provided for them. In 1843 the faculty proposed that a new building should be erected to house the societies as well as a museum, a chemical laboratory, and a library. In 1848 Van Nest Hall was opened west of Queen's. The societies' substantial libraries were located on the first floor of Van Nest Hall and were open for a brief period on Saturday mornings. When the societies became inactive near the end of the century, their books were deposited in the college library and became an integral part of it.

In 1856 a building was constructed to house the seminarians, their classrooms, and a library. This marked the end of the long association of the seminary and the college.

A new librarian who surveyed the holdings in 1866 found only 3,000 volumes and 800 congressional documents. Few books were of recent vintage; in the field of chemistry not one new work had been added in 20 years, and even in the classics the critical editions were all those of a past generation. The librarian noted that the library was "without the means to make men scholars." The faculty urged the trustees to support the library, and from time to time they made sums of money available.

President W. H. Campbell in 1872 addressed an open letter to the Friends of Rutgers College on behalf of the library. He wrote:

> I was authorized (by the Board of Trustees) and requested to make an immediate effort to secure, by donations of books and money, a suitable basis for a Library of Reference, and a few needed standard works.
>
> After full consideration of the matter, it has been decided to attempt the raising of three thousand dollars ($3,000) for this purpose, and we now appeal to our

> friends for aid. . . . The Library and Reading Room are now open every day and the books that we seek to procure are such as will be in almost constant use.

No record exists of the gifts received by the librarian, Professor G. W. Atherton.

Until 1873 the library remained in Old Queen's, when it moved to the newly built Kirkpatrick Chapel. Space had been provided there for the library.

By 1877 arrangements had been made to hire a student assistant in order to keep the library open every weekday for 2½ hours. In order "to increase the culture and usefulness of the institution," the library was also open for 2 hours on Saturday.

In 1882 the trustees approved a faculty plan for the conferring of advanced degrees. However, Rutgers lacked the resources needed for graduate study. The college library was woefully inadequate, for there had been no regular appropriations. It had been maintained only by occasional gifts of money and books.

Until 1884 faculty members were called upon to serve as the college librarian. In 1864 President Campbell named DeWitt T. B. Reilly, professor of Latin, to serve as librarian. History professor George W. Atherton was college librarian from 1871 to 1880. He was succeeded by mathematics professor Isaac Hasbrouck, who had been assistant librarian since 1868.

Irving Strong Upson was appointed librarian in 1884 at an annual salary of $150. The official minutes indicated: "Out of which he may have the privilege of engaging an assistant, the Trustees recognizing the fact that his work will be largely a labor of love to his Alma Mater." Upson had studied at Rutgers and after his graduation had become a clerk in the Agricultural Experiment Station. He was the first nonprofessor to become librarian, although in addition he retained his position as chief clerk at the State Experiment Station. He reported to the Board of Trustees in 1885 that during the previous year the library had added 1,167 volumes, bringing the total number of books on the shelves to 9,901 "if we accept the old records." Upson's method of selecting books for the library was remarkably uncomplicated:

> By a special arrangement with Mssrs. N. Tibbals and Sons, New York City, a box of recent publications for inspection with a view to purchase is forwarded to the library as often as desired. These books are placed on a table in the main library room where they may be examined by any caller at the library for two or three weeks. The President and the librarian then select such of the books as it is desirable to retain, and the remainder are returned to the booksellers. A careful record is also kept of titles of books suggested by professors and students, and the books are immediately purchased if judged advisable. In these ways new and standard books are being constantly added to our shelves (*2*).

He further reported that perhaps the most noteworthy step taken by the library was the hiring of a man to catalog the library collection. He was to "devote his whole time to the construction of a double card catalogue, otherwise known as an author and subject catalogue" (*3*). In concluding his report Upson requested an additional $50 to supplement the $60 fund used to purchase periodicals (*4*).

Upson brought the library to a new level of efficiency. The library collection of the college greatly increased during his tenure. He and President Gates had induced the trustees to appropriate $1,000 more each year for the library, and by 1890 the collection totaled more than 26,000 volumes. Also, the library had been augmented by gifts of large collections such as that of P. Vanderbilt Spader in 1887.

Space in Kirkpatrick Chapel became inadequate; books were behind one another on shelves and stacked on the floor. Their proper use was impeded and the service to the students was inadequate. The need for a new library was brought to the attention of Mr. and Mrs. Ralph Voorhees, and in 1902 they offered $20,000 for the erection of the desired building. Plans were drawn up by Henry Rutgers Marshall, proposing a stone structure in keeping with the Queen's building. The cost was, of course, much more than the amount first donated. Mr. and Mrs. Voorhees increased their gift and this was subsequently increased again when costs continued to mount. On November 23, 1903, the Voorhees Library was dedicated. Mr. Voorhees was present at the dedication exercises and spoke briefly, although he was blind and unable to observe his gift. Forty-six thousand volumes were moved into the new building, beginning a new era in library service at Rutgers.

In 1905 Irving Upson moved from the library to serve as treasurer, registrar, and secretary to the faculty, thus becoming the first "administrator" of the college.

George A. Osborn was selected to succeed Upson as librarian in 1907. He had become Upson's assistant just prior to his graduation from the college in 1897 and had served as acting librarian from 1905 to 1907. He began his job in the new Voorhees Library, the first building to be devoted exclusively to library use.

The library underwent rapid growth during the early years of Osborn's 37-year administration, with the collection tripling between 1907 and 1922. However, with the consequent increase in acquisitions, the collection soon expanded beyond the capacity of the building. An addition was begun in 1923 and the Voorhees Library building assumed its present dimensions.

In 1937 George Osborn was described as a man who "belongs to a class of individuals fast disappearing from the American library scene, who substitutes for formal library training a long and useful experience, coupled with a scholarly understanding of the needs of his colleagues for library materials, and a sensitiveness to the world of books" (*5*). However, he was handicapped in his role of librarian by a small staff, an overcrowded building, and an inadequate book budget. The university had turned its attention toward scholarly activity and recognized that it must enlarge the library to meet the demands of growing graduate instruction. Twenty years would pass, however, before the physical space would improve.

One evidence of this new scholarly activity was the organization in 1937 of the Associated Friends of the Library of Rutgers University. Their journal featured scholarly articles based upon research conducted from library materials. They served as a vocal constituency in behalf of the library's needs.

That same year the Voorhees Library was described as "admittedly inadequate to the needs of the University. It is badly planned, in the first place; and it is too small both in reading space and in stack space and hopelessly short of adequacy in space for technical operations and administrative purposes." Further, "a new building for library purposes must be made a primary aim of the University" (*6*). Although the annual library expenditure for books had increased greatly, the needs of the library were not being met. William M. Randall, writing on the library in 1937, echoed the plea made by previous librarians: "But funds they must have. Undernourishment of the library in this regard has an influence for ill which increases its effect in almost geometric progression" (7).

Library expansion was not possible during the war years. The Voorhees Library had long since been outgrown, with the result that a substantial proportion of its collections had to be stored in warehouses and basements in various remote locations. Professor Donald F. Cameron became librarian in 1945. Following the war the book budget increased from $77,200 to $101,200 (1952). The additions to the collection heightened the necessity for additional space.

In 1952 the governor of New Jersey in his budget message recommended an appropriation of $2 million for a new University Library. When the legislature made the sum available there were assurances that an additional $2 million would be granted a year later to make possible the erection of a building that would be adequate for the foreseeable future. In 1953 the legislature granted the supplemental installment.

November 1956 saw the formal dedication of the Rutgers University Library (now Archibald Stevens Alexander Library to honor a long-time member and former chairman of the Board of Governors). The six-story building at the northern end of College Avenue has a capacity of 1,500,000 volumes and room for 1,000 readers.

Continued growth of the university through the 1950s and into the 1960s included the establishment of a medical school at Rutgers in 1961. Rutgers Medical School was opened with a 2-year program in the fall of 1966 in a new building on the Busch Campus in Piscataway. The nucleus of a medical library collection, which had developed over the years, was organized in 1965 within the University Library upon the appointment of a librarian for science and medicine.

The year 1970 saw the completion of the Library of Science and Medicine adjacent to the Medical School. Into this library went the collection developed for it, as well as the science collections formerly held on the Queen's Campus and the Biological Sciences Library. In 1971 the College of Pharmacy moved from Newark to the Busch Campus. The Pharmacy Library also became part of the Library of Science and Medicine.

Alexander Library, with its art unit, houses the major humanities and social sciences collections. The Library of Science and Medicine and the eight specialized science libraries house the science research collections. Together, Alexander and the Library of Science and Medicine (including their branches) contain the bulk of the university's research collections as well as collections to support undergraduate instruction.

The Rutgers library system is a network of 18 library units. In 1976 the Rutgers University Libraries contained over 1,900,000 bound volumes and 2,000,000 documents, plus manuscripts, microforms, pamphlets, maps, and other materials. The libraries add from 100,000 to 120,000 volumes a year. A staff of 100 professional librarians and 240 staff members are responsible for libraries on three campuses. In New Brunswick there are: the Alexander and Art Libraries on the Queen's Campus; and the Mabel Smith Douglass Library, Carey Library of the Institute of Management and Labor Relations, and the Agriculture Library on the Douglass and Cook Campuses, with the Bailey B. Pepper Library (Entomology) nearby. The Kilmer Area Library is located on the Kilmer Campus with Livingston College. The Library of Science and Medicine and the collections for Mathematics, Chemistry, Physics, the Center for Alcohol Studies, Microbiology, the Center for Urban Policy Research, the Herbarium, and Ceramics are located on the Busch Campus. Although in the New Brunswick area, these libraries are in the town of Piscataway across the Raritan River. The John Cotton Dana Library and the Newark Law Library are at Newark. Located on the Camden campus are the Camden Law Library and the Camden College Libraries.

Each library has a unique purpose, yet each serves also as a part of the total Rutgers University Libraries resource. A more detailed description of each library follows.

Units of the Rutgers Library System

ARCHIBALD STEVENS ALEXANDER LIBRARY

Many changes have been made to the Alexander Library (formerly Rutgers University Library) since it opened in 1956. Its ever-expanding collection in the humanities and social sciences numbers 706,000 bound volumes, 1,552,000 government documents, and 683,000 microforms occupying most of the available space on the library's six floors. The staff, 21 professional librarians and 45 staff members, operates 14 departments.

As in the past, the Alexander Library continues in many ways to be a central library for the system. In addition to serving the needs of undergraduate students of Rutgers and University Colleges and the graduate students and students of the several professional schools, Alexander shares its space with the administration of the Rutgers University Libraries, the Technical Services Department, a centralized operation for Rutgers University Libraries, and Multi Media Services. Multi Media Services, located on the fourth floor, holds 600 phonotapes, 10,000 phonodisks, 600 films, 600 slides, film loops, and filmstrips available to all campuses. The music collection and the East Asian collection are located in Alexander Library, as a part of its function in providing for users of social science and humanities materials.

The Special Collections Department, on the first floor, houses the university collections of rare books, manuscripts, and other research materials. These include collections of Cobbett, DeFoe, Freneau, Noah Webster, and Whitman; the Symington collection of first editions, manuscripts, and correspondence related to English literature of the late 19th and early 20th centuries, especially Borrow, the Brontës, Gosse, Swinburne, and Wise; a substantial collection of 19th-century gift annuals; an extensive collection of New Jerseyana, including books, pamphlets, newspapers, maps, pictures, and manuscripts; considerable early Americana, including almanacs and newspapers; and a collection relating to the history of agriculture, which is strong in printed material of the 16th, 17th, and 18th centuries.

The Art Library is administratively part of the Alexander Library but since 1966 has been located in Voorhees Hall, Queen's Campus, in the original library, now remodeled to accommodate the university's Art Museum as well as the Art Library. The book collection consists of approximately 25,000 volumes. Three noteworthy special collections are maintained by the Art Library. The first of these, the Stern Collection of modern art, consists of about 2,200 titles and association copies of important works in the field. The Cowdrey Collection of American Art comprises some 3,000 volumes. Both Stern and Cowdrey are shelved with the other art books rather than segregated. Their bookplates, especially designed for the purpose, indicate their origin. The third collection consists of between 4 and 5 thousand uncataloged pamphlets; included are museum reports, exhibition catalogs, and miscellaneous items relating to art.

LIBRARY OF SCIENCE AND MEDICINE

The Library of Science and Medicine has grown substantially since it opened in 1970. Its staff of 14 professional librarians and 25 assistants oversees a collection of 94,000 monographs, 103,000 bound periodicals, and 98,000 government documents in the areas of the physical and biological sciences, engineering, medicine, pharmacy, and general psychology. As a part of the service of this library, access to on-line data retrieval is available. A small historical collection of books in the sciences and pharmacy is housed in its Special Collection room. In addition to this science library there are eight specialized science libraries which are administratively connected to it.

AGRICULTURE LIBRARY

The Agriculture Library is an agricultural information center which contains primarily documents from the United States government, state experiment stations, foreign research institutions, and foreign agricultural stations. In 1975 most of the monographs and periodicals were transferred to either the Douglass Library to support teaching at Cook College or to the Library of Science and Medicine and the Alexander Library to support research. A reference collection serves the staff of the Agricultural Experiment Station and Cook College graduate students, and online access to the National Library of Agriculture is available.

CENTER OF ALCOHOL STUDIES LIBRARY

The Library of the Center of Alcohol Studies occupies Room 219 in Smithers Hall, the center's headquarters on the Busch Campus. Begun at Yale University in 1930, the center was established as a separate unit about 10 years later and moved to Rutgers in 1962. The function of its library is the acquisition, maintenance, and servicing of books, periodicals, and other materials which deal with problems relating to alcohol and alcoholism, exclusive of the technological and industrial uses of alcohol.

The collection consists of about 7,000 bound volumes and a large microfilm collection of relevant theses.

The Center of Alcohol Studies produces a scholarly and scientific abstracting service and a copy of this *Classified Abstract Archive of the Alcohol Literature* (CAAAL) is available in the library. The library also contains, in its Raymond G. McCarthy Memorial Collection, 98% of the complete texts from which the abstracts are made. These now number over 18,000. Although the original texts are written in many different languages, the abstracts are issued in English.

CHEMISTRY LIBRARY

The Chemistry Library is housed in the annex of the Wright Chemistry Laboratory in the science complex on the Busch Campus. It serves the faculty, students, and staff of the university who are interested in books and periodicals in the fields of chemistry and chemical engineering. Its collection includes approximately 15,000 volumes, of which about 9,000 volumes are bound journals.

BAILEY B. PEPPER (ENTOMOLOGY) LIBRARY

The Pepper Library is located in the Georges Road Laboratory adjacent to the Cook Campus. It is a research collection of 4,000 monographs, documents, and journals in entomology.

HERBARIUM

The Herbarium, located in the Chrysler Herbarium on the Busch Campus, has a collection dealing with plant identification.

INSTITUTE OF MICROBIOLOGY LIBRARY

The specific function of the Library of the Institute of Microbiology, located on the Busch Campus, is to serve as a communications link in microbiological education and research. To accomplish this purpose, it maintains a collection of 15,000 bound volumes of pertinent literature in microbiology and its peripheral sciences.

MABEL SMITH DOUGLASS LIBRARY

The Library of the New Jersey College for Women had its beginnings, as did all early departments of the college, in an old brownstone mansion known as College Hall. Here, in 1918, a few books loaned by the Rutgers Library were placed on the desk of the registrar to be used by the students. As more books arrived from the University Library they were placed on top of the cabinets in the registrar's office.

In the second year of the college, the number of books (mostly loans from Rutgers) had grown to the point of requiring a new location. The collection was then moved to a closet in the study hall in College Hall. Two closets were soon needed, and a student helper was engaged to assist the registrar-librarian.

In the summer of 1921 the library was moved from the study hall to the lower floor of the dean's residence, where it remained until the summer of 1924. The years 1922–1924 showed a rapid growth in the book collection and in the use made of the library by the students. It was during this time that the various clubs of the New Jersey State Federation of Women's Clubs gave about 1,000 books for a Browsing Collection. These were placed in a room with comfortable chairs and a fireplace where students could enjoy the books and a cup of tea.

In 1924 the library returned to College Hall, this time to the top floor. Here the library remained until the summer of 1926, when quarters were provided for it in the newly erected Recitation Hall. In 1923 there was a collection of about 1,200 cataloged volumes, with a librarian and two student assistants in charge. By 1939 the collection had grown to over 75,000 cataloged volumes, acquired through gifts and purchases, and there was a staff of 15.

In the early years of the library important gifts were received, including the George F. Parker Library of 10,000 volumes, purchased by Thomas Fortune Ryan and donated to the library; 1,300 volumes from the estate of Elizabeth R. Edwards; and the Stanton Memorial Collection, given by Theodore Stanton as a memorial to his mother, Elizabeth Cady Stanton.

The library remained in Recitation Hall until 1961, when it moved into a handsome new building on Chapel Drive. The Mabel Smith Douglass Library serves the 7,000 students of Douglass and Cook Colleges. Cook College was developed in 1972 from the former College of Agriculture and Environmental Science and is located on land contiguous to the Douglass College Campus. An addition to the library, completed in 1975, doubled its original size. The attractive building in the center of the Douglass Campus housed 173,000 volumes in 1977 and had a full-time staff of 7 professional librarians and 15 assistants.

NEWARK DANA LIBRARY

The University of Newark was formed in 1936 by the merger of five previously independent institutions in New Jersey's largest city. The goal had been to offer a bachelor's degree from a liberal arts institution and opportunities to pursue professional education in a number of fields. This goal was achieved in part, but it soon became apparent that the University of Newark could not remain viable as a privately supported institution. In 1946 it merged with Rutgers and since that date has become an important arm of Rutgers University in New Brunswick. The backgrounds of the two institutions are quite different: the University of Newark began in 1927 and Rutgers was established before the Revolutionary War (and is associated in the popular mind with the Ivy League schools). Their merger opened a new era with the establishment of a Newark-based adjunct of Rutgers University. A School of Nursing, a Graduate School of Business, a School of Criminal Justice, in addition to the undergraduate college, a growing graduate school, and the School of Law, have added to the university's programs.

In its early years, the Dana Library occupied the third, fourth, and fifth floors of Currier Hall. For a period of time in those years the building also housed all the administration offices of the Newark College of Arts and Sciences, the Departments of Zoology and Physiology and of Chemistry, and the Institute of Animal Behavior. During the library's occupancy it was without an elevator, its seating capacity was 175, and the overflow of the stacks was piled on the floor. Services were comparable. In 1959/60 the collection was 65,000 volumes, the circulation was 21,553, a total of 839 reference questions were handled, and a professional staff of three provided service.

The John Cotton Dana Library was completed in 1967. It serves the 4,000 undergraduates and 2,000 graduate students in eight graduate programs. It has a collection of 225,000 bound volumes and a full-time staff of 9 professional librarians and 26 assistants. An addition to the Dana Library completed in 1977 doubled the building's space.

RUTGERS–CAMDEN

Rutgers College of Arts and Sciences at Camden was established as the College of South Jersey in 1927. Originally a 2-year institution, the college became a 4-year division of Rutgers when they merged in 1950.

Rutgers–Camden is primarily a nonresidential liberal arts college for 3,000 students in 26 different fields. The campus has grown dramatically since the merger.

With the opening of the Science Building and the Student Center on the campus in 1964, the first phase of a development program which will eventually encompass some 16 acres was completed. As part of the second phase of expansion, an addition to the library and other buildings were completed.

The college library contains approximately 151,000 volumes plus 47,000 government documents. It is a depository for both federal government documents and the documents of the State of New Jersey.

The library building provides space for a total of 210,000 volumes and seating for 745 students. A staff of 6 professional librarians and 12 assistants provides the library services.

KILMER AREA LIBRARY

Livingston College is located in Piscataway on land obtained from the federal government, formerly Camp Kilmer. Three undergraduate coeducational colleges were originally projected for the site, with the Kilmer Area Library serving all three colleges.

Livingston College, opened in 1969, is the only college which has been built on the site. Its 3,500 undergraduates are offered a wide range of courses in community development, health and social services, social studies, journalism and communications, computer sciences, and ethnic studies, besides traditional academic programs.

The library's specialized audiovisual collection and 96,000 bound volumes support this undergraduate program. Five professional librarians and 15 support staff members operate the Kilmer Area Library.

CAMDEN LAW LIBRARY

Since Rutgers University has two separate law schools, located in Newark and Camden, there is a law library to support the law programs at each location.

Rutgers School of Law–Camden had its origin in the South Jersey Law School, which was established in Camden in 1926 by Arthur E. Armitage, Sr., and an interested group of citizens. The early success of the legal education program led its founders to establish the College of South Jersey.

In 1950 the law school merged with Rutgers University. Designated as Rutgers School of Law–South Jersey Division, the law school had its own faculty in residence at the urban center and its own facilities. The teaching members of the staff in Camden and the instructors at Newark made up the faculty of the State University School of Law. By a resolution of the Board of Governors, the South Jersey Division was separated from the School of Law in Newark and was formally established as an autonomous unit on July 1, 1967.

The Law Library is located on the third floor of the Law School Building. Its collection of 101,000 bound volumes is maintained by a staff of 6 professional librarians and 11 assistants, for 550 students. It emphasizes East European and Russian law in its collection.

NEWARK LAW LIBRARY

The Law Library in Newark had its origin with the founding of the New Jersey Law School in Newark. From 1908 to 1930 this school was housed on Park Street, Newark. In 1926 a second law school was founded in Newark, the Mercer–Beasley School of Law, which in 1934 became part of the University of Newark. In 1936 the New Jersey Law School and Mercer–Beasley School of Law were merged to become the School of Law of the new University of Newark. The two small law libraries were also merged, and they reported a collection of 7,500.

By 1941 the University of Newark Law School was placed on the approved list of law schools of the American Bar Association, and it became a member of the Association of American Law Schools.

When the University of Newark was incorporated into Rutgers University, one of the first changes to occur was the separation of the Law Library from the general University Library. Between January 1947 and April 1948 the Law Library was moved from 40 Rector Street to the former Ballantine mansion at 37 Washington Street. This continued to be its home until 1957, when it moved a few doors away to 53 Washington Street, the former Newark YWCA. On the completion of Ackerson Hall in November 1965, the Law School and Law Library occupied the first building ever constructed for educational purposes in Newark.

The library collection is presently over 180,000 volumes, large parts of which are gifts of local insurance firms and several of the large law firms. The Law Library staff of 8 professional librarians and 11 assistants serves a student body of 900 law students. The collection emphasizes Western European law.

CENTER FOR URBAN POLICY RESEARCH LIBRARY

The Library of the Center for Urban Policy Research is located on the Livingston College Campus. A collection of 3,000 bound volumes forms the permanent nucleus of the library; this is enhanced and enriched by a large number of government publications, pamphlets, and research reports dealing with urban problems.

INSTITUTE OF MANAGEMENT AND LABOR RELATIONS: CAREY LIBRARY

The Institute of Management and Labor Relations, a unit of the University Extension Division in New Brunswick, maintains a specialized library of materials on industrial relations. Although the chief functions of this collection are to facilitate research and the work of the teaching program, the library extends its services to industry, trade unions, librarians, students, teachers, and members of the general public. Through the continued cooperation of both companies and labor unions, the library is able to include among its holdings a number of unusual publications particularly applicable to the needs of its special clientele.

The library's resources, like the programs of the institute, are concentrated within the field of industrial, labor, and management relations. The general collection contains dictionaries, directories, indexes, periodicals, government documents, and abstracting and reporting services pertaining to collective bargaining, negotiations and contracts, labor arbitration reports, and similar topics. Company files include such items as histories of separate companies, handbooks for employees, collective bargaining agreements, health and welfare plans, and related items. Similarly, the file of union material incorporates pamphlets by and about individual unions, pictorial accounts of union development, shop stewards' manuals, union constitutions and bylaws, speeches by union leaders, runs of union newspapers, and the proceedings of union conventions. The library has material relating to public sector bargaining, with emphasis on the New Jersey experience. A special subject file contains data relating to the field of industrial relations.

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VIRGINIA P. WHITNEY
ANN MONTANARO

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SAINT ANSELM — COLLEGE LIBRARY (ROME)

Officially known as the Pontificio Ateneo di Sant'Anselmo and popularly called (in Rome) the Anselmianum, the present Saint Anselm College and its rich library trace their origins to 1687 and the school established for Cassinese Benedictines in the monastery of Saint Paul-Outside-the-Walls, by Pope Innocent XI.

Located since 1896 on the Aventine Hill, the college—which was suppressed in 1810 by Napoleon; was closed in 1837 due to the cholera epidemic in Rome; and was forced, given the Italian political situation, to remain closed again from 1870 to 1888—has had a tumultuous and difficult existence. Moreover, prior to 1896 it was located first in the monastery of Saint Paul-Outside-the-Walls, then in the Palazzo dei Convertendi (1888), and later (1893) in the Palazzo di Bocca Leone.

From its earliest days the Anselmianum had faculties in philosophy, theology, and canon law; but it was not until the pontificate of Pope Pius IX (1846–1878) that it gained the authority to confer a degree in theology. Pope Leo XIII granted the Benedictines the right to award degrees in both philosophy and canon law. And in 1933 Pope Pius XI added the title of pontifical to the college.

In conformity with the spirit and charisma of the Order of Saint Benedict, the Pontificio Ateneo di Sant'Anselmo established a liturgical institute (1950) for the critical editing of liturgical texts, and the Institute for Monastic Studies (1952). In 1961 the liturgical institute (started, as was noted, in 1950) was raised to the status of Pontifical Liturgical Institute for the preparation of professors of liturgy as well as liturgical consultants.

The Pontificio Ateneo di Sant'Anselmo has, throughout the years, published a number of very serious studies and serials. Among the most important are *Studia Anselmiana* (1933–); *Rerum Ecclesiasticarum Documenta* (Series *maior*: *Fontes*; Series *minor*: *Subsidia Studiorum*); and *Corpus Consuetudinum Monasticarum*.

The Anselmianum's library of over 50,000 volumes not only reflects the main thrust of this pontifical athenaeum—thus, its richness in manuscripts, incunabula, and rare books concerning liturgy and allied subjects—but it is in miniature a living witness of the fate suffered by so very many Italian ecclesiastical libraries at the hands of both Napoleon and the Italian government.

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ROMANO STEPHEN ALMAGNO, O.F.M.

SAINT LOUIS PUBLIC LIBRARY

Forerunners of the Library

The public library for the City of Saint Louis, like those of the other big cities in the early history of this nation, traces its origin back to the earliest decades of the country's independence. It was Benjamin Franklin who first promulgated the idea of free public libraries, although the first forms occurred as subscription societies with individual memberships. While it was still a primitive frontier town concerned primarily with trapping, river commerce, and the beginning western movement into the vast, newly acquired Louisiana Territory, private membership libraries or reading rooms were opened often in Saint Louis, and they failed in succession. The town had only a few hundred inhabitants, but public opinion was strong that a reading collection was badly needed for the city to grow to a stature comparable with the nation's eastern cities.

Having no other way to finance operations, library organizers established them on a commercial basis. Even the town trustees supported the first attempt, in 1811, by providing space for the reading matter (mainly eastern newspapers) above the market house. None of these earliest organizational efforts succeeded financially even though one advertised itself as a "circulating" library. Not until 1824 did one, the Saint Louis Library Association, establish enduring roots, again through city government support for facilities, and with strong newspaper coverage. It persisted for 15 years, and then it finally collapsed and was sold at auction. That collection changed hands several times before it was incorporated into the newly organized and state-chartered Mercantile Library (1846/47).

As the city grew in population with the expansion of the nation across its western Mississippi River boundary, so did the several kinds of libraries grow and develop. Organizations, societies, and vocational groups founded libraries for their members' pleasure and edification. Private schools and colleges followed suit, although it wasn't until 1865 that the city school system organized its own library for teachers and students alike. Meanwhile, the Mercantile Library—founded as a stock company which sold annual memberships to benefit the vocational class in society (called mechanics)—grew and prospered. It was the largest library in the city and was rich in paintings and statuary as well as books.

Foundation of the City Library

Ira Divoll was the city school superintendent in the mid-1800s, and when national economic and social conditions returned to pre-Civil War status, he found a school board willing to support him in the drive for a new departure: the Saint Louis Public School Library. The only organizational means at his disposal was, again, commercial. However, given the prestige of the public schools, the sale of subscription memberships at low rates was calculated to be sufficient to meet the financial costs. Low membership fees went far toward satisfying Divoll's objective of providing a means of continuing education for the vast majority of students who were not wealthy enough to continue their formal education beyond elementary schooling.

Thus, the Public School Library Society was incorporated by the state legislature in 1865, and it grew slowly into a formidable institution that won its independence from the schools and separate tax support by the public in 1893. Divoll, who was still school superintendent, was the first—but temporary—librarian that oversaw the initial collection of 1,500 books. These were mostly texts and juvenile reading, and were housed in the school board meeting room. While authorized to do so, the school board failed to support its earliest library, which forced the fledgling to rely solely on donations of books and money, in addition to the income from memberships (sold at $3 each).

The embryonic library gained vigorous new life and endurance expectancy after John J. Bailey was appointed the first full-time librarian. The collection promptly grew in size and at the end of his first year a printed index to its 6,000 volumes was issued (it contained the lament that it wasn't "prepared upon a thoroughly scientific plan"). Moreover, this first publication attempted to disabuse the public of its conviction that the library was primarily for children. With such a small beginning collection, the books were carefully protected in locked book cases, but they were lent for home reading one at a time.

After experiencing its early success under the aegis of the city schools, the library was formally and legally taken over by the school board in 1869, which governed the library through a Board of Managers selected from its own members. In addition, it agreed to begin supporting the library with a minimum of $3,000 annually. With this new injection of guidance and support, the library gained new strength; it had a collection of 20,000 volumes that were loaned 54,000 times in 1870, and it was operated for 12 hours each day by a staff of four. The intellectual societies of Saint Louis met in the library and kept their own book collections there, many of which were finally merged with the library's books. Rapid progress was made in adding the standard characteristics of a modern service, for example, by starting a card catalog and adding state and U.S. government documents.

As the collection grew in size there was a modest parallel growth in space; in 1874 a second reading room was added. But it was in that same year that authority was secured from the state legislature to open the library for free public use on the premises, even while borrowing privileges were still restricted to dues-paying members. A major issue arose about the public reading interest in novels, which constituted three-quarters of all the materials borrowed. The Board of Managers restricted novel borrowing, with the result that dues-paying members turned to the Mercantile Library for their popular reading, and this in turn forced the board to rescind this policy in order to retain its 5,800 registered borrowers.

Move to Independence

By the time John Bailey was replaced by Frederick M. Crunden as librarian (in 1877), departments had made their appearance in the library. German service and reference were established. Crunden, the determined and vigorous developer of the library, promoted it in the community by such devices as publishing each year the names of members, giving good school students life memberships, and reducing the fee for annual memberships.

Crunden was a dynamic man with clearly defined objectives for the library in the future. He set to work at once to improve upon the institution he had inherited, concentrating first on completing all the arrearage in journal binding and refurbishment of the physical facilities. Each year, in his annual report, he listed the library's deficiencies and repeated year after year the need to open the service free of charge to the entire populace. It was during his tenure that the first branch was opened, which became possible only because free space was made available. The library contributed a small collection, but the attendant was supplied by the community served. Crunden soon exhibited his creativity in promotional ideas, which boosted the attractiveness of the library to the public. He instituted the publication of a bulletin which described new books received, the rental of duplicates of popular books to increase income, the encouragement of leisure reading among schoolchildren, and the issuance of bibliographies for German- and French-speaking citizens. He promoted the passage of a new state law in 1885 authorizing cities to levy taxes for public library service. It was during Crunden's tenure that the idea was promoted that the public library was the "people's university." He repeatedly and publicly advocated the library's expansion into neighborhood branches and conversion of the subscription service into free, city-wide use. Advertising leaflets were printed and distributed widely to attract members.

Further progress was made by the installation of electricity in 1885 and through the increased number of citizen clubs and study classes that met in the library. Crunden had improved the library so dramatically during the first 11 years of his tenure that he attracted national attention and was elected the fourth president of the American Library Association in 1889.

By 1893 the library had outgrown its old quarters; it moved its 90,000 volumes to two floors in the new Board of Education building. In that same year the voters of Saint Louis were persuaded to approve a separate library tax on themselves in order to detach the services from the schools and open them to all residents free of subscription charges. The life members of the old organization then turned over their library to the new Board of Directors, a separate corporate body appointed by the mayor.

New Beginnings

Physically, the library remained in the school board building, but borrowers quadrupled in number, as did the annual circulation. Annual income increased severalfold, and the staff grew as the library embarked on an expansion plan. Crunden adopted the use of delivery stations at 22 fixed locations in the residential neighborhoods where people could meet a horse-drawn wagon twice each week to return borrowed books and get new ones. Classroom libraries were located in the schools.

More improvements were made. A book repair section was established, a public information desk was installed, a children's room was opened in 1897, and a monthly *Public Library Magazine* was issued that had the characteristics of a literary journal. A reference department was started. All that was lacking were branches and a library-owned central building to house the burgeoning public service and collection.

Steps were taken to fulfill these remaining needs. The most productive effort came as a result of a conference with Andrew Carnegie. He offered the city $1 million provided that half would be used for construction of a main library and the remainder for the construction of six branches. In return, the city had to provide the sites for the buildings and more annual income than was then received.

Officials promptly moved to take advantage of the Carnegie offer of 1901. An entire block in downtown Saint Louis was acquired, and in 1912 a new granite and marble building was completed after a design by architect Cass Gilbert. It was built to accommodate 1 million volumes and 600 readers.

New Expansion

Dr. Arthur E. Bostwick succeeded Crunden in 1909, and with the additional annual income resulting from the Carnegie requirement he began a new expansion of service throughout the city. The year 1911 saw the establishment of a Municipal Reference branch in City Hall and the beginning of telephone reference service. The music collection was begun (starting with scores), and an organized children's service program was initiated. Two more subject departments were created, namely, Art and Applied Science, which today remain subject field specialties of the library. In its concern with service to all of its public, the library installed foreign-language book collections in 18 European languages. Interlibrary book loans were initiated, and a delivery system organized by the library was tried before abandoning that method in favor of parcel post delivery.

With the Carnegie grant money, six neighborhood branch buildings were constructed one after another between 1906 and 1910. Resulting from this increased number of facilities and additional people borrowing more books, a need developed immediately for a bindery, which was organized in 1913.

The period from 1913 to 1926 was one of slower growth and development at Main Library in comparison with the previous decade, but branch establishment continued apace. Delivery trucks replaced horse-drawn wagons making the rounds of delivery stations. Services in the new central building were enriched by the addition of a Teachers Room in 1918 and the inauguration of Readers Advisory service in 1925. The Academy of Science collection of 20,000 volumes was donated to the library, as was the small library of the Engineers Club. Library service for the blind was organized in 1924. Six more branches and four subbranches came into being in the early 1920s. Traveling libraries and deposit stations made up the more than 200 additional service outlets.

Library Education Program—the Bostwick Era

The Saint Louis Public Library's Library School emerged gradually from the library's earliest in-service training program. During the last decades of the 19th century, new staff members were submitted to an apprenticeship period after passing stiff entrance requirements. New employees were required to possess a high school education plus a knowledge of two foreign languages. Apprenticeship consisted of on-the-job training in the several departments, and all the differing tasks and routines were taught by department heads.

In 1905 this process of practical, directed experience was changed to a full-time learning class lasting for one month. Into this training program were grouped all new employees who entered upon duty at the same time. They received no pay for this work/preparatory-training period.

Encouraged by the success achieved through this concentrated training, and responding to the need for an increased and more thoroughly trained staff (who were required for staffing an expanding branch program), the library converted these month-long training sessions into a full-blown school lasting nine months. This formal education curriculum was placed under the principalship of Harriet P. Sawyer, a full-time professional library educator. The school developed rapidly under her leadership and in 1917 it became the Library School. Enrollment was opened to nonresidents, including students from foreign countries. The school was recognized by the American Library Association in 1921.

The course of study was lengthened to 2 years in 1931, but the library's lowered income during the Depression forced the school's closing, as an economy measure, in 1932. Over its 22-year history the school had graduated 440 librarians who were employed across the country.

The Bostwick regime is known for the full development of the library's branch system and a rich publishing program. Following the founding of the first six branches with the Carnegie subsidy, another ten branches were established during the next 22 years, some in rented or donated facilities and two in public school buildings. One of these was a donated building to house the regional library for the blind, which furnished services by mail throughout Arkansas, Kansas, and Missouri.

At the Main Library, expansion of service took an unusual turn in the 1930 addition of another room to the new structure. The Steedman Memorial Room, to contain the honored man's distinguished collection of rare works on architecture, was built onto the building in an interior, open courtyard and opened off the Art Room. Mr. Steedman endowed the still-growing gift collection and also donated the new room, constructed and furnished in the old English Tudor manner.

The Bostwick administration also suffered economic ravages from the Depression, albeit book circulation and personal use by the public soared to new, all-time heights. Tax income fell during the early 1930s, requiring the reduction of staff, lowered salaries, and book budget cuts. This necessary economy was mitigated by a few gains made by participation in some national economic recovery programs. Federally sponsored programs made possible some building renovation projects, restoration and preservation of the library's permanent collections, and the addition of some murals in branch buildings.

After nearly three decades of service to the library, Dr. Bostwick retired as librarian in 1938 but was retained as associate librarian. Bostwick was widely known even beyond Saint Louis; he was a prolific author, college professor, encyclopedia editor, past-president of the American Library Association, and a regular contributor to *Literary Digest*. During his tenure the book collection multiplied three times in size to nearly 900,000 volumes, and book circulation doubled to over 3 million a year.

Operational Refinement

The first task Charles H. Compton, former ALA president, set for himself upon becoming the fourth librarian of the Saint Louis Public Library in 1938 was to make a survey of his inherited responsibility. His analysis resulted in the publication *The St. Louis Public Library Today and Tomorrow*, which was issued for the edification of the Board of Directors, the staff, and the public at large. It called attention to the current status of the library, which had been deteriorating, after a glorious expansion, since the Depression onslaught. Tax income had declined during the Depression years and was insufficient to provide the services required by greatly increased public use. Compton's inventory of deficiencies pointed out that income had dropped by 20%, employees had no pension plan, new and adequate lighting was needed throughout the Main Library, the book budget was inconceivably low, and the growing newspaper files needed conversion to microfilm to ensure preservation of contents. Despite all the statistical documentation for his case, Compton had to wait 8 more years for relief through a tax increase.

The first chance at alleviation of this distressing economic blight appeared in the public move to call a state constitutional convention in 1942. Compton's object, with the assistance of public librarians from throughout the state and the help of his own Board of Directors, was to secure a constitutional provision that would exempt all library tax rates from inclusion in the maximum tax rates fixed for political subdivisions. Success with this aim would relieve political opposition to proposed local library tax increases from civil government officials who also had tax increase plans. Encouraged by his initial efforts, which had received a favorable response from the convention delegates, Compton lengthened his agenda for constitutional reform on behalf of public libraries. He added two more objectives: first, to secure a given percentage of all state income as earmarked funds for public library support and, second, to secure adoption of a policy declaration by the state to promote public libraries, together with a commitment to support them. After lengthy and arduous political work by all whom he led, Compton witnessed the adoption of a new state constitution in 1945 that answered his aims, namely, the policy declaration and the freeing of library tax rates from limits set for cities or counties from which they receive support.

However, that was not the end of the legal battle over taxes that the library and Compton had to fight. In 1947 the city government refused to pass on to the library its share of the intangibles tax yield generated in the city. The library sued and won its case in the State Supreme Court by a decree of 1950.

In the meantime, and as a result of the new constitution, the legislature passed a new law providing for distribution of state aid by formula. The library's financial condition was relieved somewhat, but not fully alleviated until the voters in Saint Louis approved a 20% tax rate increase in 1946, the first since 1901.

The Second World War had intervened during Compton's drive to shore up the overburdened library, which merely strained it further. The staff threw themselves energetically into the Victory Book Campaigns and Savings Bond Drives. Some branches in the system were used as offices by Draft Boards and for sugar rationing administration. Finally, in 1945, in order to relieve the fiscal pressure and to lighten the workload on aging but unpensioned staff, the library gave reduced work schedules at reduced pay to those employees of advanced age and with long tenure. In addition, that was the year that a downtown branch was discontinued; it had operated free of rent in a department store for 30 years.

Despite the financial strain that marked the Compton administration, and the continuing battle to prevent that struggle from adversely affecting service, some gains were made.

A bookmobile made possible by a gift was started on its rounds between branch areas in 1941, and in 1948 a second vehicle was purchased with the yield of the new tax increase. In 1946 a public relations office was opened with the hope that an organized publicity campaign would win back the readers who had gone off to war or the war-time factories. Several memorial book collections were established, mainly in honor of deceased newspaper editorial writers. In 1948 a film library was established that has since grown into one of the finest collections in the country and which is used very widely by the public. By the end of Compton's tenure, the library had amassed 1 million books, and annual circulation had dropped from a high of over 4 million in 1933 to 1.9 million in 1950. Library income had tripled to $1.6 million.

The last significant contribution made by Charles H. Compton, before he retired in 1950, was to place the backing of the library behind the Great Books Discussion Groups movement. Compton saw and developed the natural tie between the Socratic discourse among intellectually curious people and the reading service the library was rendering. Compton personally helped lead the spread of the movement in Saint Louis and devoted most of his attention to it after retirement.

Improvements in the Physical Plant

Louis M. Nourse succeeded to the directorship in 1950, and he faced two worsening economic problems.

The expanding national economy that followed the Second World War created, with its rising costs, new financial hardships for the library. This was joined by another problem, the aging and obsolete condition of the library's physical facilities. These situations soon consumed the library's last tax rate increase, leaving the institution unable to cope with the inevitable larger annual budgets. The Saint Louis Public Library was behind its peer cities in per capita financial support and was even unable to meet national standards. A new library tax increase had to be sought.

First, however, the legislature had to be persuaded to raise the tax rate ceiling. With this done, the voters in 1952 gave a large majority to the issue, thereby affording the library a 50% increase in its tax income.

Several improvements occurred about this time to the benefit of the staff, in addition to the salary increases that became possible. For the first time in the library's history, a professionally constructed Personnel Classification and Pay Plan was put into effect. This new scheme, with its detailed job descriptions, replaced an old, rough division of positions. Next, the library staff members were provided with coverage by Social Security. This minimum pension provision was supplemented later (in 1960) by inclusion of the library staff in a new city employees' retirement system.

During the early 1950s, when the spread of television occurred, the library suffered some loss of use, and this stimulated staff worry about TV's future effects. Nevertheless, two additional branches were opened by the mid-1950s. Although small and in rented quarters, they covered parts of the city where branch service was still lacking. Another one was constructed in 1963.

Major branch expansion and improvement began after the library received $1 million from a successful 1955 city-wide bond issue referendum. While this sum was considerably less than the $4 million requested, it was used to build three more branches and an annex to Main Library. The annex was needed to relieve overcrowded Main, and to it were moved the bindery, book repair, the film library, and bookmobile and community services.

The renovation and modernization of Main, built in 1912, also fell as an obligation on Nourse, and the first bond issue proceeds were insufficient to meet all needs. Very fortunately, another bond issue was passed 7 years later, from which the library benefited by an amount of $725,000. With these funds, augmented by federal LSCA construction grants, further progress was made by building two more branches and remodeling a third, plus the completion of remodeling and redecoration of Main Library (see Figure 1).

This grand development in the short period of a decade stretched the library's resources, and once again, with constantly rising public use, there recurred the need to increase the library's tax income. The voters overwhelmingly approved another 50% increase in the library tax rate in 1962. This injection of new funds was increased in effect 2 years later by the successful legislative move to secure future acceptance by the state of the obligation to reimburse the library for its costs of furnishing library service to the blind readers in the state.

The Nourse regime—marked by physical expansion and modernization of facilities, together with a 100% increase in the tax rate—had provided the library by the end of his tenure with an annual income of $2.6 million and a book inventory of 1.2 million. By 1966 circulation had climbed to 3.1 million per year.

F. Charles Taylor succeeded Louis Nourse as director in 1966; he served for only 2 years. This was a time when many of the large inner-cities were struggling

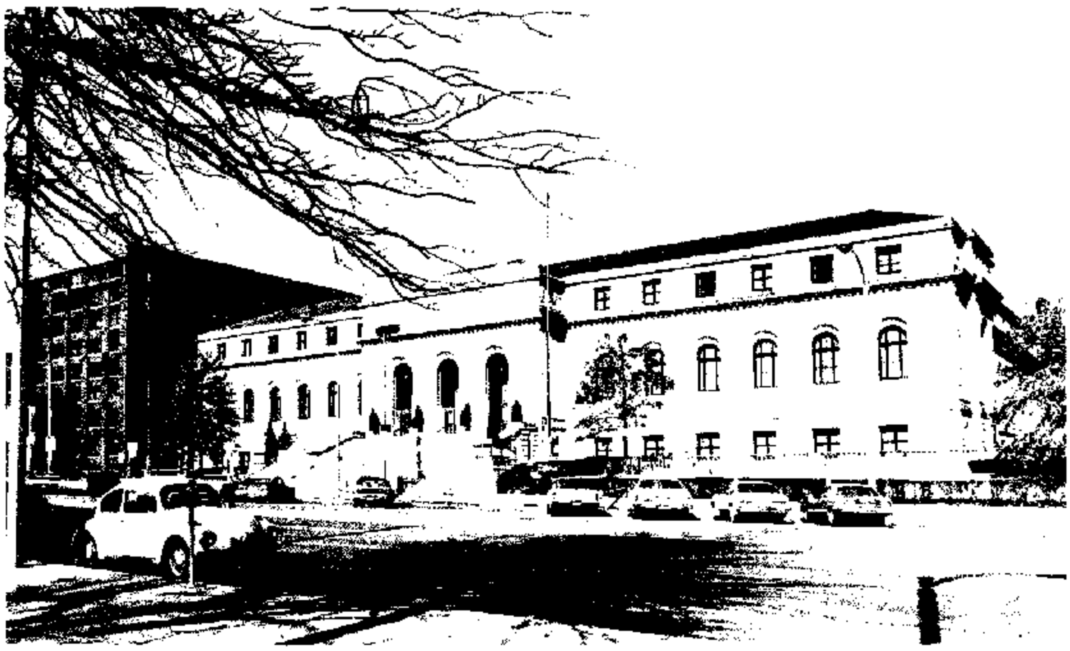

FIGURE 1. *The Main Library, Saint Louis.*

with population abandonment for the suburbs, physical deterioration of older housing, and riots and other lawlessness, and were coping with the growing class of the poor. The Saint Louis Public Library joined in the War on Poverty by launching a number of new, unconventional approaches to the problem of increasing the attractiveness of library service to those who used the library little or not at all. The object was to reach the unserved, and innovation became the watchword to mark the new methods tried in giving service to all. The library became a partner in the programs conducted under the Model Cities label. Further, the library began designing its own programs with specific LSCA federal grants.

Next, the library responded to the needs of another heretofore neglected group of citizens that were attracting national attention: the aged. With federal financial assistance, the library mounted a special delivery service by vans to nursing and retirement homes and hospitals for the elderly and disabled. This successful service was supplemented with home-delivered books to shut-ins.

Another new service was initiated: Art and sculpture reproductions were offered as loans to patrons. Also, new management practices were installed in some of the library's operations. An automated circulation control system was tried, heavier use of microfilm was begun, more office machines were introduced, and a centralized shipping and receiving service was set up.

Additions to the physical plant were continued with remaining bond issue funds, to which were added more federal construction grants. Two new permanent branch buildings were built to replace old ones, and a concealed addition was made at Main Library. Young Adult Services were relocated to the addition, and Technical Services were allocated more space for expansion.

With operational costs rising, the library was beginning to run an annual budget deficit. Worry was so serious about its financial future—due to a shrinking tax base and decreasing public use—that library officials began looking for new, alternative sources of revenue.

Period of Reanalysis

Early in 1969 Paxton P. Price assumed the directorship, and he faced a brewing financial crisis. Relief from the certainty of having to reduce all services, due to continuing budget deficits, could come only through raising the library tax rate. This was negotiated in 1970 when a 66% rate increase was barely passed by the voters.

With the added income, the library's financial future appeared to be secure for another decade. Federal LSCA funds were obtained yearly as a supplement, but the mid-1970s ushered in a period of high inflation and skyrocketing prices. The local tax base continued to decline. These circumstances, combined with an accelerating negative response from voters to other proposed tax rate increases and bond issues, mandated a fresh look at conditions confronting the library. It was finally realized that the city had lost a third of its population during the previous 25 years, while the library had increased its required expenses through expanded services and facilities. Obviously, this imbalance had to be redressed in order to be fiscally sound in the future.

Refinancing through the 1970 tax increase also made it possible to revise staff salaries upward to competitive levels and to increase personnel benefits that included prepaid health insurance. Professionally conducted management training was offered for supervisors, two formal manpower training programs were provided for low-ranking staff members, and participatory management was introduced. A professional firm was engaged to make a study of personnel resources management, which resulted in a reclassification of positions and revised job descriptions.

New financial affluence also offered the opportunity to execute the long-sought but delayed air conditioning of Main Library. This move also provided the humidification system so badly needed for conservation of books stored in the stacks.

Modernization and redecoration of the library's branch properties were continued. Three old branches were treated thusly, including the installation of air conditioning. Moreover, with the aid of federal funds two new branches were built and another was enlarged. Another entirely new, but small, branch was started as a result of an inner-city experiment.

This was a period, also, of many public service improvements and modernization. A Rare Book Room was opened at Main Library. The old Children's Room was converted to a Children's Literature Collection to support authors, editors, teachers, and illustrators. Departmentalization was rearranged and physically organized in the old two-story building to accommodate user convenience. This resulted in opening a Microfilm Reading Room and the establishment of a bibliographic center, together with a reconstituted Readers Advisory Service and the creation of separate departments for documents and serials. Reciprocal borrowing privileges were extended to users of surrounding public and academic libraries. Night telephone reference service was instituted and a media van was launched on visits to playgrounds, parks, and ethnic community festivals. A microfiche copy of the library's total holdings was made for each public service unit. A monthly *Index of St. Louis Newspapers* was published and sold by subscription to make it self-supporting. A new *Union List of Periodicals* was cooperatively published with other area libraries. The library began serving as a CLEP (College Level Examination Program) testing center, and participation in the pilot national program of enlarged services to adult independent learners resulted in establishment of an adult education coordinator's office. Lastly, automation of services to the blind and physically handicapped is planned, to be followed by other service applications such as circulation control.

Internal management improvements took several directions. A statement of the library's purposes and goals was issued and a *Materials Selection Policy* was published. The economically unjustified bindery was closed. The Technical Services Department was reorganized, streamlined, and supported with service from the Ohio College Library Center.

By 1976 the annual income stood at $4.7 million, and circulation, while down in aggregate, amounted to 4.7 items per capita. The collection inventoried at 1.3 million volumes.

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PAXTON P. PRICE

THE SAINT PAUL PUBLIC LIBRARY: 1857–1978

The Great Fire

Fire Wrecks Library with $375,500 Loss; 7 Hurt, One May Die
—*St. Paul Pioneer Press*, April 28, 1915

In a letter to her mother written April 30, 1915, Alma Schmidt, a young resident of the neighboring YWCA, described her feelings as she witnessed the historic fire that destroyed the Saint Paul Public Library's Market House headquarters:

> Theresa . . . came to my room and we watched. Somehow one loves a library and it seems awful to have it burn. It is so much more human than any other building. I had brot [sic] back five books only a little while before and had taken home with me "The Fugitive." Little "fugitive" isn't it queer that just that should have escaped the fire?

Most Saint Paulites shared Alma's sentiments at the loss of the library, an object of some considerable civic pride. The *St. Paul Pioneer Press*, in its April 28, 1915, edition, detailed the damages: $375,500 in building and lending materials; seven injured firemen, one seriously hurt; not to mention the 5,000,000 gallons of water that finally squelched the 15-hour blaze. In response, private citizens offered their personal book collections; philanthropists proposed matching funds for rebuilding and restocking; a church leased its rooms for interim headquarters; and the Minneapolis Public Library invited Saint Paul Public Library customers to enjoy temporary borrowing privileges from the collection of their sister city.

Besides this widespread evidence of public support, the Saint Paul Public Library staff rejoiced in the presence of mind of four of its members: an engineer, a reference staff member, and two Reading Room attendants whose combined efforts salvaged two Chinese jade volumes valued at $2,000. Since these rare books weighed 75 pounds each, the task was not accomplished without placing in peril the lives of those concerned.

There were other consolations for the library. Among them was a new building, the cornerstone of which had been laid the September of the previous year. It would be completed in 1917 at a total cost of $770,018 to become a civic showplace with its Italian Renaissance architecture and pink Tennessee marble exterior. Moreover, the design was to wear so well that 58 years later it would be added to the National Register of Historic Places.

Humble Beginnings

The Saint Paul Public Library's beginnings had been considerably more humble. In 1857 the original Mercantile Library Association's collection numbered 300 volumes, largely the contributions of well-wishers and friends. It was only in 1863, when the subscription library merged with the library of the Young Men's Christian Association, that the circulating volumes increased to 1,500 professionally selected titles. The newly formed Saint Paul Public Library Association was housed on the third floor of the Ingersoll building on Bridge Square, where it flourished for some 20 years. In 1883 the library became a free, public institution and the collection of 8,000 books was transferred to the city. In 1889, upon completion of the City Hall, the library established its headquarters on the fourth floor. In 1900 the library moved to the Market House location on Seventh and Wabasha where the collection rose from 51,000 to the 158,000 volumes that were destroyed in the 1915 fire.

The New Central Library

At all of its locations previous to 1917 the public library had shared its facilities with other occupants. The Market House location was especially crowded, the library existing next to or above such diverse operations as a millinery parlor, a cafeteria, a shoe store, a barber shop, and a pool hall. At the new 1917 location, bounded by Fourth Street, Kellogg Blvd., and Market and Washington Streets, the other occupant was more compatible. The James J. Hill Reference Library established in honor of the famed railroad builder occupied the Market Street side of the block, serving the specialized research needs of Saint Paul citizens.

The entire building's architecture is of Italian Renaissance design. The exterior is pink Tennessee marble, and the principal rooms are finished in grey Mankato stone. The four majestic floors of public library departments boast ornate ceiling decorations by Lee Woodward Zeigler (former director of the Saint Paul Institute of the Arts), Frank P. Fairbanks, and Sherwin and Berman of New York. The entrance lobby includes a sculptured frieze modeled by Ulysses Ricci of New York.

On the second floor of the building—in what is now the library's Science and Industry Room—one of the library's benefactors, Judge Greenleaf Clark, is especially remembered with an inscribed tablet and ceiling decorations including the names of the great minds of Western civilization: from Homer to Hegel.

Branching Out

Indeed, 1917 was the beginning of good times for the library. A $75,000 Carnegie endowment made possible the building of three branch libraries: Arlington Hills, Riverview, and Saint Anthony Park. Hospital Services began in 1921. And 1930 saw the addition of two more branches, Hamline and Merriam Park, both constructed from funds bequeathed by the Henry Hale estate to the amount of $86,000. In 1939 the James H. Skinner Memorial Room for Young Adults was donated by members of another philanthropic family. The Listening Room for recorded music was named in honor of Marian Ramsey Furness, a descendant of Minnesota's first territorial governor, Alexander Ramsey.

But some Saint Paulites weren't content with the sporadic, if generous, contributions of local philanthropists. In 1945 they formed the Friends of the Public Library of the City of Saint Paul, Minnesota, Inc., which is active to this day, offering both monetary and moral support to library endeavors. Bookmobile service went into operation in 1949. In that same year a completely refurnished Children's Room was dedicated to the memory of Thomas and Emilie Cochran, and the Central Library was at last complete.

Ten years later it was time to modernize again. Audio charging was installed in all agencies, and the Central Library's departments were reorganized with new furnishings and a general renovation. The year 1963 saw the addition of a Publications Office to print the library's own newsletters, booklists, brochures, and bookmarks. Federal funds from the Johnson administration's War on Poverty made possible the Community Relations Office's Operation Outreach. This new program, funded for $104,230 under the Library Services and Construction Act, enabled staff to take the library story into the community in a van complete with bookshelves and a portable puppet stage. The combined efforts of the Community Relations Office and the Publications Office, as well as the cooperation of the staff of all public departments, earned the Saint Paul Public Library five John Cotton Dana Publicity Awards, in 1963, 1964, 1965, 1966, and 1968.

Something Old, Something New

In 1967 a new branch was completed in the inner-city, utilizing the shell of a former movie theater. The carpeted, very modern, air-conditioned building offered more space and efficiency than any previous branch, and it held a collection large and diverse enough to serve a wider area than the immediate neighborhood. Keith Doms, director of the Carnegie Library of Pittsburgh, was the site consultant. It was the first regional branch in the Saint Paul Public Library system. City architect Robert L. Ames and Cerny Associates, Inc., planned the building project. Combined funding for the new facility came from a 1953 city bond issue and a federal Library Services and Construction Act grant of $100,000.

Nineteen sixty-seven was also the year of the Central Library's 50th anniversary celebration, the Golden Gala, when hundreds of customers came for a Sunday open house to learn about the library's past as well as plans for the future. Popular tunes of 1917 were played by a live band for the enjoyment of those examining first-floor historical displays, while electronic music accompanied the third-floor demonstration of information retrieval. Staff members wore costumes appropriate to the displays they manned.

The Challenges of the '70s

As the 1970s began the Saint Paul Public Library was in the modern mainstream with collections that included cassette tapes, phonograph records, films, filmstrips, slides, framed pictures, and sculpture reproductions as well as the more standard books, paperbacks, periodicals, government documents, and pamphlets. A Video Communications Center had begun to experiment with television programming in libraries as well as with special projects such as the recording of local oral history. And a Homebound Service staffed by 50 volunteers was initiated to bring senior citizens and the disabled in contact with recreational and educational reading, and with a recently established large print collection available to people of all ages.

Like most modern libraries, the Saint Paul Public Library has experienced increased demands for information. For 1976 the monthly average of reference questions was 50,000. Budgeting for these increased demands was a problem with inflation cutting into the tax dollar. Still it was not as bad as the Depression years, when movie theaters had special performances for book donors, when civic groups and the Housewife's League united to make personal donations to the library. The newly formed Metropolitan Library Service Agency (MELSA), a cooperative union of nine county libraries, helped overcome some of the budgetary deficiences through the following projects: the establishment of a formal interlibrary loan system, monetary support for the indexing of Saint Paul newspapers, and, most important, the reciprocal loan program for customers of all member libraries in the metropolitan area.

And once again, in 1978, the Central Library was in the limelight—being the object of a major improvement plan. Capital improvement funds have been designated to produce an air quality control system that will ensure the comfort and safety of the library's customers, staff, and materials in a manner never dreamed of in 1917 when the building was first dedicated. Saint Paul's downtown area is going through a period of rebirth and the Saint Paul Public Library is right in the midst of it—next to the beautiful, modern addition to the Saint Paul Civic Center, across from the recently revamped Rice Park, and in the path of proposed city skywalks that will link the entire downtown community together in rain or sleet or hail. If Alma Schmidt were alive in the 1970s instead of 50 years previous she might well return *The Little Fugitive* to the stacks without crossing a single street or experiencing one gust of wind as she made her way through the skyways from the still nearby YWCA.

At the Helm

The history of the Saint Paul Public Library would be incomplete without a listing of the men and women who determined the course of events from the time before the fire to the era of air conditioning.

1877–1913

Mrs. Helen J. McCaine, head librarian from 1877 to 1913, began with the Ingersoll Library Collection of 1,500 and ended 36 years later with the 158,000 volumes of the Market Place Library. She had a nationwide reputation as a book selection expert, personally scrutinizing every volume that entered her collection. Her professional peers rated her a good librarian, an able executive, and a financial miracle worker. She bought books, paid salaries, and met all other library expenses with $10,000 per annum. Mrs. McCaine's customers remembered her best for her "gracious and winning" ways.

1914–1921

W. Dawson Johnson was a doctor of literature, an essayist, and a writer of books. Although an owner of a motor car, Dr. Johnson was noted for walking 17 miles a day to work up an appetite. While his neighbors and fellow librarians were abed he often rose to plant a beet or an onion or a radish. He had many interests but one dream. This dream was a sign on every lamppost, "Your book is at the library." As he himself said, "The book that's on the shelf might as well be no book."

He was one of the first library public relations men to distribute selected lists of books to his customers, no doubt a natural projection of his own skills as a bibliographer and scholar of note. He also sent library-related notices to trade periodicals: the electrician's *Buzzer* and the lumberjack's *Pine Cone*, as well as to churches and clubs. There were blotters bearing library facts. A florist sent out lists of library books on flowers to customers. Brochures advertising library service came to homes with meter men and telegraph couriers. Johnson was definitely ahead of his time.

1922–1931

Webster Wheelock's appointment to replace Dr. Johnson was protested in the City Council. It was felt that his career as a journalist for the *St. Paul Pioneer Press* and experience as an insurance man in no way prepared him for work in libraries.

However, Wheelock was to prove his detractors wrong, gaining a national reputation for his participation in American Library Association committees and his eventual presidency of the Minnesota State Library Association. One of Mr. Wheelock's outstanding accomplishments was the part he played in the settling of the Henry Hale Estate, which made possible the building of the branch libraries at Hamline and Merriam Park. Libraries were closed out of respect on the day of his funeral.

1931–1936

Jennie T. Jennings braved "tsks" upon her appointment by admitting in a local newspaper interview that she liked to read Westerns. "I suppose my liking to read Western stories will earn a black eye for me from other librarians. Of course, I do not believe that Wright and Gray have produced literature. Oh, my no!" As Mrs. Jennings explained, part of the reason she was "hooked" on this form of escape reading was the fact that she had spent several years at a gold mining camp with her late husband. "He liked Western stories, too. And I used to read them to him after his sight failed." But she also read "good books," considering Homer's *Iliad* as almost a family Bible. And she succinctly answered reporters' questions regarding her more serious reading. She found Drieser "ponderous," *Elmer Gantry* "unfair and untrue," and Hawthorne, Dickens, and Galsworthy "special favorites."

Not only Mrs. Jennings's knowledge of books was challenged during her administration. A greater test that she passed equally well was the library budget and how to balance it during a depression era. Against all odds this library director managed to maintain the essential features of library work despite necessary reductions in service. She also wrote many professional articles including a plea for "State Certification of Librarians"—still an unattained goal of many Minnesota librarians.

1937–1956

Perrie Jones received the unanimous approval of the City Council upon her appointment, having to her credit an impressive past performance as supervisor of institutional libraries for the State of Minnesota. Miss Jones was already noted for her work in organizing the hospital division of the Saint Paul Public Library some years previous.

Not content to improve the library during her life through the establishment of bookmobile service, the completion of the memorial rooms for young adults and children, the establishment of the Friends of the Library—she left a generous, foresighted endowment fund for the benefit of the Saint Paul Public Library staff: "My purpose in assigning first priority to scholarships and grants to members of the staff of the Saint Paul Public Library is to enable them to widen their horizons and to acquire experience in other public libraries as well as academic training to offset the ever present danger of becoming ingrown."

1956–1978

J. Archer Eggen has added two more decades of growth and innovation to the library's history. He introduced audio charging and reorganized the Central Library shortly after his appointment.

Subsequent years would be characterized by: new services such as Operation Outreach; new departments—the Video Communications Center; and new libraries —Lexington, the remodeled theater; Highland, an old library made new; and Sun Ray, a library named for its shopping center location. Mr. Eggen also must claim credit for the modern air quality control system currently being installed in the downtown Central Library. Only his approach to customer relations is old, the continuation of a tradition of Saint Paul Library service: "The library customer comes first."

The Saint Paul Public Library was recently described by a user as just the right size. "Big enough to have what you want and small enough to care about what you want"—a very apt tribute to over a century of library leadership.

Saint Paul Public Library System Statistics

Following are some data on the City of Saint Paul and its public library system, as of 1977.

Area served: 56 square miles
Population: 309,980
Bookstock: 746,371
Annual circulation: 1,996,297
Buildings:
  Central Library
  Ten branches
  (plus one bookmobile)
Administration:
  George A. Latimer, mayor of Saint Paul
  J. Archer Eggen, library director

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ELAINE WAGNER

SALT LAKE CITY PUBLIC LIBRARY

The Salt Lake City Public Library is a tax-supported public institution serving the area of Salt Lake City, Utah, with a population in 1970 of 175,885. General management, regulation, and control of the library is vested in a Board of Directors consisting of nine persons appointed by the mayor and the City Commission of Salt Lake City from the community-at-large. The current annual operating budget of $1,595,826 is derived from a 3.75 mill levy received from general property taxes, as well as monies collected from fines, gifts, and other endowments. Over 56,000 community members are currently registered as active library patrons.

The Salt Lake City library system consists of the Main Library, three branches, and two bookmobiles. Service is also provided to many local nursing homes and to home-bound patrons.

The initial attempt to establish a public reading room in Salt Lake was made in 1872 by a small group of women organized as the Ladies Library Association. They created a small library of 400 volumes, and until 1876 provided the community with its first introduction to library service.

After the reading room closed, the Masonic Order in Salt Lake established the Masonic Public Library in 1877, which consisted of close to 10,000 volumes. Lack of financial and community support compelled the private organization to discontinue service, but its members elected to donate their collection to the newly established Pioneer Library Association in 1891. This library consisted of 10,000 volumes which were made accessible to citizens who purchased shares in the organization. In 1892 the city government allocated $1,000 to the Pioneer Library Association for its services.

In 1896 Utah was admitted as the 45th state in the Union, and within the year a new state law provided for free public libraries. Subsequently, the Salt Lake City Public Library opened in the City and County Building, on February 14, 1898. The first governing board members were: Alfales Young, W. J. Bateman, Alfred Lambourne, John D. Spencer, Mrs. D. Vincent, Mrs. Isaac Jennings, Mrs. Stanley Clawson, Mrs. H. J. Hayward, and Mrs. Joseph M. Cohen.

The volumes maintained by the Pioneer Library Association formed the nucleus of the collection, and Ann E. Chapman, librarian for the Pioneer Library Association, was selected as the first librarian of the Salt Lake City Public Library.

As the city grew it became apparent that the facilities in the City and County Building were totally inadequate. In 1900 John Quackenbos Packard donated a building site valued at $20,000, and $75,000 for a free public library and reading room. The new library was opened in October of 1905 under the direction of Miss Joanna Sprague and her six assistants. Miss Sprague had replaced Miss Chapman as librarian after Miss Chapman's death in 1903.

The structure was designed by the New York firm of Heins and LaFarge and was a combination of Ionian and Doric styles. It contained 20,000 square feet of space and, at that time, housed approximately 20,000 volumes.

During Miss Sprague's tenure as librarian, the Salt Lake City Public Library expanded its services considerably. During 1906 three small branches were opened in the Bonneville, Emerson, and Franklin Schools. All were equipped with 50 books and were actually intended to act as small school libraries. In 1908 an Auxiliary Association for the Blind was established in the basement of the Main Library, under the direction of Mrs. Andrew Rowan.

It soon became apparent that the community was in need of additional branch stations. The Chapman Branch Library was established on the west side of the city in the Horsely Department Store in 1912. It housed a collection of 1,500 volumes and was named after the first librarian, Miss Ann E. Chapman.

At that time the library was operating on a budget of approximately $22,000 annually, or one-third of a mill levied on property taxes. After assurance that the mill levy would be raised to one-half mill, the Library Board began efforts in April of 1914 to establish a branch in the southeast Sugarhouse area of the city. In November the Sprague Library was opened in a rented facility, with 2,335 volumes.

By 1915 the *Annual Report* of the city library showed 25,445 library card holders accounting for a circulation of 313,796 volumes for the year. It became necessary to build a $25,000 addition to the Main Library building on State Street.

The Carnegie Foundation donated $25,000 in 1917 toward the construction of a permanent home for the Chapman Branch Library. In 1918 the first city-owned branch library building went into operation when the Chapman Branch moved to its new location. The new building was designed by J. D. C. Young to accommodate 11,000 volumes. Library service is still provided from this location.

In 1919 the city library opened two new deposit stations. One was located in a local drug store, and the other in the Warm Springs Depository. Service was also provided to four local hospitals.

The northwest-side Spencer Branch was opened in 1921, it was named in honor of Mr. John D. Spencer, who was an active library supporter and respected as one of the first Library Board members. Service from the Spencer Branch was discontinued in 1965, although the building is still owned by the city library and has been recently used by a variety of community organizations.

The City Commission approved an appropriation of $30,000 to cover construction costs for a new branch building to house the Sugarhouse Library collection in 1928. Designed by the Ashton and Evans architectural firm, the Sprague Branch still operates from this location.

In 1935 library services were extended to the prisoners in the County Jail. Fifty books per month were circulated.

In 1940 Joanna Sprague retired from her position as head librarian after 42 years of service. Julia Lynch became the third director of the Salt Lake City Public Library. Miss Lynch died in 1943, and her assistant, Miss Ethel Holmes, was appointed director.

The next 10 years of operation proved that the Main Library building was inadequate and overcrowded. During the 1940s and 1950s, city officials, prominent local leaders, national experts, and the Library Board joined efforts in a campaign to raise funds to build a new library facility. When first built, the Main Library held 20,000 volumes. In 1948 it was said to hold 234,344 volumes, and in 1960, an astounding 400,000 volumes.

The year 1952 brought the retirement of Ethel Holmes and the appointment of Margaret Block as director. Miss Block administered the library through 9 years of difficult transition as efforts to gain support for a new library were intensified.

The mayor of Salt Lake City during 1956, Mr. Adiel F. Stewart, started the library building fund. The Library Board soon after started formal proceedings to see the building fund project realized.

In 1960 the Library Board asked Miss Block to head the Reading Room for the Blind, and requested that Mr. L. H. Kirkpatrick from the University of Utah administer the Salt Lake City Library while a new librarian was actively sought.

Calling the library "antiquated and overcrowded," Mr. Robert Thomas (from the Hutchinson, Kansas, Library) took the reins as the first male director of the Salt Lake City Public Library in late 1960. The two bookmobiles which had been purchased in 1959 were put into action. Within the first few months the circulation figures for the bookmobiles were up to over 11,000 books per month.

During the same year, a strong plea from the citizens in the Rose Park area was heard for a full-service branch in that locale. The Friends of the Library, an auxiliary association organized to focus attention on library service, was founded in 1960, in time to lend additional support to the cause of a new library.

In 1961 a local bond election was held and the Salt Lake City citizenry overwhelmingly approved a city capital improvement program which included the construction of a new main library building as part of the Salt Lake City Civic Center. Groundbreaking ceremonies in December of 1962 heralded the construction of a five-floor structure costing $2.5 million. The building, designed by the Edwards and Daniels architectural firm, was planned with a capacity of 765,200 volumes and 117,000 square feet of space. In 1966 the design was praised by the American Institute of Architecture as a "distinguished accomplishment in library architecture."

On October 30, 1964, the efforts of the Library Board and the community were realized when formal dedication ceremonies opened the new Salt Lake City Library at Fifth South and Second East. Comparable efforts by the Rose Park community were also rewarded when the Rose Park Branch Library was completed in 1965.

A single-story structure, the building contains 6,652 square feet of space and houses a popular reading collection.

The vacated Main Library building was restored and utilized to house the Hansen Planetarium and Space Museum, an allied operation of the Salt Lake City Library system. At the present time, efforts are being made to arrange for a separation of finances and management between the library and the planetarium.

In 1969 Robert Thomas submitted his resignation after 9 years to accept a new post in New York. In September of 1969 the board asked Mr. Richard Rademacher, from Eau Claire, Wisconsin, to accept the vacated position.

Richard Rademacher identified a number of areas in which the Salt Lake City Library needed growth and development, and he spent his 7 years with the library actualizing those improvements.

In 1972 the library began organizing what was to become the Information Center. Intended as a community referral and resource outlet, the Information Center exemplified the contemporary trend toward a broadened definition of information services, combined with a more practical and responsible attitude toward community needs. Also in 1972, the library began servicing home-bound patrons and nursing homes when the BOND (Books on Delivery) project was initiated. A staff of volunteers actively continues the program, providing library materials to those who would be denied them without aid.

As one of nine metropolitan libraries involved, the Salt Lake City Library began to actively study and prepare to institute the Adult Independent Learners Program in 1973. The project was designed to utilize the library as a resource for adult continuing education. Since the actual start of the program in 1974, patrons have participated in projects ranging from foreign languages to calligraphy. Staff members act as consultants and tutors in the program, designing study guides, compiling bibliographies, and generally assisting the learners.

In 1974 the library was selected as a regional depository for the national Foundation Center Collection. The Foundation Center compiles and disseminates low-cost information regarding grant and foundation monies and how to apply for them.

During the early '70s, the advantages of new technology did not evade the city library, as a computerized circulation system was investigated. A contract was signed in 1974 for the installation of a LIBS 100 computer, and subsequently, all circulation procedures were transferred to the computer. A LIBS 100 has also been installed in the Salt Lake County Library system and the Marriott Library at the University of Utah, opening the path to future networking and cooperative possibilities throughout the Salt Lake valley.

In 1976 Richard Rademacher accepted a position in Wichita, Kansas, and the Library Board appointed Mr. J. Dennis Day from Troy, Ohio, as director of the Salt Lake City Library.

Since his arrival Mr. Day has acted to update and clarify vital areas in library service and management. Staff committees were formed to review and revise the materials selection policy, the personnel code, policies and procedures, and the library's long-range goals. A project was initiated to plan and design a continuing system of informational and direction graphics. And a new employee orientation program was developed and instituted, which will be supported by a new committee formed to study staff development.

As a direct result of the library's involvement in the Adult Independent Learners Program, the Salt Lake City Library joined with nine other libraries in the nation to form the Consortium for Public Library Innovation. The alliance was formed to facilitate the improvement of library service through research and experimentation.

New directions currently pursued include a revision of the present employee performance appraisal system; a professional job and salary review; an effort to study the availability of, and feasibility of obtaining, outside funding from foundations and grants for library projects and collection development; and a thorough study to produce a master plan for future branch development in the Salt Lake City area. The library is also currently in the process of transferring a portion of its cataloging requirements to the OCLC system with the intention of substantially improving on the time taken to provide new books to the patrons.

The years ahead are destined to be full of the continued change and growth which have marked the library's rapid development. Modern technology will continue to pose new challenges, and may alter the character of the delivery of library services. But the overriding priority of true public service in the Salt Lake City Public Library will continue to propel us into a promising future.

Currently, the Main Library collection is divided into nine different subject areas. They are: General Collections, Business, Science and Technology, the Information Center, Periodicals, Fiction and Literature, Children's and Young Adult's, Fine Arts, and Special Collections. Supportive areas include: Circulation, Technical Processes, the Business Office, Public Relations and Printing, and all Extension Services.

The staff consists of 16 professionals, 36 paraprofessionals, and 74 additional employees, for a total of 126 staff members in the Salt Lake City Library system.

Over 100 years ago, a small group of Utah women belonging to the Ladies Library Association struggled to create the first public reading room in the Utah territory. Their efforts foreshadowed a long and tireless effort to establish a community-supported public library. From limited beginnings, the dreams and ideals of the reading room matured to eventually materialize into a major metropolitan public library system belonging to the citizens of Salt Lake City, Utah.

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NANCY TESSMAN

SAMPLING

See *Statistical Methods and Analysis*

THE SAN DIEGO HISTORICAL SOCIETY

San Diegans organized their first Historical Society on January 24, 1880, describing it as an organization "for the diffusion of a general knowledge of natural and civil history." The members demonstrated their broad interests as they set about collecting artifacts for their "cabinet of curiosities," including such diverse objects as ore samples, the skin of a jelly fish, and a bit of "Pele's hair" thrown up from Hawaii's Mauna Loa volcano. They debated topics such as: "Resolved: That the Indians have a right to the soil of America" and "Resolved: That the Temperance Societies do more injury than good." They sponsored lectures on hawks and owls, ferns and "forest trees," as well as on historical subjects.

The Historical Society continued in this vein for slightly less than a decade and then lapsed into inactivity. The community's interest in things historical found an outlet through such organizations as the Native Sons and the Native Daughters of the Golden West, both of which were first organized in San Diego in 1887; and later, in the Pioneer Society of San Diego, incorporated in 1911. The Pioneer Society began collecting documents and records as well as a few artifacts, which ultimately were to become the nucleus for the present museum and library collections of the Historical Society.

In 1928 San Diegans took a renewed interest in a historical society. On December 14, with George White Marston as founder and first president, the San Diego Historical Society was incorporated as a nonprofit cultural and educational organization. The stated objectives and purposes were "for the discovery, collection and preservation of books, pamphlets, maps, genealogies, portraits, paintings, relics, manuscripts, letters, journals, surveys, field books and any and all other books, articles or materials which may establish or illustrate the history of Western America, particularly the County of San Diego and the State of California, and the publication and dissemination of such historical matter as this corporation may authorize."

The formal organization of the Historical Society was prompted by a growing concern for the preservation of various landmarks and other historical materials that were being obliterated or obscured by urban growth and population increase. This was true especially of Presidio Hill, where the Franciscan Padre Junipero Serra and Captain-Governor Gaspar de Portola had established the first mission and presidio in Alta California. Many felt that the site was as important as Plymouth Rock. A member of the Board of Directors of the Historical Society wrote in 1929 that: "San Diego has had such an influx of residents in recent years that they hardly had the opportunity of acquainting themselves with the traditions, origin and history of San Diego. . . . And it was primarily for the purpose of disseminating this knowledge that the San Diego Historical Association was formed, and the prelude on the [Presidio] Hill undertaken." "San Diego has a double claim to fame," he wrote. "It was alike, the first point of discovery on the Pacific Coast of what is now the United States [Cabrillo in 1542], and the first place of settlement as well [Serra and Portola in 1769]."

Motivated by his desire to preserve and protect this historic site, George White Marston, a San Diego businessman and philanthropist, began acquiring land on Presidio Hill in 1907. By 1928 he had about 20 acres. He hired John Nolen, a noted city planner and landscape architect from Cambridge, Massachusetts, and developed the land as a park. He then constructed an imposing building designed by architect William Templeton Johnson in the Spanish colonial style; and the park and building were dedicated on July 16, 1929, to commemorate the accomplishments of Padre Serra and the early Spanish explorers.

Marston presented the Serra Museum building and the park land to the City of San Diego as a gift with the understanding that it would be the home of the newly formed Historical Society. As the crowning feature of the landscape—with a commanding view of the city, the bay, the ocean, and the mountains—Serra Museum in Presidio Park stands as a monument to the heritage of San Diego. Today, Presidio Hill (a designated National Historic Landmark) and Serra Museum symbolize the endeavors of the Historical Society to protect, preserve, and interpret San Diego's history. Below the museum on the grassy slopes in Presidio Park (now encompassing 40 acres, with several historical monuments and markers) are rolling mounds where Historical Society archaeologists are unearthing evidence of the beginning of Western civilization on the Pacific Coast of the United States. The artifacts recovered and displayed in the museum offer an opportunity to gain new insights into San Diego's first century.

When the Historical Society established itself in Serra Museum in 1929, Marston purchased 15th-, 16th-, and 17th-century artifacts, furnishings, and works of art in Spain and brought them to the museum for exhibit on the theory that they were representative of the period of the Spanish explorers and missionaries. The museum also became the depository for the Historical Society Library and Manuscripts Collections, which had acquired the records and documents collected by the defunct Pioneer Society of San Diego.

The City of San Diego accepted Marston's gift of the park and museum reluctantly, and refused to allocate funds for maintenance or improvements. While the city did agree to provide water, Marston continued to pay the expenses of maintaining the park and the costs of any additional plantings or other improvements for nearly a decade.

Early in 1930 Marston hired the Historical Society's first curator, John Davidson. Davidson and his wife Winifred, along with the second president of the Historical Society, State Senator Leroy A. Wright (who served in that elected office for 13 years), dedicated themselves to building the library and manuscripts collections. For 24 years Davidson worked diligently, but with limited funds, to enhance the collections. When he retired as executive director in 1954, Gerald F. MacMullen was appointed and served for a decade, steadily building the museum collections and adding to the library. During the next 5 years, the Historical Society had two different executive directors and an interim director. In 1969, on the 200th anniversary of the founding of San Diego, the Historical Society had six employees, an annual budget of $60,000, and 800 members; and in that year the society appointed James E. Moss as executive director.

For 40 years Serra Museum served as the major facility for the Historical Society's projects. In 1969 the society began an expansion program by acquiring and restoring the Villa Montezuma, because of its historical and architectural significance, and because it could serve as a combined historic house museum and cultural center. Built in 1887 by Jesse Shepard at 1925 K Street in San Diego's Golden Hill area, the Villa Montezuma is the city's most fascinating historical landmark of the Victorian period. A magnificent example of eclectic Victorian architecture with a Queen Anne flavor, designed by architects Comstock and Trotsche, it is a monument reflecting the architecture, life, and times of the city's most gaudy and exciting boom period.

The Historical Society raised the funds to purchase the property, restore it, and have it surveyed and recorded by the Historic American Buildings Survey. The villa was placed on the National Register of Historic Places, and it was then deeded to the City of San Diego. In November 1972 the Historical Society opened it as a public museum interpreting the Victorian period, but also with a broad range of educational and cultural activities. The programs and exhibits are oriented toward expanding audiences among nontraditional museum patrons, with special emphasis on ethnic culture and traditions.

In 1973 the Historical Society obtained the use of a municipally owned building in Balboa Park for a permanent artifact and archival storage facility, which also permitted expansion of the accessions and catalog departments.

In 1976 provisions were made for another major expansion when Miss Mary G. Marston, daughter of George Marston, gave her house and gardens to the city and asked that they be designated for use by the Historical Society. George Marston built the house in 1904 on 4½ acres contiguous to Balboa Park. Architect Irving Gill—whose simple but bold techniques gained him a national reputation as an innovator in the emerging American style of architecture—designed the building, which has been placed on the National Register of Historic Places.

With the enthusiastic encouragement of Miss Marston, the historic structure is being developed by the Historical Society as an Urban History Center with interpretive exhibits and programs focusing on the early 20th century in San Diego. When fully developed it also will house the extensive library, manuscripts, and photographic collections; provide quarters for the Publications and Administrative Offices; and serve as a location for other historical, educational, and cultural activities.

With these four structures the Historical Society provides a full range of historical activities. It maintains major library, manuscripts, and iconographic collections; engages in the preservation of significant historic structures; conducts a traditional museum program with exhibits and attendant lectures, tours, and educational activities; sponsors an archaeological excavation; and carries on a substantial publication program.

The publication program includes an illustrated quarterly magazine, *The Journal of San Diego History,* first issued in January 1955; a monthly newspaper, *San Diego History News,* issued initially as a newsletter in 1963; and, beginning in 1976, a number of books on California and San Diego subjects.

The Historical Society's collection of documents and artifacts has reached major proportions and contains a remarkable and continually increasing amount of materials dating from 1542 to the present, including approximately 3,000 cataloged artifacts reflecting the history of San Diego and over 15,000 books, reports, unpublished manuscripts, theses, and dissertations concerning all facets of San Diego's development. Bibliographic files on thousands of San Diegans, including early pioneers; microfilm of San Diego newspapers; photostatic copies and microfilm of Spanish documents located in Mexico City's Archivo General pertaining to Southern California between 1769 and 1840; indexed typescript and tape-recorded interviews with historical figures; and numerous official city and other iconographic items give the library and manuscripts collection the distinction of being the nation's largest single collection of San Diego materials.

The library covers a wide range of source material. Strong in 20th-century materials as well as documents of the earliest periods, and with a rapidly increasing number of records relating to San Diego's urban history, the collections are balanced, covering all periods. There are a number of published and unpublished accounts of the ranchos established in San Diego County. Among these is the collection assembled by Captain William Murray Kerr, U.S.N. Ret., and the account book and ledger of the W. W. Fish Baja California Ranch, 1842–1861 and 1880–1883. In addition there is a splendid collection on the American period in the oral history section, with over 470 typescripts from tape-recorded interviews with early settlers.

One of the strongest sections of the library is that dealing with people. In addition to the material contained in diaries and the typescripts and tape-recordings, the library has a complete file of San Diego business directories, county histories, and census records for 1850, 1860, and 1870 for San Diego County. This collection is augmented by biographies of individuals in 374 notebooks which contain primary material on thousands of San Diegans. There are also larger accumulations of the records and letters of persons active in the life of San Diego.

Cultural and social organization materials include fraternal and patriotic societies, lodges, literary and musical clubs, and churches. There is a large mass of material on civic improvements, which covers parks, harbor developments, city planning and public housing, health (hospitals and doctors), and the 1915 and 1935 Expositions. The society has recently embarked on a program for the preservation of historic houses, and the library contains data on individual houses plus information on streets and a complete section on place names in San Diego County.

There is much material on the natural resources of San Diego County, covering mineral, timber, and land resources. This is supplemented by files on the flora, horticulture, and agriculture of the region. Because San Diego County is semidesert, water is a resource of primary importance. The holdings of the library range from the U.S. Geological Survey Water-Supply Papers and overall studies of the Colorado River to local reports and the early water projects of Colonel E. Fletcher and reports and studies of the irrigation districts formed in the county.

The Historical Society conducts an active campaign to acquire business and industry records: files and publications on banks, utility companies, land developments, the fishing and canning industry, manufacturing, shipping and transportation companies, and wholesale and retail stores. In the last few years a program has been inaugurated to increase the holdings of architectural drawings. Today the library has over 450 drawings of schools, churches, residences, and public buildings throughout the San Diego area. The library is also the depository for official city and county records, with present holdings exceeding 2,000 linear feet. Covering the period 1873 to 1950, these records include minutes from the Board of Supervisors, Board of Aldermen, and Common Council; correspondence from the County Sheriff's Office; and proceedings from the superior, municipal, and probate courts.

In the endeavors to collect documents and record history through an oral interview program, the need to accumulate a variety of materials reflecting the contributions and attainments of all people has been accentuated. The Historical Society makes special efforts not only to collect materials on various ethnic groups in San Diego County, but also to stimulate research and writing in these areas through an Annual Institute of History. The institute awards monetary prizes and arranges publication of winning papers in the *Journal of San Diego History.*

Supplemented by a carefully selected assortment of reference books and periodicals, the library and manuscripts collections have grown in comprehensiveness and stature. They now constitute a major resource on the history of the San Diego region, as well as that of Southern California, Baja California, and the Southwestern United States, when events or individuals that have a bearing on the history of San Diego are involved.

As America celebrated its bicentennial the San Diego Historical Society took its place as one of the nation's most energetic and successful historical societies of its kind. With an annual operating budget of $365,000, a staff of 26, and a membership approaching 3,000 in number, the Historical Society has developed a broad-based program for achieving the goals outlined in its Articles of Incorporation. It has enriched the lives of San Diegans of all ages, and as a cultural institution it has attracted hundreds of thousands of visitors each year.

The Historical Society operates its historical properties by formalized agreement with the City of San Diego, and it is supported by membership dues, private contributions, and grants from the City and County of San Diego. The Historical Society is a nonprofit educational and cultural institution, exempt from taxation under Section 501(c)(3) of the Internal Revenue Code. It is governed by a 25-member board of directors. An executive director and staff are responsible for the society's operations.

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JAMES E. MOSS

SAN DIEGO PUBLIC LIBRARY

The San Diego Public Library is a department of the City of San Diego, California, and falls under the general direction of the city manager, who in turn appoints a city librarian.

San Diego is a chartered city, the second largest in the state of California in both land area and population. The public library system consists of a Central Library, a Governmental Reference Library (located in the County Administration Building in San Diego, jointly supported by the city and the county and operated by the city), 28 community branch libraries, and a bookmobile. Organizationally, the library has a city librarian, appointed by the city manager, with an office among the other city department heads at the city's Administration Building. Day-to-day operation is the responsibility of the assistant city librarian, whose office is at the Central Library located downtown, less than a mile from the City Administration Building. The assistant city librarian is also in charge of the Administration Division. Three principal librarians supervise, respectively, the Central Library Division (public services at Central Library and Governmental Reference Library), the Extension Division (branches and bookmobile and shut-in services), and Technical Services Division (order, catalog, and circulation control and Central Library library aide or page pool).

A Board of Library Commissioners consisting of seven San Diego citizens serves as an advisory body to the city manager and through him to the mayor and City Council. The mayor and the council, respectively, appoint and confirm the commissioners to 2-year terms, with a limit of four terms each.

San Diego County, outside of the City of San Diego, has six separate public libraries in incorporated cities, with the remainder of the other incorporated cities and the unincorporated area served by the San Diego County Library. Together, these libraries, the four municipal libraries of the adjoining Imperial County, the Imperial County Library, and San Diego Public Library make up the state-sponsored Serra Cooperative Library System, named for the pioneer Spanish missionary Junipero Serra, who first established missions to the Indians and mission libraries in California. There is also a San Diego Greater Metropolitan Area Library Council which actively encourages cooperative efforts among all types of libraries in both counties; San Diego Public Library is also a member of this group.

The idea of a public library in San Diego started when Alonzo Horton, the developer of modern San Diego, established his own Horton Library Association in 1870 to encourage sale of his developed land. He sold off the 1,000 volumes soon after the settlers balked at purchasing the books from him. San Diego's City Council authorized formation of a public library on April 28, 1880. It took 2 years for final action to occur, and on July 15, 1882, the city's public library opened in rent-free rooms on the second floor of the Commercial Bank at Fifth and G Streets. Augustus Wooster became the first city librarian, serving from 1884 to 1887; he was followed by Miss Lulu Younkin (1887–1895) and Miss Mary Walker (1895–1903).

Lydia Horton, third wife of developer Alonzo Horton, led a campaign in the late 1890s for a permanent library building. Andrew Carnegie, in response to an inquiry from Mrs. Horton (who was by then secretary of the Library Board), pledged building funds in 1899 if the city would provide the land. The new library was opened in 1902. This was the first Carnegie gift for a public library west of the Mississippi River. In the next year Mrs. Hannah P. Davison became city librarian. By the end of her tenure in 1916, San Diego had grown considerably: from 17,700 residents in 1900 to 39,578 in 1910 and to an eventual 74,683 in 1920.

Under Miss Althea Warren, the first graduate librarian in the system and city librarian 1916 to 1926, the library weathered the sudden expansion of the city brought about by World War I, and it also opened a number of branches. Annexes were needed to relieve overcrowding of the Central Library. Miss Warren went on to the Los Angeles Public Library and later became its city librarian and president of the American Library Association. She was succeeded by Miss Cornelia Plaister. Miss Plaister carried on a program from 1926 to 1946 to replace temporary branches with permanent buildings, and new branch locations were added. Continued drives to replace or enlarge the Carnegie Central Library building failed, but not through the fault of the librarian and those who aided her in broadcasting the need for a larger building.

The post-World War II years seemed more kind to building attempts in San Diego, as they were elsewhere in the country. Miss Clara E. Breed, who became city librarian in 1946 after Miss Plaister passed away, set immediate new goals for a larger Central Library and an expanded branch system. Her tenacity and clear objectives—at a time when the city had a population of 334,387 and was destined to reach 711,600 by 1970—were precise and logical. Two successful city bond issues resulted in 1949 and 1966 and these, aided by some occasional federal funds and a private bequest, brought about a new 144,000-square-foot Central Library and 17 new branch buildings between 1950 and 1970. Miss Breed retired in 1970. In recent years the library has added five new branches, four of them containing 8,000 square feet of space and one with 10,000 square feet, in contrast to previous 4,000- to 5,000-foot agencies.

Readership has always been high in San Diego. A report by the American Library Association in 1922 showed San Diego to have the highest per capita library use of any city in the nation. Recent comparative statistics show that San Diego has the second highest per capita use among the six largest cities of California.

Book circulation is well over 4¼ million, but staffing is low; and this places on San Diego the dubious honor of having one of the highest work loads per staff member among large cities of the state of California.

San Diego has one of the most complete and intact reference collections of United States government documents and an enviable library of State of California publications. Both collections are carefully cataloged. The general book collection has emphasized purchase of both popular and scholarly works so as to reflect the requirements of a heterogeneous metropolitan area. On the third floor of the Central Library is the Julius Wangenheim Collection, a gift of Mr. Wangenheim's family to commemorate the late civic leader's love of books and his interest in the history of the book and in fine printing. The family also furnished the room to look like a home library. It contains writing and printing from early clay tablets through medieval manuscript books and incunabula on to fine printings of today. Another bequest, of about a half million dollars, was made by Edwin A. Benjamin, and this specified "improvement of library service." Part of it was used to assist in construction of a community branch named after him.

One of the several guides and indexes which the staff produced over the years to assist in readers service was an index to the official daily newspaper, the San Diego *Union*. Beginning in 1930 with Works Progress Administration assistance, each daily issue was indexed, along with an annotation of the contents of each article. Subjects covered were San Diego, nearby Imperial Valley, and Baja California, which adjoins San Diego in the Republic of Mexico. The index is kept current. In the meantime, a generous gift by James S. Copley (chairman of the board of the publishing company for the Copley Newspapers, which include the San Diego *Union*) enabled additional staff to index the paper and its predecessors from their early beginnings in 1851 to 1860 and from 1868 to 1903. It is hoped that some means can be made to index the missing years from 1903 through 1929. Some spot indexing has been done for those years. In recent years the library has acquired other collections such as the Mengar collection of early dime novels, the William Templeton Johnson collection of books on architecture, the Donal Hord collection of books on sculpture, the Goe collection on chess, the Ruth Ragan collection on Shakespeare, and others.

At this time the City of San Diego is studying the possibility of expanding or replacing the 144,000-square-foot library opened downtown in 1954. A master plan, prepared by the library at the direction of the City Council, calls for a building of 350,000 square feet, which is projected to last through the year 2000. Another plan, with several alternatives, has also been prepared for expanding the community libraries. It includes the replacement and consolidation of some with larger facilities to accommodate the inner, well-developed parts of the city as well as the growing outer tiers.

MARCO THORNE

THE SAN FRANCISCO PUBLIC LIBRARY: A HISTORY

"One educated man is worth a whole committee of safety. . . . I am a working man but will give my five dollars toward our free library." Dennis Kearney, drayman and fiery leader of the Workingman's Party, wholeheartedly supported the establishment of a free public library in San Francisco. Since almost every literary, art, and historical society in the city had its own collection of special works, it was time that a library which served the needs of all San Franciscans be created. Kearney was only one of the prominent citizens who voiced approval before the assembled group in Dashaway Hall on the evening of August 3, 1877. Enthused San Franciscans filled the seats in the Post Street hall to hear their State Senator George H. Rogers propose the creation of the city's first public library.

Suggestions and donations came from the anxious crowd. Marcus D. Boruck, publisher of the weekly *California Spirit of the Times*, donated 50 books to the new library, and he was immediately outdone by Dr. George Hewston's generous gift of 100 volumes from his personal collection. Judge J. W. Dwinelle asked that the reading room be well lit and pleasant, and that pictures and statues be placed throughout the library as they too served as educators. Boruck again took the floor and insisted that the library be opened on Sundays, the same as churches. Pleased with the response, Senator Rogers drew up the resolution for presentation to the state legislature, which provided for a library through annual taxation.

With the passage of Rogers's bill the following spring, 11 men were appointed to govern the new library. Henry George, future author of *Progress and Poverty*, Andrew S. Hallidie, inventor of the cable car, and Senator Rogers were among the members selected. The trustees elected Henry George secretary, and chose Albert Hart, former assistant to the Sacramento state librarian, as chief of San Francisco's first public library. A small operating budget of $24,000 was secured from the city's Board of Supervisors by a writ of mandamus granted by Judge Dwinelle, and 6,000 books were purchased. Pacific Hall, located in the center of the city on Bush Street between Kearny and Dupont Streets, was rented to house the library.

Within 3 weeks of the opening on June 7, 1879, approximately 18,000 San Franciscans had visited the library and 17,000 volumes were perused. The library began as a reading room and none of the books circulated for home use, but patrons would often patiently stand in a line that extended down Bush Street and around the Kearny Street corner. The library was indeed a success, and San Franciscans clamored for more books. But the job of cataloging the collection exhausted Librarian Hart, who resigned in November 1879, and his successor, C. H. Robinson, also overworked, quit on June 1, 1880.

The library was booming, and even the Mechanics Library considered relinquishing its collection to the city for the new public library. In the budget for 1880–1881, the Board of Supervisors doubled the library's meager allocation to $48,000. There were 10,500 cardholders by 1880, with a noticeable increase in the number of female patrons using the library. The taxing job of cataloging 30,000 volumes was completed, and a check service was started to clear the approximately 4,500 books borrowed daily. The year was highlighted by two donations of $1,000 each. Adolph Sutro specified that his gift be invested in works on mining, metallurgy, geology, mineralogy, assaying, and chemistry. John P. Dunn's gift bought books on social reform, political science, and mechanics and arts trades.

Efficient service and space were the two concerns of Librarian Fred Perkins. In his 1882 report to the Board of Trustees, Perkins urged that slippers be issued to the pages because they made too much noise clattering up and down the stairs to find and stack books, and that larger accommodations be found for the growing collection. The lack of space, compounded by Perkins's fear of fire, made him persistent. Next door to Pacific Hall was the California Theater, and it was an unwritten tradition that theaters in San Francisco burn down every 7 years. The California Theater still had a few years to go, but Perkins was not about to tempt fate.

His successor, John Vance Cheney, a poet originally from Boston, finally moved the library to the Larkin Street wing of City Hall in 1888, where it remained for nearly 7 years before relocating to the more spacious and elegant McAllister Street wing. The last move caused a 20% drop among the women patrons, who were forced to climb the stairs until 1897 when an elevator was installed in the wing. Despite the absence of an elevator, the move from Pacific Hall to City Hall marked a period of expansion and extension of the library services. Beginning in 1888 the trustees experimented with branch libraries in the heavily populated neighborhoods in North Beach, South of the Slot, and Potrero Hill. In 1895, after the appointment of George T. Clark as city librarian, the Periodical Room was added in the Main Library, the new Harrison Branch was opened on Harrison Street, and the North Beach Branch moved from Stockton to Powell Street. In October the Main Library acquired a Juvenile Department in the North Gallery, with a 3,000-volume collection. Two years later, in 1897, the public gained entry to the stacks, and the new Fillmore Branch opened on California Street in 1898.

The turn of the century brought more expansion and sizable public donations. Senator James Phelan donated a building for the Harrison Branch in the vicinity of South Park in 1901, and the Carnegie Foundation offered $750,000 to the city for the construction of a central library building and branches. The following year Andrew J. McCreery gave $45,000 for a new building for the Noe Valley Branch, and in 1903 Mme. Emilia Tojetti encouraged the establishment of a music library in the Main Library. Seven deposit stations were set up between 1902 and 1905 to supplement the branch libraries, in Ocean View, Potrero, Noe Valley, Sunset, South San Francisco, Oceanside, and in the Rialto Building on Mission and New Montgomery Streets. The voters approved a bond issue of $1,647,000 in 1903 for the purchase and erection of a new library, and the Board of Trustees then purchased the block from Van Ness Avenue to Franklin Street between Fell and Hayes Streets in 1905.

The library, as well as San Francisco, was enjoying a period of growth, but on Wednesday morning, April 18, 1906, an earthquake registering 8.25 violently shook the city and caused an inferno that consumed one-third of the city. The library in the poorly constructed City Hall was leveled by the earthquake. Entire collections of books, pamphlets, periodicals, and newspapers, plus the card catalog, the shelflist, and the complete records of the library were lost. The 2,000 books in the bindery burned, and only 1,500 of the 15,000 volumes signed out were returned by the borrowers. From the four remaining branches and the six deposit stations, only 25,000 volumes were saved. The Harrison and North Beach branches and two deposit stations were destroyed. The earthquake crippled the entire library system.

The task of gathering valuable materials and the reconstruction of the library took the greater part of a decade, a decade marked by a series of scandalous political deals. The city's Board of Supervisors passed an ordinance to build a temporary City Hall on the block purchased by the library Board of Trustees the year prior to the earthquake and fire. In an effort to keep the library out of City Hall politics, the Board of Trustees filed an injunction on September 17, 1906, which restrained construction on the library block. The injunction was upheld in court on October 9, 1906, and the Board of Supervisors was forced to locate elsewhere. Three months after this embroilment, the supervisors granted the trustees permission for the construction of a temporary library on the library site, which was completed in March 1908. The Board of Trustees met in the Fillmore Branch until the McCreery Branch on Sixteenth and Market Streets was restored as an interim main library.

Generous contributions and offers of assistance came from libraries throughout the country and from private individuals. The staff of the Cleveland Public Library sent money to aid needy staff members. The Schirmer Music Library in Boston, through the efforts of Julius R. Waybur, contributed sufficient materials to form the nucleus of the small music library started in 1903, and Mme. Tojetti donated her operatic collection of 700 vocal scores. The Board of Trustees, after pleading for additional funds, received an additional $25,000 allocation to catch up on its book collection.

George T. Clark resigned in 1907 to become librarian at Stanford University; he was replaced by William W. Watson, formerly assistant state librarian.

The North Beach Branch moved into leased quarters in 1908 and acquired a collection of books written in Italian, the first library to cater to the needs of a minority group. Two new deposit stations were established, one at Glen Park and another at Visitacion Valley. Mission Street Library was relocated at 1207 Valencia Street, and the Harrison Branch was moved in 1909 to Page Street and renamed the Park Branch. Three more deposit stations opened in 1910, on San Bruno Avenue, Union Street, and Mission Street. With so many branches and stations operating, an automobile service was inaugurated in 1912 to save wear and tear on the books, which had been hauled from branch to branch on the street cars. By the end of the decade, there were 50 employees throughout the system, including part-time workers and pages.

Due to ill health, Watson resigned in March 1912, and Robert Rea was appointed to succeed him as city librarian.

San Francisco desperately needed a new main library to house the collections temporarily sent to the McCreery and Park Branches for safekeeping. James Phelan, library trustee and former mayor, contacted the Carnegie Foundation to reactivate the offer made by Andrew Carnegie in 1901 to grant San Francisco $750,000 for the construction of a central library and branches. The Carnegie Foundation confirmed the offer on June 20, 1910, with the stipulations that San Francisco was to furnish sites for the libraries and that half of the $750,000 was to be applied to the construction of branch libraries. Another 2 years passed, and finally, on June 24, 1912, the Board of Supervisors accepted the Carnegie offer. Immediately, appropriations were made for the construction of new branches in the Richmond, Mission, Noe Valley, Golden Gate Valley, and Sunset districts. At a special municipal election held on June 30, 1913, San Franciscans approved the charter amendment which permitted the trustees to exchange their lot for a site in Civic Center and to erect a new library. Ground-breaking ceremonies were held in March 1915 at the site of the new main library.

San Francisco architect George W. Kelham, whose designs were selected after competing against five other architects, chose the Italian Renaissance style for the new library. The use of gray granite blocks, Roman arched windows framed by free-standing ionic columns, and classical statues lent balance and grace to the exterior of the building, which was 190 feet wide by 305 feet long. Kelham carefully kept the main cornice of the library the same height as Nourse Auditorium and City Hall, thereby harmonizing the whole of Civic Center. The addition of classical statues done by sculptor Leo Lentelli (which were purely ornamental and were to be replaced by more significant figures in the future), the list of the names of 84 eminent men of letters, and a series of famous quotations emphasized the scholarly atmosphere of the building. The library grounds were enhanced by the planting of sycamore trees around the building. The impressive, monumental features of the library were the message. It was to be a reliquary for books, a proof of civilization on the frontier, an elevator of public taste, and the transmitter of culture.

The interior of the building continued the Renaissance theme, creating a unified effect. A bust of Edward Robeson Taylor—physician, lawyer, former mayor, and valued trustee of the library—composed by sculptor Haig Patigian and donated by James Phelan, graced the entrance of the library. The inscriptions on the front of the building and throughout the library are believed to have been coined by Taylor especially for the library. The pockmarked travertine marble (mostly imported from Italy and the rest an imitation made in San Francisco), the vaulted ceiling of the vestibule, and the grand staircase leading to the delivery room complement the majesty of the library's exterior. The delivery room (now the general reference room), the heart of the library, was deliberately placed in the center with easy access to the card catalog and call desk for patrons to claim books obtained from the stacks. Paul E. Denivelle, famous for his architectural modeling of the 1915 Panama–Pacific International Exposition and his invention of imitation travertine marble, was responsible for the interior finishing of the library.

The colonnaded main corridor on the second floor is enhanced by 10 California landscape murals by landscape painter Gottardo Piazzoni, given to the library by the Association for Piazzoni Murals. Muted in tone, the five panels on the north wall represent "The Sea," while the five on the south wall represent "The Land."

Another set of outstanding murals are on the same floor as the Piazzoni murals. Painted by Frank Vincent DuMond, who designed them to decorate the Arch of the Setting Sun in the Court of the Universe at the Panama–Pacific Exposition, these murals are 47 feet long and 12 feet high and commemorate the pioneer spirit. "Leaving the East," the panel on the History Department wall, depicts the source of the western drive. From the snow-covered land of New England, a youth filled with adventure and instilled with Puritan traditions leaves his family. At the head of the procession are other youths carrying the necessities of life. The old Concord wagon is overburdened with goods; some, like the grandfather clock, are sentimental reminders of home. In the distance is the New England meeting house, the bulwark of American democracy. As the group moves away from this symbol, they take with them the preacher, the jurist, the schoolmistress, and the child, who is representative of family life. Some of the figures are portraits. The preacher is William Taylor, one of California's first street preachers. The pioneer is James Adams, better remembered as "Grizzly" Adams, and the judge is Stephen J. Field. The experienced plains driver and the fur trapper accompany the group, with the mythical Call of Fortune leading the way.

The second DuMond mural, "The Arrival in the West," is on the wall of the Literature Department. This panel, in contrast to the sobriety of the first, is full of the vibrancy of life. The immigrants have reached their destination and have entered the fertile, robust land of the West. The artist, writer, sculptor, architect, scholar, and the youth and family are greeted by Conquest, who sits enthroned amid the abundance of the land. Again, DuMond has given meaning to his mural through the portrayal of great Californians. The writer is Bret Harte, one-time editor of the *Overland Monthly*, and the artist is William Keith, noted for his watercolors of Yosemite and California landscapes. At the end of the procession the Spirit of Enlightenment accompanies Father Junipero Serra, who is carrying a replica of one of the missions he founded, and Captain Juan Bautista de Anza, the Spanish explorer who selected the site of Mission Dolores and the Presidio of San Francisco.

Every appointment on the second floor was selected and designed to maintain the continuity of the architectural style of the library. The bookcases, ornamental doorways, and most of the woodwork have been refinished in antique oak, and the plain, plaster wall surfaces and painted beam ceilings are in the style of the old Italian Renaissance rooms. In contrast to the richness of the second floor, the third floor continues the Italianate theme, but in a more functional and subdued manner. The Periodical Room, the Technical Book Room, and the Music Library were originally located on the third floor, together with the trustee's conference room and the office of the secretary.

The new San Francisco Library was dedicated on February 15, 1917, during afternoon ceremonies held in the main Reading Room. The speaker's program included Mayor James Rolph, architect George Kelham, Trustee R. B. Hale, President of the Board of Trustees Joseph O'Connor, and Edward Robeson Taylor, who read his ode. The ceremonies ended with the singing of "America" by the audience.

The building had taken 2 years to construct; and the cost, including the furniture and equipment, was $1,153,000, of which $778,000 was supplied by the City of San Francisco and $375,000 by the Carnegie Foundation. The library was closed for 2 weeks while the move was made, and at last the entire collection, including the material stored at the Park and McCreery branches, was under one roof and available to the public. For the first time since the foundation of the library, it was possible to shelve the whole collection at once. When the Main Library was opened, the stack floors were finished only up to the fourth level. The remaining stack floors and shelves were added later as the collection grew. Departments and other units within the Main Library were organized on the basis of function: Circulation, Reference, Order, Catalog, Bindery and Book Repair, and Branch Department. In addition, there were a Children's Room, Music Department, Periodical Room, and a large Reading Room. This arrangement survived more than four decades until the departments of the Main Library were reorganized by subject in the early 1960s.

In 1918 the library program was crippled by the catastrophic influenza epidemic, and the entire system was closed to the public for several weeks. When the doors were reopened, the wearing of face masks was required by the city's Board of Health for an additional week. This did not delay the growth of the library at all; two large branch buildings (Sunset and Golden Gate Valley) were constructed during this same year. Just 3 years later, in 1921, the last of the Carnegie money was used to complete the North Beach and Presidio Branches.

The period of the 1920s was characterized by further expansion of the neighborhood branch system (Excelsior and Ingleside, 1925; Ocean View, 1926; Glen Park and Bay View, 1927; and Portola, 1928). In 1929 the library opened a specialized branch in the Russ Building, devoted entirely to business literature and services. Special collections of note began to develop during these years. In 1926 a collection of rare and fine books was formed and given to the library in memory of Max John Kuhl, a local attorney and civic leader. This is a collection of fine printing of all periods; it includes a Dove's Press Bible, a Kelmscott Chaucer, and an Ashendene Spenser. The resources in the Main Library were substantially strengthened in 1927 with the installation of the Sutro Branch of the California State Library. Largely destroyed in 1906, this remnant of Adolph Sutro's famous collection of rare books and manuscripts had grown to about 70,000 items; many of these had come from the Royal State Library of Munich and from some of the renowned monastic libraries of Europe and Mexico.

In spite of the worldwide economic stresses of the '30s, the San Francisco Public Library continued to grow in several ways. The Depression and accompanying joblessness drove people to the library by the thousands. Never before had books circulated so heavily; circulation figures achieved in individual branch libraries have never been equaled in the four decades since. Construction and opening of new branches continued: Anza in 1932; Visitacion Valley in 1934; and Parkside, West Portal, and Bernal in 1936. The library's special holdings gained significantly when the library trustees voted to acquire strong collections of Jack London and Bret Harte manuscripts, books, and other printed materials. This was made possible by a bequest from James D. Phelan, reform mayor, governor, U.S. senator, financier, civic leader, and, for many years, a library trustee. The resulting California Authors collection was named in his memory.

The early years of the '40s found the library involved with the same kinds of shortages of resources and staff which beset all organizations during wartime. In June 1945, when the United Nations Conference on International Organization took place in San Francisco, the library became the center for the cooperative work carried on at the conference by the Library of Congress.

Several generous gifts served to enhance the future development of the library's collections and resources. The income from a large sum of money from the estate of Alfred Fuhrman would be used to acquire books and other materials in economics and related subjects. In April of 1947 Nat Schmulowitz, a prominent local attorney, civic leader, and scholar, presented to the library his collection of humorous works. His devoted interest in the library led him to contribute substantially to the development of the Schmulowitz Collection of Wit and Humor (SCOWAH), one of the best and most complete of its kind in the world.

Brought to a grinding halt by the war and the subsequent period of recovery, branch library development resumed once again in the '50s. Under the direction of Laurence J. Clarke (1945–1960), the era of postwar branch development began with construction of the attractive Parkside and Potrero Branches. During the next 18 years eight more buildings sprang up: in the Marina, Outer Sunset (Ortega), Merced, North Beach, Eureka Valley, Western Addition, Excelsior, and Bayview–Hunters Point (Waden).

Meanwhile, the Main Library was experiencing severe growing pains. The central building's holdings exceeded the 400,000-volume capacity originally projected. One early result was the removal in 1959 of the important Sutro Library from the Main Library; it could no longer be comfortably and effectively accommodated there. Relocated in the Gleeson Library building on the campus of the University of San Francisco, the Sutro Library now functions as an archive of rare books and manuscripts, and as a busy and basic repository of information for researchers in family history and genealogy.

In 1958 Emerson Greenaway, librarian of the Philadelphia Free Library and newly elected president of the American Library Association, was commissioned to undertake a survey of the San Francisco Public Library; he was to analyze the system and to make recommendations for improvement of administration and operations in the library. In his report he urged greater citizen support; consolidation of technical services; establishment of subject departments; appointment of new administrative officers (assistant city librarian, chief of the Main Library, and three coordinators of age group-oriented services); new lines of administrative control; consolidation of all nonprofessional administrative services; revitalization of collections; Sunday hours; and an expanded role for the library as a focal point for library services in Northern California.

The notable achievement of the 1960s was the complete reorganization of technical services under the direction of William R. Holman (1960–1967). These and a number of later changes had their basis in the 18 recommendations of the Greenaway report. Thus, from the established functional arrangement of more than 45 years, the new plan for the Main Library provided for a nucleus of four large subject-based departments: Art, Music, and Recreation; History and Social Science; Literature, Philosophy, and Religion; and Science, Technology, and Government Documents. The General Reference Department (including newspapers and periodicals), Circulation and Registration, Special Collections, Main Children's Room, and San Francisco Room completed the picture. A new Technical Services Division resulted from combining the former Catalog, Order, and Binding and Book Repair Departments. The opening of the Anna E. Waden Branch Library in the Bay View–Hunters Point area in 1969 signaled the completion of the library's postwar branch development era.

A feasibility study conducted by the consulting firm of Arthur D. Little, Inc., underscored once again the inadequacies and inefficiencies of the 53-year-old Main Library building. The report, made possible through a grant of $125,000 from the U.S. Housing and Urban Development Department, recommended that a new, larger main library be provided in San Francisco so that the bibliographical and informational needs of the city, the region, and the state might be better served. Also recommended was the establishment of three large regional branches to provide improved and expanded services to residents nearer to their homes. The efforts for a bond election to raise funds for an enlarged main library and the search for solutions to the library's space problems have continued into the mid-1970s.

Lack of space has not prevented the San Francisco Public Library from initiating innovative programs, generally with the assistance of federal Library Services and Construction Act funds. Among these are the Early Childhood Project, a program primarily directed at preschool children and their parents; the California Video Resource Project, which experimented with development of video applications in a library setting; and the Bay Area Reference Center (BARC). Established in 1967, BARC continues to function as a high-level reference center within the San Francisco Public Library, and it is one of two such centers in California.

San Francisco Public Library provides bibliographical, informational, and other library services to the 670,000 residents of the city. An additional daytime population of 502,000 individuals who commute to the city daily are potential and actual users of the library. Interlibrary loan service is available on request to individuals who reside outside of the immediate area. In addition, the Bay Area Reference Center uses the biliographical and informational resources of the library to respond to requests received from throughout northern California (population: 7,848,000) and frequently from out-of-state.

In common with other American public libraries, San Francisco's library has, since 1970, contended with many severe problems brought about by a series of anemic budgets: that is, reductions in number of staff; the inroads of inflation on diminishing book and periodical appropriations; minimal or nonexistent funds for purchase of new furniture and equipment, or replacement and repair of old, worn items; deferred maintenance of buildings; and the cumulation of backlogs in many areas of public and technical services. There are, however, definite and promising signs of improvement in evidence.

A vigorous and dedicated library commission, appointed in 1976 by a sympathetic mayor, has chosen an experienced library administrator, John C. Frantz, to develop plans and to provide the creative leadership to remedy these serious problems. Increasing support from powerful neighborhood and citizen groups, a hard-working Friends of the Library organization, an able and committed library staff, and a local Board of Supervisors which is beginning to respond favorably to the people's needs for improved library services—these are a few indicators of the potential upswing in the fortunes of the San Francisco Public Library, an institution striving continuously to find ways to provide more and better library services for everyone.

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SAUDI ARABIA, LIBRARIES IN

Introduction

Of the many oil-producing countries in the world, Saudi Arabia is perhaps featured most in the international press today. The press, which sees Saudi Arabia only as the land of the world's largest oil reserve, often misses the point insofar as it ignores or fails to highlight the country's widespread social, economic, and cultural development plans; its free education; its social and health security system; and its libraries.

Saudi Arabia, a country of Southwest Asia founded in the 20th century as a modern state by King Abdul Aziz ibn Saud, enjoys great importance because of the Holy Cities of Mecca and Medina. The kingdom is bounded by the Red Sea and the Gulf of Aqaba in the west; by Oman, Qatar, and the Arabian Gulf in the east; by Jordan, Iraq, and Kuwait in the north; and by Yemen in the south. The total area of the kingdom is 872,722 square miles. According to the latest primary census conducted by the government in 1975, the total population of Saudi Arabia is 7,012,642, comprising 5,128,655 settled and 1,883,987 nomadic people (*1*).

Public Libraries

HISTORY AND BACKGROUND

A historical investigation of the medieval libraries of Saudi Arabia indicates that most of the libraries evolved mainly in the two cities of Mecca and Medina. The Great Mosque of Mecca and the Prophet's Mosque in Medina were the sole cultural and educational centers, and they put heavy emphasis on theological education. The early existence of libraries in Mecca and Medina supports the conclusion that libraries from their beginning up to the 19th century were built either inside a mosque or as appendages to mosques. Those libraries built outside the mosque were mostly endowed for the benefit of students studying in the mosque.

The rich collections of the Great Mosque of Mecca and the Prophet's Mosque of Medina developed through various channels such as donations from scholars and distinguished pilgrims, endowments, and so on. The collections have been growing tremendously through the ages, for the following reasons:

First, Mecca and Medina are the holiest cities of Islam, where pilgrims from all over the world meet annually. Most scholarly pilgrims have given lectures and donated copies of their works to the mosques of these two cities.

Second, it became a matter of prestige for caliphs, sultans, kings, princes, wealthy people, and distinguished authors to donate their private libraries for the use of the students of the great mosques. The collections are usually kept inside the mosque. Burkhardt, describing cultural life in Medina, confirmed the fact that most of the libraries in Medina were endowed to the mosque. He wrote:

> I saw one library in the house of a Sheikh where at least three thousand manuscript volumes were heaped up; but I could not examine them. As it often happens in the east, these libraries are all "waqf" (endowments) that have been presented to some mosque by its founder, or entailed upon some private family, so that the books cannot be alienated (*2*).

Third, it became a matter of religious tradition for many early authors to donate the best copies of their own works to the great Mosques of Mecca and Medina.

Fourth, many Quranic [Koranic] manuscripts found today in the libraries of Mecca and Medina were scribed by distinguished hands. Caliphs, sultans, princes, and distinguished scribes wrote in their own hand copies of the Quran [Koran] to be sent to Mecca and Medina.

> The African Sultan Abul Hassan sent to the Mosque of Mecca a copy of the Quran which he had written himself, and which he had had most beautifully illuminated. The same Sultan made a second copy which he sent to the Mosque of Medina and was intending to make a third copy for Jerusalem, but he died before its execution (*3*).

Sultan Ibrahim, the son of Mahmud the Ghaznevite, wrote a splendid hand. Every year he made a copy of the Quran and sent it to Mecca. The libraries of Mecca and Medina are full of Quranic chapters written by Ottoman sultans such as Sultan Mahmud, son of Abdul Hamid; and Sultan Abd al-Majid, son of Mahmud

Khan. This tradition has added to the richness and the uniqueness of the collections, and it has been maintained through the years; hence, today one naturally looks to the endowed collections of the Mosques of Mecca and Medina for the greatest manuscript treasures.

COLLECTIONS OF THE GREAT MOSQUE OF MECCA AND THE PROPHET'S MOSQUE IN MEDINA

The evolution of the collections of the Great Mosque of Mecca and the Prophet's Mosque in Medina can be traced according to the factors discussed in the following sections.

Mecca

The first known collection in Mecca was that of Sheikh Muhammed ibn Futuh al-Miknasi. It was donated in the year 487 A.H. (1085 A.D.)* to the Malikite sects and located in the Malikite Place inside the Great Mosque (*4*).

In the year 554 A.H. (1159 A.D.) Nour al-Din ibn Salah ad-Din, king of Yemen, built an almshouse for the students near the mosque. The building was designed to include a reading room and a library. He donated from his own library a great number of books in every field of knowledge. This library developed gradually through donations made by local scholars. In 785 A.H. (1383 A.D.) Sheikh 'Abd Allah ibn Abi Bakr al-Kurdi donated his private library, and this was followed by Sheikh 'Ali ibn Muhammad ibn Sanad, who made a similar donation of thousands of books in 827 A.H. (1423 A.D.) (*4*).

In his history of Mecca, Qutb ad-Din al-Hanafi indicates that in the year 641 A.H. (1243 A.D.) a *madrasah* (school) with a large library attached to it was built in the corner of the Great Mosque of Mecca near Bab as-Salam (the Gate of Peace), by the servant of the Abbaside Caliph Mustansir, Prince Sharaf ad-Din Iqbal ibn 'Abd Allah al-Shurabi. Another great library was built in 882 A.H. (1477 A.D.) at the order and expense of the Mamluki Sultan Kait-Bay, who donated thousands of his own rich manuscripts, brought from Egypt, to this library. However, this library was subjected to the depredation of manuscript hunters at a later date and most of its treasures disappeared. A third library was built at the expense of the Ottoman Sultan Sulaiman in the year 973 A.H. (1565 A.D.), in the southern corner of the Great Mosque of Mecca. The library was attached to a school for the four orthodox sects of Islam. The collection of this library consisted of the donations made by Sultan Sulaiman and other local donors (*5*).

In the eighth century A.H. (the 14th century A.D.) Sultan Shah Shuja', king of Persia, built an almshouse near Bab al-Safa' (Gate of al-Safa') to be used by poor students. He donated part of his private collection in the year 827 A.H. (1423 A.D.) to be kept at this almshouse. The collections had some precious Persian manuscripts (*4*).

* A.H.: After Hijra, i.e., the year when the Prophet migrated from Mecca to Medina—the start of the Muslim calendar.

According to 'Abd al-Gabbar, a collection of 3,653 manuscripts was donated by the Ottoman Sultan 'Abd al-Majeed in the 13th century A.H. This was kept in the dome behind Be'r Zamzam (the Well of Zamzam), inside the Great Mosque. The whole collection was destroyed when a flood inundated the entire mosque in 1278 A.H. (1861 A.D.) (*6*).

Finally, a dome behind Bab Duraibah (the Gate of Duraibah) was chosen in the year 1299 A.H. (1881 A.D.) to be the central library of the Great Mosque of Mecca. The library consisted of a large, domed reading room and storage rooms. The remaining books of Sultan 'Abd al-Majeed and many collections previously scattered throughout the mosque were transferred to this site. The collections increased as many worthwhile collections were donated by interested princes, scholars, and wealthy people. The most important collections donated to this library were the following:

Sharif 'Abd al-Muttalib collection (prince of Mecca)
al-Shirwani collection
Itirgi collection
al-Hindi collection
Rushdi Basha's collection (governor of the Hijaz)
al-Dehlawi collection
al-Idrisi collection
al-Zamzami collection
al-Mu'alimi collection
Daghustani collection

However, the holdings have been combined, including all these collections of rich manuscripts in all branches of knowledge, and we now have what is known as the al-Haram Library, the Library of the Great Mosque of Mecca.

Medina

According to the early description of Medina left by the great Arab traveler ibn Jubair, in the fifth century A.H. there were two large libraries located in the two corners of the Prophet's Mosque. He left us a brief description of them indicating that most of the works were concentrated in Islamic theology (*7*).

In the year 587 A.H. (1191 A.D.) a private library belonging to a Persian king was donated to the Prophet's Mosque. It was situated in a private room inside the Mosque (*7*).

However, this entire collection was destroyed when a fire devastated the mosque in 886 A.H. (1481 A.D.), and thousands of other valuable manuscripts stored inside the mosque were also burned. Al-Samhudi, the historian of Medina, lost over 300 of his own manuscripts in this fire (*8*). Following this disaster, the Mumluki Sultan Kait-Bay ordered that the collections be rebuilt, and he sent a large number of Qurans and other books to replace the burned collection (*9*).

Al-Mahmudiyah Library was founded in the year 1272 A.H. (1855 A.D.) at the rear corner of the Prophet's Mosque behind Bab al-Siddiq (the Gate of Abu Bakr al-Siddiq), by the Ottoman Sultan Mahmud Shah. The contents of this library, mostly manuscripts, totaled some 3,000 volumes at the time of its establishment (*10*).

'Arif Hikmat Library was founded in 1270 A.H. (1853 A.D.) near the eastern corner of the Prophet's Mosque, by the Grand Mufti of Islam, Sheikh 'Arif Hikmat al-Husaini. The library was built in two sections. There was a large reading room (28 feet by 28 feet) surrounded by closed shelves and covered by a large dome. The building was made of stone and the surface of the dome was overlaid with lead. The second section consisted of two floors; one contained rooms for storage and offices, and the other was furnished as a residence for the librarian. The design of the reading room included the following important features: the Islamic architectural design, the artistic paintings and engravings made on the walls and the inner portion of the dome, and the highly decorated woodwork.

The origin of this library dates back to the 18th century, when Sheikh 'Arif Hikmat al-Husaini, a native of Istanbul, inherited a large number of manuscript books from his father. The collection grew tremendously, particularly when Sheikh 'Arif became the grand mufti of Islam in the Ottoman Empire. Being a scholar, he spent a great deal of his wealth in acquiring manuscripts dealing with every aspect of human knowledge. He selected and acquired the most valuable manuscripts in the Islamic world, most of which were written and illuminated by the most famous scribes. Many are most exquisitely done. A note written on the title page of one manuscript, signed by Sheikh 'Arif, indicates that he paid 400 Osmanli golden pounds to acquire it. After his retirement, Sheikh 'Arif Hikmat decided to spend the rest of his life in Medina. He built the library at his own expense and presented it as an endowment to the City of the Prophet. The document of endowment, kept at the Court of Medina, was considered to be one of the most important in the history of endowment at Medina (*11*). He also endowed the revenue from a large number of his properties in Medina and Istanbul, to be spent as a permanent income for the library (*12*).

During World War I, the Ottoman sultan ordered the Turkish governor of Medina to send the whole collection to Istanbul. The collection was indeed packed and shipped, but by the time it reached Damascus, the war had become intense and the collection was kept there for a period of time. Later, after the outbreak of the Arab revolution, the governor of Syria shipped it back to its original library in Medina (*13*).

According to Childs, this library was said to have contained at one time some 17,000 volumes consisting of works on religion, history, philosophy, mathematics, medicine, astronomy, and linguistics, most of which were in manuscript form (*14*). Some idea of the richness and value of its contents may be gained from the fact that some years ago Prince Shakib Arsalan offered about $40,000 for one manuscript from the collection (*15*).

Philby has given a cursory but most delightful account of the library and its scholary director:

> At the further end of this [close] stands the famous library of the Sheikh al-Islam 'Arif Hikmat, the repository of many hundreds of rare, unique and priceless manuscripts. The keeper of the library, whose chief feature is a most attractive

> circular reading room with the precious books laid (not stood) in piles on the surrounding shelves, is a charming old scholar known as Sheikh Ibrahim ibn Ahmed Hamdizada al-Kharbuti, of Anatolian origin, whose grandfather settled here in A.H. 1225 [A.D. 1839]. He showed me some of his treasures, and my only regret was that, on both occasions of my visiting Medina, lack of time and other claims on my attention prevented me from making as much use of the library as I should have liked (*16*).

He also mentioned a few of the gems of the 'Arif Hikmat Library, shown to him at random by Sheikh Kharbuti.

a. A perfect copy dated A.H. 395 [A.D. 1005] of a work entitled Kitab al Awa'il by Imam Hilal ibn Hassan al-'Askari. A copy of this manuscript was made in 1930 by Sheikh Ibrahim himself for the late Sanusi leader, Saiyid Ahmad, during the latter's sojourn at Medina as an exile from Libya. There are no other copies of this work in existence.
b. A copy dated A.H. 466 [A.D. 1073] of the Kitab al-Tashbihat by Abu Ishaq al-Baghdadi.
c. An undated copy of a geographical work called Dhikr al-Masafat wa Suwar al-Aqalim composed in A.H. 309 [A.D. 921] by Ahmad ibn Sahl al-Balkhi as the result of his far eastern travels.
d. An old but undated copy (believed to be of the fourth or fifth century of the Hijra) of Tabaqat al-Shu'ara by Muhammad ibn al-Salam al-Jumahi—apparently the only known copy of this work.
e. A single volume containing the whole of Bukhari's Sahih (traditions of the Prophet) in a beautiful hand dated A.H. 1167 [A.D. 1753].
f. A manuscript dated A.H. 1220 [A.D. 1805] of al-Ghazali's Ihya al-'Ulum by a scribe named Muhammad Mukhlis al-Dhihni (*16*).

In addition to the fact that they include many works of broad subject coverage, the manuscripts of 'Arif Hikmat Library can be considered as a unique, rare, and rich collection. Most of the items are representative of one or more of the following types of literature and unique features:

1. Rare works produced by distinguished authors and compilers
2. Works with special external features:
   a. Notes of ownership
   b. Seals of distinguished owners
   c. Autographs
   d. Endorsements
   e. Complete bibliographic features, e.g., author, scribe, illuminator, and colophons bearing the date, place, and name of the scribe
3. Original works of high intrinsic literary and historical value
4. Works of original artistic value, binding, calligraphy, illumination, illustrations, and other decorative features
5. Works of contemporaneous value, containing accurate and reliable texts

No major study has ever been made of the 'Arif Hikmat Library and its treasure of manuscripts. Orientalists such as Burkhardt (*2*), de Gaury (*17*), Hurgronje (*18*), and Philby (*16*), who visited and described the two holy cities of Mecca and

Medina, have never discussed the state of libraries in the two cities. American professional librarians who have been in Saudi Arabia during the 20th century, such as Beltran, Coleman, Evans, Hart, Kerker, Nickel, and Ogden (*19*), have never discussed or sketched the state of historical libraries in this area of the world.

A few descriptions—they are very brief—of the libraries of Medina have been given by Spies (*20*), Karad Ali (*21*), Abd al-Gabbar (*22*), Ali Hafiz (*23*), Shakeeb Arsalan (*24*), and Fu'ad Hamzah (*25*). During the late period of Ottoman rule in the Hijaz (the western region of Saudi Arabia, encompassing Mecca and Medina) the collections of rare books in these two cities started declining, and some valuable manuscripts disappeared and found their way to the West (*26*).

CURRENT DEVELOPMENTS IN THE PUBLIC LIBRARY SYSTEM

The second 5-year development plan for the Kingdom of Saudi Arabia, for the period 1975–1980, pays special attention to the national library system. Public libraries are being improved through a program of renovation and remodeling in keeping with modern trends in library science. Library activities have been expanded to include annual exhibitions of student art and book fairs displaying new publications in various fields. The plan also aims at expanding the national public library system and improving library facilities, as follows:

1. Complete prior authorized library construction (for which 23.6 percent of the original fund will remain) in 1395–96.
2. Establishing a biography center and opening 10 new general libraries: 2 per year beginning in 1395–96, to increase the number of public libraries from 22 to 32 by the end of the plan.
3. During the period 1396–97 to 1397–98, construction of one large, five medium, and ten small library buildings as replacements of existing facilities (*27*).

In recent years, the Saudi government has spent millions of Saudi riyals in building libraries of all kinds all over the country. For instance, the construction of the building for the King Abdul Aziz Islamic Library in Medina is said to have cost over 10 million Saudi riyals.

The Quranic Library established in 1972 inside the Prophet's Mosque, near Bab as-Salam (the Gate of Peace), is unique; it is the only one of this nature in the whole world. Its collection is comprised of Qurans which represent the following intrinsic features:

1. Qurans written by distinguished scribes: sultans, kings, princes, and famous scribes
2. Qurans representing special artistic values such as calligraphy, illumination, binding, kind of paper or vellum, and other decorative features
3. Qurans representing special external features such as notes of distinguished owners, seals of distinguished owners, autographs, or complete bibliographic features
4. Qurans of unusual sizes or materials
5. Qurans representing various periods (from the 2nd century A.H. up to the 14th century)

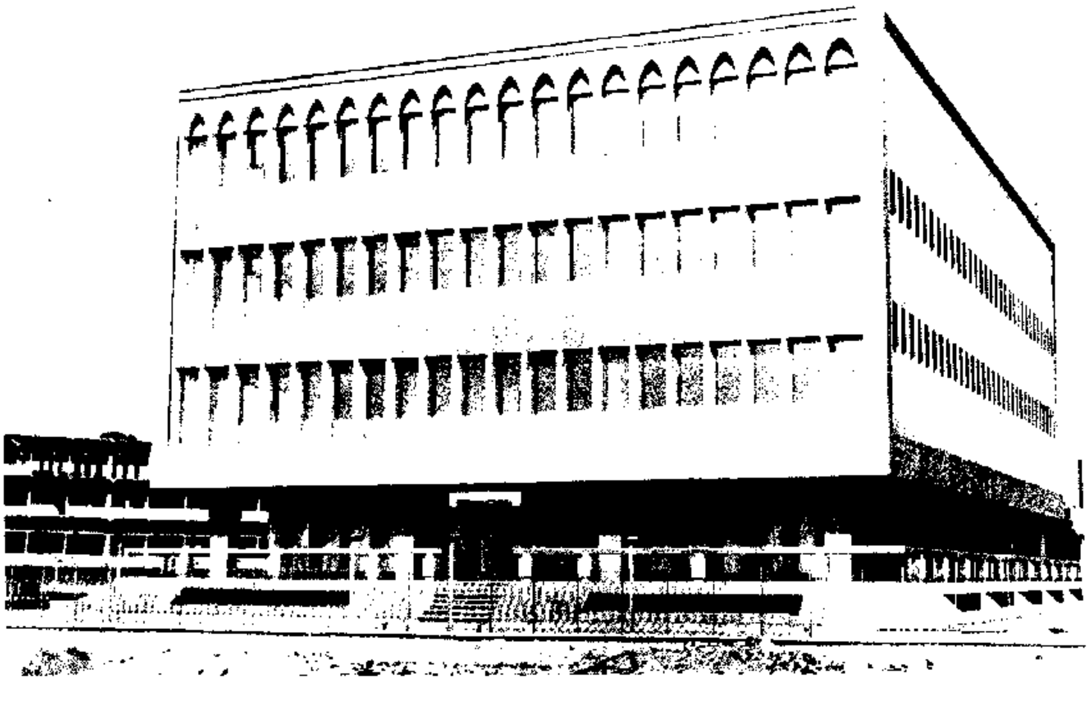

FIGURE 1. *The Public Library of Jeddah.*

Public libraries have been established in the large cities of Riyadh, Mecca, Medina, Jeddah (see Figure 1), Hafuf, Dammam, Taif, and Abha. The old historical libraries such as 'Arif Hikmat Library, al-Mahmudiyah Library, al-Haram Library of Mecca, and ibn Abbas Library of Taif have been renovated.

University Libraries

The development of universities in Saudi Arabia began in the 1950s. The first was Riyadh University, organized in 1957 in the capital city of Riyadh. Following this creation of a full-fledged university, King Abdul Aziz University was set up, first as a private university in the western region of Saudi Arabia, in 1965. It became a government university in 1971 when it had fulfilled the major requirements of any modern university. In 1961 the Islamic University was established in Medina, with emphasis on theological education. The University of Petroleum and Minerals was established in 1964 in the eastern region of Saudi Arabia—where all oil resources are located—with emphasis on engineering, science, and applied geology. In 1974 a new Islamic University was founded in Riyadh: Imam Mohammad ibn Saud University, which is concerned with religion, humanities, and social science. The last of this chain of new institutions was King Faisal University. It was founded in Dammam in 1975 and was initiated by the faculties of Islamic architecture, agriculture, and medical sciences.

This development in higher education indicates that there has been a very rapid expansion of universities; however, Western-style higher education only started in the 1950s. The new King Faisal University at Dammam is only the latest of a series of institutions which has taken the university population from under 7,000 in 1970 to nearly 25,000 in 1975. In order to maintain standards, government policy has been that no university should be allowed to grow to more than its planned capacity; when demand exceeds its capacity, a new university will be set up. It is intended that any new institution should be geared as closely as possible to the specific needs of its community.

The newly formed Ministry of Higher Education, which is responsible for university education within the kingdom, is putting great emphasis on several important aspects: construction of new, modern campuses, development of research facilities, establishment of graduate programs, and increased enrollment capacities.

The library systems of all Saudi universities are centralized. Each university has a central library and a number of smaller library units at several locations on the campus. The central library is responsible for almost all the activities of the system, controlling the acquisition and processing and the distribution of the staff. The dean of libraries is the top administrator, holding a senior position within the university administration. He holds, by law, membership in both the supreme and the university council. Regarding acquisition, approximately three-fourths of university library books are obtained from Europe and the United States, and over 80% of all orders are placed with foreign sources. The remaining 20% of orders are placed with Arabic and local book dealers and publishers, for the acquisition of materials in Arabic languages.

Library budgets are very large and there is every indication that they will continue to grow. Both Riyadh University and King Abdul Aziz University have a current acquisition budget of over 5 million U.S. dollars, and this will increase to $7 or $8 million in the next financial year. The University of Petroleum and Minerals has a current acquisition budget of over 1 million U.S. dollars and this will also increase in the years to come.

This fact has a great influence on the collection development of all university libraries. It is assumed, however, that within 5 years most of these libraries will exceed 1 million titles in each system and will face severe space problems.

Even at the present time, most of the existing library buildings are becoming inadequate, as the demand for space for library materials and readers increases. Therefore, all six universities are either developing additional extension programs for existing buildings, or are constructing new, modern buildings for library use. For instance, Riyadh University recently completed a new addition to its old central library building, and King Abdul Aziz University has built a new, two-story library building (see Figure 2).

In addition, all six universities are undertaking master programs for new, modern campuses which will result in large, permanent university library buildings. The University of Petroleum and Minerals, although it completed a permanent library building in 1974, is expected to have a space shortage in the near future; and this calls for more serious discussion on the issue of microform application in serial collections in Saudi university libraries. However, the major concerns of university

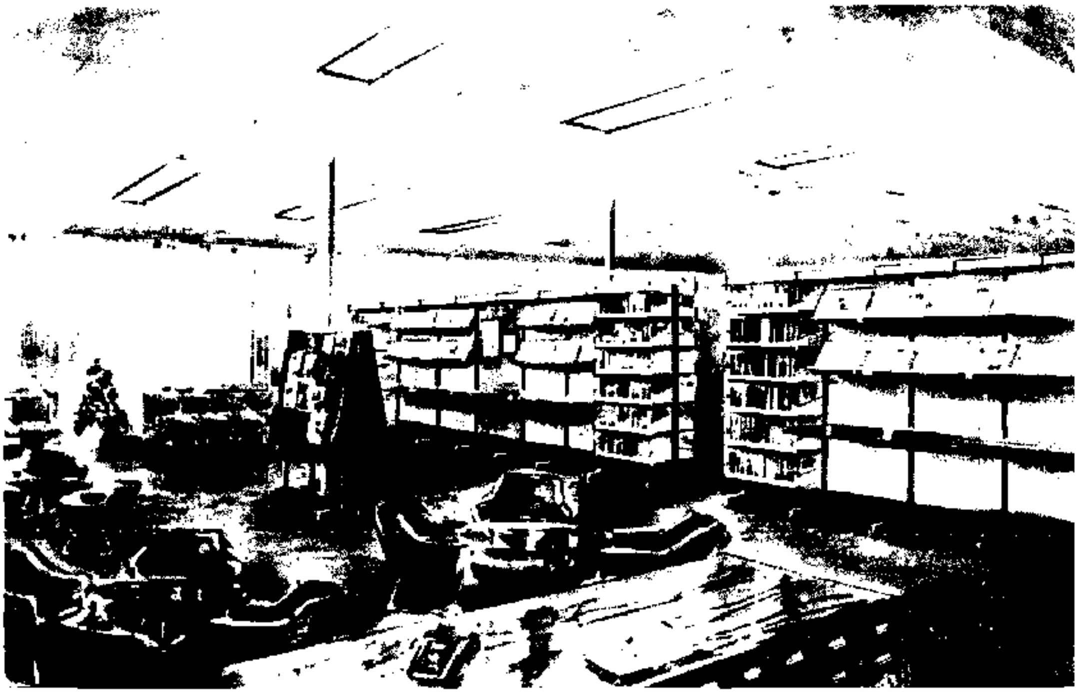

FIGURE 2. *The University Library of King Abdul Aziz University, Jeddah; browsing area.*

library systems in Saudi Arabia relate to the following: the need for establishing more interlibrary loan arrangements; training of clerical and professional staff; acquisition of more Saudi materials in terms of both general publications and government documents; and the fact that the library collections, as they are expanded and developed at a faster rate and in a more intensive way, have to be developed with special emphasis on Muslim culture and contemporary Middle Eastern literature in all disciplines.

To sum up the development of university libraries in Saudi Arabia: there are probably enough institutions; there are extensive plans for more buildings; allocations for possible automation in libraries have been made; budgets are adequate; and there is wide-open support from the government for all aspects of librarianship—but, on the other hand, there are woefully few professional librarians trained to solve the professional problems of librarianship, and there is a lack of standards. There is a need for more professional coordination of library development in areas such as bibliographic control, interlibrary loan, resource sharing, and automation of library processes.

School Libraries

As is true in many developing nations, Saudi Arabia's rapidly expanding school population and advancing educational aspirations are outstripping its ability to furnish more and more schools throughout the country. School statistics (elemen-

TABLE 1

Statistics on the Saudi Arabian Education System: 1969/1970–1974/1975

Level of education	School year	Number of teachers	Pupils/Students			Schools/ Colleges
			Female	Male	Total	
Elementary	1969/70	17,181	119,789	277,364	397,153	1,824
	1970/71	17,435	132,277	295,520	427,797	1,908
	1971/72	19,577	153,964	321,043	475,007	2,154
	1972/73	22,130	174,194	346,928	521,122	2,467
	1973/74	26,384	197,448	380,286	577,734	2,711
	1974/75	29,756	223,304	411,194	634,498	3,028
Intermediate	1969/70	3,460	5,305	55,271	60,576	352
	1970/71	3,339	8,645	60,283	68,928	395
	1971/72	4,186	13,546	70,135	63,681	484
	1972/73	5,262	20,518	78,233	98,751	557
	1973/74	6,171	29,478	85,872	115,350	586
	1974/75	7,418	38,544	98,339	136,883	647
Secondary	1969/70	512	1,487	13,798	15,285	79
	1970/71	650	1,856	17,903	19,759	87
	1971/72	944	2,979	20,053	23,032	141
	1972/73	1,337	4,009	22,767	26,776	152
	1973/74	1,650	6,412	26,774	33,186	160
	1974/75	2,132	10,206	31,333	41,539	182

tary, intermediate, and secondary) for 1969 through 1975 are given in Table 1. The data in this table show a vast increase in both the number of schools and the number of students. The second 5-year plan indicates that the number of schools will increase, perhaps by as much as a staggering 95%.

There has been an enormous increase in the level of expenditures and budget allocations for all levels of the educational system, which rose from 168 million riyals in 1961/1962 to 3,760 million riyals in 1974/1975. The current expenditure represents 8.2% of the national budget (see Table 2).

The current development plan envisages very heavy building programs, with a general improvement in facilities at all levels and a particular concentration of resources on technical and vocational education. However, at present the situation of school libraries is rather gloomy. Reliable figures for school libraries indicate that only about 25% of those schools that have libraries have the basic collections of general books and textbooks selected centrally by the Directorate General of Libraries of the Ministry of Education. The Ministry of Education is well aware of this deficiency but is faced with serious difficulties in solving the problem rapidly.

In the first place, most schools do not have a room available for conversion to a library. According to plans for the future, all schools will have a library. Those to be built in villages will have a separate room with a separate entrance to the outside, and they are to serve as both a school library and a community library. Second, very few teachers are aware of the potential of the school library as an integral part of the educational system. Third, very few books are published

TABLE 2

Expenditures for Education in Saudi Arabia: 1969/1970–1974/1975

Year	Percent of General Budget allocated to Ministry of Education	Ministry of Education budget (riyals)	Percent of General Budget expended on education	Total education expenditures (riyals)	General Budget of Saudi Arabia (riyals)
1969/70	64.3	384,228,000	10.0	598,088,000	5,966,000,000
1970/71	64.1	427,158,000	9.8	666,351,000	6,780,000,000
1971/72	61.9	711,378,000	10.7	1,150,053,000	10,782,000,000
1972/73	60.7	965,861,000	12.1	1,591,506,000	13,200,000,000
1973/74	59.75	1,327,692,000	9.8	2,232,657,000	22,810,000,000
1974/75	55.0	2,068,365,000	8.2	3,760,283,000	45,743,000,000

in Arabic for children. On the other hand, media and audiovisual materials have been given great importance. In the fiscal year of 1976, the Ministry of Education had a budget of over 150 million U.S. dollars for audiovisual developments. A great deal of this money was spent on educational television, films, projectors, viewers, language laboratories, and many other audiovisual materials.

Special Libraries

Among the most vital libraries in Saudi Arabia are those classed as special libraries. Within this group are libraries which serve industry, business, government, and special agencies.

The library serving the Industrial Studies and Development Center is small. Its holdings number only a few thousand volumes plus some specialized journals. The library appears to be well organized and is used by the staff of the center for data and research activities. The center itself conducts a number of special studies and projects to help industrial planning, and it is responsible for improving the flow of technical knowledge to and among those who need it. The main library of the center is located in Riyadh, and two branches have been launched, in Jeddah and Dammam.

The Arabian American Oil Company, popularly know as Aramco, developed a library system in the early 1950s, taking into account the requirements of the employees of the company. The system includes technical libraries, the Medical Library, an Arabian Affairs Library, and a Law Library. The main purpose was to provide technical information for Aramco's personnel. The Medical Library was founded to acquire medical literature for research purposes. The Arabian Affairs Library is responsible for collecting material on the politics, economics, history, religion, culture, and geography of the Middle East. The Law Library is a highly specialized center for information on international law, Islamic law, and American laws.

In 1970 the Saudi Airline Company launched its first library and information center to acquire specialized materials on aviation and the air transport industry. The library is still in active operation, handling extensive indexing and abstracting services for the aviation industry. Also, a number of large commercial companies have taken an active role in founding specialized libraries equipped for the vital reference work needed in their operations and business.

In addition to such specialized libraries serving industry and business, many government ministries have established their specialized libraries. Good examples of such ministerial libraries are those of the following: Ministry of Planning, Ministry of Information, National Guard, Ministry of Finance, Ministry of Health, Ministry of Foreign Affairs, Ministry of Interior, and Ministry of Commerce.

The Institute of Public Administration Library was founded in 1962. It is a specialized center which collects materials in the social sciences. As stated in the *Bulletin* of the library, the Institute Library is an open-stack library housing almost 15,750 titles of published materials (8,397 titles in Arabic and 7,353 titles in foreign languages). In addition the library subscribes to major public administration journals and collects a wide range of pamphlets. The most important feature of this library is the fact that it acts as a depository center for all publications issued by the government of Saudi Arabia.

Library Training

Library training in Saudi Arabia is very new. The first academic program of library education was established at King Abdul Aziz University in 1972 as a department within the Faculty of Arts. The Department of Library Science offers a 4-year program within the basic undergraduate curriculum, leading to a bachelor's degree in library science.

Each student is required to earn 120 credit hours, divided as follows:

15 credit hours to be earned from those basic courses required by the university
12 credit hours to be earned from those courses required by the Faculty of Arts
18 credit hours to be earned from subjects other than library science
75 credit hours to be earned from library science courses

Courses on library science are selected from the following areas of library education:

Technical services
Resources
History
Administration
Information science
Bibliography
Communication and media
Archives

Students are required to earn 75 credit hours from the following list of library science courses:

Course number	Course title	Credit hours
LIS 100	Introduction to Library Science	3
LIS 110	Introduction to History of Books and Libraries	3
LIS 120	Introduction to Cataloging and Classification	3
LIS 121	Descriptive Cataloging	3
LIS 140	General Reference Materials	3
LIS 150	Research Methods	2
LIS 160	Introduction to Documents and Archives	3
LIS 170	Introduction to Information Science	3
LIS 211	History of Libraries	2
LIS 225	Classification	3
LIS 228	Subject Cataloging	2
LIS 237	Periodicals	2
LIS 240	Reference Works of Arab Heritage	3
LIS 250	Introduction to Library Administration	2
LIS 261	Arab Documents and Archives	3
LIS 271	Elementary Statistics	3
LIS 273	Library Automation	3
LIS 274	Human Relations	3
LIS 300	Research Methods in Library Science	2
LIS 310	History of Libraries in Islam	3
LIS 320	Technical Services in Libraries	3
LIS 321	Advanced Cataloging	2
LIS 330	Bibliography	3
LIS 341	Reference Works in the Humanities	3
LIS 342	Reference Works in the Social Sciences	3
LIS 343	Reference Works in Pure and Applied Science	3
LIS 351	School Library Administration	2
LIS 352	Public Library Administration	3
LIS 361	Arabic Paleography	3
LIS 365	Arabic Manuscripts	3
LIS 371	Educational Psychology	3
LIS 373	Data Processing	3
LIS 375	Publishing	3
LIS 400	Special Course in Librarianship	2
LIS 411	History of Books	2
LIS 424	Audiovisual Materials	2
LIS 425	Advanced Classification	3
LIS 431	Descriptive Bibliography	3
LIS 432	Analytical Bibliography	3
LIS 433	Critical Bibliography	3
LIS 451	University Library Administration	3
LIS 452	Special Library Administration	3
LIS 465	Manuscript Editing and Publishing	3
LIS 467	Government Documents	3
LIS 473	Documentation	3
LIS 474	Communication of Information	3

Enrollment in the undergraduate program as of December 1976 was 85 students, of whom 60% were female and the rest male students. The first graduation ceremony was held in April 1977.

In addition to the undergraduate program, the Department of Library Science offers a master's program in librarianship. Candidates are required to earn 36 credit hours; 30 credits are earned through courses and 6 credit hours are granted for the master's thesis.

Imam Mohammed ibn Saud Islamic University in Riyadh established a 4-year undergraduate program for library science in 1974. The University of Riyadh has also launched its first Diploma Program in Librarianship, which started in the academic year 1975/1976. This is a 2-year program beyond the bachelor degree which aims to prepare professional librarians in all aspects of librarianship.

In addition to these academic programs, the Institute of Public Administration in Riyadh has started a short training program for library personnel. The objectives of the program are to train library personnel to cope with basic library requirements. The program consists of the following courses:

Introduction to Library Science
Library Administration
Technical Operations
Reader Services
Human Relations
Practical Studies

The duration of the program is 4 months, leading to the award of a library diploma.

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ABBAS S. TASHKANDY

SAVAGE, ERNEST ALBERT

Ernest A. Savage (1877–1966) was one of the select band of librarians who, by precept and example, helped to raise the standard of librarianship in the British public library service during the early decades of the present century.

Savage was born at Croydon, Surrey, on March 30, 1877, the son of a builder and decorator in a small way of business. After a wretched schooling (as short as it was rough) and following a few disastrous weeks as a printer's apprentice, at the age of 13 Savage became a junior assistant on the staff of the new Croydon Public Library. Thanks to the enterprise of the railroad companies, Croydon had recently found prosperity as one of London's most popular commuter satellites. Undoubtedly the town needed a public library service, but for several years it was obliged to put up with a poor one. This was housed in makeshift premises, and the over-crowded home-reading department was dominated by a prime example of librarianship's most frustrating invention: an indicator which told the clamoring readers, by means of numbered metal tags, whether the books they had lighted upon in the printed catalog were "in" or "out."

Soon Savage was fully accomplished in all the petty skills a Victorian public library assistant was required to know. Fortunately, in 1895 he took office at Watford, as sublibrarian to John Woolman. Although Woolman was responsible for the town's School of Science and Art as well as its public library, he found time not only to coach Savage for matriculation but also to introduce him to the benefits of the Decimal Classification and the classified printed catalog, both of which were distinct novelties at that time.

Savage's return to Croydon, in 1898, as a branch librarian was dictated mainly by personal reasons (he was engaged to a Croydon schoolteacher), but it turned out to be the luckiest decision he ever made. A few months later the Croydon Public Libraries came under the direction of Louis Stanley Jast (1868–1944), one of the most engaging personalities, as well as one of the most talented librarians, the British public library service has known. Jast was the friend and the most devoted disciple of James Duff Brown (1862–1914), who, in his lamentably short life, gave British public libraries a new pattern of administration and British public librarians a new sense of purpose.

Discovering that Savage had a lively intelligence as well as a useful knowledge of librarianship, Jast made him his deputy. Savage thus had the supreme advantage of closely observing an energetic librarian—one with an original and restless mind—as he transformed a humdrum public library service into one of the best in the kingdom. Many ideas which have long been commonplace were tried out by Jast at Croydon at the beginning of the century. Savage himself learned a good deal from Jast, including the art of making a little money go a long way. Like most British public libraries at the beginning of the century, Croydon's had only a modest income (*1*).

Jast was so persuasive, so infectiously enthusiastic, that Savage might have fallen completely under his spell. Fortunately, he had developed a mind of his own and refused to accept Jast's notions without challenge. Unorthodox in most things, Jast had an unshakeable belief in the virtues of large general reference libraries. Savage had not. He believed that most of the books immured in reference libraries would live far more useful lives in the home-reading departments.

Fortunately, perhaps, for the future of Jast and Savage's friendship, in 1904 Savage became librarian of the neighboring small town of Bromley. There he planned his first library building (one of the many given to the United Kingdom by Andrew Carnegie during the Edwardian period), and there he made a name for himself as a speaker at the Library Association's meetings. He also consolidated his reputation as a shrewd and provocative commentator on library affairs in his frequent contributions to the independent *Library World* and to the staider *Library Association Record*. His connection with these two journals lasted for about 60 years.

Following his appointment at Bromley, Savage became a member of the legendary dining and debating club for chief librarians called the Pseudonyms, where he was given the curious sobriquet "No Name" (from the novel by Wilkie Collins), on the curious grounds that he had no personality. Judging from his writings, no librarian had more.

In 1906 Savage became librarian of Wallasey, a small town on the Wirral peninsula which faces the great city of Liverpool across the Mersey estuary. There he adopted a mode of life to which he adhered until he retired: it can best be described as "round-the-clock-librarianship." By this time Savage was utterly absorbed by his work. Home, hobbies, recreations—all were made subservient to his consuming interest in librarianship. He first won the gratitude of his library committee and his readers by persuading Carnegie to change his mind and give Wallasey the money for a new central library (after he had told the library committee's chairman that the existing building was good enough). Savage further enhanced his reputation by establishing a high quality service which made the Wallasey Public Library the cultural center of the community; this notwithstanding that the number of assistants he had was so small that he only called them a staff (so he said) when bragging to other librarians.

It was while Savage was at Wallasey that he was commissioned to write *The Story of Libraries and Book-collecting* (1909) and *Old English Libraries* (1911), two zealously researched studies in library history which are still remembered, largely because in recent years they have been reprinted in the United States. They are the most impersonal and least stimulating of Savage's books and are now much in need of revision.

It is hardly surprising that a man so absorbed in librarianship as Savage should be attracted to its history. But when writing these books Savage took a risk, as interest in library history was still very small. Many years later, recalling ruefully how much trouble these carefully written treatises had cost him, Savage said: "The study of library history should be subsidized and supervised" (*2*). This, like many other things he longed for, eventually came about.

The 9 years Savage spent at Wallasey gave him a different perspective of the Library Association (LA). When he lived near London and regularly attended its meetings, where a muster of 30 members was better than average, Savage looked upon the LA with the tolerance which springs naturally from cosiness. At Merseyside, as he soon discovered, there were librarians who regarded the association far less charitably. To them it was a reactionary and ineffective body, as bereft of influence as it was of wealth. Although L. Stanley Jast had become the LA's honorary secretary in 1904, even he was unable to increase its membership, galvanize its council, or elevate its status. Its membership, and therefore its income, was so small that it could hardly afford the rent for its grossly inadequate accommodation. Realizing that the only way to change the conduct of the LA's affairs was to take an active part in its government, in 1914 Savage made a bid for election to the LA council. He was easily successful.

One would have expected James Duff Brown to have played a leading role in the LA's affairs, but in fact he never did. In 1912, dissatisfied with the LA's policies and achievements, he resigned his membership. But at this time he was a sick man, and 2 years later he died. Savage was one of the many who wrote an obituary appreciation of him for the *Library Association Record*, May 1914, but his most eloquent tribute came much later, in an essay entitled "James Duff Brown After Fifty Years," *Library Review*, Autumn 1960 (*3*).

Without Brown, the *Library World* (which he had founded as well as edited) was in danger of losing its zest. This was partly remedied by the introduction in April 1914 of a feature called "Letters on Our Affairs," in which several leading librarians (using as pseudonyms the names of librarians of the ancient library of Alexandria) provided fairly uninhibited comments on the library scene. This series was the inspiration of Savage, who contributed to it himself under the pseudonym "Zenodotus"—but only at intervals during the periods 1914–1917 and 1943–1945. Like everything else Savage wrote, these "letters" were written with scrupulous care and usually with unchallengeable good sense.

Although Savage enjoyed himself at Wallasey, the library gave him too little scope. Fortunately, in 1915 he became librarian of Coventry, a West Midlands city which could have been then (as it is now) a center for tourists, had its ancient splendors been lauded half as much as its industrial prowess. It was widely renowned for its bicycles and automobiles, but by 1915 many of its factories had been geared to the war effort.

Savage was convinced that the city libraries could help the war effort too, by providing local firms with a technical information service. Not content with inaugurating this service at Coventry, in 1916 Savage persuaded the LA to set up a special committee to discover ways of improving the supply of technical information throughout the country. As the government had recently established a Department of Scientific and Industrial Research (DSIR), which had funds at its disposal that could be used to subsidize industrial research, it seemed reasonable to the LA's special committee that some of this money should be used to assist local technical information services. To this end, it recommended the establishment of a National Lending Library of Scientific and Technical Literature. Unfortunately, DSIR was not interested. A library of this kind did eventually come into existence (it was the forerunner of the present British Library Lending Division), but not until after World War II. However, the special committee's work was not altogether in vain, as it encouraged the public libraries of several of the major cities of Great Britain to establish services for local industrial and commercial firms which have been, and still are, of considerable value (*4*).

By the end of World War I, the public library service—which had always been hindered by acts of Parliament that put a limit on the size of the rate local authorities could levy in support of their libraries—was in danger of collapse owing to rising costs. At the end of 1919, therefore, Parliament removed this limit altogether, in England and Wales. The immediate effect was by no means spectacular; at the local level the long tradition of a cheap library service was hard to break. In any case, the war was followed by a long period of economic depression.

In Scotland, the statutory limit to the library rate was not removed, but it was raised from one penny to threepence in the pound. It was part of Savage's philosophy that a modest library income was no excuse for a mediocre library service. He had proved this at Wallasey and Coventry; in February 1922 he went north to prove it at Edinburgh, where he had been appointed principal librarian of the city libraries. Edinburgh had delayed providing a library service until 1887, and had done so then only because Carnegie offered the cost of a substantial central library building. The appointment of a schoolmaster as the first librarian (presumably because he was a good friend of Carnegie) was not exactly disastrous, as he turned out to be little worse than some of his contemporaries who regarded themselves as "professional." But in comparison with Savage, he was a mere amateur.

The 20 years during which Savage was in charge of the Edinburgh city libraries may be divided into two more or less equal periods. During the first, Savage was engaged in bringing the service up to the average level of the other large city libraries in Great Britain. During the second he was busy taking Edinburgh above that standard. During the first period he had to convert all the city libraries to open access and purge them of their shabby stocks. He also reclassified the books by the Library of Congress scheme. He had long ago turned his back on the Decimal Classification, and at Wallasey he had devised his own scheme.

Even while he was in the thick of reorganization at Edinburgh, Savage found time to turn his attention to another and greater problem.

By the mid-1920s, the Library Association was in a most unsatisfactory state. Although one of its objects was "to unite all those engaged or interested in library work," an increasing number of chief librarians—and still more library assistants—did not belong to the LA; in fact, its membership, still less than 1,000, was almost stationary. Although solvent, it had to depend on free accommodation; its official journal, for its first 24 years a monthly publication, had been demoted to a quarterly; its paid secretary having resigned, he was not replaced. In the words of Savage, the LA was at that time at its lowest period of prosperity.

Savage had sharply criticized the conduct of the LA's affairs for years. Now he took action. In July 1926 he persuaded the LA Council to appoint a special committee to report on the development of the association. Before the report was presented, Savage visited the United States, where he attended the jubilee meeting of the American Library Association (ALA). He also made a brisk tour of American public libraries. The result of this expedition was to convince Savage that the ALA was "the powerful driving force of the library movement in the States and Canada" and that what was most worth doing in Britain was to raise the LA to a similar level (*5*).

In October 1926, when the ALA held its anniversary meeting at Atlantic City and Philadelphia, its situation was very comfortable. Its membership was about ten times that of the LA; its budget was well over $400,000; more than 90 people were on its payroll, in Chicago and elsewhere; and, to crown everything, the Carnegie Corporation of New York had recently promised it an endowment fund of $1.000,000, together with a series of annual grants.

There was no chance of bringing the LA's fortunes up to this level, but there were two ways in which it might be relieved from its chronic stagnation. The first was to obtain financial aid from the Carnegie United Kingdom Trust (CUKT). The second was to absorb the other library associations, national and regional, which had come into being. The special committee recommended the former plan.

It was hoped that the CUKT would make a favorable reply before September 1927, when the LA was to hold its jubilee conference at Edinburgh. But it was not until December 1927 that the CUKT made a definite offer of help. One of its conditions was that the LA would "make a considered effort to induce the other library groups and associations to come within a single unit" (*6*).

In September 1928 Savage became honorary secretary of the LA, which meant that during the next 4 years—when the LA's affairs were gradually put on a secure foundation—he was intimately involved in its plans and vital negotiations. He helped persuade the Association of Assistant Librarians to become a section of the LA, which it did in January 1930; and he chaired the committee which planned the LA's headquarters. The headquarters building, which the CUKT helped the LA to acquire, was the first home the association could call its own. It was taken over in March 1933. Ironically, by this time the LA's members and their libraries were suffering from the worst period of the interwar economic depression, the notorious "slump."

In February 1934, having piloted the LA through a crucial period in its history, Savage resigned from the honorary secretaryship. He was doubly honored by the association: he was given an honorary fellowship, and he was elected president for the year 1936.

While he was still honorary secretary, Savage accepted a commission from the Carnegie Corporation to investigate and report on public library provision in the West Indies. Early in 1933, in little more than a month, he journeyed from island to island inspecting society libraries and public libraries. He saw much to interest him, but in his detailed report he made it clear that the overall standard of library provision was poor. The solution he recommended was to establish an experimental public library service (serving a single governmental area and organized on British county library lines) and then encourage its extension to other areas (*7*). It was several years before any action was taken on Savage's report, but eventually Dr. Helen Gordon Stewart inaugurated a library system in Trinidad and Tobago. Dr. Stewart found that the pattern of operation recommended by Savage was not wholly feasible, but his report was of value nevertheless (*8*).

Savage's work at Edinburgh reached an interesting stage in the 1930s, and he was considerably annoyed when the outbreak of World War II brought an end to his plans for expansion. As a public librarian, the main tenets of his creed were: (*a*) that large central libraries should be divided into subject departments, each having both reference and home reading services and each supervised by a librarian with special bibliographical and library training; (*b*) that a few large branch libraries are better than many small ones; and (*c*) that every library should be designed with maximum facilities for display.

Unfortunately, as he was unable to begin with a clean map and was restricted by what would nowadays be regarded as a very modest budget, Savage was prevented from demonstrating fully his notions of an ideal public library service. But what he was able to accomplish was of considerable interest, the more so because all that he did was explained and justified in two of his most notable books: *Special Librarianship in General Libraries* (1939) and *Manual of Book Classification and Display for Public Libraries* (1946).

Savage took a keen interest in the development of public libraries in America long before he was able to go there, and it was from America that he derived his interest in subject departmentalization. "American librarians," he said, "quick to appreciate the work of their fellows, will tell you that Cleveland Library is one of the best examples of a great municipal library, sharing with Los Angeles and Baltimore the honour of pioneering divisional organisation. But in this country, subject departmentalism has hardly dare affront the reference idol" (9).

Savage did not affront it himself as boldly as he wished. In 1932 he opened an

Edinburgh Historical and Topographical Library and an Economics and Commercial Library; in 1934 he opened a Music Library and in 1936, a Fine Art Library. And that, owing to the limitations of the central library building, was as far as he could go. If he had had his way, there would have been nine subject departments instead of four.

Savage was not only saddled with more branches than he wanted, he had to build, when the opportunity arose, on sites not of his own choosing. But there were exceptions: at Leith (1932), an entirely new library, and at Dundee Street (1940), a replacement library, gave him some scope for indulging in the arts of display, for which he had a strong predilection. At Leith the whole of the home-reading department became, in effect, a series of small-scale special collections. There were shelves for display and special cases for display on an unusually liberal scale. At Dundee Street, Savage devised a special system for keeping the open-shelf bookstock from becoming stagnant.

In the summer of 1939, just before a check was put upon British library development by the outbreak of war, Savage brought together the best of his published and unpublished essays and addresses in a book mentioned earlier: *Special Librarianship in General Libraries*. In it he explained to his fellow librarians the virtues of subject departments in public libraries and how they might form them. Then, taking a clear leap into the future, in a long, detailed, and farsighted essay called "The Training of Librarians," Savage offered to the British library profession what he regarded as an ideal system of library education. Obviously it owed a good deal to his study of library education in America, but, as always, Savage explained, in his own lucid and lively way, not only what should be done, but why and how. He wrote:

> I am dissatisfied that at this stage of library provision no more than one school exists for oral teaching in librarianship, and that it plays little part in training those in the municipal service. I am dissatisfied that promising librarians are remote from any teaching other than that doled out to them in the libraries where they work; teaching generally inadequate, uneven in quality, and bounded by local outlook. I am dissatisfied with the examinations, which probe to discover what conundrums and curiosities students do not know instead of what they should know as practising librarians. And to complete my tale, I am dissatisfied that the [Library Association] Education Committee, discussing every detail and every decision in full session, should be so harassed by routine that it cannot stay for a moment to consider whether it is raising our calling to a profession or degrading it to an unimaginative bureaucracy (*10*).

Savage retired in 1942, but his preoccupation with librarianship did not end. Deafness deterred him from attending professional meetings and visiting the new schools of librarianship he had pleaded for, but nothing prevented him from commiting to paper all that he knew and all that he hoped for in librarianship.

As Savage hated loose ends, it must have pleased him that he lived long enough to say all that he wanted to say. The books, articles, and reviews he published between 1942 and 1963 lacked nothing of his characteristic vehemence and wit, although occasionally they had a strident tone absent from his earlier writings.

Although for most of his career Savage had been in the van of library progress, when the Library Association published Lionel R. McColvin's trenchant, invigorating report, *The Public Library System of Great Britain* (September 1942), which time has now revealed as a prophetic document, Savage would have none of it. Probably because he had thoroughly enjoyed himself administering small public libraries, he regarded as outrageous McColvin's proposal that all the smaller library authorities should be obliged to surrender their powers to large ones. For the first time in his life he clung obstinately to tradition and expected others to do so.

Savage's attack on the McColvin Report is understandable. His even fiercer attack on the character of Henry Tedder (1850–1924; a founder member of the LA and for 34 years its respected honorary treasurer) is not. This notorious indictment—in which Tedder was blamed for all the ills which beset the LA before it was reorganized under Savage's direction—is a regrettable flaw in a fascinating volume of reminiscences in which Savage recalled his childhood at Croydon and his early years in the library profession. Savage denied that *A Librarian's Memories* (1952) was an autobiography. He described it as "a commentary on my education for and in librarianship." Whatever it may be, there is no other book quite like it in the entire literature of librarianship.

Perhaps the best book written by Savage during his retirement (it was certainly the most highly praised) is *A Librarian Looks at Readers*, an engaging volume of essays which could have been entitled more accurately "A Librarian Looks at Literature." Many librarians have tried to wear the mantle of literary criticism; few have done so with distinction. Savage is one of the few. Whether he was writing about poetry or fiction, oral culture or children's magazines, he was always readable, frequently enlightening, and sometimes agreeably tart.

Most of the essays Savage wrote during his retirement remain uncollected, in the pages of the *Library Association Record*, the *Library World*, and the *Library Review*. Among the best are several in which he wrote a more intimate kind of library history than he had attempted during his Wallasey days. Instead of toiling among unfamiliar treatises in the hushed reading rooms of vast research libraries, he wrote of persons and events lying within the arc of living memory, his major research tools being his own memory and the back files of the professional periodicals in his study. A good example of this less formal type of library history is "Movements and Men of the Past in the Library Association." He contributed this essay to the September 1950 issue of the *Library Association Record*, which celebrated the centenary of the first Public Libraries Act (*11*).

When Savage published his last article, in October 1963, he brought to a close what was, in effect, a working life for librarianship extending over 73 years.

Savage had a long and, on the whole, a happy retirement, during which he saw (if only from afar) the implementation of almost all the advances in librarianship he had advocated: the replacement of part-time by full-time courses in library education; the recruitment of graduates to the public library service; and the reorganization of several great city libraries into subject departments, beginning with Liverpool, which, under the direction of Dr. George Chandler, was given a far more elaborate pattern of subject specialization than Savage had been able to introduce at Edinburgh. Finally, in 1962 Savage saw the creation of a truly professional Library Association, following the appointment of a new secretary, H. D. Barry.

Influences can seldom be measured, but it is reasonable to believe that several of the beneficial changes which have come about in the British public library service over the past half century have been due in some measure to the influence of Savage. More than any of his contemporaries, more even than L. Stanley Jast and W. C. Berwick Sayers, Savage was the great teacher (one could say preacher) of his generation.

Two things are certain. One is that Savage demonstrated, if any man did, that librarianship is a profession worthy of the best talents which can be encouraged to serve it. The other is that in librarianship he himself had the luck to find his true vocation.

Ernest A. Savage died at Edinburgh, February 4, 1966.

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JAMES G. OLLÉ

SAYERS, WILLIAM CHARLES BERWICK

William Charles Berwick Sayers (1881–1960), commonly known as Berwick Sayers, belonged to the small but remarkable group of librarians who gave some measure of distinction to the British public library service during the early decades of the 20th century, when the average level of public library provision was lamentably low.

Sayers was born at Mitcham, Surrey, on December 23, 1881, the son of an "artist decorator." When he was five the family moved to Bournemouth, Hampshire, then a quiet, undeveloped seaside town of little more than 10,000 inhabitants. In 1896 Sayers joined the staff of the new Bournemouth Public Library as a junior assistant. "It was because I wanted to be [an] author," he said, "that I became librarian; the love of books begets books; and when I was not writing I was reading" (*1*).

Sayers made a fortunate beginning. The chief librarian of Bournemouth, Charles Riddle, had been deputy to James Duff Brown at Clerkenwell (London), and there Brown had pioneered, in 1894, a safeguarded open-access system, the first in Britain. Sayers was therefore spared the frustration of closed access and the awful tyranny of the library indicator.

In 1904 Sayers had an even greater stroke of luck. He was appointed deputy to Louis Stanley Jast, chief librarian of Croydon, Surrey, in succession to Ernest A. Savage. At that time there were no schools of librarianship in Britain (the first was not established until 1919), but working with Jast was a first-rate professional education in itself. Under his restlessly inventive direction, Croydon's library had become, within a few years, one of the best public library services in the kingdom, and probably the liveliest.

Jast was the friend and most ardent disciple of James Duff Brown, but having at his disposal greater resources than Brown had (either at Clerkenwell or at Islington), he made Croydon not only an efficient public library for the community but also a superb training ground for potential chief librarians. "We all believed," said Sayers, "that Croydon was the best library in the world."

Sayers soon discovered that working for Jast meant "going all out." Nevertheless, he had enough surplus energy to work as an officer of the Library Assistants' Association (LAA) at a crucial stage in its development. The Library Assistants' Association—renamed the Association of Assistant Librarians (AAL) in 1922—had been founded in July 1895 to promote the interests of the growing number of library assistants and assistant librarians who regarded the Library Association, not without reason, as an association of chiefs. As interpreted by Sayers, the aims and objectives of the LAA were:

> to produce a situation that would provide an assistant with friends in every library; secondly, to establish a platform, because we had many grievances as well as some aspirations to air; above all, to increase our deserving by the acquirement of qualifications that intelligent people would recognize—we did not even despair of committees and councillors (2).

Soon after his arrival at Croydon, Sayers became the honorary secretary of the LAA's Education Sub-Committee. In 1906 he became honorary secretary of the association, a responsible office he held until 1909, and again from 1912 to 1915. In the intervening years he served as president. "The L.A.A.," he said in after years, "became the central interest in my life."

As an officer of the LAA Sayers had two particular aims: to increase substantially the association's membership and to establish branches in all the main areas of population. To this end (at his own expense, the LAA having too little funds to support him), he traveled around the country on a crusading mission which, in most areas, was gratifyingly successful. Although Sayers was a modest man, when the AAL celebrated its jubilee he recalled with evident pride that, during the years when he held office, the association's membership had increased fourfold (*3*).

What else was attempted and achieved during these years may be discovered in Michael J. Ramsden's *A History of the Association of Assistant Librarians 1895–1945* (1973). According to Ramsden, Sayers is "without question the outstanding figure in the Association's history."

Sayers's work for the Library Association (LA) was not so spectacular, but he was an LA councillor for over 40 years, took a particular interest in the association's educational work, and in 1938 was honored with its presidency.

Early in 1915 Sayers left Croydon to become chief librarian of Wallasey. Once again he took over from Ernest A. Savage, who left him, he said, nothing to do. In fact, he inaugurated a popular children's library. Before the year was out, however, he returned to Croydon, at the express invitation of the Libraries Committee, to succeed Jast as chief librarian. Sayers remained at Croydon for the rest of his days.

Some librarians win fame through their work for the libraries they administer; others, for their labors for librarianship at large. A few, among whom may be numbered Sayers's contemporaries L. Stanley Jast and Ernest A. Savage, manage to gain distinction on both counts. Sayers belongs to the second category. For reasons not entirely his fault (for one thing, he was saddled with a badly designed late Victorian central library building), Sayers was unable to raise the Croydon library service much above the level to which it had been brought by Jast, except in one notable respect.

Sayers had an abiding interest in children's libraries. Its origin could, perhaps, be traced back to the day when he discovered, to his chagrin, that he could not borrow books from the Bournemouth Public Library until he was 14. His professional interest began to develop strongly when he became Jast's deputy. In 1911 he published a little volume called *The Children's Library.* This was the first British manual on children's libraries, and, as Sayers himself said, it was "written in the light of the experience of American rather than English librarians."

In 1920, as chief of the Croydon library, Sayers found himself in a good position to practice what he had preached. He converted a large, disused reading room into an attractive children's library and appointed a children's librarian, a post which was still something of a novelty in Britain (*4*). Croydon thus became a fairly early and a quite interesting example of what could be achieved in the realm of children's librarianship with enthusiasm and imagination (*5*).

Sayers's idea of a children's library was that it should be "beautiful, comfortable, comprehensive." How far he was in advance of his time may be gauged from an article he published in the *Library World* in 1926 entitled "The Central Need in Library Work for Children in England." In this article he not only made a strong plea for the appointment of children's librarians, but dared to suggest that they should be paid "as much as the average teacher" (*6*).

Sayers's interest in children's libraries has been partly obscured by his more obvious contributions to the study of library classification. For about 30 years the teaching and study of library classification in Britain was based largely on the writings of Sayers.

In 1906, or thereabouts, Sayers devised a series of so-called canons of classification, which he later developed and applied to the Brown, Cutter, Dewey, and Library of Congress schemes. In 1915 these studies, which were written with youthful confidence and Sayers's characteristic clarity, were published in a book called *Canons of Classification.* Three years later Sayers published the first edition of his well-known manual, *An Introduction to Library Classification.* This achieved a unique position among textbooks on librarianship, because of its unprecedented popularity; but by 1954, when it reached its ninth and final edition, it was clear that it represented an approach to classification which was becoming outdated. Strictly speaking, Sayers was less of a theorist on classification than an expositor, but he was a highly skilled expositor, undeniably the most influential teacher of library classification of his age.

In 1938, in the course of a lighthearted poem in praise of Sayers (it was the year of his LA presidency), Stanley Jast said:

> His textbooks are the nightmare of ambitious youths who wish
> That fate had not condemned them in his Dewey seas to fish (*7*)

But this was Jast's little joke. Thanks to Sayers, many young librarians condemned to study librarianship alone, or with the brittle aid of correspondence courses, found in library classification, at least, a subject in which they could stretch their minds with some enjoyment.

In 1926 Sayers published the first edition of his advanced *Manual of Classification.* Since his death this has been kept alive in editions revised and rewritten by Arthur Maltby.

Sayers's books on classification owed a good deal to his long experience as a part-time lecturer on the subject, particularly at the University of London School of Librarianship, where one of his star pupils was S. R. Ranganathan.

Although Sayers is most often remembered as a specialist, his interest in librarianship was wide. It included, among other things, library cooperation (he was one of the trustees of the National Central Library and for some years chairman of its Executive Committee) and most aspects of library extension work. Only a librarian with a wide-based interest in librarianship would have taken over, as Sayers did, the revision of James Duff Brown's *Manual of Library Economy*, which Sayers piloted through four editions.

Writing was as natural to Sayers as breathing. In addition to his professional writings, he wrote extensively on the history of Croydon and he was the author of the standard biography of the composer Samuel Coleridge-Taylor (1875–1912), whom he knew. Also, like his friend Stanley Jast, from time to time he dabbled in poetry.

Sayers's professional writings included not only his several textbooks but countless articles. Many of the latter were written for the *Library World*, of which Sayers was either the editor or the advisory editor (his precise status was never made clear) from about 1916 to 1958. The *Library World*, an independent journal of librarianship, was founded by and (for its first 14 years) edited by James Duff Brown as an evangelistic organ in support of his campaign for better and brighter public libraries. Under his direction (1898–1912) the *Library World* was informative, instructive, humorous, and mischievously critical; everything, in fact, which the *Library Association Record* was not.

As Sayers was the essence of optimism and tolerance, the editorials of the *Library World* lost their former zest. Furthermore, with the passage of the years the journal began to assume a rather old-fashioned appearance, which must have greatly distressed the shade of its lively founder. On balance, however, it continued to justify its existence, and from time to time its old radicalism was revived by vigorous and pungent writers such as Ernest A. Savage, J. P. Lamb, Lionel R. McColvin, and Stanley Snaith. As Sayers wrote for the *Library World* not only under his own name but anonymously and pseudonymously (it is pretty certain that he was "Robert Johnson" and "Eratosthenes"), one way and another he did a tremendous amount to keep alive a journal which, because it was free from association ties, it would have been a pity to lose.

Sayers retired from the Croydon libraries in 1947, but it would be fair to say that his retirement was purely nominal. Although in his latter years he became a shade pompous and reactionary, his interest in librarianship never waned. As always, he remained kindly and sympathetic toward the younger generation of librarians; and unlike Ernest A. Savage, who could neither forget nor forgive, when

Sayers looked back upon the library world as he had known it, he found more to commend than deplore. He did not write his autobiography, but he left behind several engaging autobiographical essays, which are listed in the Bibliography. One book which, unfortunately, he did not live long enough to write (he was collecting materials for it when he died) was the biography of Stanley Jast.

In January 1960 the Classification Research Group resolved to honor Sayers by publishing a *Festschrift* for his 80th birthday, but as he died on October 7, 1960, the proposed *Festschrift* became a memorial volume.

Among those who wrote obituary appreciations of Sayers was H. M. Cashmore, librarian emeritus of the City of Birmingham, who praised "his warmth of heart, patience, courtesy and kindness, his humour and his generosity, his sympathetic helpfulness, and his scorn for sham and humbug" (*8*). To this it is only necessary to add a sage observation by Sayers's old friend and former colleague James D. Stewart. "When he died," said Stewart, "he was seventy-nine years young."

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SCATTERING, LAWS OF

Introduction

Statistical regularities may be observed in many natural and social phenomena. A number of statistically similar patterns of distribution have been empirically observed in all the important phases of generation, recording, dissemination, and utilization of recorded knowledge. Lotka's law of scientific productivity, Zipf's law in linguistics, and Bradford's law of scattering of scientific papers are important examples of such empirical laws. It has been suggested that such empirically observable statistical relationships or "laws of scattering" are simply variant manifestations of a more general "empirical hyperbolic distribution," in which the product of fixed powers of the variables involved is a constant (*1*, *2*).

The general equation for such distributions is

$$x^n \cdot y = k$$

where x and y are the interacting variables; the values of the exponent n and the constant k depend on the variables involved and the nature of their interrelationship. In general, some specific variant of this general statistical relationship may be observed in situations in which a large number of independent *sources* (e.g., journals) contribute *items* (e.g., articles) randomly in a given field of activity. Other examples of sources and items which display a hyperbolic interrelationship are: (*a*) all book publishers in a country and the number of books published by each of them in a given period, (*b*) all periodicals indexed in an indexing system such as MEDLARS and the number of references indexed from each journal, and (*c*) the number of books in a library and the number of times each book is borrowed by users (*3*).

The discovery and explication of such empirical laws of scattering are important because of the predictive power of the laws. Empirical laws such as the Bradford law of scattering provide rational approaches that replace or supplement traditional and intuitive approaches to decision making in general, and in design and operation of information systems in particular.

Lotka's Law

In 1926 Alfred J. Lotka proposed an inverse square law relating authors of scientific papers to the number of contributions made by each author. Lotka was interested in determining, "if possible, the part which men of different calibre contribute to the progress of science"(*4*). He counted the number of individual authors and the number of contributions made by each of them in the decennial index of *Chemical Abstracts*, 1907–1916. Only the letters A and B were covered. Similar data were also collected from the name index of Auerbach's *Geschichtstafeln der Physik* (J. A. Bath, Leipzig, 1910). Lotka plotted, on a logarithmic scale, the number of authors against the number of contributions made by each author, and he found that in each case the points were closely scattered about a straight line having a slope of approximately two to one. On the basis of these data, Lotka deduced a general equation

$$x^n \cdot y = \text{constant}$$

where y is the frequency of authors making n contributions each.

For the special case that $n = 2$ (inverse square law of scientific productivity), the value of the constant was found to be 0.6079. If this inverse square law is true, then the proportion of authors who contribute a single item should be 0.6079 (or just over 60%) of the total number of authors. Lotka's data were found to be in close conformity with this deduction. The observed figures for the proportion of authors making one contribution each were 57.9% for the *Chemical Abstracts* data

(6,891 contributors) and 59.2% for the Auerbach data (1,325 contributors). He then summarized his findings thus:

> In the cases examined, it is found that the number of persons making 2 contributions is about one-fourth of those making one; the number making 3 contributions is about one-ninth, etc.; the number making n contributions is about $1/n^2$ of those making one; and the proportion, of all contributors, that make a single contribution, is about 60 per cent (*5*).

In other words, for every 100 authors contributing one article each, there would be 25 authors contributing two articles each ($100/2^2 = 25$), about 11 authors contributing three articles each ($100/3^2 = 11.1$), about 6 authors contributing four articles each ($100/4^2 = 6.25$), and so on.

In Lotka's original paper there was no suggestion that this was a universal law applicable to all branches of knowledge, or even to all branches of science. Subsequent studies have shown that the law is applicable to the literature of the history of technology and that of map librarianship (*6, 7*). For information science literature, a new constant ($1/n^{3.5}$) was required to provide a good fit with empirical data (*8*). In another sample study, Lotka's law was not found to be in agreement with empirical data for library science literature, where fourth-fifths of all papers were the only contribution of an individual author (*9*).

Derek J. de Solla Price has suggested that one-half of all scientific papers are contributed by a number of authors equal to the square root of the total number of scientific authors (*10*). It has recently been demonstrated that Price's "square root law" is not mathematically inconsistent with Lotka's law (*11*).

Lotka's law of scientific productivity is based on a fundamental assumption that the number of papers published by a scientist is a measure of his contribution to science. The validity of this assumption is obviously debatable. In this context, Price's comments are noteworthy.

> Let it be freely admitted at the outset that this is a bad scale. Who dares to balance one paper of Einstein on relativity against even a hundred papers by John Doe, Ph.D., on the elastic constant of the various timbers (one to a paper) of the forests of Lower Basutoland?
>
> The scale is bad if for no other reason than its existence has moved people to publish merely because this is how they may be judged.
>
> . . . Flagrant violations there may be, but on the whole there is, whether we like it or not, a reasonably good correlation between the eminence of a scientist and his productivity of papers (*12*).

It is obvious that any final assessment of scientific productivity should depend on a far broader basis than mere productivity in publishing.

Zipf's Law

George K. Zipf proposed an inverse relationship between the rank of a word in order of frequency, and the frequency of its occurrence in a long stretch of natural language text. He examined word frequencies in newspaper reports, encyclopedia articles, and similar documents for "empiric evidence of vocabulary balance." One of the texts examined by Zipf was James Joyce's novel *Ulysses*. The novel contains a total of 260,430 running words, of which 29,899 are unique word forms. A frequency table of words occurring in this novel, arranged in the order of decreasing frequency, was available ready-made, and by examining this table, Zipf found that the product of the rank of a word (r) and its frequency (f) was a constant. For example, the tenth most frequent word ($r = 10$) occurred 2,653 times ($f = 2{,}653$); the hundredth word ($r = 100$) occurred 265 times ($f = 265$); the two hundredth word ($r = 200$) occurred 133 times ($f = 133$), and so on. In all these cases, the product of the rank and the frequency of the words was nearly the same.

Zipf's law states that if the words occurring in a natural language text of sizable length were listed in the order of decreasing frequency, then the rank of any given word in the list would be inversely proportional to the frequency of occurrence of the word. Zipf's equation is

$$r \cdot f = k$$

where r and f are, respectively, the rank and frequency of words, and k is a constant (*13, 14*).

Zipf's law was further expanded and restated by Benoit Mandelbrot, as follows (*15, 16*):

$$f = k(r + c)^{\theta}$$

where c and θ are constants. The constant c and the exponent θ in this equation are supposed to provide a better fit than the original Zipf equation for high- and low-frequency words, respectively (*1*).

Although Zipf's law was derived from empirical data on word frequency in natural language texts, its manifestations are evident in a wide range of social and economic phenomena (*17*). Zipf explained the pervasive manifestation of his law as a consequence of a general principle of least effort (*14*). An example of a phenomenon governed by Zipf's law is subject indexing using a controlled vocabulary. All the descriptors or terms in a controlled vocabulary are not used with the same frequency; some are used very frequently, and some are rarely used. An inverse relationship seems to exist between the frequency of use of descriptors and their rank in order of frequency (*18*). A similar relationship has been discovered between the number of documents indexed and the number of different descriptors employed in coordinate indexing (*19*).

Bradford's Law of Scattering

Samuel Clement Bradford was much concerned with the twin problems of overlap and omission in the coverage of primary journal literature by indexing and abstracting services. In his article published in 1934, which contains the first enunciation of his law of scattering, Bradford wrote:

> Those who are concerned with progress in science and invention are aware of the need for the provision of an efficient service for abstracting and indexing scientific and technical literature. It is, therefore, somewhat disquieting to find on inquiry that, although the 300 abstracting and indexing journals notice 750,000 articles each year, which is the same as the total number of papers published in their fields; owing to duplication of effort, only 250,000 different articles are dealt with and 500,000 are missed. This is the more difficult to understand when the skill and money spent on these services are realised. It seemed worthwhile to inquire whether the cause of this failure might not lie in the manner in which the literature of a subject is distributed among the periodicals that contain it, and an investigation was consequently undertaken by Mr. E. Lancaster Jones in the Science Library. The results fully confirm this view *(20)*.

Bradford examined two bibliographies prepared in the Science Library (Britain) on applied geophysics and lubrication, and he prepared lists of journals arranged by decreasing order of source items contributed by the journals to the bibliographies. He noticed that in each subject there were a few very productive sources, a large number of sources which were moderately productive, and a still larger number of sources of constantly diminishing productivity. The whole range of periodicals was thus seen as "a family of successive generations of diminishing kinship, each generation being greater in number than the preceding, and each constituent of a generation producing inversely according to its degree of remoteness" *(20)*.

In the list of periodicals ranked by diminishing productivity, Bradford identified three groups of periodicals that produced approximately the same number of articles on the subject, but the number of periodicals in these three equiproductive zones increased by a constant factor. Based on this analysis, he stated his law of scattering thus:

> If scientific journals are arranged in order of decreasing productivity of articles on a given subject, they may be divided into a nucleus of periodicals more particularly devoted to the subject and several groups or zones containing the same number of articles as the nucleus, when the numbers of periodicals in the nucleus and succeeding zones will be as $1:n:n^2$. . . . *(21, 22)*.

Bradford also plotted graphs of the cumulative number of source items (R) versus the logarithm of the cumulative number of journals ($\log n$). The resulting graphs for applied geophysics and lubrication were similar to the graph shown in Figure 1. Such a graph is sometimes called a "Bradford bibliograph."

The graph begins as a rising curve AP_1 and then continues as a straight line. The rising part of the graph represents the nucleus of highly productive journals. The points P_1, P_2, and P_3 on the bibliograph are the boundaries of three equiproductive zones in which the same number of articles as in the nucleus (represented by $OY_1 = Y_1Y_2 = Y_2Y_3$) are derived from an increasingly larger number of journals (represented by OX_1, X_1X_2, and X_2X_3).

AMBIGUITY IN BRADFORD'S LAW

Bradford's verbal formulation of the law of scattering is not mathematically

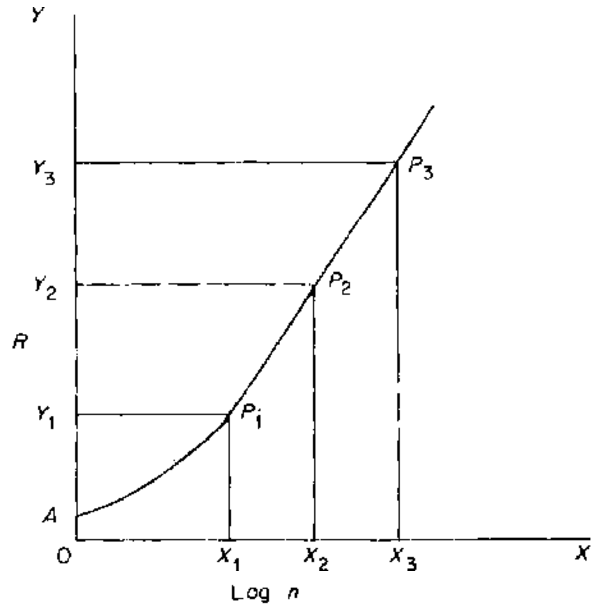

FIGURE 1. *The Bradford bibliograph.* R *is the cumulative number of references and* n *is the cumulative number of journals.*

identical with the graphical representation described in his original article in 1934. The verbal formulation was the result of Bradford's theoretical speculation; the graph was obtained by plotting empirical data derived from two bibliographies at the Science Library. The verbal formulation corresponds to the linear portion of the bibliograph, but not to the entire graph with its initial rising curve. This ambiguity was first noticed by Vickery in 1948. Vickery also extended the Bradford distribution and showed that the relation should hold for any number of zones of equal yield, not just for high-, medium-, and low-yielding quantiles as Bradford had proposed (*23*).

It has been suggested that Bradford's earlier work as a chemist might have provided the inspiration for his later formulation of the law of scattering:

> In the late 1920's Bradford was a chemist working on Liesegang Rings, which are banded precipitates formed at the junction of certain fluids as they diffuse into one another. If this experiment is performed in a long tube, the rings are spaced along the length of the tube, and the distance between each pair of rings increases exponentially away from the initial junction of the fluids.
>
> The analogy between this phenomenon and Bradford's division of the literature into groups is clear when the original formulation of the law is considered. Hence the difference between the first statement and the graphical expression in which he tested out this idea (*24*).

The graphical representation of the law of scattering has been found to be slightly more accurate than the verbal formulation when tested with empirical data derived from a number of bibliographies in different subjects. Also, the graphical method seems to be more convenient for use: The nucleus is readily identifiable, and the total number of journals and articles may be easily estimated with a minimum of observed data (*25*, *26*).

Since its enunciation, Bradford's law of scattering has been analyzed, restated, and interpreted by several contributors. There are variations in the subsequent analyses and interpretations, mainly because of the original discrepancy in its analytical and graphical formulations by Bradford. Two major schools can be recognized: the analyses by Leimkuhler (*27*) and Goffman and Warren (*28*) are based on Bradford's verbal description of the partitioning of journals into equiproductive zones; those by Kendall (*29*), Cole (*30*), and Brookes (*31*, *32*) are based on the graphical model.

Leimkuhler derived the following function to predict the distribution of references in a collection of pertinent source documents (*27*):

$$F(x) = \frac{\ln(1+\beta x)}{\ln(1+\beta)} \quad (0 \leqslant x \leqslant 1)$$

where $F(x)$ is the cumulative fraction of references in the collection, x is the fraction of documents in the collection which are most productive, and β is a constant related to the subject field and the completeness of the collection.

$F(x)$ is the Bradford cumulative distribution function, and it is the inverse function for the Bradford law of scattering. The Bradford distribution predicts the number of references for a given proportion of journals; whereas Bradford's law of scattering gives the number of journals required to obtain a given proportion of the references. Leimkuhler concluded that "Bradford's law and Zipf's law are essentially just two different ways of looking at the same thing" (*27*).

Kendall applied Bradford's law of scattering to a study of the dispersion of operational research literature and obtained a remarkably linear bibliograph. He also showed that the Bradford distribution was structurally similar to the Zipf distribution (*29*).

Another important interpretation of Bradford's law was made by Brookes in 1968 (*33*). Brookes derived the following expression for the "exact Bradford distribution function":

$$R(n) = k \log n$$

where $R(n)$ is the cumulative total of relevant papers found in the first n journals when the journals are ranked in the order of decreasing productivity. The value of the scattering parameter k depends on the document collection. Brookes showed that this distribution is identical to the Zipf distribution, and he concluded that Bradford's law of scattering and Zipf's law are essentially the same.

Brookes's equation is an exact formulation of the distribution which satisfies Bradford's law of scattering as amended by Vickery. But, when empirical data are plotted, the ideal straight line indicated by Brookes's equation is attained only in part. When data pertaining to 730 papers on vitamins found in 146 journals were plotted by Brookes, the resulting bibliograph followed a linear course, but it eventually formed a curve which drooped below the straight line predicted by Bradford's law. A similar droop had been noticed earlier when Groos plotted data gathered

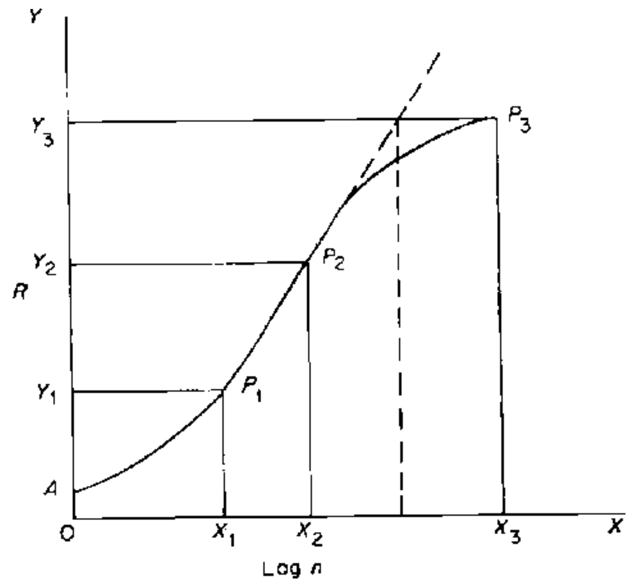

FIGURE 2. *The "Groos droop."* R *is the cumulative number of references and* n *is the cumulative number of journals.*

by Keenan and Atherton on the journal literature of physics (*34*, *35*). (See Figure 2.)

There are two possible explanations for this droop of the Bradford bibliograph from linearity: (*a*) The literature search was incomplete—if the search had continued, more references would have shown up, thus restoring the sagging empirical curve to its predicted linearity; (*b*) the law of scattering as formulated by Bradford is precise only up to a point—it does not completely fit the empirically observed pattern of distribution of literature. Both these explanations for the "Groos droop" have been proposed.

APPLICATIONS OF BRADFORD'S LAW

Bradford's law has been shown to be applicable to bibliographies as well as to larger aggregates of literature (*28*). A study of the distribution of monographic literature issued by publishers has shown that Bradford's law can be applied to predict the productivity of publishers of monographs (*36*). Patterns in the actual use of documents in libraries have also been found to obey the law of scattering (*37–40*).

Bradford's law has been applied to studies of the dispersion of literature, mostly in the fields of science, engineering, and medicine. Most of these are "citation studies" which consist of ranking journal titles on the basis of the frequency of citations made to those titles in published literature. Ranked lists of journals may also be developed on the basis of actual use of the journals as revealed by circulation statistics or direct observation in libraries. A number of such studies are listed in the Bibliography. Ranked lists of journals can be used as a tool in the development and management of journal collections in libraries. Studies on the scattering of literature enable designers and managers of libraries and information centers to answer the following types of questions:

> What would be the cost of collecting all the journals relevant to a given topic?
>
> What fraction of the total coverage would be available at any specified limit of cost?
>
> What is the optimum distribution of journal collections as between a central reference point and satellite departmental or regional collections?
>
> How can a given collection best be subdivided into collections of primary, secondary and tertiary relevance or into stores requiring frequent, occasional, or only rare access? (*33*)

"Core lists" of journals based on frequency of citation or frequency of use are useful in identifying important journals for acquisition. But a high rank in a core list based on frequency of citation does not necessarily indicate a high intrinsic value for a journal. Frequency of citation or use of a journal is governed by many factors—such as availability, language and country of publication, size and frequency of publication, coverage in secondary journals, reprint dissemination, reputation of the authors, and so on (*41–43*). The use of citation frequency as a measure of journal significance is based on two assumptions: (*a*) citation is a valid index of use, and (*b*) use is positively related to value. A comparison of lists of journals ranked by citation counting with lists of the same journals ranked by frequency of use in the British Library Lending Division, showed a low rank order correlation (*44*). The use of core lists as aids in planning and developing a collection of journals should be tempered by an appreciation of the needs of the specific situation. "Bradford's law is not reliable in predicting the productivity of individual journals; it is a statistical law which relates only to large collections of journals or to major subsets of such collections" (*33*).

The law of scattering has also been used to study the rate of obsolescence of literature. It is well known that recent literature is used more extensively than older literature. There is some indication that the rate of obsolescence of literature with time follows an exponential distribution (*45*). Obsolescence studies could be useful in decisions on weeding, binding, and buying back runs of serials, and in predicting future use of library collections (*46*). Brookes has suggested graphical methods for (*a*) estimating the completeness of bibliographies and (*b*) determining a suitable cut-off point in core lists of journals beyond which it would be more economical to acquire photocopies of journal articles than to acquire journals on subscription (*32*, *47*). Other possible applications of Bradford's law are (*31*, *32*):

1. Estimating comprehensiveness of indexing and abstracting services
2. Measuring effectiveness of retrospective and current awareness services
3. Prediction of publishing trends
4. Planning multilevel (e.g., national, regional, and local) library systems and networks

There is not enough evidence, however, to demand the actual use of the law of scattering for any of the above purposes. Brookes feels that the Bradford–Zipf distribution, after more refinement and testing for reliability, "seems to offer the only means discernible at present of reducing the present quantitative untidiness of scientific documentation, information systems and library services to a more orderly state of affairs capable of being rationally and economically planned and organized" (*31*). However, it must be conceded that the laws of scattering are empirical laws and do not have the universality or immutability of the laws of nature. "As with any social arrangement we can change them if we have the inclination to do so, and the power to persuade others to conform. This option is not available with the laws of nature. Things fall to earth, not away from it, whatever the consensus of opinion" (*48*).

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K. Subramanyam

THE SCHOMBURG CENTER FOR RESEARCH IN BLACK CULTURE

The Schomburg Center for Research in Black Culture is the most comprehensive resource in the world for the study of Black peoples. Located in Harlem, New York City, the Schomburg Center provides books by Black authors and literary and historical works which are accounts of Black life and history. The book collection is supplemented by numerous periodicals, pamphlets, manuscripts, personal papers, photographs, prints, newspaper clippings, playbills, programs, broadsides, and sheet music. Also included are several thousand phonograph and tape recordings, both music and spoken word, of works by Black people. On display in the center are art objects of ivory, metal, and wood from the African continent, as well as paintings and sculpture by Afro-American artists.

The Schomburg Center is international in scope—in other words, it concerns all peoples of African descent—and it covers every phase of Black experience. Its materials range from early rarities to contemporary publications, from Benin to Watts.

The nucleus of the center was the distinguished private library of Arthur A. Schomburg, a Puerto Rican of African descent. In 1926 the Carnegie Corporation of New York provided the money with which the New York Public Library purchased the collection from Mr. Schomburg. Today its holdings, multiplied and broadened, serve as the major resource for those seeking documentation concerning Black activity wherever Black people have lived in significant numbers.

The motivating force in the life of Arthur A. Schomburg was a zealous interest in collecting Black art and printed materials. He attributed this interest to a remark by one of his teachers in Puerto Rico (where he was born and spent his early years) that "the Negro had no history." He spent his life and his personal funds disproving this assertion.

> The American Negro must remake his past in order to make his future.
>
> Though it is orthodox to think of America as the one country where it is unnecessary to have a past, what is a luxury for the nation as a whole becomes a prime social necessity for the Negro. For him, a group tradition must supply compensation for persecution and pride of race the antidote for prejudice. History must restore what slavery took away, for it is the social damage of slavery that the present generation must repair and offset. (Arthur A. Schomburg, "The Negro Digs Up His Past," in *The New Negro*, Alain Locke, ed., reprint, Arno Press, New York, 1968)

Schomburg wrote these statements in 1925 after the historic collection which he had assembled during his years in Harlem and Brooklyn had been purchased by the New York Public Library. Indeed, these statements were an integral part of the publications which heralded the movement variously described as the "Harlem Renaissance," the "Black Renaissance," and the "New Negro Movement." The renaissance received its most significant recognition with the appearance of a special Harlem number of *Survey Graphic*, edited by Alain Locke. Later in the same year, the articles which appeared in that journal were collected and enlarged in a book, *The New Negro*.

Schomburg's essay "The Negro Digs Up His Past" expressed the relation of book collecting to the creativity of this period. The library to which his collection was added became, and continued to be, the cultural center of Harlem. There, Claude McKay, Langston Hughes, Countee Cullen, Jessie Fauset, and James Weldon Johnson (to mention only a few) might be encountered as readers as well as occasional lecturers for the frequent forums and informal gatherings which took place at the center. Although there were many elaborate social parties which gained more publicity, the library was the hub of serious activity during the 1920s, and A. A. Schomburg was the motivating force. His personality and talent added warmth and magnitude to his collection until his death in 1938.

The librarian in charge of the Negro Division (as it was named then) was Mrs. Catherine A. Latimer, who may have been the first Black professional librarian employed by the New York Public Library. She was the reference librarian responsible for integrating Schomburg's collection and the earlier book collection into the great New York Public Library system. A word needs to be said here about the community which motivated the establishment of the Negro Division. In the early 1920s, as Harlem was emerging as a Black community, there was developing an interest in Negro history. It must be admitted that this was a nationwide interest, as expressed by Carter G. Woodson and his associates in founding the Association for the Study of Negro Life and History and in the beginning of the American Negro Academy, of which Schomburg was a founding member. In Harlem, a number of concerned citizens sought the special attention of the New York Public Library toward developing the branch library in its midst as the cultural center of Black Harlem. One of the first activities undertaken by the librarian brought in to develop this center—with the active support of such prominent citizens as James Weldon Johnson, Hubert Harrison, and others—was to set aside a reference collection of books by and about Negroes. This collection proved inadequate and thus the help of the Carnegie Corporation was sought to acquire Schomburg's library. Urban League officials—including George Edmund Haynes, Eugene Kinckle Jones, and L. Hollingsworth Wood—were vital instruments in these arrangements, for at that period the Urban League's program included artistic and creative concerns, as well as social and economic matters.

Mrs. Latimer remained the reference librarian until her death in 1954. She was the organizer through the early period. Schomburg did not become directly involved with the library immediately. For 2 years he served as curator of the Negro collection at Fisk University, but he served the New York Public Library's 135th Street Branch from 1932 until his death in 1938. Mrs. Latimer supervised tremendous activity during the days of the Work Projects Administration, when the manuscript collection of Mr. Schomburg and the extensive collections of Alexander A. Crummell and Bruce "Grit" (so nicknamed by Booker T. Washington) were arranged and callendered. Mrs. Latimer was peripherally involved with the Negro in New York Project, which was based in the 135th Street Branch. Later came the

Negro Theater Project, in the basement, and this led to the Library Theater Project which survives as the Equity Library Theater. Even later, the American Negro Theater was developed in that same basement, and that group remained associated with the library, to launch the careers of Frederick O'Neal, Harry Belafonte, Sidney Poitier, and others.

Among the items in Schomburg's original collection were the following:

A copy of Juan Latino's Latin verse (Granada, Spain, 1573). Remembered as an incumbent of the chair of poetry at the University of Granada during the reign of Philip V and spoken of as the "best" Latinist of Spain in his day, Latino had not been thought of as a Negro for generations. Schomburg reminded scholars that Juan Latino was a full-blooded African Negro. He offered the poet's verse on the return of the Spanish prince from the battle with the Turks at Lepanto (published 20 years before the first of Shakespeare's writings) as an exhibit of Negro accomplishments.

The work of America's first Negro poet: Jupiter Hammon's *Address to the Negroes in the State of New York* (1787).

Manuscript poems and early editions of the works of Phillis Wheatley, slave girl.

The autobiography of Gustavus Vassa, which led to Granville Sharp's attack on slavery in the British colonies.

Copies of the *Almanacs* (1792 and 1793) compiled by Benjamin Banneker, the Negro whose unusual abilities were employed by Thomas Jefferson and others.

The sermons of Lemuel Haynes, the Negro who served as pastor of a white church in Rutland, Vermont, for 30 years following the Revolutionary War.

The scrapbook of Ira Aldridge, Negro actor who won fame in Europe as a Shakespearean actor during the 19th century.

Clotel, or the President's Daughter: A Narrative of Slave Life in the United States, the first novel by an American Negro.

On April 20, 1927, Paul Robeson and Lawrence Brown gave a Town Hall concert to promote a Museum of African Art in Harlem. Proceeds of this benefit completed a fund already started by subscription for the purchase of part of the Blondiau Collection of African Art. That purchase was placed on loan in the New York Public Library's 135th Street Branch and remains part of the existing display of African art.

In 1936 the Williamson Collection of Negro Masonry was presented to the Negro Division. Harry Williamson had been collecting books about Blacks in masonry for three decades before he turned over his library to augment the existing collection at the 135th Street Branch. He sought to document the legitimacy of the Prince Hall Lodges, which were not recognized by the white Masons, as well as to chronicle the many and varied activities of Prince Hall Masons. He included such records as the proceedings of 59 Grand Lodges of Prince Hall (dating from 1860 proceedings of masonic congresses), constitutions of 31 Prince Hall Grand Lodges, masonic periodicals, and scrapbooks of newspaper clippings on masonic activities. Williamson had developed the most comprehensive body of material on the Black masonic movement in the country. After the original donation, until his death in

1965, Williamson continued to add to his collection, keeping it current and increasing its importance and significance manyfold.

During the Depression many activities of the 135th Street Branch were centered around Mr. Schomburg's collection. One of the most notable was the exhibition of paintings by Charles ("Spinky") Alston, who died in the spring of 1977. He was director of the art workshop and taught Jacob Lawrence, in whom Mr. Schomburg took special interest. The gouache entitled *The Curator* (which is Lawrence's impression of Mr. Schomburg) has come into the holdings of the center in recent years.

With aid of Alain Locke, the Adult Education Program of Harlem was initiated in the same buildings, and it successfully introduced many migrants from the rural South into the joys of literacy. The forums and programs connected with this project brought speakers from many subject fields and many lands.

One of the most memorable events was the presentation of Phillipa Schuyler, child prodigy pianist at the age of four. Many Africans who later became independent rulers of their countries have reminisced of the inspiration derived from attending programs in the center's auditorium during the 1930s.

After Schomburg's death in 1938, the Negro Division was officially designated the Schomburg Collection. Under Dr. L. D. Reddick, successor to Schomburg, the scope and activities of the collection were greatly expanded by the inclusion of lecture series, exhibits, scheduled programs on special occasions, and the annual Honor Roll in Race Relations Awards. In 1941 the collection was moved to the top floor of a new steel-girdered building facing on 136th Street, attached back-to-back to the old 135th Street building. It soon became the focus of international attention in the field of Black Studies. Dr. Reddick resigned his position in 1948. He was replaced for a few months by Dr. Dorothy Williams, who was followed by the present incumbent, Mrs. Jean Blackwell Hutson, who is now designated chief of the Schomburg Center.

The curators who succeeded him built upon the spirit and tradition of Arthur Schomburg and the others who participated in the movement for a Black collection in the early 1920s. The collection has gradually expanded from the original nucleus of reference volumes to a present bookstock of 65,000. In addition, it includes a wealth of nonbook and even nontextual resources which are of immeasurable value to the scholar.

The excitement of the so-called Black Revolution of the 1960s was accompanied by demonstrations about the apparent neglect of the Schomburg: the poor physical condition of its housing, lack of humidity and temperature controls, deterioration of the books and other material, etc. These protests were followed by the formation of committees to change the deplorable conditions, and they finally culminated in 1971 in the incorporation of a group of concerned citizens as the Schomburg Collection of Black History, Literature and the Arts. President of the board of the new corporation was Frederick O'Neal, with Edward Taylor as vice-president, William Ford as treasurer, and Jean Blackwell Hutson as secretary. Other outstanding members of the board were Leroy Bowser, Dick Campbell, Dr. John Henrik Clarke, Geanie Faulkner, Dr. J. Newton Hill, Dr. Mary Holford, Bertina

Hunter, Ann Kheel, Leon Lewis, Ella McDonald, Guichard Parris, James Pitt, and Viola Scott-Thomas.

The purposes of the Schomburg Corporation have been to raise funds for the conservation and preservation of material in the Schomburg, to work toward the construction of a new building that would adequately house the holdings, and to solicit new material. The corporation was instrumental in obtaining a grant from the National Endowment for the Humanities in 1972 and in raising matching funds to meet the requirements of that part of the grant. With the New York Public Library, it was successful in obtaining a continuation of this grant through June 30, 1974, and in obtaining second and third grants from the NEH for 1974–75 and 1976–78.

The corporation, together with the New York Public Library and interested political figures, effectively worked toward securing an award under the Federal Public Works Employment Act of 1976 that will give the Schomburg Center its vitally needed new home. Contracts were approved in January 1977, and construction of the new building began with clearing the site in April of that year. Groundbreaking ceremonies were held on June 8, 1977, with the opening expected in January 1979.

Also in June 1977, Mr. O'Neal became president emeritus of the corporation, and he was succeeded as president by James Drayton. Ella McDonald is now first vice-president, Emory Taylor is second vice-president, Bertina Hunter is treasurer, and Jean Hutson continues as secretary. Other members of the board are Leroy Bowser, Carolyn Anderson Brown, Dick Campbell, Dr. John Henrik Clarke, Professor James H. Cone, Geanie Faulkner, Dr. J. Newton Hill, Dr. Mary Holford, Jane Tillman Irving, Rev. William M. James, Ruth Jett, Ann Kheel, Diane Lacey, Leon Lewis, Frederick O'Neal, Guichard Parris, Dr. Dannetta Sanders, Dean Schomburg, Viola Scott-Thomas, and Father M. Moran Weston. The corporation has been, and will continue to be, influential in attracting materials that will enrich the collection.

Meanwhile, in 1972 the administration of the collection was transferred from the Branch Libraries System (in which it had functioned for 47 years) to the Research Libraries of the New York Public Library. At that time the name was changed to the Schomburg Center for Research in Black Culture.

The 50th anniversary of the center was celebrated by an extensive exhibition of its notable holdings in the Great Hall of the 42nd Street Library. The opening of the exhibition was marked by a reception, in the Great Hall and in the Trustees Room. An effort was made to bring out everyone who had been associated with the history of the Schomburg, to join in the celebration with contemporary, literary, and artistic persons, and with those currently involved with its development. It was truly a memorable occasion, accented by the premier of the film *From These Roots*, sponsored by the Schomburg Center and produced by William Greaves, Inc.

One little-known aspect of the recent history of the Schomburg is the vital support of the New York State Legislature, which has enabled the Schomburg to maintain longer hours of opening than many other units of the New York Public Library and has substantially augmented funds for staff, acquisitions, and preservation. The first grants in 1973 were largely spearheaded by State Senator Sidney von Luther, but his effectiveness has been continued and even extended by Senator Carl McCall and Assemblyman George Miller, with the support of the Black and Puerto Rican Legislative Caucus.

A national fund-raising campaign by mail—under the leadership of Mrs. Ralph Bunche and Drs. John Hope Franklin and Robert Weaver—has raised matching funds for two grants from the National Endowment for the Arts. It has initiated an annual fund-raising dinner and produced a quarterly journal mailed to donors and national educational institutions.

Today the Schomburg is a living monument to the efforts and concerns of those who helped transfer the private library of Arthur Schomburg to a public center for research in Black culture.

JEAN BLACKWELL HUTSON

SCHOOL LIBRARIES

In contemporary American education, the school library is respected and valued as a vital, integral support component of the school's instructional program. The concept that the school library should be directly involved in the school's instructional program and should serve as a learning laboratory is a unique 20th-century development. This concept is the direct result of America's determination, following the spectacular success of Russia's sputnik in October 1957, to upgrade the quality of education—kindergarten through graduate school. This thrust, generated by America's deep concern for equaling or surpassing Russia's scientific excellence, propelled the traditional school library from the peripheral fringes of instruction, from noninvolvement, into the mainstream of the teaching and learning program.

History

Historically, school libraries—as their college and university counterparts—were created to provide custodial care for a school's collection of reference books. The earliest record of tax moneys being allocated to establish and support a library as a separate school facility predates the American Declaration of Independence by approximately 200 years. In Shrewsbury, England, an ordinance was passed in 1578 which stated that schools should include "a library and a gallerie . . . furnished with all manner of books, mappes, spheres, instruments of astronomye and all other things appertyninge to learning which may either be given to the schools or procured with school money" (*1*).

The birth of America's school libraries cannot be assigned a definite date. Rather, these first school libraries were born unheralded in the earliest colonial times when the teacher in the one-room placed the Bible, a chapbook, and the Bay Psalm Book on the corner of his desk. Benjamin Franklin as early as 1740 included a school library as a separate and distinct facility in his blueprint for an ideal academy. In 1744 the Penn Charter School in Philadelphia followed Franklin's advice and designated a specially designed room as its library. Despite Franklin's advice and the example set by the Penn Charter School, school libraries as separate entities did not come into existence until the middle of the 19th century.

Inasmuch as public schools are tax-supported institutions, there were no school libraries until state legislatures allocated tax moneys for their establishment and support. In 1835 New York State enacted legislation to permit school districts to use moneys for the purchase of library books. In 1839 New York passed additional legislation setting aside the annual sum of $55,000 to be given on a matching-funds basis to local school districts for the establishment, not of *school building* libraries (i.e., libraries for individual schools), but of *school district* libraries.

Horace Mann recommended to the Massachusetts legislature in 1839 that moneys be provided to establish school building libraries. He warned that students, if limited to textbooks, would "contract a habit of being contented with ignorance" (*2*). In 1837 Massachusetts enacted legislation to enable school districts to raise funds for libraries and in 1842 appropriated $15 per school district for the purchase of library books, provided that the school district appropriated a like amount. Similar laws were passed by Michigan in 1837, by Connecticut in 1839, and by Rhode Island in 1840. By 1876, 19 states had passed laws permitting public moneys to be used by school districts for the purchase of library books.

Evidence abounds that school libraries during the 19th century existed in name only. They were little more than unorganized, unsupervised, and little-used miscellaneous book collections that lacked any semblance of educational significance or value. The inadequacies of these so-called school libraries is shown by the following rules pasted inside the cover of library books housed in the principal's office of the Third Ward School in Pittsburgh, Pennsylvania, in 1859:

1. All scholars in the Grammar Department and those in rooms numbers 9, 10, and 11 (Intermediate Department), whose conduct and recitations are uniformly good, and who shall be recommended to the Librarian by the Teacher in charge, shall be entitled to receive a book on the first and third Friday of each month.
2. No scholars allowed to retain a book longer than two weeks.
3. Scholars forfeit their privilege of receiving books by lending, soiling or abusing them.
4. Parents will be required to replace any book lost or torn.
5. No scholar will be allowed to have more than one book out at a time.
6. The Principal shall be Librarian. (*3*)

Birth of the School Library Profession

Two significant events foreshadowing America's concern with the development of school libraries coincided with the nation's centennial celebration. The first event was the publication by the United States Bureau of Education of a special report, *Public Libraries in the United States of America: Their History, Condition and Management.* This report, though chiefly concerned with the status of public libraries, revealed that only 826 high school libraries existed in the entire United States. The second event was the formation of the American Library Association in Philadelphia in 1876. This association—under the leadership of its first president, Melvil Dewey—addressed itself to the task of improving and extending school library service as well as public library service.

In 1896 the National Education Association established a Library Section. The American Library Association created its own School Library Section in 1914. These two professional organizations created a joint School Library Committee in 1915, to carry out two specific functions:

1. To investigate actual conditions in high school libraries throughout the United States.
2. To make these conditions known to school administrators and to secure their aid in bettering existing conditions.

The first purpose was accomplished through a series of surveys of school library development in the South, the Middle West, the West, and the East. The second purpose was accomplished in 1916 when a report of the findings of these surveys was presented to a gathering of the Secondary Department of the National Education Association at which high school principals, teachers, librarians, and state and city superintendents were in attendance. The full account of this historic meeting was published in the *National Education Association Proceedings* for 1916.

School Library Standards: 1918

Following the presentation of the survey report, the membership of the Department of Secondary Education voted that the Library Committee should be continued and should work out a comprehensive program for school library development. This committee prepared America's first school library standards, under the chairmanship of Charles C. Certain. This document, *Standard Library Organization and Equipment for Secondary Schools of Different Sizes,* was adopted by the National Education Association in 1918, and it was subsequently adopted by the American Library Association and published in 1920. In the history of America's school library development, the publication of the Certain Report, as these standards were commonly called, is a historical turning point of great significance, for it marks the emergence of the school library from the "dark ages" of educational neglect, misuse, and ineffectiveness.

In the introduction to the Certain Report, Jesse Newlon, Denver superintendent of schools, explained the need for and the significance of high school library standardization:

> . . . the war has taught us that we must spend more money in every line than we have ever spent before. But in planning our high schools we have overlookt, with very few exceptions, the high-school library.

> What is true of high schools in general is true of junior high schools in particular. . . .
>
> There are few well-planned high-school libraries in the United States. Sometimes there is a large study-hall for the library—generally just one room with no workroom or conveniences of any kind for the library staff. . . .
>
> Herein lies the importance of the report on STANDARD LIBRARY ORGANIZATION AND EQUIPMENT FOR SECONDARY SCHOOLS OF DIFFERENT SIZES. For the first time administrators see that the library is the very heart of the high school. It will be possible now for those of us who believe in the importance of the library to talk in definite terms to boards of education when we are planning junior and senior high schools. . . .
>
> Those of us who deal with boards of education know that we are likely to get what we want if we know what we want. The person who approaches the board of education with a definite program in mind, knowing exactly what he wants, with recommendations and reasons for it, is likely to get what he wants, and that is true of the community . . . . this library report will make it possible to get good libraries—a thing we have not had in the past. Of course, there are a few exceptions, but in general we do not have adequate arrangements in our high schools, either in room, in equipment, or in staff for libraries. . . .
>
> We can now offer boards of education a report that is official—really official. This report represents the best of those who have studied thruout the country. Great good will come from that (*4*).

Because Jesse Newlon was both a superintendent of schools and a spokesman for high school library development, fellow farsighted school superintendents also endorsed the Certain Report. Because school superintendents are vested with the responsibility and the authority for initiating instructional change, a school library reformation grew out of this report.

Fortunately, this document not only provided comprehensive and quantitative requisite standards for high school library organization and development, but it also set forth a multiphased implementation program which specified the procedure to be followed in translating the standards into matching state and local school library programs.

> It is suggested that a committee be organized in each state to make a survey of library conditions in high schools. To begin with the work of standardizing libraries, actual conditions should be studied in relation to the standards given in this report.
>
> A complete survey should be made including such items as: (1) appropriate housing and equipment; (2) professionally trained librarians; (3) scientific service in the selection and care of books and other printed materials and in the proper classification and cataloging of this material; (4) instruction in the use of books and libraries; (5) adequate annual appropriations for salaries and for the maintenance of the library, for the purchase of books, for supplies, and for general upkeep; (6) a trained librarian as state supervisor of all the school libraries.
>
> Based upon this survey, a schedule of systematic library development should be outlined, with definite annual goals to be attained, until all standards have been achieved (*5*).

The wisdom and foresight of the Committee on Library Organization and Equipment in advocating a state implementation procedure, in the Foreword of the document, cannot be overemphasized. The standards—no matter how excellent—would have had little or no impact without the endorsement and support of the state departments of education. This document was magnificently planned, designed, and structured. It has served ever since as a model of excellence.

Several requisites specified in the report are of hallmark significance:

> THE LIBRARIAN—QUALIFICATIONS
>
> The librarian in the high school should combine the good qualities of both the librarian and the teacher and must be able to think clearly and sympathetically in terms of the needs and interests of high-school students.
>
> A wide knowledge of books, ability to organize library material for efficient service, and successful experience in reference work should be demanded of every librarian. Most of all should the personality of the librarian be emphasized. Enthusiasm and power to teach and inspire are as essential in the high school librarian as in the teacher.... Successful teaching experience in a high school is a valuable asset in the librarian....
>
> The salary of a high-school librarian should be adequate to obtain a person with the qualifications set forth in this report. It should not be lower than that of the English teacher. In departmentalized high schools the librarian should receive a salary equal to that of other department heads....
>
> Clerical work of the high school of the nature of office work should not be demanded of the librarian. Under no circumstances should the librarian be expected to do clerical work properly required in the principal's office such as keeping records of attendance and official records. To require such work of trained librarians is wasteful of educational resources and money....
>
> The librarian should be present at all teachers' meetings and should have the ability to work for and with teachers so well that mistakes in adaptation of book collections to needs may not occur.
>
> CENTRALIZATION AND DISTRIBUTION OF VISUAL MATERIAL
>
> The Library should serve as the center and co-ordinating agency for all material used in the school for visual instruction, such as stereopticons, portable motion picture machines, stereopticon slides, moving picture films, pictures, maps, globes, bulletin board material, museum loans, etc. (*6*)

With the publication of the 1920 standards, the school library profession had for the first time definitions of the basic requisites for the training of the school librarian and the direct involvement of the librarian in the school's instructional program. These standards also widened the definition of library materials to include all materials, both print and nonprint, although it was over 30 years before this concept was put into general practice.

Standards for Elementary Libraries: 1925

The Department of Elementary School Principals included in its fourth *Year Book*, published in 1925, the "Report of the Joint Committee on Elementary School Library Standards."[7] Charles C. Certain chaired this committee, which represented the Department of Elementary School Principals and the School Librarians' Section of the American Library Association. These standards were printed and distributed by the American Library Association in 1925. In the Foreword, Charles C. Certain clearly related the emergence of the elementary school library as an instructional support agency to the changes in methodology taking place in the elementary school:

> Modern demands upon the public school presuppose adequate library service. Significant changes in methods of teaching require that the school library supplement the single textbook course of instruction and provide for the enrichment of the school curriculum. Children in the school are actively engaged in interests which make it necessary for them to have the use of many books and a wide variety of materials, such as pictures and lantern slides. An essential consideration is that the books and materials be readily available when needed, and under the direction of a library staff which is part of the school organization.
>
> In the traditional schoolroom, the library was more of a luxury than a necessity. Until recently, there was no library in most public elementary schools. This was because the schoolroom procedure of the past was an impoverished procedure so far as social values were concerned. The teacher spent her time largely in urging the children from day to day to master, page by page or section by section, some instruction (7).

In this second Certain Report, the standards required the school librarian to be freed of clerical tasks, to work with children and teachers, and to provide guidance in the use of both informational and recreational materials. As in the first Certain Report, this report also stressed that the library should serve as the center and coordinating agency for visual materials as well as for books.

The impact of the 1925 report, published as *Elementary School Library Standards*, was blunted by the severity of the Depression which followed the stock market crash of 1929, just 4 short years after the publication of the second Certain Report. The period of the 1930s was one of retrenchment in education on all levels, and most school library programs all over the nation were drastically curtailed or eliminated altogether.

School Library Standards: 1945

In 1945 the American Library Association published postwar standards, *School Libraries for Today and Tomorrow*, which defined the educational purposes of the school library as follows:

1. Participate effectively in the school program as it strives to meet the needs of pupils, teachers, parents, and other community members.
2. Provide boys and girls with the library materials and services most appropriate and most meaningful in their growth and development as individuals.
3. Stimulate and guide pupils in all phases of their reading so that they may find increasing enjoyment and satisfaction and may grow in critical judgment and appreciation.

4. Provide an opportunity through library experiences for boys and girls to develop helpful interests, to make satisfactory personal adjustments, and to acquire desirable social attitudes.
5. Help children and young people to become skillful and discriminating users of libraries and of printed and audio-visual materials.
6. Introduce pupils to community libraries as early as possible and co-operate with those libraries in their efforts to encourage continuing education and cultural growth.
7. Work with teachers in the selection and use of all types of library materials which contribute to the teaching program.
8. Participate with teachers and administrators in programs for continuing professional and cultural growth of the school staff.
9. Co-operate with other librarians and community leaders in planning and developing an over-all library program for the community or area. (8)

These standards tied the quality of school library service to quantitative standards—an educationally significant school library program, which was stressed in the recommendations, requires the services of qualified personnel in sufficient numbers, an abundance of appropriate printed and audiovisual materials, adequate facilities, sufficient support equipment, and a planned procedure for making the resources and the services of the school library readily available.

The 1945 standards, *School Libraries for Today and Tomorrow*, ideal though they were, had little effect on school library development. Money was in short supply and many school administrators tended to place school library programs at the bottom of their budgetary priority list. Public apathy in regard to the quality of public education was widespread. Education at bargain basement prices was accepted as the rule, without question or qualm. It was not until Russia's demonstrated superiority in the field of space, in October 1957, that the American became apprehensive about the adequacy of education. Sputnik had shattered America's complacency.

Congress—finally admitting that educational excellence is in large measure dependent upon both costly materials and costly services—passed the National Defense Education Act of 1958. This act, popularly known as NDEA, provided state and local districts with matching funds for the purchase of instructional materials and equipment to support the teaching of science, mathematics, and modern foreign languages, and for guidance programs. NDEA also provided funds for in-service training of teachers, guidance counselors, and librarians.

The National Defense Education Act had immediate and far-reaching results. School districts became increasingly aware of the importance of providing teachers and students with instructional materials in order to extend learning beyond the limitations of the textbook and the confines of the classroom. Teachers, alerted by their professional organizations and through their participation in in-service programs, became more open to instructional innovation. Enrichment and acceleration, both requiring a wealth of instructional material, were two of the more commonly accepted approaches to up-grading the quality of classroom teaching. The teacher who was ready to extend learning beyond textbook and classroom needed appropriate support materials, and especially a library laboratory where the students could work with materials under the guidance of the school librarian who shared with the classroom teacher the responsibility for encouraging and enabling the students to learn.

The impact of NDEA was immediate. In 1958 a joint committee was formed by the American Association of School Librarians, the Association of College and Research Libraries, and the Department of Audio-Visual Instruction of the National Education Association to define both the function of the school and college library as an instructional materials center and the role of the librarian as an instructional materials specialist. No longer was there any doubt that libraries in schools and colleges were to be more than printed-resource centers; they were to be multimedia learning centers and were obligated to provide every type and all kinds of significant carriers of information regardless of how that information was packaged.

The policy statement regarding the service of school and college libraries as instructional materials centers set forth the following principles:

> All instructional materials now available, and others yet to come, are needed to secure effective and efficient utilization of educational facilities and teaching personnel. Each type of material has a unique contribution to make to the educational process. Some materials will be more effective in achieving one teaching or learning objective; others will serve another purpose better. There is no basic competition among materials. The point is that in any situation the distinctive characteristic of each medium should be recognized and all appropriate materials should be used. . . .
>
> In light of the significance of instructional materials specialists to the total educational program, it is necessary that there be definition of responsibilities, of required competencies, and of the means by which these competencies can be developed. . . .
>
> Those personal characteristics and abilities necessary to be effective in working with people in a leadership role become of major importance when the role is one of improving teaching and learning. To fulfill this role is the primary responsibility of instructional materials specialists. Their province is the materials of teaching and learning. The challenge is that of developing increasingly effective use of all types of materials by teachers and students. The measure of their success is the quality of teaching and learning that results.
>
> . . . the joint Committee believes that the knowledge and basic skills required for instruction materials specialists to do professional work in education, and the most likely sources of obtaining basic competencies are as follows:
>
> 1. SUCCESSFUL TEACHING EXPERIENCE: Instructional materials specialists should first of all be experienced teachers. . . .
> 2. FOUNDATION AREAS: Instructional materials specialists should have course work in (a) educational administration and supervision, (b) principles of learning, (c) curriculum development, (d) guidance and counselling, and (e) mass communications. . . .
> 3. SPECIALIZED AREAS: Instructional materials specialists should have course work and in-service experience in the following areas relating directly to the nature and effective use of materials: (a) analysis of instructional materials, their nature and content; (b) methods of selecting and evaluating materials, through study of individual media as well as through cross-media study by curriculum unit or grade level; (c) utilization of materials; (d) production

> of appropriate instructional materials, including laboratory work with specific media; and (e) processes for the organization and maintenance of materials and equipment. (9)

In the history of school library development, this policy statement serves as the "declaration of independence" for school librarians, for it sets forth the philosophy that the school librarian is, and by rights ought to be, a teacher directly involved in the teaching and learning process; this policy statement frees the school librarian from the tyranny of professional educational noninvolvement.

School Library Standards: 1960

The American Association of School Librarians published in 1960 the single most important document in the history of school library development, *Standards for School Library Programs*. These standards were prepared by the School Library Standards Committee under the joint chairmanship of Frances Henne, professor, School of Library Service, Columbia University, and Ruth Ersted, supervisor of school libraries, Minnesota State Department of Education. The committee, which began its work in 1957, represented many groups and individuals interested in and responsible for school libraries. The executive boards of 20 professional organizations appointed representatives to serve on the standards committee. These representatives assisted in all phases of planning procedures, formulating philosophy, and defining qualitative and quantitative requirements. The committee turned for guidance to school administrators, teachers, and librarians in all areas of the United States. The 1960 standards were not just a committee project; they were a broad-based, grass-roots endeavor involving many individuals throughout the United States.

In a very real sense, the 1960 standards are much more than a statement of the qualitative and quantitative requirements for school library programs; this document, in actuality, is an educational "bill of rights" for all American children and young people. Part I of the standards is captioned "The School Library as an Educational Force"; this introduction to the standards clearly sets forth the premises that the school library should serve as both a source and a force for educational excellence:

> [It is] of importance to all citizens . . . that our schools have the resources needed for teaching and learning.
>
> Whatever form the soul-searching regarding the education of youth may take, sooner or later it has to reckon with the adequacy of the library resources in the schools. Any of the recommendations for the improvement of schools . . . can be fully achieved only when the school has the full complement of library resources, personnel, and services. . . .
>
> In the education of all youth, from the slowest learner in kindergarten to the most intelligent senior in high school, an abundance of printed and audio-visual material is essential. These resources are the basic tools needed for the purpose of effective teaching and learning. . . . The scope of knowledge has become too vast

> to be covered extensively within the boundaries of classroom instruction, superior though that instruction may be. Through the school library these boundaries can be extended immeasurably in all areas of knowledge and in all forms of creative expression, and the means provided to meet and to stimulate the many interests, appreciations, and curiosities of youth.
>
> The school library thus stands as a symbol for the truthful expression of man's knowledge and experiences. The extent to which many children and young people of today will be creative, informed, knowledgeable, and within their own years, wise, will be shaped by the boundaries of the content of the library resources available within their schools. . . .
>
> Educational leaders stress the point that the school library is one of the requirements for quality education. . . . the school library program, embracing teaching, guidance, and advisory services, forms a unique and vital part of quality education.
>
> The most important part of the library program is the work with students and teachers, those activities and services that make the library an educational force in the school (*10*).

Throughout this document, the qualitative and quantitative standards are directly related to the philosophy that a quality, optimum education demands the support of a quality, optimum school library program.

Believing that a quality library program cannot be left to chance, the 1960 standards spelled out in detail the requisites of staff, media, facilities, service, and budget.

> A competent, effective library staff is the keynote to good school library service. No matter how extensive the collections, how large the budget, or how spacious the quarters, a school library cannot function fully as an educational force in the school if the size of the library staff is inadequate or if the librarians are lacking in the special qualifications their work requires. New educational trends, new instructional techniques, and the many diversified uses that students independently make of books and other materials offer the creative school librarian almost limitless possibilities in planning and implementing the school library program.
>
> General areas of activities that the professional library staff participates in as part of the instructional program of the school follow:
>
> 1. The school librarian works closely with classroom teachers, guidance counselors, and other faculty members, and does everything possible to make the school library of optimum service to them.
> 2. The school librarian stimulates and guides students in their reading and in their use of other communication media. He contributes in many other ways to their social and educational growth.
> 3. The school librarian directs the planning and implementation of the school's program of instruction that teaches students how to use library resources intelligently and effectively.
> 4. The school librarian constantly serves the school in his capacity as a specialist in the field of books and other materials: in the evaluation and selection of resources for the collections of the school library; in guiding and assisting students and teachers in the use of these materials; in making materials easily accessible; in being a resource consultant. . . .
> 5. A professional library staff member serves on all school committees concerned with curriculum development, and is available as a materials resource person for all departmental committees. . . .

6. A professional library staff member serves on the school's committee for textbooks. (*11*)

The 1960 standards clearly defined the function of the school library as an instructional materials center and a learning laboratory, supplying not only the raw materials but also the tools, the incentive, the guidance, and the climate essential for learning how to learn.

The *Standards for School Library Programs* were published at a most auspicious time. In rapid succession a number of vitally important events took place which moved America's schools along the road toward realizing both qualitative and quantitative standards for school library development:

1961: The Council on Library Resources provided a $100,000 grant to fund the School Library Development Project designed to provide leadership and guidance to the 50 states in their implementation of the *Standards*.

1962: The Knapp Foundation, Inc., awarded a $1,130,000 grant for a 5-year project to demonstrate the value of a full program of school library services employing multimedia.

1963: The National Education Association Project on Instruction recommended in its report, *Schools for the 60's*, that there be one or more well-planned instruction materials centers in each school system and in each school building.

1964: The National Defense Education Act was extended to include materials essential for the teaching of social studies, reading, and the language arts.

1965: The Elementary and Secondary Education Act through Title II provided federal funds for the specific purpose of purchasing school library resources, textbooks, and other instructional materials for the use of children and teachers in public and private elementary and secondary schools. Funds provided under ESEA Title II were an outright grant and required no matching expenditure on the part of the schools.

1968: The American Association of School Librarians initiated the School Library Manpower Project, a 5-year program funded by the Knapp Foundation, Inc., to study the manpower problem in three aspects: task and job analysis, education for librarianship, and recruitment.

1969: A joint committee of the American Association of School Librarians (of the ALA) and the Department of Audiovisual Instruction (of the NEA) published *Standards for School Media Programs*, which updated the quantitative requirements for school media programs.

1969: The American Association of School Librarians endorsed the School Library Bill of Rights for School Library Media Programs.

1969: The Commission on Instructional Technology in its report, *To Improve Learning*, stressed the necessity for the scientifically planned and integrated use of instructional media to support the total teaching and learning process.

1970: The American Association of School Librarians defined, published, and widely distributed a policy statement, *Policies and Procedures for the Selection of Instructional Materials*.

1975: The American Association of School Librarians, in cooperation with the Association of Educational Communications and Technology, published *Media Programs: District and School*, which updated the 1969 requirements for school media programs.

During the 1970s significant changes in educational focus, thrust, organization, content, and process have taken place. Each educational change of significance has required increased interaction with the school library program. The following changes have thrust the library into the mainstream of the educational process: greater emphasis on humanizing and individualizing instruction; on depth, breadth, and relevance in the instructional program; on learning how to learn; on thinking as a life-skill; on learning experiences in both the affective and the cognitive domains; on flexibility in scheduling, class size, grouping, and course offerings; on the open school and the open classroom; on the right to read and functional literacy; on career awareness; on the humanities; and on the planned and systematically integrated use of instructional media. The contemporary school library (regardless of whether it is called an instructional media center, a resource center, a communications center, or by any other name) is a source and a force for educational excellence, and the school librarian (regardless of whether he or she is called a media specialist, a resource specialist, a communications specialist, or by any other name) is a teacher insofar as training, certification, and service are concerned.

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SCIENCE CITATION INDEX

See *Citation Indexes*

SCIENCE INFORMATION EXCHANGE

See *BioSciences Information Service*

SCIENCE–TECHNOLOGY DIVISION, SPECIAL LIBRARIES ASSOCIATION

Since the time of its formation over 50 years ago the Science–Technology Division of the Special Libraries Association (SLA) has served to attract members from a wide variety of technical backgrounds and interests, especially appealing in recent years to those who have broad interests in science and engineering and those who wish to associate with people who do. Over the course of these years the division has also served the association as a unit which has nurtured the formation and growth of numerous sections until they reached the point of being strong enough to branch off and form their own divisions. In spite of the dissolution of component parts, the division has remained one of the largest divisions of the SLA, with an ample supply of funds in its coffers. It has sponsored many projects, stimulated the preparation of important monographic and serial publications, and served as a training ground for many association officers.

The division began in 1923 when George W. Lee organized the first meeting of technically oriented librarians at the annual SLA convention, held that year in Atlantic City. The result was the formation of the Technology Group, which gained official recognition from the SLA Executive Board in March 1925. In 1926 it joined some business-oriented units to form the Commercial–Technical Group; it split apart in 1933, with the science-oriented members then forming the Science–Technology Group that year. Its first chairman was Louise Griepenstroh.

The Science–Technology Group began its existence with four sections: Chemistry, Petroleum, Public Utilities, and Rubber. In 1936 the Electrical Communication Section was added, which later (1941) changed its name to the Engineering–Aeronautics Section. Two more units were formed in that decade: the Pharmaceutical and Metals Sections, in 1947 and 1949, respectively. The only backward step, organizationally, was the dissolution of the Rubber Section in 1935.

In 1950 all SLA groups were renamed as divisions, so the Science–Technology Division received its present name that year. It began this phase of its life with six sections: Chemistry, Engineering–Aeronautics, Metals, Petroleum, Pharmaceutical, and Public Utilities. The first of the sections to leave the division was the Metals Section, which became a division in its own right in 1953. However, in 1955 the Paper and Textiles Section was formed, so the division once more had six sections.

In the early 1960s more and more thought was given by section members to the financial and organizational advantages of seeking divisional status for their sections. However, before any other sections followed the example of the Metals Division by breaking away, two more sections were formed within the division in 1964, when the Nuclear Science and the Aerospace Sections were officially recognized. Thus the Science–Technology Division reached what was to be the peak of its organizational strength in that year, having a total of 2,567 members, almost half of the association's total of 5,697. Then began a period of reduction in the number of its units and in its membership.

Rather unexpectedly, the next section to dissolve and seek division status was one of the newest—the Aerospace unit, which took this step in 1965. In 1966 it was followed by the Engineering, Nuclear Science, and Petroleum Sections; and the Chemistry and Pharmaceutical Sections dissolved to become divisions in the fall of 1966. In 1969 the Public Utilities Section left, and in 1970 the Paper and Textiles Section dissolved for lack of membership support and activity. Thus, in the course of about 6 years, all the eight sections of the division had dissolved, all but one for the purpose of becoming divisions of the SLA.

Lest one suppose that the Science–Technology Division immediately went into a relapse, perhaps never to recover, it should be noted that in 1970 it still had 1,732 members, versus 6,500 in the association as a whole. In 1974, as it began its second half-century, the division still had 1,577 members (making it one of the larger divisions), and it was financially secure. One reason for this was the desire of many members to belong to a division representing all areas of science and technology. Other members who joined the more specialized technical divisions nevertheless frequently retained or obtained membership in the Science–Technology Division in order to keep in touch with a wider group of technically oriented librarians than membership in a more specialized division was apt to permit.

As to the accomplishments of the division, its members have produced many important, useful publications, commencing in the mid-1920s when bibliographies on technical topics were prepared soon after the group was formed. Three union lists of technical serials were issued in the 1930s and 1940s. A valuable publication in 1944 was the *Patent Index to Chemical Abstracts, 1907–1936*, prepared by the Chemical Section; this was so popular that it had to be reprinted in 1954.

A different kind of publication emanated in 1950, when the Metals Section, in cooperation with the American Society for Metals, issued the *ASM–SLA Metallurgical Literature Classification*. This was an aid for classifying such literature, with provisions for the use of punched cards if desired.

A full-length book, *Technical Libraries: Their Organization and Management* (edited by Lucille Jackson), appeared in 1951, following several years of effort by many division members. Two indexes to government reports (PB series) were published, in 1949 and 1953; they were the work of division members belonging to the Philadelphia Chapter.

Two works by division members had the honor of inaugurating two association series. The first was *Libraries for Research and Industry*, issued in 1955 under the editorship of Margaret P. Hilligan. It was the first SLA Monograph in a new series so entitled. The other was *Bibliography of Engineering Abstracting Services*, edited by Miriam M. Landuyt, also issued in 1955. It was the first volume in the SLA Bibliography Series. In 1956 a work appeared which represented the work of many division members, especially those in the Chemistry Section: *Handbook of Scientific and Technical Awards in the United States and Canada, 1900–1952*, edited by Margaret A. Firth.

In regard to serials, one of the most important ones is *Sci–Tech News*, the official bulletin of the division. Since 1966, this has also been the official bulletin of many of the technically oriented divisions, most of which had once been sections in the division and which for various reasons have preferred to keep relying on this publication for divisional news.

The predecessors of *Sci–Tech News* were the informal mimeographed *Bulletin of the Science–Technology Group*, published during the period 1934–1946, and a publication bearing the curious title *Ye Alchemical Libraries Almanack (being the Bulletin of the Science–Technology Group Special Libraries Association)*. The latter began in September 1946 and continued until March 1949, the month *Sci–Tech News* was first published, under the editorship of Allen G. Ring. This was published, more often than not, on a quarterly basis, although it suffered from long-standing financial problems. Finally, instead of relying on voluntary payments for subscriptions, it changed to a system whereby a certain sum from each member's association allocation was set aside for the journal. This plan, plus the acceptance of paid advertising in 1959, led to better times. Since 1966 other divisions have co-sponsored the publication, and the journal has been self-supporting in recent years.

Sci–Tech News has long had special features, such as book reviews, abstracts of selected periodical articles, and a list of bibliographies of interest. Issuance of citations of articles on automation and computers led to a decision not to compete with the same sort of feature appearing in the official publication of what is now the American Society for Information Sciences (ASIS). This in turn led to the creation of a new indexing and abstracting service, *Documentation Abstracts*, which commenced in March 1966 under the sponsorship of ASIS, SLA, and other groups. Another feature for many years was "Science–Technology Serials," edited by Andrew Glick for most of its life (1957–1962). A similar feature, entitled "New Engineering Serials," began in 1972 under the editorship of Carmela Carbone. Those wanting a detailed history of the journal are referred to the article by Alfred Beltran (*1*).

Some periodicals prepared by the division are well known throughout the library world, such as the Pharmaceutical Section's *Unlisted Drugs*, which began in 1949. Probably the best-known title of general interest is *Scientific Meetings*, which began in 1957. Most of the early work was done by two division members: Gertrude Bloomer and Joan Hutchinson. By 1963 this publication had become so popular that the tasks were too much for them, so the division transferred the responsibility to the association. The SLA continued to publish this journal until the end of 1976, after which it was taken over by a commercial firm. Interests on the part of several division members in book reviews of sci–tech books led the association to commence *Technical Book Review Index* in 1935, which it continued to issue until the end of 1976, when it, too, was turned over to commercial interests.

The division has sponsored several projects, meetings, and workshops. Between 1935 and 1957 it sponsored a pool of bibliographies for members to borrow. The interest of the Engineering–Aeronautics Section in translations led in time to the creation of a large number of records that were transferred to the association around 1950. This was followed in 1953 by the creation of the National Translation Center at the John Crerar Library in Chicago, which the association sponsored for many years.

The division has sponsored several meetings, beginning in the 1950s, on the topic of technical reports and documentation, some sponsored in cooperation with other groups. Other projects included a duplicate periodical exchange, which existed in the 1940s and had a revival in the 1950s. As early as 1950, work on a divisionwide salary survey was carried on, with data published in 1951 (*2*). In recent years the division has sought out appropriate projects which it can support, and several are being carried on at the present time.

Awards have been given by the division since 1955, although generally in a spasmodic fashion. In 1955 the Division Award was given, for the first time, to E. J. Crane of *Chemical Abstracts*. In 1957 the Special Division Award for Contributions to Librarianship was made to Margaret P. Hilligan. Two awards were made in 1960: the Award of Merit went to Margaret A. Firth, and the Publication Award, to Gordon Randall. In 1961 the Award of Merit went to Nell Steinmetz, and the Publication Award went to Gertrude Bloomer and Joan Hutchinson. In 1963 the Publication Award was given to Helen Redman and Lois Godfrey as well as to the Rio Grande Chapter.

The Awards Committee was rejuvenated in the 1970s, but no new awards have been made to date. However, since 1972 the division has given monetary awards to students and other members who have written winning papers in a competition, granting travel funds to those who had never attended annual conferences before.

Additional data on the division prior to 1959 can be found in the article written by Betty Joy Cole, included in the association's 50-year history (*3*).

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SCIENTIFIC LITERATURE

The major categories of scientific literature and its various aspects are discussed separately in this article. The contents are:

Historical Overview

INTRODUCTION

The date of the first scientific writing is not known precisely. Contributions to science were made by the early civilizations of Assyria, Babylonia, China, Egypt, and India. In these early civilizations, knowledge was transmitted largely through oral communication, and the fragments of papyri and cuneiform clay tablets that are extant from these periods do not give us a precise picture of the pattern of scientific communication during early times. The invention of movable type by Gutenberg in 1455 was a landmark event in the history of written communication. The printing press made it possible to prepare and disseminate multiple copies of manuscripts.

During the 16th and 17th centuries, great advances were made in the intellectual, economic, technological, and social spheres by natural philosophers such as Francis Bacon and René Descartes, who placed great emphasis on the scientific method of inquiry. During this period, written communication was largely accomplished through books and gazettes. The book was not particularly suited for the rapid dissemination of new ideas, since the author had to work for several years and accumulate enough results to warrant publication of a book. Accounts of single observations and discoveries began to be disseminated through booklets and pamphlets. William Harvey's work on the circulation of blood, for example, appeared as a 72-page booklet in 1628 (*1*).

SCIENTIFIC SOCIETIES

The history of scientific literature is inseparably connected with that of scientific societies. Scholarly societies were in existence even in the earliest civilizations of China, Greece, Egypt, India, and Arabia. These were associations of scholars who shared their work, results, and aspirations with those of similar interests. In ancient Greece there were many schools led by stalwarts such as Thales (ca. 640–546 B.C.) and Pythagoras (ca. 582–497 B.C.); each of these eminent scholars gathered around him a number of students of mathematics and natural science. In the Academy of Plato (427–347 B.C.), zoology, botany, geography, mathematics, astronomy, and philosophy were studied. These schools were organizations for both learning and research, and in this sense they may be considered to be the forerunners of modern scientific societies.

The academies of Alexandria founded by the Ptolemies were residential research institutions where renowned men of science were accommodated and supported by the kings and thus were able to devote all their energies to study and research in the physical and medical sciences. Among the lasting contributions of the Alexandrian academies may be counted the *Elements of Geometry* by Euclid (ca. 330–260 B.C.) and *On Floating Bodies* by Archimedes (287–212 B.C.), which have been the foundations of subsequent developments in these branches of science. The history of these early scholarly societies and of their bibliographical contributions has been traced by Thornton and Tully in their excellent treatise *Scientific Books, Libraries and Collectors* (*2*).

The societies of Arabia carried on the traditions of the academies of Greece and Alexandria, and toward the close of the 10th century there existed a society in Basra called "Ichwan-al-Safa" [Brethren of Sincerity] which was very similar to our modern societies. This society produced an encyclopedia of science covering physics, mathematics, and biology as well as logic, philosophy, and metaphysics (*3*). Even today, thousands of Arabic manuscripts, including those on scientific disciplines, are held in the libraries of Europe, Egypt, Turkey, Saudi Arabia, India, and Pakistan.

Scientific societies remained relatively dormant between the suppression of the Platonic schools in 529 A.D. and their revival during the Renaissance. It is believed that the societies continued their deliberations secretly because of opposition from governmental and religious authorities. During the medieval period, Roger Bacon was the most outstanding scientist, philosopher, and mathematician. He wrote a textbook on optics, constructed astronomical tables, described the composition and manufacture of gunpowder, suggested a design for a flying machine, and foresaw many scientific developments. His *Speculum Alchemiae* was printed in Nuremberg in 1541; a French translation appeared in 1557, and the English version, *The Mirror of Alchemy*, was published in London in 1597. Various editions of his other works were published in Paris, Oxford, London, and Hamburg between 1542 and 1659. Roger Bacon's works were also published as *Opus Majus, Opus Minus*, and *Opus Tertium;* various editions of these works were printed in London, Oxford, and Venice between 1733 and 1900 (*4*).

During the 16th and 17th centuries, Francis Bacon and other natural philosophers believed that concerted action of scientists was necessary to promote the experimental method of scientific inquiry. In his book the *New Atlantis*, which propounded the experimental method of research, and also in his other writings, Francis Bacon stressed the necessity for an organization to coordinate the work of individual scientists. Scientists in Europe met, often secretly, to share and discuss their findings. Discussions on experiments and discoveries were often recorded, and copies of these minutes were sent to other scholarly centers. Latin was the language commonly used for such scholarly communication. These assemblies led to the establishment of many scientific societies including the Royal Society in England and the Académie des Sciences in France—two of the greatest academies in the history of science.

The Royal Society

In the middle of the 17th century, small groups of scholars and philosophers began to meet in various places (including taverns) in London to discuss the experimental method of scientific inquiry propounded by Francis Bacon. These groups, which later became known as the "Invisible Colleges," could not meet openly and regularly because of the civil strife in England. After the civil war ended, these natural philosophers decided to establish a formal constitution and on November 28, 1660, they drew up a memorandum of association. This was the foundation of one of the greatest scientific societies, the Royal Society. On July 15, 1662, the society received its royal charter from King Charles II. Lord Brouncker (the first president), Christopher Wren, Robert Hooke (the first curator), Henry Oldenburg, John Evelyn, Robert Boyle, and Edmond Halley (after whom Halley's Comet is named) were some of the eminent men who founded the Royal Society (*5*). In the roster of the presidents of the Royal Society may be seen the names of some of the most distinguished scientists of the world: Sir Humphry Davy (president of the society, 1820–1827), Sir George Gabriel Stokes (1885–1890), Lord Kelvin (1890–1895), Lord Rayleigh (1905–1908), and Sir Joseph John Thomson (1915–1920), to name a few. Among the fellows of the society are listed such illustrious names as Michael Faraday, Charles Darwin, John Dalton, and Clerk Maxwell.

Isaac Newton was elected to the Royal Society in 1671. Newton was indifferent to the publication of his monumental work *Principia*, which has been acclaimed as the greatest scientific work ever published. It was issued in 1687 by the special efforts of Edmond Halley, himself an outstanding astronomer and geophysicist, who was then assistant secretary of the Royal Society. The manuscript is now preserved by the society as its most precious scientific treasure. The society's Newton Collection also contains the reflecting telescope that Newton constructed in 1671. Isaac Newton himself became the president of the society in 1703 and held that office until his death in 1727.

Some of the publications of the Royal Society are: *The Philosophical Transactions* (1665–), one of the oldest scientific journals still being published; *Proceedings of the Royal Society* (1832–); and a number of monographs. These include

John Evelyn's *Sylva, or a Discourse of Forest Trees* (1664), the first book printed by the Royal Society; Robert Hooke's *Micrographia, or Some Physiological Descriptions of Minute Bodies Made by Magnifying Glasses* (1665); and Newton's *Philosophiae Naturalis Principia Mathematica* (1687). The society also published two monumental bibliographies of scientific literature: the *Catalogue of Scientific Papers* and the *International Catalogue of Scientific Literature*. These are discussed in a later section on the bibliographic control of scientific literature.

The Royal Society's Scientific Information Conference held in 1948 may be said to be a landmark event in the history of scientific literature. This international conference was convened as a result of a recommendation from the Royal Society Empire Scientific Conference of 1946, and its aim was to examine the possibility of improvements in the existing methods of production, collection, indexing, abstracting, and distribution of scientific literature. Many important recommendations were made and published in the report of the proceedings (*6*).

The Royal Society Scientific Information Conference was followed by the International Conference on Scientific Information, held in Washington, D.C., November 16–21, 1958. This Washington conference was sponsored by the National Science Foundation, the National Academy of Sciences, the National Research Council, and the American Documentation Institute. The deliberations of the conference were divided into the following seven areas:

1. Literature and reference needs of scientists: Knowledge now available and methods of ascertaining requirements.
2. The function and effectiveness of abstracting and indexing services.
3. Effectiveness of monographs, compendia, and specialized centers: Present trends and new and proposed techniques and types of services.
4. Organization of information for storage and search: Comparative characteristics of existing systems.
5. Organization of information for storage and retrospective search: Intellectual problems and equipment considerations in the design of new systems.
6. Organization of information for storage and retrospective search: Possibility for a general theory.
7. Responsibilities of government, professional societies, universities, and industry for improved information services and research.

The texts of the papers presented, along with a summary of discussion in each of the areas, were published in a two-volume proceedings (*7*).

Scientific Societies in the United States

The Boston Philosophical Society, established in 1683, was probably the first scientific society to be organized in the American colonies; but it did not function for long. The American Philosophical Society was established in Philadelphia in 1743 by Benjamin Franklin. The members of this society discussed questions of natural philosophy, history, and politics, and carried out investigations in botany, medicine, mineralogy and mining, mathematics, chemistry, industrial arts, and agriculture. The *Transactions of the American Philosophical Society* began in 1771.

John Adams established the American Academy of Arts and Sciences in Boston in 1780. The objectives of this academy were:

> To promote and encourage the knowledge of the antiquities of America and of the natural history of the country, and to determine the uses to which the various natural productions of the country may be applied; to promote and encourage medical discoveries, mathematical disquisitions, philosophical inquiries and experiments; astronomical, meteorological and geographical observations, and improvements in agriculture, arts, manufactures and commerce, and in fine, to cultivate every art and science which may tend to advance the interest, honor, dignity and happiness of a free, independent, and virtuous people (*8*).

The *Memoirs* of the academy started in 1785.

Many specialized societies at the state level mushroomed in the last quarter of the 18th century: the Medical Society of New Jersey (founded 1766), the Massachusetts Medical Society (1781), the College of Physicians of Philadelphia (1787), the Philadelphia Society for Promoting Agriculture (1785), the Massachusetts Society for Promoting Agriculture (1792), the Chemical Society of Philadelphia (1792), and others. The Academy of Natural Sciences of Philadelphia, started in 1812, published the *Journal of the Academy of Natural Sciences* (1817–) for over a century. The Boston Society of Natural History, established in 1830, has been one of the most active local scientific societies. It is known for its library, its museum, and its journal, the *Boston Journal of Natural History*.

A number of major national societies were established in the United States in the 19th century. Mention should be made of the American Medical Association (1847), the American Dental Association (1859), the American Society of Civil Engineers (1852), the Smithsonian Institution (1846), the American Association for the Advancement of Science (1847), and the National Academy of Sciences (1863). The principal publications of the National Academy of Sciences are: *Memoirs* (1866–), the *Biographical Memoirs* (1877–), the *Annual Reports* (1863–), the *Proceedings* (1863–1894), and the *Proceedings,* new series (1915–).

Bates has noted three main developments during the period from the close of the Civil War to the close of the First World War (9). These are: a tendency toward specialization, a drift in the direction of national centralization within the specialities, and formation of technological societies in response to the demands of the machine age. The American Chemical Society, which has assumed world leadership in the handling of chemical information and the production of primary and secondary journals in chemistry, was established in 1876. Many national-level engineering societies came into existence during this period: the American Society of Mechanical Engineers (1880), the American Institute of Electrical Engineers (1884), the Society for Automotive Engineers (1904), the American Institute of Chemical Engineers (1908), and the Institute of Radio Engineers (1912).

The trend toward specialized societies at the national level has continued in recent decades. The Electron Microscope Society of America (1942) and the Society for Experimental Stress Analysis (1943) are typical examples of specialized societies.

Toward the close of the 19th century, it was found that professional engineering societies of national scope had grown into centralized, monolithic organizations and could not be sensitive to the interests of remotely stationed members. In the early decades of the 20th century, a large number of regional associations of practicing engineers sprang up in different states and regions. Professional engineers working in a state or region could actively participate in and "belong" to the regional societies. Some national associations recognized this need and established local chapters, many of which started their own periodicals. This phenomenon is particularly noticeable in the United States, which has perhaps the largest number of such provincial professional engineering associations.

The publications of the regional societies are generally intended to provide a forum for communication among members on a variety of professional and paraprofessional matters. The emphasis is on news about persons and events, job opportunities, relations between government and industries, employer–employee relations, and professional "shoptalk," rather than on research investigations. Usually these regional societies are not specifically restricted to any one discipline or branch of engineering. Some of the earliest known publications of regional professional associations in the field of engineering, listed in order of their first year of publication, are:

1880 *Michigan Engineer,* Michigan Engineering Society, Detroit
1915 *Minnesota Engineer,* Minnesota Federation of Engineering Societies
1917 *Cleveland Engineering,* Cleveland Engineering Society
1917 *Florida Engineering Society Journal*
1925 *Illinois Engineer,* Illinois Society of Professional Engineers, Springfield
1926 *Baltimore Engineer,* Engineering Society of Baltimore
1930 *Texas Engineer,* American Society of Civil Engineers, Texas Section
1936 *Detroit Engineer,* Engineering Society of Detroit
1937 *Missouri Engineer,* Missouri Society of Professional Engineers
1939 *New Jersey Professional Engineer,* New Jersey Society of Professional Engineers, Trenton
1942 *Texas Professional Engineer,* Texas Society of Professional Engineers, Austin
1943 *Georgia Engineer,* Georgia Architectural Engineering Society, Atlanta
1948 *Georgia Professional Engineer,* Georgia Society of Professional Engineers, Atlanta
1948 *Midwest Engineer,* Western Society of Engineers, Chicago

A detailed account of the historical development of American scientific societies may be found in *Scientific Societies in the United States,* by Ralph S. Bates (*10*). For current information on societies, the *Encyclopedia of Associations* (Gale Research Company, Detroit, Michigan) is a useful source.

PUBLICATIONS OF SCIENTIFIC SOCIETIES

The publication activities of scientific societies range from membership directories and newsletters to extremely complex, integrated information systems generating a variety of services and products, as exemplified by the information processing and publication programs of the American Chemical Society and the American Institute of Physics. The following are the various types of publications and information services of scientific societies:

1. Primary journals. American scientific societies together publish about 40% of the world's significant journals.
2. Abstracting and indexing journals (e.g., *Chemical Abstracts* and *Chemical Titles* of the Chemical Abstracts Service, American Chemical Society).
3. Reviews (e.g., *Annual Reports on the Progress of Chemistry*, Chemical Society, London).
4. Reference books (e.g., *American Institute of Physics Handbook*).
5. Newsletters.
6. Translations (e.g., *Russian Journal of Physical Chemistry*, published by the Chemical Society, London, which is a cover-to-cover translation of *Zhurnal fizicheskoi khimii* of the Academy of Sciences of the U.S.S.R.).
7. Standards, codes of practice, manuals (e.g., *Boiler and Pressure Vessel Code* of the American Society of Mechanical Engineers; the American Society for Testing and Materials produces and publishes standards and codes of practice).
8. Conference papers and proceedings, usually reported in the official journal of the society.
9. Monographs and monographic series (e.g., Advances in Chemistry Series of the American Chemical Society).
10. Machine-readable data bases (e.g., Chemical Condensates of Chemical Abstracts Service, American Chemical Society).
11. Audiovisual materials (e.g., IEEE Soundings, a series of quarterly colloquia on cassettes for the current awareness and continuing education of engineers; filmstrips, motion pictures, and slide sets prepared by the American Society of Civil Engineers for use as educational aids).

Primary journals published by societies are of two basic types:

Journals containing mainly original research papers and papers presented by members at technical meetings. These are usually entitled Transactions, Proceedings, Memoirs, or Journal of the society (e.g., *Proceedings of the American Society of Civil Engineers*, *Transactions of the American Society of Mechanical Engineers*, and *Journal of the American Chemical Society*).

Periodicals intended to serve as a forum for communication among members on topics of common interest, that is, to report current events and trends, news about members, and proceedings of business meetings. These are usually entitled Newsletter or Bulletin of the society (e.g., *Bulletin of the American Society for Information Science* and *Society of Women Engineers Newsletter*).

The American Chemical Society, the American Institute of Physics, the American Society of Civil Engineers, and the Institute of Electrical and Electronics Engineers are among the largest publishers of primary journals. The American Institute of Physics, established in 1931, is a federation of several societies—including the American Physical Society, the Optical Society of America, the Acoustical Society of America, and the Society of Rheology—with a combined membership of over 70,000. The American Institute of Physics and its member societies together publish approximately 25 primary journals and about an equal number of English translations of Russian physics journals; all these account for nearly one-third of the total world output of significant journal literature in physics. The institute also makes available its magnetic tape data base, Searchable Physics Information Notices (SPIN).

The publication output of the American Society of Civil Engineers includes the following:

1. *Civil Engineering* (monthly journal)
2. Fourteen primary journals of the technical divisions (e.g., *Journal of the Engineering Mechanics Division* and *Journal of the Sanitary Engineering Division*)
3. *Transactions of the American Society of Civil Engineers*
4. *ASCE Publications Abstracts* (bimonthly)
5. Newsletters of the technical divisions
6. A biennial directory
7. *Official Register* (annual)
8. Annual report
9. *Engineering Issues* (quarterly)
10. *Hydrotechnical Construction* (English translation of the Russian journal *Gidrotekhnicheskoe stroitelstvo*; monthly)
11. Cumulative indexes to its journals
12. Miscellaneous publications including manuals
13. Audiovisual materials including motion pictures, filmstrips, slide sets, etc.

The Institute of Electrical and Electronics Engineers (IEEE)—which was formed in 1963 by the merger of the Institute of Radio Engineers (1912) and the American Institute of Electrical Engineers (1884)—publishes about 36 primary journals, annual convention records, standards, and a combined index to its publications.

The publication program of the American Chemical Society and the Chemical Abstracts Service is very comprehensive and includes primary journals, secondary journals, handbooks, union lists of periodicals, specialized indexes, and machine-readable data bases. These are not discussed here as there are already very many articles and guides describing the various products and services of the American Chemical Society and the Chemical Abstracts Service (*11–13*). Developments pertaining to the information-processing and publication programs of the American Chemical Society are regularly reported in *Chemical and Engineering News* and the *Journal of Chemical Information and Computer Science* (formerly the *Journal of Chemical Documentation*).

A comprehensive bibliography of the publications of 369 scientific, engineering, and medical societies has recently been compiled by James M. Kyed and James M. Matarazzo (*14*).

SCIENTIFIC LITERATURE: A NATIONAL RESOURCE

The Soviet Model

In the 20th century, the production, dissemination, and bibliographic control of scientific literature have become national concerns in many countries of the world.

Lenin was perhaps the first national leader to urge the development of libraries for information dissemination for national development in the early decades of this century. The present-day concept of library service in the Soviet Union is guided by Lenin's famous statement made in 1913 in the journal *Rabochaia pravda*:

> The glory and the pride of a public library does not depend upon the number of its rare books, sixteenth-century editions or tenth-century manuscripts, but on how widely books are circulated among the people, how many new readers are enrolled, how rapidly book requests are filled, how many books are borrowed, and how many children become interested in reading books and using libraries (*15*).

Since the October Revolution of 1917, the government of the U.S.S.R. has been actively concerned with the organization of a highly centralized national information system for the promotion, dissemination, and exploitation of scientific and technical information, which is considered an important national resource. The Council of Ministers of the U.S.S.R. centrally defines and controls the functions of libraries and information centers by passing decrees and enacting statutes. "All libraries, like all other organized cultural activities in the U.S.S.R., are under the overall direction and control of the Communist Party" (*16*). A delegation of American librarians that visited Soviet libraries and bibliographic centers observed:

> The entire complex system of library networks is pervaded by a spirit of guidance from higher to lower agencies in the hierarchy. All-Union library organizations and large libraries assist similar institutions on a republic level, those on a republic level assist those on oblast level, and so on. The three most common fields of guidance are in technical processes, selected bibliographies, and centralized cataloging. This central guidance results in remarkable uniformity in all libraries of the U.S.S.R. with respect to content of collections, methods of cataloging, forms of technical services, and types of services to readers (*17*).

According to a Soviet writer, scientific and technical libraries in the U.S.S.R. are entirely the offspring of the Great October Revolution of 1917, necessitated by a very intensive and planned use of scientific and technical information for national economic development (*18*). Since the revolution, the government of the U.S.S.R. has passed and implemented a series of decrees emphasizing the importance of scientific and technical information for developments in Soviet economy, industry, and military power. During the 23rd Congress of the Communist Party of the Soviet Union, Premier Kosygin declared:

> Technical progress in the national economy and the success of science depend in great measure on a well organized system of information (*19*).

In November 1966 the U.S.S.R. Council of Ministers passed a decree on the development of a "Nationwide System of Scientific and Technical Information" (*20*). Some measures proposed in this decree were:

1. The All-Union Scientific and Technical Information Center should collect microfilm copies of reports on completed research, to be made available in any place in the Soviet Union within a few days after completion of research.

2. Inclusion of summaries in all scientific and technical publications.
3. Reduction of delays in scientific and technical information service.
4. Reorganization of activities in the regional scientific and technical information centers.
5. Organization of Selective Dissemination of Information (SDI) service to specialists by the information institutes.

Soviet authorities are systematically working to: (*a*) relieve the professional research worker of the tedium of looking for information, so that he can devote all his energies to actual research work; and (*b*) reduce the time-lag between the generation of information through research and its application in technological development. Another decree, entitled "Measures for Increasing the Efficiency of Research Organizations and Accelerating the Use of the Achievements of Science and Technology in the National Economy," was passed by the U.S.S.R. Council of Ministers in 1968. This decree proposed, among other things, that the State Ministry for Science and Technology devise suitable information dissemination systems to reduce the time-lag between the discovery of new information and its application in developmental work (*19*). Thus, through numerous decrees, the Soviet government centrally defines, coordinates, and directs the bibliographic control and dissemination of scientific and technical information.

Acquisition, processing, and dissemination of scientific and technical literature in the Soviet Union are carried out by a number of specialized information centers, both at the all-union level and at the republic level. Each of these information institutes specializes in one discipline or type of document. At the all-union level, there are seven such information institutes:

1. All-Union Institute of Scientific and Technical Information, Moscow (VINITI)
2. All-Union Research Institute for Medical and Medico-Technical Information
3. All-Union Institute for Scientific and Technical Information in Agriculture
4. Central Institute for Scientific Information on Building and Architecture
5. All-Union Research Institute in Scientific and Technical Information, Coding and Classification
6. All-Union Information Bank of Standards and Specifications
7. Central Research Institute for Patent Information and Technoeconomic Research

The All-Union Institute for Scientific and Technical Information (VINITI) is perhaps the largest and most important institute in the U.S.S.R. for the bibliographic control and dissemination of scientific and technical literature. Established by a decree of the U.S.S.R. Council of Ministers, VINITI has been acclaimed as a unique example of a highly centralized, monolithic organization for the bibliographic control and dissemination of scientific and technical literature. The activities, services, and products of VINITI are described elsewhere in this encyclopedia by its director, Alexander Mikhailov (*21*).

The advantages of this centralized system are that overlaps and gaps in the coverage of secondary services can be easily detected, and unproductive duplication of effort can be minimized. It is also possible to control the scope and coverage of secondary services since they all originate from one or a few central organizations. For example, about 15% of the abstracts prepared by VINITI appear in more than one series of its abstracting journal, *Referativnyi zhurnal*. Since the abstracts are all drawn from a central pool, the possibility of unintended duplication of abstracting is minimal. However, in a small number of cases, multiple abstracts of the same document are prepared with different slants to fit the scope of different series of *Referativnyi zhurnal*.

One of the problems usually associated with a monolithic, centralized system such as the VINITI is the rigidity of the system, which makes it less responsive to demands for changes in policies and procedures. Also, since there are no competing systems, a centralized system may lack the incentive to strive for improvement in the quality, speed, and cost-effectiveness of its performance and its products.

The American Model

In the Western world, the systematic organization and exploitation of scientific and technical literature did not become "a pressing national problem" until the Second World War, when the various governments' interest in and commitment to the support of research and development became firmly established. In the United States, a series of legislative acts culminated in the establishment of a number of national agencies concerned with scientific and technical information: the Office of Naval Research (1946), the United States Atomic Energy Commission (1947–1975), the National Science Foundation (1950), and the National Aeronautics and Space Administration (1957). One of the specific responsibilities of the National Science Foundation is to foster the interchange of scientific information among scientists in the United States. In recent decades, a number of congressional committees have made extensive studies of the organization, dissemination, and exploitation of scientific and technical information generated through research and development.

The launching of the Sputnik in October 1957 by the Soviet Union ushered in the era of space exploration; it also intensified the United States government's interest in the generation and exploitation of scientific and technical information in its quest for superiority in military strength and technological supremacy. The Executive Branch established a number of study panels that have stimulated national-level plans for handling scientific and technical information. In 1958 a panel headed by W. O. Baker was set up under the President's Science Advisory Committee to study the problem of scientific and technical communication. The Baker Panel suggested the development of a coordinated national science information service that would utilize the existing decentralized services and units, instead of a highly centralized national system of the type implemented in the U.S.S.R. The National Defense Act of 1958 mandated the National Science Foundation to implement this recommendation. As a result of this mandate, the National Science Foundation established its Office of Science Information Services.

A task force headed by J. H. Crawford, Jr., was established in 1962 by the president's science adviser. During the same year, the President's Science Advisory Committee set up another study panel under the chairmanship of Alvin M. Weinberg. The Crawford Task Force recommended a centralized national agency for directing federal information-handling programs and the establishment of special units within federal research and development agencies for dealing with scientific and technical information. The second recommendation was implemented by some of the federal agencies, including the Department of Defense, the Atomic Energy Commission, and the National Aeronautics and Space Administration.

The major thrust of the Weinberg Panel was that the entire information transfer process must be viewed as an integral part of the total research and development process, and that the working scientist and the agencies supporting the generation of information through research and development should also assume the responsibility for the organization and dissemination of scientific and technical information. The panel recommended that technical information centers be set up in research environments for the collection, reviewing, analysis, and synthesis of current information, and that scientists should be adequately rewarded for doing such crucial activities in the information transfer chain.

The Committee on Scientific and Technical Information (COSATI) was set up by the Federal Council for Science and Technology (FCST) in May 1962 to: (*a*) coordinate federal agency scientific and technical information services; (*b*) examine the interrelationships of existing information services, both within and outside the government, to identify gaps and unnecessary overlaps; and (*c*) develop governmentwide standards and compatibility among information systems. COSATI's membership consists of representatives from 12 federal departments and agencies. In 1971 the administrative responsibility and operation of COSATI were transferred to the Office of Science Information Services of the National Science Foundation.

At the request of the National Science Foundation, in 1966 the National Academy of Sciences and the National Academy of Engineering established a Committee on Scientific and Technical Communication "to investigate the present status and future requirements of the scientific and engineering communities with respect to the flow and transfer of information." The report of this committee (often referred to as the SATCOM Report) and the report of the Weinberg Panel (published in 1963) may be considered as two landmark documents that have triggered a great deal of interest, discussion, and action concerning scientific and technical information at a national level (*22, 23*).

The SATCOM Report contains 55 specific recommendations based on the following three guiding principles (*24*):

1. The management of all scientific and technical communication activities must be as responsive as possible to the needs, desires, and innovative ideas of the scientific and technical groups that they serve. These activities must be sufficiently flexible to adapt rapidly to changes in user needs and communication techniques.
2. The administrative entities responsible for scientific and technical information

programs must be so organized and coordinated that they represent a logical and efficient division of functions, but authority over them must be sufficiently widely distributed to achieve the responsiveness deemed essential.

3. The planning of information activities must involve constant attention to the simplification and consolidation of existing knowledge and its frequent reprocessing to adapt it to the needs of diverse users, especially those engaged primarily in the practical application of scientific and technical information.

The following three basic problem areas were addressed by SATCOM (*25*):

1. Definition of the roles of federal agencies, private sector nonprofit agencies, and private sector for-profit concerns in scientific and technical communication: The committee urged that the roles of these three groups of organizations be mutually reinforcing.
2. Economics of scientific and technical communication: One of the recommendations of the committee was that sponsors of research and development should continue to honor page charges to support primary publication of research.
3. The impact of new technologies on scientific and technical communication: The committee urged sustained experimentation in the design and use of effective combinations of human and machine functions in information retrieval.

In sharp contrast with the system in the U.S.S.R., the dissemination and bibliographic control of scientific and technical information in the United States depends on voluntary cooperation among numerous publishers, information systems, and abstracting and indexing services, in both the public and the private sectors. There are also very many specialized information centers, both government and private, engaged in the acquisition, processing, and dissemination of scientific and technical literature. Most of these centers specialize in one branch of science or in a narrow subdiscipline. The major functions of these information centers in general fall into the following areas:

1. Production, maintenance, and distribution of machine-readable bibliographic data bases (e.g., MEDLARS of the National Library of Medicine, COMPENDEX of Engineering Index, Inc.)
2. Provision of current awareness services (e.g., Automatic Subject Citation Alert of the Institute for Scientific Information)
3. Publication of abstracting and indexing services (e.g., *Chemical Abstracts, Index Medicus, Government Reports Announcements and Index*)
4. Referral service (e.g., National Referral Center for Science and Technology at the Library of Congress)
5. On-demand bibliographic searches (such as those provided by MEDLARS and the National Technical Information Service)

A chain of information analysis centers is maintained by the United States Department of Defense and other federal agencies such as the Energy Research and Development Administration (formerly the United States Atomic Energy Commission). "An information analysis center is a formally structured organizational unit established for the purpose of acquiring, storing, retrieving, evaluating, analysing, and synthesizing a body of information in a clearly defined specialized field or pertaining to a specified mission with the intent of compiling, digesting, repackaging, or otherwise organizing and presenting pertinent information in a form most authoritative, timely, and useful to a society of peers and management" (*26*).

A typical example of information analysis centers is the Radiation Shielding Information Center, functioning since 1962 at the Oak Ridge National Laboratory, Oak Ridge, Tennessee. This center is jointly sponsored by the erstwhile United States Atomic Energy Commission and the United States Defense Nuclear Agency. Staffed by research scientists, information specialists, and support personnel, the center serves as a national technology resource for collecting, organizing, evaluating, and disseminating information related to radiation from reactors, radioisotopes, weapons, accelerators, and outer space. It also collects, packages, and disseminates digital computer programs for use in radiation-shielding calculations. With the assistance of the computerized Storage and Retrieval Information System (SARIS), the center answers technical inquiries, publishes bibliographies and state-of-the-art reviews, and routinely disseminates selected information to fill individual needs indicated by customer profiles (*27*). In 1974 there were about 27 information analysis centers similar in scope and functions to the Radiation Shielding Information Center, sponsored wholly or jointly by the former United States Atomic Energy Commission. The United States Department of Defense also has a chain of similar information analysis centers, typified by the Defense Metals Information Center at the Batelle Memorial Institute, Columbus, Ohio, and the Military Entomology Information Service at the Walter Reed Army Medical Center, Washington, D.C. (*28*). Descriptions of federally supported information analysis centers may be found in the *Directory of Federally Supported Information Analysis Centers* (3rd edition, Library of Congress, National Referral Center for Science and Technology, Washington, D.C., 1974). The National Referral Center for Science and Technology has also published a few other directories that are helpful in locating brief descriptions of other information centers (*29–31*). Aluri and Yannarella have compiled a bibliography of the publications of selected information analysis centers (*32*).

An important recent development is the establishment, by an act of Congress, of the National Commission on Libraries and Information Science (NCLIS). Public Law 91–345, signed by President Richard Nixon on July 20, 1970, affirmed that "the library and information services adequate to meet the needs of the people of the United States are essential to achieve national goals and to utilize most effectively the nation's educational resources." NCLIS is an independent agency within the Executive Branch; its charges are as follows:

1. To advise the president and the Congress on the implementation of national policy.
2. To conduct studies, surveys, and analyses of the library and informational needs of the nation.
3. To appraise the adequacies and deficiencies of current library and information resources and services and evaluate the effectiveness of current library and information science programs.

4. To develop overall plans for meeting national library and informational needs and for the coordination of activities at the federal, state, and local levels, taking into consideration all of the library and informational resources of the country to meet those needs.
5. To advise federal, state, local, and private agencies regarding library and information sciences.
6. To promote research and development activities which will extend and improve the nation's library and information-handling facilities as essential links in the national communication networks.
7. To submit an annual report to the president and the Congress.
8. To prepare and publish such additional reports as it deems to be necessary.

Much of the research work in universities and other research agencies is supported by federal funds funneled through the National Science Foundation and many other federal funding agencies. On May 11, 1976, the president of the United States signed Public Law 94–282, the National Science and Technology Policy, Organization and Priorities Act of 1976. This law affirms the responsibility of the federal government "to promote prompt, effective, reliable and systematic transfer of science and technology information by appropriate methods. . . ."

There is no one national system or agency in the United States that is solely responsible for the bibliographic control of scientific and technical literature. The government's concern for bibliographic control of scientific and technical literature is shared by numerous agencies in the private sector, including commercial enterprises, academic institutions, professional associations, and scholarly societies. There is also no government mandate that calls for cooperation or coordination within this loose assemblage of diverse agencies—all engaged in the common task of disseminating scientific and technical information. However, there is a growing awareness of the need for cooperation, and the movement for voluntary cooperation among the agencies in both the public and the private sectors is gaining momentum. The efforts of federations such as the Association of Scientific Information Dissemination Centers (ASIDIC) and the National Federation of Abstracting and Indexing Services (NFAIS) in this direction are noteworthy.

An obvious disadvantage of such a decentralized system is the unproductive duplication of effort. But this is balanced by a number of advantages: The coexistence of a plurality of bibliographic agencies in both the private and the public sectors promotes a competitive atmosphere in which every agency is forced to strive for better performance, speed, and economy in its operations. The net result to the users of scientific and technical information is the availability of a great variety of products and services at competitive prices. A striking example of the net advantage to the user is the progressive reduction in the cost of on-line bibliographic searching, accompanied by the ever-expanding repertoire of data bases made possible by the healthy competition among three commercial retailers of on-line bibliographic access. The companies involved are Bibliographic Retrieval Services, Inc., System Development Corporation (ORBIT system), and Lockheed Missiles and Space Company, Inc. (DIALOG system). The competition among companies that is inevitable in a pluralistic society and the advances in computer technology have made it possible for these companies to announce "the era of the $5 search" (*33*).

A highly centralized organization for bibliographic control seems to be more conducive to an aggressive dissemination and utilization of scientific and technical literature. In the Soviet block countries, abstracting and indexing services are extensively and purposefully exploited as a primary means of propagating scientific and technical literature. These services are aggressively disseminated not only to scientists and engineers, but also to factory foremen and graduate students. In his study of the diffusion of abstracting and indexing services, Irving Klempner observed:

> Nowhere has the abstract been more fully adopted and more doggedly exploited in the diffusion of scientific and technical information than in communist countries. Whether indicative or informative, in card format or published in primary journals or in abstracting and indexing services, the abstract has been frequently used as the official medium for current awareness and information retrieval (*34*).

It appears that the diffusion and utilization of abstracting and indexing services in the United States is much less extensive. Irving Klempner's study indicated that in 1967 VINITI disseminated its *Referativnyi zhurnal* (excluding *Express Information* and other related services) to approximately 375,000 Soviet recipients. During the same year in the United States, only 12,255 recipients received the four federally sponsored secondary services: *Nuclear Science Abstracts, Scientific and Technical Aerospace Reports, Technical Abstracts Bulletin,* and *United States Government Research and Development Reports* (USGRDR) (*35*). However, such comparisons should be tempered by an appreciation of the widely divergent sociopolitical environments obtaining in the two countries.

Characteristics and Structure of Scientific Literature

INTRODUCTION

In his opening address to the Royal Society Scientific Information Conference (1948), Sir Robert Robinson, president of the Royal Society, said:

> The sciences have deep human interest and are not devoid of spiritual value. The object of our Founders was declared to be the improvement of natural knowledge. By that they meant, and we still do mean, improvement and spread of knowledge of nature. Neither they could, nor we can, condone the scientific miser who investigates for his own satisfaction, or profit, and keeps the results to himself for selfish reasons, whether they be aesthetic or economic.
>
> Faraday expressed it very well (he always did) when he described the three necessary stages of useful research—the first to begin it, the second to end it, and the third to publish it (*36*).

Sir Robinson was reiterating the principle that the march of science rests on its published record, and that ready access to scientific and technical information is a fundamental need of scientists everywhere. More recently, Elmer Hutchisson, director of the American Institute of Physics, asserted his "conviction that the written record of the accomplishments of scientific research constitutes one of civilized man's most important intellectual resources" (*37*). Scientists constantly draw upon this growing volume of records, and they also strive to contribute their individual share, however small, to the total body of recorded knowledge.

CHARACTERISTICS OF SCIENTIFIC LITERATURE

Scientific knowledge is the objective knowledge of the universe and its phenomena, generated by the scientific method of inquiry and validated to conform with empirical observations of natural phenomena. Every new addition to the store of objective knowledge is an extension of the existing body of knowledge as recorded in the primary literature of science. The new knowledge so developed is recorded on tangible media and thus adds to the stockpile of scientific literature. Therefore, scientific literature—which embodies the existing store of objective knowledge—is at once the foundation on which the incremental progress of science rests and also a product of such advances in scientific knowledge. In the humanities new developments do not necessarily replace past achievements: G. B. Shaw's plays do not make Shakespeare's plays obsolete, and Picasso's paintings do not replace those of Rembrandt. But the objective knowledge of science is cumulative in nature, and each incremental advancement in scientific knowledge in some way adds to, modifies, refines, or sometimes totally refutes prior knowledge on which the advancement was based to begin with. Einstein's general theory of relativity is an extension and generalization of Newton's classical mechanics; the heliocentric theory of Copernicus totally rejected and eventually replaced Ptolemy's geocentric theory that prevailed at the time. This cumulative quality of science is shared by the literature of science; hence the clamor of scientists and other users of scientific information for the most recent literature.

The second important attribute of science, which is shared to a large extent by the literature of science, is its universality. Scientific truth is "supranational"; it transcends political, sociological, cultural, and linguistic limitations, although these factors influence the organizational dynamics of scientific research in any given society. For example, the organization of scientific research activity in the United States is different from that in the Soviet Union because of the vast differences in the political ideologies and socioeconomic infrastructures of these two countries. However, Soviet physics could not be different from American physics, inasmuch as the laws of physics, regardless of the nationality of the physicists who discover them, are as immutable as the natural phenomena they depict. Any aberration that may be deliberately or inadvertently superimposed upon scientific truth by political or other considerations (e.g., the Lysenko affair) is bound to be discovered and rejected sooner or later. Likewise, scientific literature, which is simply a concrete embodiment of the objective knowledge generated by science, is quintessentially universal, although there may be vast differences in its language, bibliographic format, and physical medium. These differences can be resolved by appropriate transformation (e.g., translation and reformatting), and then the scientific literature produced in one country can be used by the scientists of another country. The abstracts in

Referativnyi zhurnal, a Russian abstract journal, are translated and incorporated into *Applied Mechanics Reviews* of the American Society of Mechanical Engineers. Many physics journals produced in the U.S.S.R. are translated from cover to cover by the American Institute of Physics, Plenum Publishing Corporation, and other agencies and are made available to English-speaking physicists throughout the world. This could not be done if scientific literature, like science itself, was not essentially universal. The same cannot be said of the literature of other branches of knowledge, however. Some branches of the social sciences and the humanities are more or less culture-specific and are not transplantable across cultural-geographic interfaces. Islamic law, for example, cannot be practiced in the United States (and vice versa), even though Islamic law books can be translated into English, because of the culture-dependency of law. Such translations are useful, though, for academic pursuits.

Scientific literature is the validated record of the achievements of science. Traditionally, scientists have been zealous in guarding the high standards of scholarship and the quality of the work reported in scientific literature. Research articles submitted by scientists for publication in scholarly journals are refereed by a panel of experts to ensure accuracy and quality. In order to obtain impartial assessment of the manuscripts, the refereeing process is usually done anonymously. The referees do not know the identity of the author, and the author is not aware of the identity of the referees. Scientific societies play a dominant and useful role in maintaining this tradition of validation of scientific literature.

Scientific literature is also a "public" record of scientific knowledge. The channels of communication (e.g., primary journals and conference papers) are accessible to anyone who satisfies the requirements of quality as set forth by scientists themselves. Also, the literature of science is public in another sense: With the exception of documents containing proprietory matter or information pertaining to national safety, the literature of science is accessible to anyone for use. Very elaborate bibliographic control mechanisms have been set up to promote easy and rapid access to scientific literature. Since science is sustained by its own literature, accessibility to scientific literature is crucial for the unimpeded growth of science. Once again, scientific societies play a leading role in the bibliographic organization of scientific literature for aiding scientists in the identification, acquisition, and utilization of scientific literature relevant to their pursuits.

THE STRUCTURE OF SCIENTIFIC LITERATURE

The structure of scientific literature can best be understood by tracing the progression of scientific information from its generation as a result of research and development endeavor through its dissemination in primary literature, its surrogation in secondary services, and its eventual integration and compaction in reviews, textbooks, and encyclopedias. Figure 1 is a schematic diagram of a bibliographic chain showing the progression of scientific information starting from the idea stage until the newly generated information is disseminated through various channels and eventually becomes an integral part of prior scientific knowledge. The figures with-

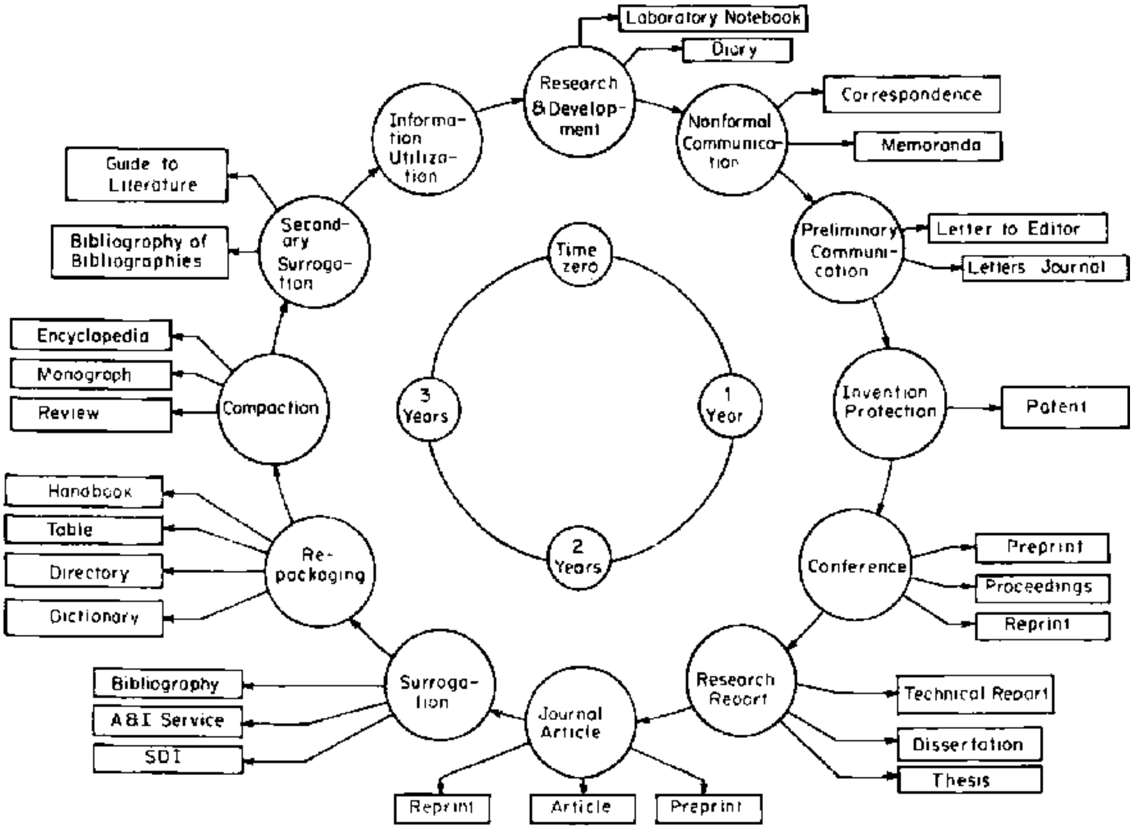

FIGURE 1. *Evolution of scientific information.*

in the inner circle indicate the time frame in years, with research starting from the idea stage at time zero. The products, or bibliographic packages emanating from each of the activities, are shown in boxes connected to the activity circles in the diagram.

Primary Sources

Unpublished Documents. Primary information derived from research and development activity can be communicated in a variety of channels. While the investigation is still in progress there is a continual interaction among the members of the research team and between the research team and members of the scientific community who may be interested in the research investigation. At this stage information flows in both directions: as input to the research team in the form of data and ideas from the scientific community and as output from the research team in the form of experimental data and preliminary findings. Such interaction almost always takes place through informal channels (e.g., oral communications, informal notes, and memoranda and correspondence), and no formal records are generated. The laboratory notebooks, diaries, or journals maintained by scientists are not published as such, but they form the basis for formal primary publication in the form of conference papers, journal articles, dissertations, or technical reports.

Preliminary Communications. When the research investigation has reached a sufficiently advanced stage, scientists prefer to communicate the preliminary findings through the formal channel, in the form of a letter to the editor in *Nature*, or a short communication in a primary journal, or a short article in one of the "letters" journals. This communication forms the earliest contribution to the existing body of scientific literature. The primary aim of this preliminary communication, which is made even before the conclusion of the investigation, is to establish priority for a possible invention or breakthrough that may result from the investigation when it is eventually completed. A secondary purpose of such preliminary communication is to disseminate nascent information on current research to other members of the scientific community to enable them to remain abreast of current developments in the wavefront of knowledge. It is generally supposed that a short communication will eventually be followed by a full-length paper, reporting the complete and final findings of the investigation in a standard primary journal. In practice, however, it has been found that full-length research papers are generally not written as a follow-up, and the short communication remains the only printed account of the investigation (*38–40*).

Patent Specifications. Not all scientists, however, communicate the preliminary findings of their research endeavor through the formal channel. Where proprietory interests are involved, no information about the invention is published in the public domain, at least not until the invention is protected by applying for a patent. The invention is then described in a patent specification, as required by the patent-granting authority (the Commissioner of Patents and Trademarks in the United States). When the patent is finally granted, the patent specification that is printed and distributed by the patent office becomes a part of the primary scientific literature.

Conference Literature. The next possible phase in the dissemination of scientific information is the presentation of a paper at a conference, which may give rise to three different types of documents: a preprint of the paper distributed by the author or the agency sponsoring the conference; the published proceedings of the conference including the edited version of the paper, along with summaries of discussion and related material; and a reprint of the paper distributed during or after the conference. All these documents constitute further additions to scientific literature.

Research Reports. If the research is done as a part of the requirements for an advanced academic degree, the results are presented in the form of a master's thesis or a doctoral dissertation. In the case of sponsored research, most sponsoring agencies (e.g., the National Science Foundation and the National Aeronautics and Space Administration) require that the results of research be periodically reported in the form of a series of interim reports and a final report. Dissertations and technical reports are not usually regarded as formally published documents. They are, nonetheless, very important forms of primary literature and constitute a sizable fraction of the total output of scientific literature.

The Research Paper. Research papers published in a refereed primary journal may be said to make up the most important basic bibliographic unit, constituting the bulk of the primary literature of science. In a sample study of the literature of computer science, journal articles were found to constitute slightly less than one-half of the total volume of primary literature; these were followed by conference papers, books, technical reports, and dissertations and theses, in that order (*41*). Like the conference paper, the journal article may also be distributed at different stages—as a preprint distributed by the author before the publication of the paper in a journal, as a paper in a printed journal, and as a reprint of the published paper distributed by the author and/or the publisher.

The total primary literature of science and technology includes a variety of forms of literature besides those already mentioned. The following list represents the wide range of formats available for communicating primary scientific information:

1. Laboratory notebooks, diaries, notes, medical records
2. Personal correspondence
3. Videotapes of experiments and surgical operations
4. Graphs, charts, and tables, usually machine-generated during experiments
5. Transcripts and audio- or videotapes of lectures and discussions
6. Internal research reports, memoranda, company files
7. Patent specifications
8. Computer programs (on punched cards, magnetic media, or as computer print-outs)
9. Letters to the editor or short communications in primary journals
10. Preliminary communications in "letters" journals
11. Preprints or reprints of conference papers
12. Conference proceedings
13. Technical reports
14. Theses and dissertations
15. Journal articles, preprints, and reprints
16. Newsletters
17. House organs
18. Standards, specifications, codes of practice
19. Trade literature (literature on products and services disseminated by manufacturers and distributors)

The characteristics and bibliographic control of some of the principal forms of primary scientific literature are described in later sections.

Secondary Sources

The discrete bibliographic units or documents comprising the bulk of the primary literature of science are scattered in a diverse variety of sources published throughout the world in scores of languages. Since the progress of science depends on the utilization of existing scientific knowledge, the tasks of identifying, selecting, and digesting pertinent information from the mass of scientific literature are important phases of the total process of scientific research and development. Surrogation of primary literature—creating current awareness services, bibliographies, indexes, abstracts, and catalogs—facilitates the identification and selection of pertinent documents appropriate for a given purpose. Repackaging the contents of primary documents into directories, handbooks, yearbooks, and the like provides rapid access to the desired specific piece of information, without the searcher having to wade through an unorganized mass of literature. Digesting and assimilation of scientific knowledge are facilitated by: (*a*) compaction of primary literature into reviews and digests and (*b*) integration of new concepts with existing knowledge in treatises, textbooks, and encyclopedias. The processes of surrogation, repackaging, and compaction of the primary literature of science result in the creation of a variety of secondary sources (Figure 2).

Tertiary Sources

As discussed in another section, scientific literature has been growing at an exponential rate; it has reached an unmanageable size owing to a multitude of factors,

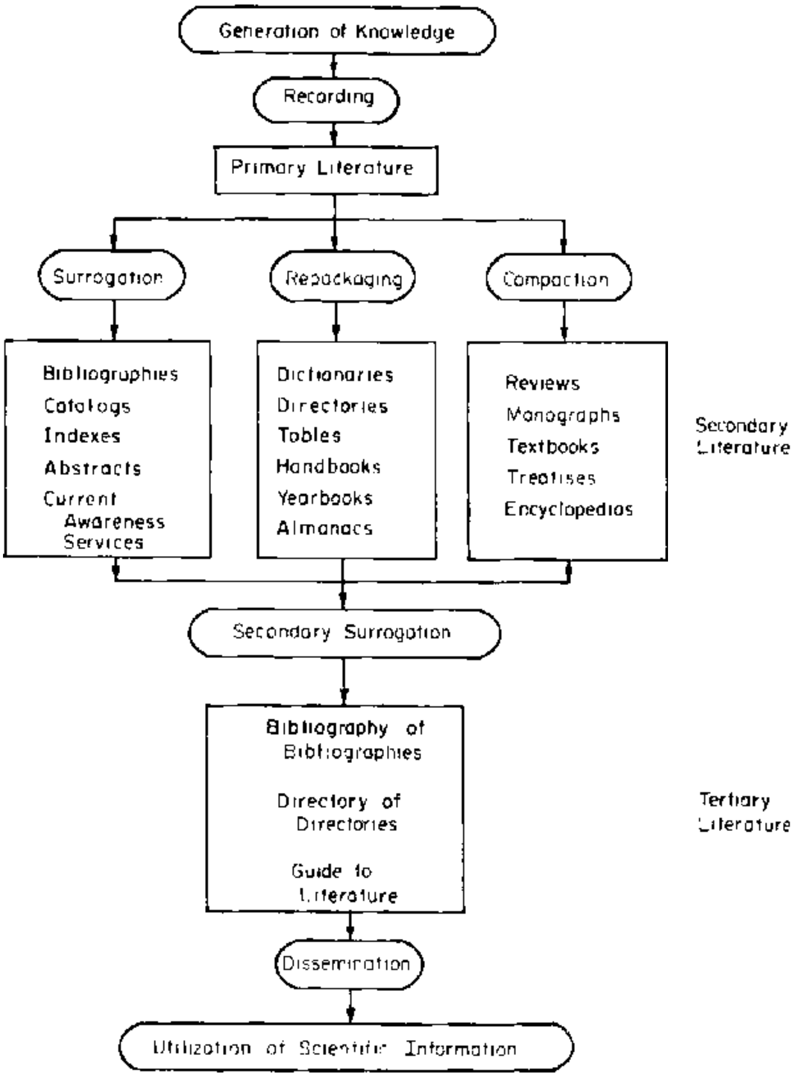

FIGURE 2. *The structure of scientific literature.*

including an increase in the number of productive scientists engaged in research and writing and the current practice of assessing the productivity of a scientist in terms of the number of publications produced. As a result of this proliferation of primary literature of science, the quantity and diversity of secondary publications have also reached such proportions as to warrant further surrogation of the secondary publications in order to facilitate identification of appropriate secondary and primary sources that will satisfy the information needs of users. The product of this secondary surrogation (Figure 2) consists of a variety of tertiary sources such as bibliographies of bibliographies, lists of indexing and abstracting services, directories of directories, and guides to literature. The characteristics and bibliographic control of principal types of secondary publications are discussed in later sections.

Primary, secondary, and tertiary literature may be produced in any one or more of the following physical media:

1. Print media (books, journals, and other printed documents)
2. Near-print media (computer printouts; mimeographed, multilithed, or typed documents)
3. Graphic media (photographs, charts, drawings, etc.)
4. Microforms (microfiche; microfilm strips, reels, or cartridges; microcards; microprints of various sizes and reduction ratios)
5. Machine-readable media (punched cards; punched paper tapes; magnetic tape, strips, chips, or disks)
6. Composite media (e.g., aperture cards)

The total structure of the literature of science may thus be seen to be made up of three hierarchical levels of publications: (*a*) primary publications in which new concepts are recorded and disseminated; (*b*) secondary publications which are derived from the primary publications by the process of surrogation, repackaging, and condensation; and (*c*) tertiary publications which are derived by further surrogation of secondary literature.

SCIENTIFIC vs. TECHNICAL LITERATURE

There seem to be some qualitative differences not only between the types of literature used by scientists and technologists as input for their research and development endeavors, but also between the types of literature generated by them as the product of their efforts. Derek J. de Solla Price has tried to articulate the distinction between scientists and technologists, but the distinction is admittedly not very clear:

> They are quite different social groups, comprising, on the one hand, the people who create new knowledge—the scientists, theoretical and applied—and, on the other, those who make new things, new chemicals, new machines: the engineers and technologists. The dividing line is by no means clear; there are many people with scientific and technical skill and training who make nothing new, adding neither to our knowledge nor to our artifacts, but work, with their know-how, well behind the research front (*42*).

To understand the differences between the literature used and generated by scientists and by technologists, one has only to observe the differences in the environments in which they function and in their goals and attitudes. "The scientist sees himself as belonging to amorphous groups of fellow scientists who share his research interests and attitudes, regardless of their organizational or geographical locations" (*43*). These amorphous groups are sometimes referred to as "invisible colleges," presumably after the groups of natural philosophers of the 17th century, who were also known by this name, and whose meetings in England eventually culminated in the establishment of the Royal Society. Membership in these invisible colleges is not formalized but is dependent on the acceptance of one's research efforts by peers. The choice of research goals is usually determined by the individual scientist depending on his own interests. In complete contrast to the scientist, the technologist typically sees himself as a member of a product-oriented corporate organization, which is also usually profit oriented. The research and development projects of the technologist are determined by the corporation in line with its total organizational objectives and commitment to profitability.

The differences in the end products of the efforts of scientists and technologists are also fairly clear. The end product of "pure" scientific research is an explanation of an observed phenomenon, or a new insight into the nature of the universe, as embodied in a new theory or modification to an existing theory. The scientist typically prepares a paper including the results of his research, for presentation at a conference or publication in a journal. Conference papers and journal articles in turn form the bulk of the material used by the scientist. Also, scientific tradition demands that the results of research be widely and freely disseminated through publication in "public" channels (e.g., the scientific journal). The scientist's desire to publish his research results widely (by distributing preprints and reprints) stems from his desire to establish priority for his work and to secure credit and peer approval for his contribution to science. In contrast to this, the research and development endeavor of the technologist usually results in an invention which may be a new product or a process, or an improvement to an existing product or process. The end results of the technologist's work are expected to be readily usable. Because of the proprietory nature of his work, the technologist and his corporate employer seek protection against unauthorized exploitation of the invention. This is done by applying for a patent. The results of developmental work are disseminated in the form of technical reports or articles in technical journals. The reward for the technologist comes mainly from the employer, and it is likely to be more tangible in nature than the reward of the pure scientist who feels gratified by recognition and approbation from his peers. The technologist uses, for his work, trade catalogs, technical journal articles, handbooks, and manuals. "Both scientists and technologists work in fiercely competitive worlds, but in science competition is among individuals for prestige, and in technology, it is among corporations for profit" (*44*).

One other difference may be noted in the literature generated by scientists and by technologists. The "scholarly" paper written by the scientist is likely to contain far more citations to earlier literature than the "technical" paper written by the engineer or technologist. This pattern, which occurs fairly consistently in published literature, prompted Price to characterize scientific literature as "papyrocentric" and technical literature as "papyrophobic" (*45*).

INFORMAL COMMUNICATION

It is known that a great deal of information transfer takes place directly from the generators of information to its ultimate users in "invisible colleges" and through "technological gatekeepers." The whole phase of surrogation and dissemination through formal channels is thus bypassed. In fact, studies reported by Voigt, Loosjes, and others have shown that libraries and other formally structured environments are not the most favored channels for the transfer of a great deal of nascent information (*46, 47*). The preferred channels for informal communication within the scientific community appear to be:

1. Personal discussion with co-workers in the immediate working environment.
2. Discussion with members of outside organizations in a variety of settings ranging from the utterly informal mixing in "hospitality suites" at conferences to the more formal colloquia and summer schools.
3. Personal correspondence.
4. Informal presentation of research results to groups within and outside one's own organization.
5. Direct exchange of preprints and reprints among scientists acquainted with each other.
6. Exchange of reprints, preprints, and memoranda in information exchange groups.

The following are some of the advantages of informal communication:

Promptness: Informal communication can take place through face-to-face or telephone conversation, personal correspondence, and preprint exchange, all of which are faster than dissemination through the formal channels.

Selectivity: Formal channels (e.g., the scientific journal) are designed to reach large audiences and therefore cannot be sensitive to individual needs. Information transmitted through the informal channel is specifically meant for an individual recipient or a small group.

Interactive communication: In the informal context (e.g., telephone conversation), continuous interaction between the supplier and receiver of information is possible. This facility is very difficult to achieve in the formal channels.

Screening and evaluation: The supplier provides evaluated and predigested information that can be readily used by the recipient. Books and other products of the formal channel often contain raw data which have to be interpreted, synthesized, and evaluated before they can be used.

Transmission of the ineffable: In the informal mode, a scientist may not hesitate to communicate opinions and experiences which are too personal to be communicated through formal channels. For example, a scientist who has had bad experience with the products of a company may not venture to publish his experience in the correspondence columns of a journal for fear of inviting unpleasant reactions, but he does not usually mind sharing his thoughts with fellow scientists during informal communication.

Personal appeal: Scientists communicating in the informal mode can establish a personal rapport among themselves; this is difficult to achieve through the formal channels.

The motivation and methodologies of informal communication have been discussed in recent literature on science communication (*48–54*).

INFORMATION EXCHANGE GROUPS

In the 1960s an interesting experiment was supported by the National Institutes of Health of the United States to facilitate rapid communication of research information among scientists by creating a formal organization for the exchange of preprints. The experiment, hailed as one of the most revolutionary innovations in the history of science communication, consisted of setting up a series of Information Exchange Groups (IEG) for different fields of inquiry. Membership in the groups was free and open to any scientist actively engaged in research, and each group had a chairman whose task was to ensure smooth functioning of the group. Any member could submit a written communication for distribution to the other members of the group. The IEG head office in Bethesda, Maryland, then made copies of the communications, called IEG Memoranda, and mailed them to the group members without charge. There was no restriction on the material submitted for distribution. Copies of papers submitted for publication in primary journals, preliminary reports of unfinished research, comments on other communications, reviews, abstracts, notes on events, and even inquiries were accepted and distributed as IEG Memoranda, without any editorial scrutiny. In all, seven IEGs were established and were in operation between 1961 and 1967.

During the initial years of the project, the IEGs were successful and became quite popular with the participating scientists, mainly because of the speed with which papers could be transmitted to their peers through the IEGs. In fact, the IEGs became so popular that both the membership and the number of communications submitted for distribution grew to unmanageable proportions, and this caused the eventual abandonment of the whole project. IEG No. 1, for example, distributed only 27 papers during the first 2 years of its life, and during the remaining 4 years, it distributed 800 papers. During the first year, the average membership per group was 56, and the average number of papers distributed was 10. By October 1966 the total membership was 3,625, and the number of memoranda circulated rose to an average of 151 per month. During the year 1966 more than 1.5 million copies of some 2,000 memoranda were sent out, at a cost of $416,000. It was projected that if the IEGs continued to grow at the rate then current, in the next 2 years the total membership could reach 14,000 and that the number of copies of memoranda to be distributed would approach the staggering figure of 30 million. The annual cost of maintaining this mammoth organization was variously estimated to be in the range of $10 million to $100 million. There was clearly no possibility of raising this sum of money every year, from any source, on a continuing basis. Some members expressed serious concern over the overwhelming inundation of memoranda, many of which were of questionable quality and doubtful utility. The uncontrolled growth of the IEGs to unmanageable dimensions caused other problems, including an unacceptable delay in the duplication and transmission of the memoranda, a suspected lowering of the standards of scholarship (presumably due to the absence of any editorial scrutiny), and a strong wave of opposition from a group of editors of primary journals. Thus, despite its initial success, the IEG project was called off by the National Institutes of Health in 1967. The main conclusions of the experiment were that the IEG concept was workable and that the IEGs could be a valuable adjunct to complement the primary journal, provided that compact groups could be built around well-defined problems or phenomena under active investigation by small groups of scientists (*55*).

UTILIZATION OF SCIENTIFIC LITERATURE

Creating and using scientific literature are important components of the activities of scientists. In an operations research study of the dissemination of information, presented at the International Conference on Scientific Information, Halbert and Ackoff reported that research scientists spend, on an average, about one-half of their total time in scientific and business communication, which includes both receiving and disseminating information (*56*). According to other estimates, the average professional person spends from 25% to 75% of his time trying to keep abreast of new developments in his field. "A working scientist spends up to one-third of his time searching for information, and the cost of this search represents one-fifth of all the money allocated to science" (*57*).

When the user of scientific information desires to acquire the literature pertinent to his needs, the process of literature search normally proceeds in the reverse direction, that is, from tertiary source to primary source, as shown in Figure 3. The user, or the information professional assisting him, first consults a tertiary publication to identify appropriate secondary tools relevant to the search process. This is the first phase in the literature-seeking process, and the product of this phase is a set of secondary publications. Some of the secondary publications—such as abstracts, directories, and encyclopedias—can be directly used to obtain the desired information, and there is no need to go further in the search process. Other types of secondary publications—such as indexes, catalogs, and bibliographies—are simply intermediate search products and serve as a key to the primary literature. The second phase of the search process then consists of scanning the secondary sources to identify appropriate primary documents which are expected to yield the information that is being sought. The next phase consists of acquiring the primary documents selected and then using the documents for obtaining the desired information. These are the elemental phases involved in the process of seeking and using

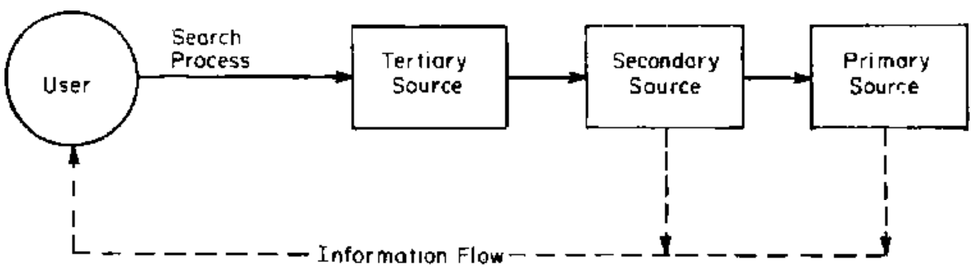

FIGURE 3. *Direction of the search process and information flow.*

scientific literature. In actual practice, this process can be quite complicated, involving such activities as question negotiation, query formulation using a controlled vocabulary, search of a computerized data base using an appropriate access language, translation of the primary document or its abstract from a foreign language, and so on.

The actual process of utilizing scientific literature is one of the less well understood phases of scientific communication. Research on the expressed and implied needs and behavior patterns of information users is in progress, aimed at an understanding of the motivation and methodology for seeking and using information by the ultimate users of information (*58*). Melvin J. Voigt has identified three types of information needs of scientists and engineers (*59*). These are characterized as follows:

1. *The Current Approach:* This is the need for information about current research and development activities and their socioeconomic implications, in one's own field of specialization as well as in peripheral fields.
2. *The Everyday Approach:* This is the need for particular items of information essential to the day-to-day work of scientists and engineers. This need for a specific piece of information or data, a method, an equation, etc., is felt by scientists and engineers in the course of their daily work.
3. *The Exhaustive Approach:* This is the need to find and to check through all of the relevant information existing on a given subject to determine the current state of the art in a given subject field, problem, or technology. This need arises when a researcher starts work on a new investigation and when reporting on the results of an investigation in the form of a paper, a patent application, a technical report, or a dissertation.

Voigt has also identified the various channels of communication usually resorted to for the satisfaction of these needs. Informal channels are favored for satisfying current approach and everyday approach questions. In-house and external current awareness services and primary journals are used for keeping abreast of current developments. For finding specific data in the everyday approach (next to consultation with colleagues), various kinds of reference books are used, such as dictionaries, directories, handbooks, and yearbooks. Indexing and abstracting services and bibliographies are used for exhaustive literature searches. Availability of large-scale machine-readable bibliographic data bases for both off-line and on-line searching has greatly enhanced the ease and rapidity with which retrospective searches can be made.

The Primary Journal

HISTORICAL OVERVIEW

Private correspondence was still the predominant means of scientific communication in the middle of the 17th century when the Royal Society came into existence in England. The idea of a journal to disseminate scientific information was first mooted by Sir Robert Moray, president of the Royal Society, in a letter written on August 27, 1661, to Christian Huygens in Holland:

> It will be impossible for me to inform you, by letter, of all the particulars that have occurred. But I believe from time to time we shall print what passes among ourselves, at least everything that may be published. Then you shall have copies among the first, and if there is something withheld from publication, it will be much easier for me to communicate it to you, than to send you word of everything by letters (*60*).

Henry Oldenburg, who was elected secretary to the Royal Society in April 1663, continued to write long letters to scientists all over the world. Among the philosophers and scientists with whom Oldenburg corresponded were: Huygens, Leeuwenhoek, Leibnitz, Malphigi, Redi, and Spinoza in Europe; Governor Winthrop of Connecticut in the United States; and Boyle, Halley, Hooke, Lister, Newton, and Wren in England. The correspondence work became so voluminous that a committee had to be formed to share the work of letter writing. As a medium of exchange of scientific information, personal correspondence had many defects:

1. Much time and effort were needed to write letters.
2. Letters were personal in tone, and they were not sent to those who would disagree with and debate their contents.
3. Unsound theories were not objectively criticized and rejected.
4. Questions of priority could not be resolved satisfactorily.
5. Some writers invented ciphers or systems of shorthand to maintain secrecy.
6. Many people who were interested in science were not included in the correspondence chain.

In 1663 François Mezeray, historian to the French king, obtained a patent for a literary-scientific periodical. This was the first concrete proposal for a scientific journal, but the project did not materialize for various reasons.

A proposal to publish a weekly scientific journal was submitted in 1664 by Sir Denis de Sallo, counselor of the Court of Parliament under Louis XIV. On August 8, 1664, a privilege was signed establishing *Le Journal des scavans* [Journal of Learned Men], and the privilege was registered on December 30, 1664. The first weekly issue of the *Journal des scavans* was published on January 5, 1665; it consisted of 20 pages and contained 10 articles, letters, and notes. The objectives of the journal, as stated in the first issue, were:

1. To catalogue and to give useful information on books published in Europe;
2. to print necrologies of famous persons and summarize their works;
3. to make known experiments in physics, chemistry, and anatomy that may serve to explain natural phenomena, to describe useful or curious inventions of machines, and to record meteorological data;
4. to cite the principal decisions of civil and religious courts and censures of universities; and
5. to transmit to readers all current events worthy of the curiosity of men (*61*).

According to Sallo, "the *Journal* was invented for the relief of those either too indolent or too occupied to read whole books," and "it is a means of satisfying curiosity and becoming learned with little trouble" (*62*).

Denis de Sallo published the journal under the assumed name of de Hedouville. After 3 months (13 numbers), Sallo's privilege was withdrawn and the journal was discontinued. Publication resumed on January 4, 1666, under the direction of l'Abbe Gallois, one of Sallo's collaborators. Reprint editions were also published for a while in Holland (1665–1792) and in Germany (1667–1671). In 1816 the *Journal des scavans* was reorganized as the *Journal des savants*, which continues today as one of the leading literary journals of Europe (*63*).

At the time *Le Journal des scavans* was being established in France, plans were under way in England to publish a scientific periodical to report the accounts of scientific experiments, excluding legal and theological matters. Moray, Boyle, Hooke, and Oldenburg of the Royal Society, and others, developed a plan for such a scientific periodical. On March 1, 1664, the Council of the Royal Society ordered "that the *Philosophical Transactions*, to be composed by Mr. Oldenburg, be printed the first Monday of every month, if he has sufficient matter for it, and that the Tract be licensed by the Council of the Society, being first reviewed by some of the members of the same. . . ." (*64*).

The first issue of the *Philosophical Transactions* appeared on Monday, March 6, 1665; it consisted of 16 pages and contained a dedication to the Royal Society, an introduction, nine articles, and a listing of important philosophical books. During 1664/1665 there was a great exodus of people from the city of London because of the plague, and this severely affected the sale of the *Transactions*. Back issues of the journal were destroyed during the great London fire in September 1666. The journal was dormant for a short period, from 1676 to 1683. In spite of these early handicaps, the *Philosophical Transactions* has survived for over three centuries and has published some of the most illustrious scientific papers, including those of Herschel, Priestley, Franklin, Rumford, and Henry Cavendish.

The *Journal des scavans* and the *Philosophical Transactions* served as models for subsequent scientific periodicals founded by European societies and academies. One of the first journals that followed their example was the Latin journal *Acta Eruditorum* (1682–), published at Leipzig. Many papers of Leibnitz on calculus were published in this journal. Papers reporting original research in physics, chemistry, biology, and medicine began to appear in specialized primary journals in the last quarter of the 18th century. The early history of scientific and technical periodicals has been studied by Kronick (*65*). The historical development of secondary journals is discussed in a later section on the bibliographic control of scientific literature.

FUNCTIONS OF THE PRIMARY JOURNAL

Since its inception over 300 years ago, the primary journal has been the most important channel for the formal communication of scientific information. Brown and his co-workers have characterized the primary journal as a formal, public, and orderly channel of communication among scientists:

> *Formal:* Papers published in journals can be uniquely identified and cited.
>
> *Public:* Anyone can submit a paper to a journal for publication, and can obtain a journal on subscription.
>
> *Orderly:* The input to a journal is accepted or rejected by the scientific community on the basis of its merit (*66*).

The primary journal serves three important functions. First of all, it is an official, public record of science. The journal serves as an archival record of scientific scholarship, scrutinized and validated by scientists through a "consensus-forming mechanism" that separates trivia and unsubstantiated claims from tested and validated facts, explanations, and predictions. Refereed papers published in primary journals serve as the basic source material for consolidation and compaction into textbooks, reviews, handbooks, encyclopedias, and similar other secondary packages.

Second, the primary journal is a medium for disseminating information. Besides the results of research and development activity, the journal conveys a variety of information—historical, social, political, commercial, and pedagogical information of interest to scientists. From its beginnings in 1665 until about the middle of the 19th century, the main function of the primary journal was to serve as an archival record of science. As the number of scientists began to increase during the latter part of the 19th century, more and more scientists began to depend on the journal as a medium through which they could keep themselves abreast of current developments in scientific research.

Lastly, the primary journal is a social institution that confers prestige and rewards on authors, editors, referees, subscribers, and publishers. Published papers are considered as a tangible measure of a scientist's contribution to the advancement of scientific knowledge, and as a basis for an evaluation of his work by his peers and employers. Publications also facilitate the establishment of priority and ownership of inventions and ideas. The journal also confers recognition and prestige on editors and referees in view of their participation in the monitoring and validating processes that are so essential to maintain the quality of scientific literature. To the subscriber, the refereed primary journal is a symbol of his professional credentials. The reward that accrues to publishers of primary journals is a combination of prestige and financial returns. Scholarly societies and universities that publish primary journals are impelled by their commitment to the advancement of scientific disciplines; commercial publishers publish journals in anticipation of financial rewards.

CHARACTERISTICS OF THE PRIMARY JOURNAL

Despite its important place in science communication, the primary journal has been the subject of severe criticism on account of its many drawbacks. The efficiency of the journal as a channel for communication of science information has suffered because of its uncontrolled growth, which has resulted in overfragmentation and scattering of primary scientific literature. Because of the diversity of its additional functions, some of which are often mutually conflicting, the journal has become too general and expensive a package, unable to perform any of its functions efficiently. The delay in its production necessitated by its role as a validated archival record of science is severely restricting its function as a current awareness tool. The following are some of the problems that have invited repeated criticism.

Proliferation

Concern over the uncontrolled proliferation of journals is not new. "In 1716, apprehension was felt about the overproduction of periodicals whose remainder would have to be bundled up and sold like rotten old cheese" (*67*). In 1831 the situation was no different:

> This is the golden age of periodicals. Nothing can be done without them. Sects and parties, benevolent societies, and ingenious individuals, all have their periodicals. Science and literature, religion and law, agriculture and the arts, resort alike to this mode of enlightening the public mind. Every man, and every party, that seeks to establish a new theory, or to break down an old one, commences operations, like a board of war, by founding a *magazine*. We have annuals, monthlys, and weeklys—reviews, orthodox and heterodox—journals of education and humanity, of law, divinity and physics—magazines for ladies and for gentlemen—publications commercial, mechanical, metaphysical, sentimental, musical, antifogmatical, and nonsensical . . . .
>
> Whether we travel, or stay at home, we are feasted with periodicals to a surfeit—they pervade the atmosphere of the country like an epidemic. Go to a tea-party, and you find souvenirs served up with the confectionary; dine with a friend, and you get reviews with your wine; walk in the street, and a fellow assails you with a prospectus; take refuge in a bookstore, and your retreat is cut off by huge piles of periodicals (*68*).

Estimates of the number of scientific and technical periodicals in existence vary from 26,000 to 100,000 titles (*69, 70*). In his 1961 book, *Science Since Babylon*, Derek J. de Solla Price postulated an increase by a factor of 10 every 50 years: 10 periodicals in 1750, 100 in 1800, 1,000 in 1850, and 10,000 in 1900. Based on this pattern, Price predicted that we might well be "on the way to the next milestone of a hundred thousand such journals" (*71*). This estimate of 100,000 scientific and technical periodicals perhaps represents those that were founded, and does not take into account the ones that have ceased publication. In his subsequent book, published in 1963, Price estimated the number of scientific and technical periodicals actually being published at 30,000 (*72*).

On the basis of the listings in the successive editions of the *World List of Scientific Periodicals*, Brown estimated that by 1979 the number of scientific and technical journals would reach 100,000 (*73*). The fourth edition of the *World List of Scientific Periodicals* lists 59,961 titles. According to K. P. Barr, only about 24,000 of the titles included in the *World List* are scientific and technical periodicals currently in existence. His reasons for this deduction are as follows:

> Only about 40 per cent of the entries (i.e. about 24,000) represent actual current titles, the remaining entries being titles which have ceased publication, cross-references, and what may be termed "*World List* ghosts," that is, titles for which no dates or holdings are given and which have, in some cases, been carried over from earlier editions. In addition, the term "scientific" is interpreted very loosely in the *World List*, encyclopedias, house journals, and business publications, for example, being included. It thus seems probable that the number of current scientific and technical periodicals included in the fourth edition of the *World List* is considerably less than 24,000 (*74*).

In another estimate, based on the statistics of periodicals acquired by the National Lending Library (now the British Libraries Lending Division), Barr concluded that "the number of currently available scientific and technical periodicals which contain material of interest to the practising scientists and technologists is 26,000" (*74*).

A more conservative estimate was made by King Research, Inc., in an investigation supported by the National Science Foundation (*75*). According to this study, in 1960 there were only 1,500 scholarly journals published in the United States. This represented a little over 33% of the world journal literature. The number of such journals published in the United States in 1974 was 1,945; this represented about 17% of the world figure. On the basis of this estimate, the number of scientific and technical scholarly journals in existence would be slightly less than 11,500.

These are typical of numerous other estimates of the number of scientific and technical journals. The figures vary greatly depending on the definition of the term and the method of estimating. Predictions of 100,000 journals are unlikely to be fulfilled. The much-apprehended exponential growth of scientific journals is no longer a serious threat, and the growth of scientific journals appears to be approaching a steady state. This belief is based on a close examination of the four editions of the *World List of Scientific Periodicals* (*76*).

The proliferation of primary journals may be ascribed to various causes:

1. Increase in research and development activity as a basis for national defense, space exploration, and industrial and economic development.
2. Increase in the number of scientists and technologists active in research and publication. Price contends that 80–90% of all scientists that have ever lived are alive now (*77*).
3. Importance attached to publications as a measure of a scientist's stature by his peers and employers. This phenomenon is often spoken of as the "publish-or-perish syndrome." A survey of biological scientists by the National Academy of Sciences in 1967 showed that on an average, each scientist contributes four distinct publications every year to the growing body of scientific literature (*78*).
4. Increasing specialization and compartmentalization of science and technology.
5. Developments in high-speed printing technology.

Proliferation of journals is due not only to the birth of new journals devoted to smaller and smaller areas of science, but also to the "splitting" of a journal into several sections that eventually become separate journals. For example, the *Trans-*

actions of the American Society of Mechanical Engineers, started as a single journal in 1878, expanded in 1959 into the following seven quarterly primary journals:

Journal of Engineering for Power
Journal of Engineering for Industry
Journal of Heat Transfer
Journal of Basic Engineering
Journal of Applied Mechanics
Journal of Lubrication
Journal of Dynamic Systems, Measurement and Control

Similarly, *Transactions of the IEEE* is a family of some 36 different journals.

The problem of journal proliferation is further aggravated by a new crop of scientific journals launched by commercial publishers who have been encouraged by the publish-or-perish syndrome of scientists and their employers, and by the zeal of many librarians who feel compelled to acquire almost everything that is published as a serial, regardless of quality or need. Because of their allegedly lax refereeing standards, the quality of such journals has been questioned by scientists. Recently a concerned group of 11 international scientists published an open letter to the world scientific community urging them not to patronize or publish in these new commercial journals (*79*).

The increase in the number of journals is accompanied by an increase in the size of the journal itself. For example, the average length of articles in the *Journal of Organic Chemistry* was 4.0 pages in 1964. This increased to 4.4 pages in 1968, and to 4.7 pages in 1972. This increase in the average length of articles was attributed not to verbosity, but to the generation of more data from more sophisticated and thorough experimentation (*80*).

The number of papers has also registered a similar growth over the years. Pasternack estimated that the number of "significant" scientific and technical documents published throughout the world was 600,000 in 1961 and 900,000 in 1965. The projected figure for 1970 was 1,200,000 documents (*81*).

The proliferation of journals has jeopardized their capacity to transmit information efficiently and rapidly. Scientists have to wade through an ever-increasing mass of literature to keep themselves abreast of developments in their fields of specialization and in peripheral fields.

Scattering of Journal Literature

Directly related to the problem of proliferation of journals is the phenomenon of the scattering of articles on a given subject in a great many journals. Citation studies have established that in any given subject, a substantial proportion of the articles is concentrated in a relatively small number of journals, and the rest of the articles are scattered in a very large number of journals peripheral to or outside the subject. This phenomenon of scattering was first investigated by S. C. Bradford (*82, 83*). It may be observed that a large number of articles on library and information sciences are found in journals in the areas of physics, chemistry, biology, engineering, psychology, sociology, and general science. It is said that literature on turtles, for example, appears in some 600 journals (*84*).

In a study of British journals by Martyn and Gilchrist, 94% of citations were shown to have come from a mere 9% of British scientific journals (*85*). This means that the remaining 6% of the articles were scattered in a very large number of journals. In the same study, the number of core scientific journals of the world (sufficient to meet about 95% of the demand for literature) was estimated to be between 2,300 and 3,200.

Some degree of dispersion of articles in various journals may be desirable to promote cross-fertilization of ideas and serendipitous discoveries. "Were the scientist to have restricted access to a few selected but highly homogeneous journals, he might not be exposed to other topics, which, though not falling in an expressed area of interest, might be of inestimable benefit for their educational and stimulus value. Apparently unrelated methods or facts have been the source of many scientific insights" (*86*). But the disadvantages of the dispersion of papers in numerous journals have far outweighed its advantages. The twin problems of proliferation of journals and dispersion of papers have jeopardized the effectiveness of the primary journal as a medium for transmitting science information efficiently and rapidly. These problems are of concern to authors, publishers, bibliographers, and users of scientific literature.

In view of the ever-increasing number of journals, authors find it difficult to decide where to submit their work for publication. This problem is especially difficult to first-time authors and those writing in interdisciplinary areas. An author may simply choose the journal that is most likely to publish his paper rather than the one that has the best chance of reaching the desired audience. Other factors that may influence an author's choice of a journal are: publication time-lag, coverage by secondary services, and the "prestige" of the journal (*87*).

A publisher wishing to start a new journal finds the task of defining the scope of the journal to be a perplexing one.

> When the publisher's objective is motivated by profit, as well as by providing a scientific service, the temptation to avoid the selectivity which might result in homogeneity of content is great because it may also restrict the sales market. As a result, many instances can be cited of publications with no apparent theme or clear-cut scope. Equally confusing are journal titles, which often fail to identify the nature or scope of a journal's content. Finally, editorial standards in selecting articles for publication may tend to be low to achieve a financially profitable position (*88*).

Bibliographers and editors of secondary services have to scan a very large number of journals in the "penumbral" and "alien" regions, far beyond the subject of inquiry, to be reasonably sure of comprehensiveness. Scattering of content areas across journals obscures the inherent structure that may exist within the literature of a discipline (*86*).

The individual scientist interested in a specific area of research is baffled by the numerous periodicals reporting literature on his subject. An average scientist may scan only about a dozen periodicals for current awareness. His endeavor to remain well informed of current developments in his field of specialization is always beset with the frightening possibility of missing items that may be of crucial importance to his research.

Slow Information Transfer

Because of the elaborate editorial and refereeing processes, sometimes involving extensive and repeated revision of the manuscript, the time-lag between the submission of the first manuscript and the eventual publication of the paper in a journal may range from 3 months to a couple of years.

The growing number of manuscripts that have to be processed also adds to the delay in publication. In 1965 the *Physical Review* received 2,600 manuscripts, of which 2,100 (about 80%) were accepted for publication. Of these, about 1,000 were accepted by referees with only minor corrections, not involving return of the manuscript to the authors; about 700 were accepted after more or less straightforward corrections that did not need reexamination by the referees; about 300 had to be reexamined by the referees before acceptance; and about 70 had to be sent to more than one referee before final acceptance (*89*).

Garvey and co-workers have shown that, on the average, work reported in journal articles was begun 28 months prior to publication, was completed 15 months prior, and was written up and submitted 8 months prior to publication (*90*). Delay in publishing research results may also be caused by the necessity for authors to "hawk" their manuscripts from journal to journal until a willing editor can be found. An interesting example of this phenomenon has been described by Shephard (*91*). An article describing the successful use of a little-known drug in the treatment of a case of poisoning by *Amanita verna* mushrooms was rejected for various reasons by four major American medical journals, before it was eventually accepted, in its original form, by the author's state medical journal. The time-lag between the original poisoning episode and the publication of the paper was 20 months, of which 7 months were contributed by the four rejections. In the meantime, the news of the case and its treatment had reached the medical community through the *New York Times* and other newspapers. Because of the delay inherent in the journal publication process, scientists resort to a variety of other channels to disseminate the results of their research; these channels include preprint distribution, conferences, and the mass media of communication.

Ziman believes that the time required for publishing the results of research is not an unreasonable proportion of the total time required for the research process itself: ". . . the various stages of hypothesis, design of apparatus, experiment, testing, confirmation, critical analysis, informal discussion, writing up, and so on, take months or years to complete, so that the interval of about four months between the receipt of a typescript and its publication in a reputable journal is not a significant proportion of the time required to make a discovery" (*92*). This is in sharp contrast to the frequent complaints of publication delay in journals. Ziman further contends that the existing system of publication can respond speedily enough when necessary:

> The conventional system does not lack the means of quick publication when this is called for. For nearly a century, *Nature* has published "letters" reporting important new discoveries within a few weeks of notification—for example, the first observation of a pulsar was announced on February 24, 1968, in a letter dated February 9. Given that word of the discovery had already been spread by telephone, teleprinter, daily newspaper, jet plane, and first class railway carriage, to everyone who had a professional interest in the subject, this seems quite fast enough for a definitive formal announcement. Let us also recall, more modestly, that only about one paper in ten thousand is so startling as to set the scientific world a-jangling, so that a very small number of quick-publication journals would be quite enough—provided that all the little shepherd boys can be taught not to cry "Wolf!" too often (*93*).

Diversity of Roles

The journal has been too general a package; it has tried to be all things to all people, simultaneously attempting to fulfill many diverse roles:

1. An archival record of the tested and integrated body of knowledge.
2. A current awareness tool for announcement of new discoveries.
3. An instrument through which scientists establish claims for priority to their inventions and build up their professional stature.
4. A book-reviewing medium to aid librarians in book selection.
5. A channel for dissemination of a variety of commercial, technical, personnel, and miscellaneous information.

Some of these roles are mutually incompatible. For example, the journal's role as an archival record necessitates thorough—and time-consuming—editing, refereeing, and evaluation processes; whereas rapid publication (with minimal editing) is indicated if the journal is to be an effective current awareness tool. In an attempt to perform such diverse, and sometimes mutually conflicting functions, the journal has not been very effective in any of these roles. According to Rossmassler, "the system does a good job of assembling knowledge into packages which are about 90 per cent mismatched to the needs of users" (*94*). This means that users have to scan more and more material to get the same amount of information that is ultimately useful to them.

Also, because of the narrow specialization of scientists and the general nature of the journal, only a small proportion of the contents of a journal is useful to specialist readers. In a survey of the users of the *Journal of Organic Chemistry*, Kuney and Weisgerber found that the average subscriber read at least a part of 17% of the articles, and half or more of only 10% (*95*). Elsdon-Dew estimated that: (*a*) an article in a highly specialized periodical is of interest to only 10% of the workers in the subject area covered by the journal; (*b*) an article in a general periodical may interest only 2% of its readers; and (*c*) an article in a local publication may interest only one-quarter of 1% of scientists in its field (*96*).

Increasing Costs

The journal is becoming increasingly more expensive. Publication costs are steadily going up, and so are subscription prices. Subscription prices of United States journals are increasing at an average rate of 13% per year. During the period 1970–1975, the average price of United States periodicals increased more steeply than other inflation indicators such as the U.S. consumer price index and materials expenditures in academic libraries. Some examples of escalating journal prices are shown in Table 1.

The annual surveys of periodical prices reported in *Library Journal* each summer indicate that subscription prices of United States journals are increasing at an average of 13% per year, and that chemistry and physics journals are the most expensive. The average price of chemistry and physics journals in 1976 was $86.72; this is nearly four times the average price of an American periodical ($22.52) in that year. The average prices of periodicals in several subject areas during 1975 and 1976 are shown in Table 2.

The data in Table 2 clearly indicate that periodicals in science, medicine, and engineering are more expensive than those in the social sciences and humanities. The problem of rising costs of journals is equally vexatious to scientists, librarians, and publishers.

The high cost of scientific journals—compounded with the phenomenon of dispersion of articles and the increasingly diverse nature of the contents of journals—is rapidly moving the journal beyond the financial means of the individual scientist. It has been pointed out that a scientist subscribing to a journal is forced to pay for 20 or 30 papers which do not concern him, in order to get the one paper he wants.

The impact on libraries is no less ravaging. Libraries have been attempting to meet this situation in a variety of ways, among which are: transferring book bud-

TABLE 1

Examples of Escalating Journal Prices[a]

Title of journal	Annual subscription ($)[b] 1970	Annual subscription ($)[b] 1975	Percentage increase
Biochemica et Biophysica Acta (Springer)	495	1,551	213
Coordination Chemistry Reviews (Elsevier)	25	136	444
Inorganica Chemica Acta (Elsevier Sequoia)	26	235	804
International Journal of Theoretical Physics	26	135	419
Journal of Theoretical Biology (Academic Press)	80	234	193

[a] Reprinted in part from Ref. *97*.
[b] Annual subscription prices paid by the University of Pennsylvania library.

TABLE 2

Survey of Periodical Prices[a]

Subject	Average price ($) 1976	1975	Percentage increase
Chemistry and physics	86.72	76.84	12.9
Medicine	47.47	42.38	12.0
Mathematics, botany, geology, and general science	42.51	35.95	18.2
Engineering	31.87	26.64	19.6
Zoology	31.34	27.37	14.5
Psychology	29.39	27.51	6.8
Home economics	17.86	14.24	25.4
Sociology and anthropology	17.11	14.85	15.2
Business and economics	16.98	15.26	11.3
Law	16.21	15.00	8.1
Education	16.00	14.72	8.7
Library science	15.96	14.18	12.6
Journalism and communications	15.90	14.70	8.2
General interest periodicals	15.24	14.36	6.1
Political science	13.09	12.79	2.3
Industrial arts	12.51	10.59	18.1
Fine and applied arts	12.42	11.09	12.0
History	11.94	11.14	7.2
Literature and language	11.60	10.41	11.4
Agriculture	10.75	9.70	10.8
Labor and industrial relations	10.33	7.40	39.6
Philosophy and religion	9.94	9.05	9.8
Physical education and recreation	9.27	7.80	18.8
Children's periodicals	5.32	4.69	13.4
United States periodicals	22.52	19.94	12.9

[a] From Ref. *98*.

gets to serials; cooperative acquisition; participation in networks for resource sharing; and, when inevitable, cancellation of subscriptions to journals. The advent of a new journal entitled the *De-Acquisitions Librarian* reflects the present reaction of libraries to the rising costs of journals.

Scientific and technical journals published by commercial publishers are said to cost five to fifteen times those published by societies (*80*). In a recent study, supported by the National Science Foundation, it was discovered that commercial publishers of journals had made an operating profit of about 14% before tax deduction (*99*). This is not a very high profit margin in the commercial sector, if it is recognized that this profit margin must account for capital improvements, risk investment, interest on debts, dividends to stockholders, and taxes. Federal, state, and local taxes may together account for nearly 50% of the gross profit.

Editorial and composition costs comprise a substantial part of the total cost of journal production. These are "fixed" costs, and they are independent of the number of copies of the journal produced. Hence, a decrease in the number of subscribers inevitably leads to an increase of subscription rates by publishers. An increase in subscription rates tends to be followed by a decrease in the number of subscribers. A publishing company caught up in this vicious cycle may easily find itself in a situation in which "an increased subscription rate will lead to a decreased rather than an increased income from subscriptions" (*100*).

Declining incomes from subscriptions, advertisements, page charges, and subsidies have forced publishers to increase subscription rates and to reduce or eliminate discounts usually allowed to subscription agents. The number of individual subscribers to scholarly journals has shown a downward trend in recent years, presumably because individual subscribers can no longer afford the increased subscription rates. In order to offset this trend, and also to compensate for the possible decline in subscriptions due to the anticipated photocopying in libraries, journal publishers have increased institutional subscription rates more steeply than individual subscription rates. Other measures—such as limiting the size and frequency of journals, generation of spin-off products from existing data bases, and changes in printing and distribution methods—have not had much impact on the economics of the primary journal.

To cope with the increased cost of publication, some publishers have been asking for "voluntary" page charges, a concept pioneered by the American Institute of Physics (*101, 102*) and subsequently endorsed by the United States Federal Council for Science and Technology. The SATCOM Report has further recommended payment of page charges to support the primary publication of research results (*103, 104*). This recommendation was made by SATCOM in recognition of the idea that information transfer is an integral part of the research and development effort and that research is not complete until the results of research are disseminated through appropriate channels of communication. It is estimated that revenues from page charges pay for "anywhere from 25 per cent to over 50 per cent of the total publication costs of roughly half of all U.S. scientific journals" (*105*). The erstwhile United States Atomic Energy Commission alone contributed over $400,000 in page charges annually to the American Institute of Physics journals (*106*).

In a study of 20 physics journals, Matarazzo showed that journals with page charges have lower subscription prices and that increases in their subscription prices in relation to increases in the number of pages have been modest (*107*). Although page charges are said to be voluntary, it is suspected that some societies give priority in their publication schedule to papers covered by page charges, over those not so covered, thus bringing indirect pressure on contributors to pay page charges (*105*).

CURRENT TRENDS IN JOURNAL PUBLISHING

Several innovations have been suggested and tried with varying degrees of success to offset the problems discussed in the preceding sections. Some of these are simple modifications that can be incorporated into the existing structure of the journal to improve the speed of dissemination of scientific information. At the other extreme, it has been suggested that the primary journal, in its present format, is totally ineffective and should be replaced with a system for distributing "separates," or single articles, or with an "electronic journal."

Faster Production

Modern methods of composition and printing, increasingly aided by the computer, have considerably speeded up journal publication. Letterpress printing is rendered obsolete by the faster and more economical offset process. Monotype composition is being increasingly replaced by newer methods of composition: typewriter composition (using Varityper, Justowriter, or other similar equipment), computerized photocomposition, and COM (computer-output-micrographics) (*108*). The advent of COM has greatly speeded up the production of both microfilm and offset masters, directly from the computer, thus eliminating many time-consuming intermediate steps in the preparation of the offset master.

Auxiliary Publication

Another solution to the problems posed by the growing volume of published material and the delay in its publication has been to print only the main text or an abbreviated version of the paper in the journal and to store all auxiliary material (such as raw data, computer programs and printouts, mathematical derivations, and bibliographies) on microfilm or microfiche in a depository for responsive dissemination to specialist users (*109*). The National Auxiliary Publications Service of the American Society for Information Science is an example of this trend. The American Chemical Society, the American Psychological Association, the British Libraries Lending Division, and the Canadian Research Council are among other organizations that have similar provisions for storage of auxiliary material.

Microform Publication

Several journal publishers—such as the American Chemical Society, the Institute of Electrical and Electronics Engineers, and the American Medical Association—have resorted to microform publication to supplement or supplant the hard-copy editions of their journals. All the primary journals of the American Institute of Physics are also published in a collective microfilm edition entitled *Current Physics Microform*. The journal *Wild Life Diseases* is published only on microcard. Each issue of the *Honeywell Journal* arrives with a microfiche copy of the same issue in a back-cover pocket. Journals on microfiche can be mailed first class, and they reach the user faster than paper editions. Although microform editions are compact, portable, and cheaper than paper editions, user acceptance of microforms has been slow. Gannett has reported a survey in which only 1% of the members of the Society of Automotive Engineers and the Institute of Electrical and Electronics Engineers preferred microfiche to the printed edition (*110*). User acceptance is shown to be improved by the use of microfilm cartridges and motorized reader/printers, which facilitate rapid searching and hard-copy printing (*111*).

Advance Announcement of Contents

In an attempt to perform the current awareness function more efficiently, the editors of many primary journals indicate in advance the contents of future issues of their journals (*112*). Papers accepted for publication in the *Journal of the Sciences of Food and Agriculture* are listed in *Chemistry and Industry*. The American Institute of Physics publishes advance abstracts of forthcoming papers in *Current Physics Advance Abstracts*. The institute also has a single-copy reprint supply service, Current Physics Reprints, through which scientists can order reprints of articles announced in *Current Physics Advance Abstracts*. *Talanta* lists "Papers Received," with the actual date of receipt of the manuscript indicated in parentheses.

Another variation of this practice is to provide information on concurrent publications in other journals, usually of the same group. *IEEE Spectrum* has two regular features: One is entitled "IEEE Tables of Contents for Current and Future Publications," and it provides details of articles in concurrent or future issues of other IEEE journals. The second feature is entitled "Future Special Issues." The monthly journal *Physics Teacher* runs a regular feature, "Read It in AJP," which lists articles in the recent or concurrent issues of the *American Journal of Physics*, with brief annotations.

Yet another approach to the improvement of the current awareness function of the journal is to publish a "preview journal" containing summaries of future articles. *Biochemica et Biophysica Acta* publishes author summaries of forthcoming papers several months before the papers are published. A compilation of these advance summaries is sold as a separate journal entitled *Biochemica et Biophysica Acta Previews*. Preview journals and advance announcements of forthcoming papers in journals facilitate rapid dissemination of current information and alert scientists to journal articles that may otherwise be overlooked by them.

"Letters" Journals

An entirely new breed of journals, known as short communication journals or "letters" journals, has come into existence exclusively for the rapid publication of preliminary results of research. The articles published in such journals are usually short, and they receive minimal or no editing. Some letters journals (e.g., *Tetrahedron Letters*) use the author's copy for printing, thus considerably speeding up the production process. The institution of the short communication journal followed a steep increase in the proportion of preliminary communications in regular primary journals that publish full-length articles. In the 6 years preceding 1972, the ratio of preliminary communications to articles increased by 40% in the *Journal of the American Chemical Society* and by 200% in the *Journal of the Chemical Society* (London) (*113*). The idea was to use these short communications journals solely for the publication of preliminary findings of outstanding importance to the scientific community, with the implicit understanding that these preliminary communications would later be followed up by full-length papers incorporating the complete details of the research project. But this objective does not seem to have been achieved. An investigation by Kean and Ronayne showed that many papers published in letters journals were short, definitive accounts of "dead-end research" with little or no follow-up potential, rather than preliminary communications of outstanding importance or general interest. Only 29% of British papers in *Chemical Communications* and only 20% of those in *Tetrahedron Letters* were found to have been subsequently followed up and published as full-length papers (*39*). About 50% of the communications published in *Physical Review Letters* are later published as full reports.

The letters journal, however, seems to have succeeded in appreciably speeding up dissemination of results of research by reducing or eliminating editorial processes and by employing faster production methods. The time-lag of publication in *Chemical Physics Letters* is said to be 14 days from the date of acceptance of the manuscript (*114*). *Tetrahedron Letters* claims to publish communications within 4 weeks. In a comparative study of *Analytical Chemistry* and *Analytical Letters*, the mean time-lags were found to be 191 days and 33 days, respectively (*40*). This time-lag represented the interval between the receipt of the manuscript in the editorial office and the actual distribution of the printed journal. The longest time-lag in *Analytical Chemistry* was 1 year, and that in *Analytical Letters* was 2 months. Thus, even in the worst case, the publication delay in the letters journal was far shorter than that for refereed, full-length papers in the standard primary journal.

The Synopsis Journal

The idea of publishing scientific papers at two different levels of completeness was proposed by N. W. Pirie during the Royal Society Scientific Information Conference in 1948 (*115*). This suggestion was based on the premise that there are basically two types of users who read a scientific paper: those who are interested in the details of the investigation and its methodology, and those who are interested only in the conclusions of the investigation. It was further contended that readers of the latter type far outnumber those of the first type, and that a short version of the paper, containing a summary of the investigation, should be prepared to meet the needs of the majority of readers, although the preparation of two versions of the paper would place an additional burden on the author. During the International Conference on Scientific Information in 1958, J. D. Bernal made a similar suggestion:

> . . . instead of the present intermediate length paper of ten to twenty pages, it would be better to have a short, pointed paper of some two pages in the form of what has been called an informative abstract. This would be supplemented by a longer, more detailed paper, not printed and published, but available in duplicated, microfilm or other modern method of reproduction, to all those thought to be interested in it or who requested it (*116*).

An interesting variation involving three levels of publication was suggested by Phipps in 1959 (*117*). He proposed that each author prepare: (*a*) a full-length report of his research, (*b*) a two-page summary, and (*c*) an abstract for deposit in a central office. Each of these would be assigned the same code number. Scientific journals would print summaries of most papers and full texts of selected papers. Abstracts would be sent to journal subscribers, perhaps on edge-notched cards. Subscribers could obtain copies of desired papers from the central office.

In 1968 the American Chemical Society examined a proposal to publish its *Journal of Organic Chemistry* in two editions: a complete edition with full experimental data and details for libraries, and a condensed version with only the main findings and limited data for general circulation. A survey was conducted to assess subscribers' reaction to this proposal. The survey led the society to the conclusion that "such a system, while perhaps needed, could not unilaterally be adopted by *Journal of Organic Chemistry* without loss in favor" (*80*). The American Chemical Society has recently resumed its dual basic journal experiment with financial support from the National Science Foundation's Division of Science Information. The purpose of this experiment is to determine whether dual journals can provide a less expensive method of communicating research findings that will also be more useful to individual scientists. In this experiment, the *Journal of the American Chemical Society* is being published in two versions: One, called the summary version, contains synopses of research papers, prepared by the authors themselves. This version, which is primarily intended for individual subscribers, also contains book reviews and communications to the editor. The second version, called the archival edition, is primarily meant for libraries. In this version the author's typewritten manuscript is reproduced at a reduced size. A survey is being conducted to assess users' reaction to this dual journal concept and the economics of publication (*118*).

The synopsis journal now under experimentation in Europe represents another attempt at multilevel journal publishing. The West German *Chemie Ingenieur Technik* prints only synopses of some of its technical articles; the original manuscript is available on microfiche upon request. It is claimed that the normal publication time of 9–12 months in the conventional journal format has been reduced to less than 3 months in the synopsis structure (*119*). A similar project is being planned by the Chemical Society in the United Kingdom. The synopsis journal serves both the archival function and the current awareness function of the traditional primary journal.

Cumulative Indexes to Journals

Current issues of primary journals are used rather extensively as sources of current information during the first few months after publication. The volume of use of journals then falls off more or less rapidly, depending on the "half-life" of the periodicals in a given discipline. In general, journals in fast moving fields such as electronics, space travel, and most branches of engineering become obsolete more rapidly than those in slow moving fields such as botany, geology, and mathematics. Once the journal issues have served their current awareness function, they become "back files" or bound volumes. But much of the material published in refereed, scholarly journals is of lasting value, and it will continue to be sought frequently during retrospective literature searches. To facilitate identification and retrieval of specific information in primary journals, most journals publish indexes at the end of each volume. There is considerable variety in the kinds of indexes provided, and in their depth and quality. Subject and author indexes are the most common types of indexes provided. The volume indexes are usually printed in the last issue of each volume or in one of the early issues of the succeeding volume. Sometimes the indexes are issued separately.

Many publishers of primary journals collate the volume indexes to their journals and publish cumulated indexes covering 10, 15, or 20 years. While 5- or 10-year cumulations are common, there are some that cover 50 or even 100 years. The importance of such cumulated indexes for retrospective literature search cannot be over-emphasized. This practice of publishing cumulated indexes to one or a group of primary journals appears to be particularly characteristic of scholarly societies and professional associations. The American Society of Civil Engineers (ASCE) publishes annual subject and author indexes to all of its regular publications in the annual volumes of its *Transactions.* These annual indexes cover all the articles published in the monthly journal *Civil Engineering* and in the technical journals of the society's 14 divisions. Besides these annual indexes, the ASCE has periodically published various cumulative indexes to its *Transactions*. Some of these are: *ASCE Index to Transactions*, Volumes 1–83 (1867–1920); Volumes 84–99 (1921–1934); Volumes 100–124 (1935–1959); Volumes 125–134 (1960–1969); and Volumes 135–139 (1970–1974).

The Society for Analytical Chemistry, London, published a cumulative index to the first 20 volumes (1877–1896) of its journal *The Analyst*; since then, it has been publishing decennial cumulated indexes to the journal. *Scientific American* (new series) has published a cumulative index to 180 issues from May 1948 through April 1963. This supersedes an earlier cumulation for the period 1948–1957.

The American Society of Mechanical Engineers (ASME) has been pursuing a policy of publishing cumulative indexes to all of its technical literature in response to user needs ascertained through a survey of index users. A 60-year index covering the period 1880–1940 and a 10-year index for 1941–1950 were both superseded by the *Seventy-Seven Year Index 1880–1956*, published in 1957. This publication is in two parts, covering the years 1880–1939 and 1940–1956, respectively. A further 14-year cumulative index to papers published in the *Transactions of the ASME* (1957–1970) was recently published by the society.

The Engineer Index, 1856–1959 (Morgan Brothers, London, 1964) is an example of a cumulative index published by a commercial publisher. This was intended to be a cumulative index to the 200 volumes issued during the first 100 years of the journal's life (1856–1956). Since the preparatory work took 5 years, it was possible to include the volumes published up to the end of 1959. However, this is not a simple collation of the individual volume indexes: "Had this been done, it would have resulted in an index of no less than 3,000 pages and, as indexing methods had changed during the period, it would have been difficult to use" (from the Foreword). A completely new index of names and subjects was prepared by omitting certain materials which were not of permanent interest or which could be traced through other sources. The types of material excluded from this cumulative index are: patent specifications, standards and codes of practice, review articles, leading articles reflecting contemporary opinion, correspondence, book reviews, and very short articles.

ALTERNATIVES TO THE SCIENTIFIC JOURNAL

Scientists and librarians have been affected by the many shortcomings of the primary journal as a vehicle for the transmission of scientific information. These problems are discussed in an earlier section. The deficiencies that are pointed out most frequently are as follows:

1. Delay in the publication of scientific information, mainly because of the time-consuming processes of editing, refereeing, printing, and distribution.
2. Proliferation of journals and the scattering of related articles in numerous journals, which make it difficult for scientists to keep abreast of current developments, and difficult for libraries and secondary services to cover even a small field comprehensively.
3. The increasingly general nature of periodicals and the intense specialization of scientists, which have rendered periodicals less and less useful to specialist readers.
4. The high cost of production and acquisition of journals, which has affected publishers, distributors, librarians, and subscribers. Authors are also affected by increasing costs of journal production: They are expected to share a part of the production costs by paying page charges.
5. The time-consuming processes of editing and refereeing, which are often done by scientists as a service without remuneration, are wasteful of the time and energy of scientists, and distract them from their research and development endeavor.

Numerous suggestions have been made in recent years to alleviate these deficiencies of the primary journal. These suggestions may be categorized into two groups:

First, innovations have been proposed to improve the speed and economics of journal publishing, without changing the traditional structure of the primary journal. Auxiliary publication schemes, publication of synopsis journals, integrated publishing of primary and secondary journals, and institution of page charges are examples of such innovations.

Second, there have been proposals for drastic alterations in the traditional format of the primary journal, or its total replacement with alternative channels for disseminating scientific information. The following are some of the proposals suggesting drastic modifications or alternatives to the primary journal that have been put forward during the last three decades:

1. Organization of information exchange groups for public distribution of preprints (*120, 121*).
2. Responsive distribution of author-prepared summaries and/or full papers following computerized matching of user interest profiles and subject headings assigned by authors to their papers (*122*).

3. Repackaging of primary journals into "user journals" or "super journals" for particular user groups (*123*).
4. Establishment of separate radio stations and/or television stations for broadcasting science reports.
5. Distribution of reports solely on tape recordings.
6. Substitution of the individual paper (or "separate") as the primary unit for distribution, replacing the primary journal.

Extensively documented reports of these and similar proposals have been made by Ralph H. Phelps (*124*) and Jacqueline Hills (*125*). By far the most momentous alternative to the scientific journal is the substitution of the individual paper, or "separate," as the primary unit of distribution. Perhaps the earliest proposal to replace the primary journal by collections of separates was made by J. F. Pownall in 1926 (*126*). During the following decades, a number of quite similar schemes were proposed for the establishment of regional, national, or international centers for the distribution of individual scientific papers as separates. Watson Davis suggested, for example, the establishment of a national center that would take over the functions of scientific publishing and bibliography. Authors would submit manuscripts, with brief summaries, to this center (rather than to journals) for reviewing by referees. Accepted papers would be typed on special paper suitable for photographic duplication. The author-prepared summaries would be published in a series of weekly or monthly journals devoted to different fields. Scientists could scan the summary journals and order full texts of desired papers. The national center would make copies of papers only as needed to fill the orders received from readers of the summary journals (*127*).

Davis's plan was published in 1939 as an appendix to J. D. Bernal's *Social Functions of Science* (George Routledge, London, 1939), in which Bernal suggested a similar scheme for distribution of separates. Bernal later presented his "Provisional Scheme for Central Distribution of Scientific Publications" at the Royal Society Scientific Information Conference in 1948 (*128*). Bernal's scheme called for the establishment of a number of National Distributing Authorities (NDA) which, working in conjunction with various scientific societies, would be responsible for the publication and distribution of scientific papers. The author would send the manuscript, along with an abstract, to the NDA. The paper would then be referred to a review panel of an appropriate society for acceptance. Titles of accepted papers would be published in a weekly list, and the paper itself would be published by the NDA as a preprint for distribution, as follows:

1. Individually to persons indicated by the author
2. Individually or in weekly batches to all subscribers who had registered their interest in certain subjects
3. Individually in response to specific requests generated by the weekly title lists
4. In bound volumes to libraries and individuals desiring them in this form
5. In batches to foreign NDA for distribution in their countries

Bernal claimed that such a centralized system of distribution of separates would be more advantageous than conventional journal publishing in terms of improvements in speed, convenience, comprehensiveness, and economy. Bernal's plan was the subject of much debate and criticism both during and after the Royal Society Scientific Information Conference. Ten years later, in the 1958 Washington Conference, Bernal's own thinking on his earlier proposal was different:

> . . . I had been so much impressed, through the experience of my own work, with the importance of reprints that I had proposed a scheme for substituting a rational distribution of these for the traditional scientific periodicals. This scheme roused much feeling and was even castigated in a *Times* leader as "Professor Bernal's insidious and cavalier proposals." However, the result of the pilot survey showed me that scientists as a whole did not work the way I did, but rather made use primarily of libraries where the disadvantages of the bound periodicals largely disappeared. Consequently, I immediately abandoned my original proposals and publicly withdrew them at the Conference (*129*).

Similar schemes for the distribution of separates as a possible alternative or supplement to the scientific journal were proposed by Atherton Seidell, M. B. Visscher, T. S. Harding, Zeliaette Troy, Bernard Berelson, P. W. Wokes, Friedrich Kaysser, J. W. Kuipers, J. H. Wilson, D. A. Brunning, and others. These and several other proposed alternatives to the scientific journal have been documented and reviewed by Phelps (*124*). In the same paper, Phelps also documented a number of objections to the various preprint distribution schemes. The main objections to any proposal that seeks to replace the scientific journal with preprint distribution systems are the following:

1. Preprint distribution is impractical; no scientist could read all the papers relevant to his work, even if they were made available to him.
2. Distribution of separates militates against standardization of scientific terminology, especially in the biological sciences.
3. Scientists would not support any plan that would take away from the scientific societies their important role as guardians of high standards in scientific communication.
4. Distribution of separates in response to requests from users would place an additional work load on users, who would have to first read title lists or abstracts of papers and then place orders for full copies of desired papers. This additional step would in turn cause inconvenience to scientists and delay their access to scientific papers.
5. Maintaining and using files of separates in libraries would be more difficult than handling bound volumes of journals.
6. Selective distribution of separates to individual scientists would call for the development and adoption of a universal classification scheme; it is obvious that no one classification scheme would be acceptable to all, or even most of, the various national centers responsible for distribution of separates.
7. Casual reading and browsing are important to scientists. Distribution of separates cannot facilitate these activities; it would therefore hinder serendipitous discoveries and cross-fertilization of ideas, and it would accelerate excessive fragmentation of science into minute and isolated specialities.
8. Scientific societies advocate the freedom of scientists to pursue their inquiries in any field of their choice and to publish their findings in any one or more of a variety of channels. Centralized distribution of separates would tend to

minimize the importance and potential of scientific societies in protecting the heritage of scientific freedom.

9. Centralized agencies for distribution of separates would not be economically viable since they could not derive any financial support from advertisements. Such agencies would have to be supported by government. Also, mailing of separates might be costlier than mailing journals. Consequently, libraries and individual scientists might find acquisition of separates to be more expensive than subscription to journals.
10. The scientific journal has been the principal vehicle for scientific communication for over three centuries. The journal is identified with a field of scientific inquiry or profession, and, by virtue of this identity, it confers status and prestige on authors, editors, and referees. The preprint or separate does not have the individuality, continuity, or prestige of the refereed scientific journal.

Several scientific societies—such as the American Society of Civil Engineers (ASCE), the American Society of Mechanical Engineers, the Society of Automotive Engineers, and the Institute of Electrical and Electronics Engineers (IEEE)—have experimented with distribution of separates to replace or supplement their journals. In an attempt to overcome delay in review and publishing of papers, the ASCE discontinued its *Proceedings* in February 1950 and began to distribute the proceedings papers as numbered separates. This arrangement was found to be unsatisfactory, and in January 1956 the society introduced its division journals. Individual papers are, however, still obtainable as reprints (*130*).

The IEEE is currently running an experimental reprint supply service called the IEEE Annals as an adjunct to its journals. Articles accepted for publication in the IEEE journals are mailed to subscribers after matching the user interest profiles provided by users with the document profiles created by indexers. In addition, contents of about 36 IEEE journals are also regularly notified in the *IEEE Spectrum*, and users can order reprints of desired articles before or after their publication in the IEEE journals. The IEEE Annals is not expected to replace the regular IEEE journals; it is a parallel service in a "quasi-competing mode," and it is expected to be economically viable. The IEEE experiment (modeled after the Mathematical Offprint Service of the American Mathematical Society) is still in progress (*131*).

After a detailed review of the various alternatives to the scientific journal, Phelps concluded that a system of separates distribution was not a satisfactory solution to the problems of the primary journal:

> The experiences of the three societies which tried and abandoned the distribution of separates as an alternative to journal publication, the experience of the Engineering Societies Library in handling separates, and the published literature critical of proposals to replace the periodical by separates convince us that a system of separates distribution is not a practical solution to problems of scientific communication (*132*).

THE FUTURE OF THE SCIENTIFIC JOURNAL

Despite frequent criticisms of its deficiencies and various proposals to replace it with alternative schemes, the scientific journal has remained the most important formal medium for the dissemination of scientific information for over three centuries. Although the journal has undergone many changes during this period, its basic structure and function have remained substantially unaltered. A recent study has indicated that the scientific journal will continue to proliferate, although at a somewhat reduced rate (*75*).

Most of the proposed alternatives to the primary journal considered in the preceding section have not passed beyond the "proposal" stage. There is, however, one system that has reached a fully operational stage. The International Research Communications System (IRCS), described by Eakins (*87*), is an integrated information system in which a single input can generate a variety of different outputs. Papers in the whole field of biomedicine are submitted to a single editorial office; after scrutiny and acceptance by referees and editors, they are first published as separates. Each month a subject-classified list of titles of papers accepted for publication during the month is compiled. At the end of each month, a number of specialist journals are published by selecting appropriate papers pertaining to the subject of the specialist journals. A paper can appear in more than one specialist journal; the average paper appears in three specialist journals. In addition, selected papers of wide interest to the biomedical community are published in a general biomedical journal entitled the *IRCS Journal of International Research Communications*. Finally, all the papers accepted by the system are microfilmed and published in the *IRCS Library Compendium*. Speed, flexibility, and predictability are said to be the main advantages of this system. Subscribers can obtain specialist journals of their choice and thus keep nonpertinent material to a minimum. It is also possible for subscribers to obtain copies of desired papers without subscribing to any journal.

The most important single force that is sure to influence the basic structure of the primary journal is the electronic computer. The American Chemical Society, the American Institute of Physics, and others have been developing computer-based techniques for keyboarding manuscripts, typesetting, microform publication through COM, and index production (*133–138*). But the computer has not so far brought about any basic alteration in the primary journal; the machine has been used mainly to expedite certain operations (e.g., typesetting) that were earlier performed manually.

The limited use of the computer in journal publishing is probably due to the fact that the scale of operation of the typical scientific journal publisher is not large enough to justify investment in new technology. Although an enormous quantity of scientific and technical literature is published every year, it is produced by a large number of publishers. Computerization becomes worthwhile only if a number of small journal publishing operations can be combined to achieve a scale large enough for cost-effective investment in computer-based publishing technology. The Editorial Processing Center (EPC) has been suggested as a possible step in this direction (*139*, *140*). The EPC is conceived of as a mechanism for combining a number of small publishing operations into an integrated publication-dissemination system on a scale large enough to make computerization worthwhile, at the same time allowing each editor full autonomy and control over his publications. The EPC is a centralized, computer-based system that can take over much of the routine, programmable tasks now performed by authors, editors, and referees, allowing them to concentrate on their nonprogrammable intellectual functions. The EPC is expected to facilitate a wide range of functions, including data capture, text editing, typesetting, page composition, manuscript tracing, subscription fulfillment, index preparation, reviewer file maintenance, and information retrieval.

In a typical EPC setting, the author of a paper prepares his manuscript using special quality paper and a typeface suitable for optical character recognition (OCR) input. He then marks the manuscript for the attention of the editor of his chosen journal and mails it to the EPC. The entire manuscript is recorded into the EPC computer by means of an OCR scanner. From this stage onward, the editor, the referees, and the author can interact through the EPC computer. The final product of this interaction is the refereed and accepted manuscript on magnetic tape, ready for photocomposition. Copies of the tape may also be sent to abstracting and indexing services and to information analysis centers for creating secondary services and products (*141*). The following are the main advantages of the EPC:

1. Operating economies resulting from: (*a*) elimination of manuscript rekeyboarding and galley proof corrections; (*b*) computerization of housekeeping operations such as routine correspondence, filing, and follow-up; and (*c*) computer support of referee selection, manuscript revision, and copyediting.
2. Faster publication of papers.
3. Potential for on-line linkages to editors, referees, authors, and even to readers.
4. Faster production of secondary services and products (e.g., abstracts, indexes, reviews).

With financial support from the National Science Foundation, the Aspen Systems Corporation has set up an experimental EPC. The American Society for Information Science, the American Society for Microbiology, the Entomological Society of America, and the American Society of Biological Chemists will each produce one journal through the experimental EPC, to study the practical and economic feasibility of such an integrated approach to journal production.

In the not too distant future the primary journal, as it is known to us now, may be entirely replaced by a computerized central depository with a network of consoles serving the various groups of users: authors, editors, referees, information analysts, evaluators, and readers (*142*). Not long ago a committee of the National Academy of Sciences predicted that in about three decades the primary journal would be rendered obsolete by a network of consoles that would facilitate intercontinental, interactive communication (*78*). These proposals might appear futuristic at first sight; but along these very lines, a concrete proposal has been made for what has been called "the electronic journal," in an investigation carried out at the University of Toronto with financial support from the National Science Foundation (*143*). The electronic journal is conceptually similar to the Editorial Processing Center, but it would consist of a distributed electronic network that could provide on-line access to scientific papers for everyone concerned: authors, editors, referees, and users (readers). In addition to performing, in an on-line mode, the basic functions of manuscript input, reviewing and editing, and housekeeping operations, the electronic journal would provide an extended spectrum of services, such as browsing facility, retrospective searching, commentaries, user scratchpads and filing systems, and data manipulation capability. It would be possible for the user, for example, to perform some transformation on the data presented in the paper—to draw graphs and histograms and have the results displayed on the terminal. The users would be able to communicate with one another over the network through computer conferencing. Authors in different geographical areas could collaborate in preparing articles. The electronic journal could also carry news items and advertisements.

Besides being faster than the traditional printed journal, the electronic journal can provide international access to scientific papers in an on-line mode, and it can also capture "fugitive materials" such as unpublished technical reports. It is also expected to be more cost-effective than an equivalently large paper journal. The approximate cost of an electronic journal publishing about 40,000 pages per year has been estimated thus: The total start-up costs would be about $20 million, and the operating costs, about $10 million a year. It is expected that an electronic journal of this size could probably pay for itself out of income from "subscriptions" (*144*).

Schemes such as the electronic journal might soon become technologically feasible and economically viable. The chief impediment to the successful implementation and acceptance of the electronic journal appears to be predominantly sociological rather than technological in nature. The traditional scientific journal has become so firmly rooted within the scientific and technical communication system that any alternative that does not have the same individuality and prestige-giving power may not be easily accepted by the scientific community. The scientific societies are likely to resist implementation of such a system on the ground that it would diminish their independence and power. This is a legitimate complaint, since such a centralized system would call for a high degree of standardization and conformity in publication practices. For widespread acceptance of centralized computer-based networks typified by the electronic journal, the advantages gained by the scientific community should far outweigh the disadvantages suffered by the individual scientists and the societies. The scientific community seems to prefer the refereed journal as a means of establishing priority and winning prestige and recognition. According to Herschman, technology and tradition are the two main drawbacks of his "journal of the future," which is basically an electronic journal:

> Its drawbacks are, of course, technology (the access must be really universal) and tradition (esthetics). The visible evidence of one's progeny is not there. This does not mean that the copy which any user sees, either on his scope, or as printed matter, won't be typographically excellent—it will, but it won't be there to cover your walls and heft in your hands and lovingly finger. All that can be said to this is that when the technology is ready, perhaps we will be also (*145*).

Patents

INTRODUCTION

A patent is a protection granted by the government to an inventor to exclude unauthorized exploitation of his invention. The precise nature of the protection granted should be clarified: What is granted to the inventor (or his heirs or assignees) is not the right to make, use, or sell, but the right to exclude others from making, using, or selling the invention. In the United States, patents are granted by the United States Patent Office, an agency of the Department of Commerce of the federal government; the duration of the protection is 17 years. In return for the protection granted by the state, the inventor is required to file a description of the invention in the form of a patent specification.

A patent should be distinguished from trademark and copyright. All these are protections granted by the state, but they are of different kinds. A trademark is the name or symbol used with a product to indicate its source or origin. Trademarks may be registered in the Patent Office. Trademark rights exclude others from using the registered name or symbol on the same type of goods, but it does not prevent others from making the same goods under a different name or symbol. Copyright protects the writings of an author against copying. Copyright protects the form of expressing rather than the substance of the writing. A description of a machine could be copyrighted as a writing. This would only exclude others from copying the description; it would not prevent others from writing another description of the machine or from making and using the machine. Copyrights are registered with the Copyright Office in the Library of Congress (*146*).

The history of patents has been traced back to the ancient Greek civilization of the third century B.C. (*147*). However, the oldest patent system with a continuous history to the present time is the British patent system, which is said to have been started from the Statute of Monopolies of 1623. The patents granted until that time were really monopolistic grants to royal court favorites, giving the sole right to deal in certain commodities or trades. In fact, the word "patent" means "open," and it is used as an abbreviation of "royal letters patent"—an open letter from the state to all subjects announcing some privilege. Patents became a form of scientific literature when the Patent Law Amendment Act of 1852 in England directed that all patents subsequently granted should be printed. At that time all the earlier patents, starting from Number 1 of 1617 (for "A Certain Oyle to Keep Armour and Armes from Rust and Kanker"), were also printed (*148*).

Before the Constitution of the United States was adopted, the various American colonies granted patents to settlers for methods of making salt and agricultural products. The Constitution of the United States contains a specific provision (Article 1, Section 8, Clause 8) empowering the Congress to enact laws relating to patents: "Congress shall have the power . . . to promote the progress of science and useful arts, by securing for limited times to authors and inventors the exclusive right to their respective writings and discoveries." Under the first patent act, approved by George Washington on April 10, 1790, the power to grant patents was vested in a board of three members, consisting of the secretary of state, the secretary for the Department of War, and the attorney general. Each patent had to be signed by the president and the secretary of state, and the administration of the patent system was entrusted to the Department of State. Thomas Jefferson, who was then the secretary of state, thus became the first administrator of the United States patent system. The Patent Act of 1836 provided for the establishment of the Patent Office under the direction of a commissioner of patents. The Patent Office was transferred from the Department of State to the Department of the Interior in 1849, and it became a part of the Department of Commerce in 1925. The present patent laws were enacted in 1870 and revised in 1952. The Patent Office performs four major functions: (*a*) examines patent applications for patentability, (*b*) grants patents, (*c*) publishes and distributes patents, and (*d*) maintains a public search room where patents and related records are accessible to the public.

THE PATENT PROCESS

To be eligible for patent protection, an invention must be a new and useful process, machine, manufactured product, or chemical composition or substance, or a new and useful improvement to any of these. By "useful" is meant the condition that the invention serves a useful purpose and is operable. A mere idea or a suggestion, or a machine that does not actually operate or perform the intended function, cannot be patented. Also, under the Atomic Energy Act of 1954, inventions useful solely in the utilization of special nuclear material or atomic energy for atomic weapons cannot be patented.

Examination of applications for patents is the largest and most important function of the Patent Office. The Patent Office has approximately 2,700 employees, and about one-half of these are examiners and other professional staff with technical and legal training. Each year the United States Patent Office receives roughly 90,000 applications. The specifications and accompanying drawings of all patents are published on the day they are granted, and printed copies are sold to the public. About 5.5 million copies of patents are sold by the Patent Office each year. Patent specifications are also made available to the public in depository libraries throughout the country. Copies of United States patents and the weekly journal *Official Gazette* may be bought on microfilm from the firm Research Publications, Inc. About 70,000 patents are issued each year. More than 4 million patents have been issued by the United States Patent Office so far. The four-millionth patent was issued in December 1976. After the current numbering system started in 1836, it took 75 years (until 1911) to issue the first million patents. The second and third million patents were issued at equal intervals of 25 years: Patent number 2,000,000 was issued in 1936 and patent number 3,000,000 in 1961. The next 1 million patents were issued in only 15 years. In a special introduction to the December 28, 1976, issue of the *Official Gazette*, which included patent number 4,000,000, the commissioner of patents and trademarks wrote:

> The increasing rate of patenting reflects the accelerating pace of our technological progress. . . .
>
> Patents encourage the development of technology by providing incentives to make inventions, to invest in research and development, to put new or improved products and processes on the market, and to disclose inventions that otherwise would be kept as trade secrets. I am confident that the patent system will continue to help bring forth technology to satisfy our nation's needs—needs such as new energy sources, a cleaner environment, and better food and medical care.

> It is fitting at the close of our nation's 200th birthday year to pay tribute to the system that has contributed so greatly to our technological strength. . . .

Patent laws and procedures differ from one country to another. National patent laws specify the nature of inventions that can be patented, the conditions under which patents are granted, and the procedure for securing a patent grant. An introduction to the patent procedures may be found in *Foreign Patents: A Guide to Official Patent Literature*, by Francis J. Kase (Oceana Publications, Dobbs Ferry, N.Y., 1972). The British patent procedure allows the inventor to file a provisional patent application, even when the invention is still not complete in its projected final form; this provisional specification is helpful to the inventor in establishing his claim for priority. A complete specification has to be filed within 1 year from the date of filing the provisional specification. Each year some 50,000 patent applications are examined in the British Patent Office, and often 2 or more years elapse between the filing of the application and its acceptance. When the inventor files an application to protect his invention, the patent office gives a serial number to the application and announces the title of the invention in the weekly *Official Journal* (*Patents*). The application is then examined by the patent office examiners; if found acceptable, it is given a seven-digit number, which uniquely identifies the patent, and the acceptance is announced in the *Official Journal*. The patent specification is then printed and put on sale. If there is no objection from any one challenging the invention during the next 3 months, the patent document is stamped with the official seal and the patent is said to have been granted. This document becomes the "royal letters patent"—a legal document on parchment, separate from the printed patent specification. The protection in England is for 16 years from the filing date of the complete specification, and an annual renewal fee has to be paid after the first 4 years. Approximately 45,000 patents are published annually in Britain.

Unlike copyright protection, patent protection is not international, and inventors have to obtain patent protection in many countries by filing patent applications in the respective national patent offices. These equivalent, or corresponding, patents for the same invention can be traced through the Patent Concordance of *Chemical Abstracts*, which covers over 50,000 patents annually from many countries of the world.

BIBLIOGRAPHIC CONTROL OF PATENTS

New patents are announced in the official publications of the national patent offices (e.g., *Official Journal* of the British Patent Office). In the United States, the *Official Gazette* of the United States Patent Office is the official journal relating to patents and trademarks. It has been published weekly since 1872. Each weekly issue of the *Official Gazette* contains abstracts of newly issued patents, with a selected diagram from the patent where applicable. The abstracts are arranged according to the United States Patent Office classification system. The *Manual of Classification* of the United States Patent Office contains a list of over 300 classes and 64,000 subclasses of the classification scheme, along with an alphabetical index. The

Manual is a loose-leaf book with periodic supplements, and it can be obtained on an annual subscription basis from the Superintendent of Documents, Washington, D.C. The weekly issues of the *Official Gazette* have an index of inventors and a subject index in which patent numbers are listed under the class numbers of the U.S. Patent Office classification scheme. These indexes are cumulated and published separately each year as the *Index of Patents.*

NASA Patent Abstracts Bibliography (1972–) is a semiannual, recurring bibliography of patents owned by the National Aeronautics and Space Administration. Patents are also covered by secondary services such as *Chemical Abstracts, Scientific and Technical Aerospace Reports, Science Citation Index*, and *Pandex. Polymer Science and Technology—Patents* (POST-P) is a spin-off product derived from *Chemical Abstracts*, and it is also available on magnetic tape. The coverage or patents in secondary services is uneven. In a sample study, in 1974, of United States and foreign patents covered in *Chemical Abstracts*, Oppenheim obtained the results shown in Table 3 (*149*).

Oppenheim's results were similar to those obtained by D. Kaye in 1965. Kaye examined the coverage in *Chemical Abstracts* of five random samples of 50 patents, from the United States, West Germany, the United Kingdom, and Belgium. In the case of the United States and West German patents, the *Chemical Abstracts* coverage was 100%; 70% of the British patents and only 2% of the Belgian patents were found to have been covered in *Chemical Abstracts* (*150*). Thus, the coverage of patents in *Chemical Abstracts* is uneven, although the abstracting service endeavors to cover "all British, French, West German, South African and United States patents of chemical or chemical engineering interest along with chemical patents issued by 21 other nations" (*151*).

The size of patent specifications varies from one page to a few hundred pages or even more. British patent number 1,108,800, for an IBM computer, has 1,319 pages and 419 sheets of drawings (*114*). Not all the information contained in patents is republished in journal articles, reports, monographs, and other forms of literature. Felix Liebesny and co-workers found that of a random sample of 1,058

TABLE 3

Coverage of Chemical Patents in *Chemical Abstracts*[a]

Sample of patents examined	Patents covered in *Chemical Abstracts*: Number	Percentage
567 U.K. patents on 20-keto steroids	472	83.2
809 U.K. patents on 11-keto steroids	786	97.2
94 U.S. patents on aminopyridines	92	97.9
62 U.S. patents on halogenated hydrocarbons	58	93.5
113 West German pharmaceutical patents	109	96.5
133 Japanese pharmaceutical patents	69	51.9
463 Belgian pharmaceutical patents	7	1.5

[a] Adapted from Ref. *149*.

British patents, only 61 (5.77%) were subsequently republished in journal articles, books, and other forms of literature (*152*). Thus, if patents relevant to a given topic of inquiry are not identified, then a great deal of primary information contained in them is likely to be irretrievably lost.

Derwent Publications Limited, of London, specializes in publishing patent abstract services. Each year, abstracts of some 60,000 patents from 24 countries are published in Derwent publications. Some of these are: *British Patent Abstracts* (all subjects); *British Patents Report* (chemical patents only); *Soviet Inventions Illustrated* (chemical, electrical, and mechanical and general patents); *Japanese Patents Gazette* (chemical patents only), and so on. Derwent data bases are available for on-line searching.

Some primary journals (e.g., *Production Engineer, Modern Plastics, Journal of Applied Chemistry*) also announce new patents, sometimes with abstracts, as a regular feature.

Conference Literature

SCIENTIFIC CONFERENCES

Presentation of papers at local, national, and international conferences has been one of the most important methods of disseminating scientific information. Nascent information on the results of scientific research can be communicated more rapidly and directly through conference papers than through papers published in journals. It has been shown that on an average, papers are presented at national meetings about 1 year earlier than their publication in journals (*153*). Another advantage of the conference paper over the journal article is the possibility of obtaining immediate feedback from the conference participants in the form of questions and comments following the presentation of the paper. Conferences also provide additional opportunities for informal communication and for developing and strengthening personal contacts with other scientists engaged in similar pursuits.

Conferences range from small gatherings of local chapters or special interest groups of national societies to large international congresses attended by thousands of delegates from all over the world. These meetings are variously titled conferences, congresses, symposia, seminars, workshops, colloquia, or teach-ins, and they generate a great quantity of published and unpublished material. Hundreds of papers are read in some of the large conferences, such as the meetings of the American Chemical Society and the American Society of Mechanical Engineers. For example, the *Proceedings of the Second International Conference on the Peaceful Uses of Atomic Energy* (United Nations, Geneva, 1958) contains 2,100 scientific papers submitted by participants from 46 countries and 6 international agencies.

The conference as a forum for information exchange is not a new phenomenon. "It is said that three international conferences were held in 1853, over one hundred in 1909, and at least two thousand in 1953" (*154*). In 1958 the International Organizations Section of the General Reference and Bibliography Division of the Library of Congress had identified and recorded in its files 1,008 multilateral meetings for 1953 and 3,249 for 1957. Based on these records, which were admittedly incomplete, Kathrine O. Murra estimated the annual number of multilateral conferences at approximately 5,000 (*155*). According to a more recent estimate, about 10,000 conferences are held each year all over the world (*156*). A National Science Foundation survey showed that 94% of professional scientific societies in the United States organize annual meetings at which original research is reported (*157*).

The following are some of the factors responsible for the enormous increase in the number of conferences in recent years:

1. Increased tempo of research and development activity throughout the world.
2. Increase in the rate at which new information is generated and exploited.
3. Growing interest in international cooperation in sharing the results of research and development activity.
4. Need for a means of communication that is faster and more direct than the printed medium.
5. Oversaturation and lack of celerity of the printed medium as a means of information transfer.

It appears that the scientific conference has become an established institution for both formal and informal communication in response to a basic need for a faster, more direct, and more vital means of communication than the overloaded and slower traditional means of information transfer (*154*).

Conferences are organized for a variety of reasons. In smaller meetings, new knowledge is announced and its implications are discussed in an expert milieu. Some gatherings are mainly instructional in nature; yet others are held in order to review the developments, assess the current state of knowledge, and identify the goals for future research endeavors in a particular branch of learning. "There are other congresses and especially the larger ones which are mainly a manifestation of solidarity of those concerned with particular subjects and at which little completely new material is presented, although much of it may be novel to the majority present" (*158*).

Alexander King has summarized the main functions of conferences thus:

1. Announcement of new knowledge
2. Exchange of information and experience
3. Education
4. Formulation of problems and situations, especially in interdisciplinary areas
5. Fact-finding and reporting
6. Negotiations and policy formulation
7. Status and ceremonial congregation (*159*)

The first four seem to be the dominant functions of the majority of scientific conferences. Baum has identified four major types of conferences, depending on their principal objectives and format (*160*):

First, there are conferences at which experts in a given field gather to discuss problems of mutual interest. Such meetings are typified by the Gordon Research

Conferences, which are week-long discussion sessions. Attendance is by invitation. No written papers are presented and no proceedings are published (*161, 162*).

The second category is that of current awareness conferences, typified by the meetings of the Federation of American Societies of Experimental Biology. Summaries of progress reports to be presented are printed in the society journal well before the conference. Speakers are not required to prepare written copies of their papers. They may, however, publish a formal paper based on the presentation in a journal later.

Third are the learned society meetings, exemplified by the meetings of the American Society of Mechanical Engineers and the American Institute of Electrical Engineers portion of the Institute of Electrical and Electronics Engineers. Papers may be submitted as either "conference papers" or as "transactions papers," for screening by experts and subsequent presentation and discussion at the conference. Transaction papers are preprinted and made available to participants before the conference. Conference papers may be submitted for formal publication by the society after the conference.

The fourth type is that of the professional group conferences, organized by a specialized group of a large professional society. This approach is taken by the Institute of Radio Engineers portion of the Institute of Electrical and Electronics Engineers, which consists of a number of decentralized professional groups devoted to the study of specific branches of electronics engineering. The role of the main professional society in such conferences is minimal.

Regardless of the function or format of the meeting, all conferences result in a great many publications of various types, distributed before, during, and after the conference. The only exceptions to this are the Gordon Research Conferences, which do not generate any printed record except the preconference announcements.

Preconference Literature

Long before the commencement of the conference, announcements, calls for papers, and programs are published in journals and are also mailed to the members of the sponsoring society and other potential participants. Journals (such as *Science, Nature*, and *Physics Today*) and newsletters (e.g., *Information Hotline*) are invaluable sources of advance information on forthcoming conferences. A number of specialized bibliographic tools that provide advance information on forthcoming conferences are listed and described by Jirina Cermakova (*163*).

Abstracts of conference papers are often distributed to possible participants or published in journals prior to the conference. The American Chemical Society, the American Institute of Chemical Engineers, and some other societies publish premeeting abstracts to tell prospective participants what they may expect to hear at the conference, and also to enable those not attending the conference to gain at least a brief view of the proceedings (*164*). The Society of Automotive Engineers, the American Petroleum Institute, and some divisions of the American Chemical Society issue preprints of meeting papers either as separates or in bound volumes. Authors of conference papers also send copies of their papers to their friends and colleagues before presenting the papers at the conference. If preprints are distributed in advance, it is usual for the speaker to assume that the paper has been read by the delegates. Distribution of preprints of conference papers gives an opportunity to the conference participants to study the papers in advance, so that more time can be spent on discussion of the papers at the conference.

Literature Generated During the Conference

Very often, abstracts and preprints of papers are made available to participants during the conference. Some societies, such as the American Society for Testing and Materials and the Society of Automotive Engineers, supply conference papers through a mail-order service. Additional literature—such as copies of opening and closing speeches, keynote addresses, texts of resolutions, and lists of participants—is distributed during the conference. These may also be printed in the official organ of the sponsoring society. The American Society for Information Science, for example, provides abstracts of papers in hard-copy format and full texts of papers on microfiche during its annual conferences.

Postconference Literature

Postconference literature consists of: (*a*) complete proceedings of conferences published in monographic form or as a special issue of a journal, including edited versions of papers read, discussions, speeches, minutes, and resolutions; and (*b*) individual contributions presented at the conference, which may be included in the proceedings volume or may be published, often suitably revised, as papers in primary journals. It is not uncommon for a conference paper to be subsequently issued as a technical report by the agency supporting the research or the organization at which the investigation was carried out.

BIBLIOGRAPHIC CONTROL OF CONFERENCE LITERATURE

Papers presented at conferences are very important for current awareness because of the currency of the information reported in them. Published volumes of conferences are eminently valuable as authoritative surveys of developing subjects and as reference works. The bibliographic control of conference papers and published proceedings of conferences is beset with many problems. An editorial in *Nature*, contemplating on the future place of symposium volumes in scientific literature, listed several defects of published symposium proceedings:

1. Delay in publication, because of the time involved in obtaining manuscripts from speakers, editorial processing, and the actual production of the printed volume.
2. Symposium volumes contain repetitive material already published elsewhere, because of the need to provide background information for the benefit of the conference audience.
3. Many conference papers do not contain adequate bibliographic references.

4. Many symposium volumes contain contributions that would not have been approved by competent referees.
5. It is difficult to identify and retrieve information buried in symposium volumes (*165*).

The last difficulty is the result of several separate problems, such as the geographic distribution of the conferences, linguistic diversity of the proceedings, inadequate bibliographic control of conference literature, delay in the publication of proceedings, lack of adequate indexes in published proceedings, and so on.

Multiplicity of language is a problem that conference papers and proceedings share with other forms of scientific literature. This problem was highlighted in a survey carried out by the Union of International Associations covering 285 conferences held during 1960/1961 (*166*). The data in Table 4 show the frequency with which various languages were used for written communication in the 285 conferences surveyed. It may be observed from this table that many of the conferences were multilingual, and that accepted papers were written in several languages.

Yet another problem is the lack of a uniform policy regarding the subsequent publication of papers presented at conferences. The Gordon Research Conferences "deliberately discourage publication so that participants can report and discuss more freely work that is not sufficiently advanced for wide dissemination" (*167*). The erstwhile Institute of Radio Engineers (IRE) inserted the following note in its journal, concerning the papers read at the convention of the institute in 1949: "No papers are available in preprint or reprint form, nor is there any assurance that any of them will be published in the *Proceedings of the IRE*, although it is hoped that many of them will appear in these pages in subsequent issues" (*168*). A list of papers presented at the 1950 winter general meeting of the former American Institute of Electrical Engineers (AIEE) was prefaced with a similar note: "These papers

TABLE 4

Languages Used in Conferences

Language	Number of conferences
English	250
French	242
German	121
Spanish	47
Italian	24
Russian	12
Dutch	8
Norwegian	7
Esperanto	6
Hebrew	2
Hindustani	2
Portuguese	2
Danish	1
Finnish	1

are not scheduled for publication in *AIEE Transactions* or *AIEE Proceedings*, nor are they available from the Institute" (*169*).

Although many channels exist for disseminating conference papers before, during, and after the conference, a large proportion of papers read at conferences are never published and are thus lost to the scientific community. According to one estimate, as much as 25% of conference papers may not appear in print at all (*170*). In a paper read at the International Conference on Scientific Information, 1958, Felix Liebesny reported that 48.5% of some 383 contributions presented at four conferences of American societies remained unpublished (*171*). Of the papers that were published, about one-third appeared in periodicals other than those in which the abstracts of the papers had appeared.

As mentioned earlier, delay in the publication of conference papers is another problem that renders their bibliographic control more difficult. In the above investigation by Liebesny, it was found that 114 papers (nearly 30%) were published within 12 months, 63 were published between 13 and 24 months, and 14 between 25 and 36 months. Four and a half years had elapsed before two of the papers were seen in print.

In an Aslib survey of 194 conference proceedings listed in the *British National Bibliography*, 42 proceedings were found to have been published in the year that the conferences took place, 93 were published in the following year, 46 were issued 2 years later, and 13 appeared 3 years or more after the conference (*172*).

A frequent drawback of published conference proceeding volumes is the lack of appropriate indexes. In the Aslib study mentioned above, 205 conference reports noted in the *British National Bibliography* in classes 500 (science) and 600 (technology) during the period 1956–1959 were examined for indexes. Of these, 103 publications (50%) had no index at all, 66% had no author index, and 59% had no subject index. Only a quarter of the publications examined had both author and subject indexes. The investigators felt that the lack of an author index in a conference proceedings volume is not a serious disadvantage unless a large number of authors (say, over 25) are mentioned. But the lack of a subject index is a definite disadvantage, especially in voluminous publications consisting of much factual information.

One other important problem that affects the bibliographic control of conference papers and proceedings is their uneven coverage in indexing and abstracting services. A study of the International Mineral Dressing Congress, Stockholm, September 1957, showed that of 34 papers, 31 were dealt with in *Chemical Abstracts*, 6 were abstracted in *Bulletin signaletique*, and 7 in the *Journal of the Iron and Steel Institute* (U.K.). *IMM Abstracts* (of the Institution of Mining and Metallurgy) abstracted all 34 papers (32 were abstracted as preprints before the conference, and the remaining were abstracted after the conference). None of the papers was abstracted in Germany or in the U.S.S.R. (*173*).

In another study, Hanson and Janes of Aslib surveyed the coverage given in English-language abstracting journals to the publications of ten conference proceedings issued during 1957/1958 (*174*). These contained 386 papers in all. No abstracts were discovered of any of the papers presented at two of the ten conferences. In all, 117 abstracts (representing 30% of the 386 papers searched) were discovered, but only 79 (or 20%) were abstracts of the papers as printed in the conference proceedings; the rest were abstracts of the same papers published additionally elsewhere, or of reviews of the papers. Nearly half of the 386 papers were neither abstracted nor indexed.

In spite of the unevenness of their coverage, abstracting and indexing services are important bibliographic tools for locating conference papers and proceedings. Some representative examples are: *Applied Mechanics Reviews, Biological Abstracts, Chemical Abstracts, Computing Reviews, Government Reports Announcements and Index, International Aerospace Abstracts,* and *Physics Abstracts.* The last-named publication has a separate index to conferences. Reviews of meetings, usually with abstracts of papers, are published in society journals such as those of the American Chemical Society (*Chemical and Engineering News, Rubber Age,* etc.) and the American Society of Mechanical Engineers (e.g., *Mechanical Engineering*). *Chemical Abstracts* includes abstracts of papers presented at the meetings of American societies, even if the papers are not subsequently published in a journal (*175*). A number of specialized bibliographic tools available for identifying conference papers and proceedings are listed and described by P. J. Short (*156*) and by Jirina Cermakova (*163*). Trade bibliographies, catalogs and promotional literature of publishers, and announcements and reviews in journals are other sources of information concerning published conference proceedings.

UNESCO–FID RECOMMENDATIONS ON CONFERENCE LITERATURE

So far, several problems pertaining to conference literature and its bibliographic control have been discussed. The quality and bibliographic control of conference literature have been subjects of much concern to both scientists and librarians. The ban on written communications in the Gordon Research Conferences is a strong deterrant to the proliferation of "premature" papers reporting undigested information on incomplete investigations. The International Federation for Documentation (FID) has been very active in the promotion of measures to improve the accessibility of conference literature. In 1959 the federation, under contract with UNESCO, conducted a study on "The Content, Influence and Value of Scientific Conference Papers and Proceedings." For this study, the FID consulted the Union of International Associations, the Abstracting Board of the International Council of Scientific Unions, and several other organizations and individuals, and also obtained information from its own member organizations. The findings of this study on scientific conferences have been published in two parts in the *UNESCO Bulletin for Libraries* (*157, 173*) and also as a separate report (*176*). In this report, known as the Poindron Report, FID suggested that organizers of scientific conferences take the following steps in order to make the proceedings of the conferences useful to research workers, particularly those unable to attend the meetings:

1. To publish, if possible, all papers (accompanied in every case by an author's summary) before the conference; the text of unpublished papers should be available on request.
2. To publish the proceedings as soon as possible after the conference, within a

year at the latest, and to consider the advantages, from the point of view of diffusion, of publishing them in a periodical. Members of the Abstracting Board of the International Council of Scientific Unions have proposed that no grant be made by an international union or a government to any conference unless its organizers pledge themselves beforehand to publish the proceedings within a year.

3. To send all conference publications, immediately after they appear, to the secretariats of the international bibliographies concerned, so that not only the entire volumes, but each individual paper, may be indicated or abstracted (using the author's summary).
4. To give all particulars of all conferences in a single calendar.
5. To provide, through some appropriate means, information about conference publications even before they are issued.
6. Union catalogs should show the holdings of conference publications in libraries.
7. To promote standardization in respect of terminology of conferences and their publications, the style of conference publications, and rules for cataloging them.

Laudable as these recommendations are, they are difficult to implement, in view of the diverse groups of people concerned with and participating in the organization of scientific conferences. However, the advent of several specialized bibliographic tools such as *World Meetings* and *Proceedings in Print* (described in References *156* and *163*) has at least partially paved the way toward the bibliographic control of conference literature.

Dissertations, Theses, and Research in Progress

DISSERTATIONS

Doctoral dissertations are an important class of primary literature. The doctorate degree is awarded only upon successful completion of supervised research and the formal presentation of the results of research in a dissertation. Each dissertation should deal with some aspect of a subject not previously treated. Doctoral dissertations are therefore an important source of original information.

Before embarking on research for the doctoral dissertation, the researcher invariably conducts a comprehensive literature survey; this is done not only to ascertain the present state of knowledge in the field of inquiry, but also to make sure that no one else has made a prior investigation on the proposed research topic. The results of this comprehensive literature survey are presented as a separate chapter in the dissertation in the form of a state-of-the-art review, accompanied by an exhaustive bibliography. Thus, dissertations can also be used as a secondary source for locating reviews and bibliographies.

In 1861 Yale University awarded America's first earned doctorates: three Ph.D.'s, in psychology, physics, and classics. From that year through 1970, American universities awarded 340,000 doctoral degrees. One-half of these degrees were awarded in the last 9 years of this period. According to one projection, some 350,000 to 400,000 doctoral degrees are expected to be awarded during the decade 1971–1980. Slightly more than one-half of these will be in science and engineering, including mathematics and social sciences (*177*). During the academic year 1974/1975, American and Canadian universities reported 34,812 doctoral dissertations. Of these, 16,898 were in the physical, earth, and biological sciences; the remaining 17,914 were in the social sciences and the humanities (*178*).

Although the number of doctoral dissertations has been increasing steadily, it appears that not much use is made of them by scholars and students. Considerable effort, time, and resources are expended in the performance of research for the doctoral degree and in presenting the results of research in a dissertation. According to one estimate, the average cost of a science doctorate is $62,000. This cost represents only the resources expended by the university; it does not include the value of the time invested by the doctoral student (*179*). Yet, gauged by the number of citations generated in published literature, doctoral dissertations produce a miniscule impact on the progress of science. In a 3,698-item bibliography on the communication of scientific and technical information published by Rutgers University Press, only nine items were indexed as dissertations or theses (*180*). In a study of nearly 9,200 bibliographic references cited in computer science literature, dissertations and theses accounted for only 2.8% of the cited references (*41*). Boyer has suggested the following as the probable reasons for the low volume of use made of doctoral dissertations:

First, many dissertation authors do not publish the contents (or even a portion) of their completed dissertation in the open literature. Contrary to popular belief, most dissertations do not find their way into print in the form of monographs or as parts of serials; 23% of chemistry dissertations and 51% of psychology dissertations did not yield subsequent publications (*179*).

Second, immediate physical access to most dissertations is generally unavailable to potential users because libraries do not acquire dissertations systematically. In spite of improved bibliographic access through the *Dissertation Abstracts International* and physical access to copies of dissertations through University Microfilms International (until recently, Xerox University Microfilms), "there is no available evidence to suggest that libraries acquire dissertations in substantially greater numbers now than before the advent of the improved services" (*179*).

Comments frequently made by students, faculty, and scholars, as encountered by Boyer during his study, would typically be as follows:

> The last source of information that I would consult for material is *Dissertation Abstracts*. Probably, any material identified would not be held by our library and, usually, the costs, nuisance, and time to obtain the dissertation are too great. Therefore, *Dissertation Abstracts* and, consequently, dissertations will remain of little value to me as sources of information (*179*).

Comments of this nature indicate that, in general, researchers typically use only those materials that are easily accessible, tend to overlook those that are difficult to identify, and ignore those that are difficult to acquire.

BIBLIOGRAPHIC CONTROL OF DISSERTATIONS AND THESES

Most abstracting and indexing journals cover dissertations, but the coverage is far from comprehensive. Individual universities periodically issue lists of dissertations approved. An example is the publication of Cambridge University, *Abstracts of Dissertations Approved for the Ph.D., M.Sc., and M.Litt. Degrees in the University of Cambridge . . .* (1925/26–1956/57). This was continued by the annual *Titles of Dissertations Approved for the Ph.D., M.Sc., and M.Litt. Degrees in the University of Cambridge* (1957/58–).

A list of "Serial Publications Listing or Abstracting Dissertations" is printed in the preliminary pages of *American Doctoral Dissertations.*

The earliest systematic attempt to list doctoral dissertations on a national level was made by the Library of Congress. The *List of American Doctoral Dissertations Printed* was initiated in 1912 as an annual publication. Only dissertations printed as monographs or as parts of scholarly journals were included in this list, and no attempt was made to list unpublished dissertations; the assumption was that all dissertations would eventually be printed. The series was discontinued with the 1938 issue, printed in 1940.

Doctoral Dissertations Accepted by American Universities (1933/34–1955/56) was an annual bibliography, without abstracts, compiled for the Association of Research Libraries and published by the H. W. Wilson Company. The title of this series was changed to *Index to American Doctoral Dissertations* (1955/56–1963/64). This was followed by *American Doctoral Dissertations*, published annually by Xerox University Microfilms for the Association of Research Libraries (*181*). *American Doctoral Dissertations* is a complete listing of all doctoral dissertations accepted by American and Canadian universities, compiled from the commencement programs issued by the universities. It is published on a school-year basis, and the entries are arranged by subject categories and degree-granting institutions.

By far the most comprehensive abstract journal for dissertations is the *Dissertation Abstracts International*, published by University Microfilms International, Ann Arbor, Michigan (*182*). This is a monthly compilation of abstracts of doctoral dissertations submitted to University Microfilms International by more than 375 cooperating institutions in the United States and a few European countries. However, its coverage of American and Canadian dissertations is not as complete as that of *American Doctoral Dissertations* (*183*). *Dissertation Abstracts International* was begun in 1938 as *Microfilm Abstracts*, and it was titled *Dissertation Abstracts* from 1952 till 1969. Its current title reflects the expansion of its coverage to include dissertations from European universities. Since 1966 the abstract journal has appeared in two sections: A. The Humanities and Social Sciences, and B. The Sciences and Engineering. Each entry includes the title of the dissertation, author's name, university, date, name of the supervisor, an informative abstract, number of pages, and order number. The abstracts are arranged under subject headings. Each issue has a subject index and an author index; the indexes cumulate annually. Full texts of dissertations on microfilm or photocopies are obtainable from University Microfilms International.

The volume indexes to *Dissertation Abstracts* were cumulated, and a *Retrospective Index* to the first 29 volumes of the abstract journal was published by Xerox University Microfilms in 1970. This consists of subject and author indexes (in 11 volumes) to all dissertations abstracted in *Microfilm Abstracts* (1938–1951) and *Dissertation Abstracts* (1952–1969). In 1973 Xerox University Microfilms published a monumental index to over 400,000 dissertations from nearly 400 institutions, covering a period of 111 years: the *Comprehensive Dissertation Index 1861–1972*. This is a computer-generated index by keywords and authors, and it attempts to list all dissertations accepted at U.S. universities from 1861 onward. Numerous Canadian and foreign universities are also included, but no claim of completeness of listing is made for universities outside the United States. The *Index* is in 37 volumes, grouped under disciplines, as follows:

Volumes	Disciplines covered
1– 4	Chemistry
5	Mathematics and statistics
6– 7	Astronomy and physics
8–10	Engineering
11–13	Biological sciences
14	Health and environmental sciences
15	Agriculture
16	Geography and geology
17	Social sciences
18–19	Psychology
20–24	Education
25–26	Business and economics
27	Law and political science
28	History
29–30	Language and literature
31	Communication and the arts
32	Philosophy and religion
33–37	Author index

Entries in the *Comprehensive Dissertation Index* include title; author; degree; date of degree; institution granting the degree; number of pages in the dissertation; citation to *Dissertation Abstracts International, American Doctoral Dissertations*, or other source of information; and order number when available from University Microfilms International. The *Index* is kept up to date by annual supplements. The 1975 supplement in five volumes indexed some 36,760 dissertations. *Comprehensive Dissertation Index* completely replaces earlier cumulative indexes to dissertations, such as the *Retrospective Index* to the first 29 volumes of *Dissertation Abstracts*, the Wilson indexes entitled *Doctoral Dissertations Accepted by American Universities* (1933/34–1954/55), and the Library of Congress *List of American Doctoral Dissertations Printed* (1912–1938).

In addition to these general indexes to doctoral dissertations and the lists of dissertations issued periodically by the degree-granting universities, a third category of bibliographies is comprised of those that are limited to dissertations in a specific discipline. The following is representative of many bibliographies of this kind: *Dissertations in Physics: An Indexed Bibliography of All Doctoral Theses Accepted* *by American Universities, 1861–1959*, compiled by M. Lois Marckworth (Stanford University Press, Palo Alto, Calif., 1961). This bibliography lists 8,216 dissertations, including the very first doctoral dissertation accepted by an American university· *Having Given the Velocity and Direction of Motion of a Meteor on Entering the Atmosphere of the Earth, to Determine Its Orbit about the Sun, Taking into Account the Attractions of Both These Bodies*, by Arthur Williams Wright (Yale University, New Haven, Conn., 1861).

An important tertiary source that describes bibliographies of dissertations and theses is: *A Guide to Theses and Dissertations: An Annotated Bibliography of Bibliographies*, by Michael M. Reynolds (Gale Research Co., Detroit, Michigan, 1975). This is a classified bibliography of bibliographies of dissertations and master's theses, both completed and in progress. The guide describes over 2,000 bibliographies of dissertations.

MASTER'S THESES

Research at the master's level is not always a requirement, and the policies of universities and those of individual departments within universities are quite diverse. The present trend appears to be to do away with research and theses as requirements for the master's degree. As in the case of doctoral dissertations, lists of theses published periodically by individual universities are important bibliographic resources for identifying master's theses. A good tertiary source that lists bibliographies of master's theses is the *Guide to Lists of Master's Theses* by Dorothy M. Black (American Library Association, Chicago, 1965). This guide consists of two sections: (*a*) lists of master's theses in specific subject fields, and (*b*) lists of master's theses of specific institutions.

There are two major recurring bibliographies of master's theses at the national level. *Master's Theses in the Pure and Applied Sciences Accepted by Colleges and Universities of the United States* (Plenum Press, New York, 1957–) is an annual list of master's theses completed at accredited colleges and universities. "Mathematical and most life sciences have been excluded from this publication. . . . Biochemistry, biophysics, and bioengineering are included in the coverage when titles in these areas are reported together with chemistry, physics and engineering and not as a separate discipline" (from the Contents page). The first 12 volumes (1957–1968) were produced and published by the Thermophysical Properties Research Center, School of Mechanical Engineering, Purdue University, Lafayette, Indiana. Volumes 13 through 17 (1969–1973) were produced by the center but printed and distributed by Xerox University Microfilms. Plenum Press has been the publisher since Volume 18, 1974–.

The second major bibliography of master's theses is *Master's Abstracts: A Catalog of Selected Master's Theses on Microfilm* (1962–), published quarterly by University Microfilms International. This abstracting journal was instituted at the request of the National Science Foundation and the Association of Research Libraries in the wake of increased interest in research at the master's degree level during the mid-1950s. The abstracts are brief (about 150 words), and the coverage is not comprehensive, as many universities do not send copies of master's theses to University Microfilms International. Each issue of the abstract journal has subject and author indexes, which are cumulated in the last issue of each volume. The indexes are also cumulated and published separately every 5 years.

FOREIGN DISSERTATIONS AND THESES

With the exception of a few countries like the United States and England, national bibliographic control of dissertations is not well organized. Even in the Soviet Union, where careful attention is given to other types of bibliographies, the task of compiling bibliographies of dissertations appears to have met with less favor. Generally, national bibliographies cover only dissertations published in monographic form. Unpublished dissertations have to be traced through other bibliographies and lists of dissertations issued by universities. National bibliographies of dissertations in many countries are listed in general guides to literature such as A. J. Walford's *Guide to Reference Materials*, 3rd edition (The Library Association, London, 1973), and Eugene Paul Sheehy's *Guide to Reference Books*, 9th edition (American Library Association, Chicago, 1975).

In England, the Association of Special Libraries and Information Bureaux (Aslib) has been producing an annual index since 1953: *Index to Theses Accepted for Higher Degrees in the Universities of Great Britain and Ireland.* This index lists some 7,500 dissertations and master's theses annually, arranged by degree-awarding school and then by discipline. Typical of university lists is London University's *Theses and Dissertations Accepted for Higher Degrees,* 1953–. Cambridge University and Oxford University also publish similar serial bibliographies of dissertations.

Bibliographie de la France–biblio, which is a continuation of *Bibliographie de la France* (1811–1971), lists dissertations periodically in a supplement. The official bibliography of French dissertations is an annual publication entitled *Catalogue des thèses de doctorat soutenues devant les universités françaises,* 1884/85–. Until 1959 the title of this publication was *Catalogue de thèses et écrits académique.*

Since 1945 all Russian dissertations have been deposited at the State V. I. Lenin Library, Moscow. These are listed in a quarterly publication entitled *Katalog kandidatskikh i doktorskikh dissertatsii postupivshikh v biblioteku imeni V. I. Lenina i gosudarstvennuiu tsentral'nuiu nauchnuiu meditsinkuiu biblioteku* (Moscow, 1958–). This is the principal current bibliography of master's theses and doctoral dissertations deposited with the V. I. Lenin Library and the State Central Library of Medicine. Eleanor Buist's article in the *Library Quarterly* (April 1963) contains a comprehensive description of the national bibliographic organization of dissertations in the Soviet Union (*184*).

As examples of other national bibliographies of dissertations there are: *Canadian Theses* (National Library of Canada, 1962–, annual) and *A Bibliography of Doctoral Dissertations Accepted by Indian Universities 1857–1970* (Inter-University Board of India and Ceylon, New Delhi, 1972–).

Copies of foreign dissertations may be obtained through the Center for Research Libraries, Chicago. The center attempts to acquire any doctoral dissertation required by its member libraries. However, the following materials are not handled by the center: dissertations from Britain, Canada, the United States, and the Soviet Union; and master's theses.

RESEARCH IN PROGRESS

Since a doctorate is awarded only for original work, it is important for a doctoral aspirant to ensure that no one else has done a prior investigation on the proposed research topic. Research intelligence at the wavefront of scientific knowledge is essential not only to prevent unintended duplication of research, but also to exploit the results of research already completed. Doctoral research currently in progress is listed in the *Directory of Graduate Research* (1953–), a biennial publication of the American Chemical Society, Committee on Professional Training. The subtitle of the 1975 edition reads thus: *Faculties, Publications, and Doctoral Theses in Departments or Divisions of Chemistry, Chemical Engineering, Biochemistry, and Pharmaceutical and/or Medicinal Chemistry at Universities in the United States and Canada.*

Scientific Research in British Universities and Colleges (1951/52–), an annual directory published by the Department of Education and Science and the British Council, provides details of research projects currently in progress in some 160 academic institutions and 104 government and nonacademic institutions in the United Kingdom. Research projects of doctoral candidates are also included.

A few primary journals (e.g., *Chemistry in Canada*) and secondary services (e.g., *Bibliography and Index of Geology*) also list dissertations recently completed and dissertation proposals approved.

A unique source of current information on ongoing research projects is the Smithsonian Science Information Exchange (SSIE). It was established in 1949 as the Medical Sciences Information Exchange under the aegis of the National Academy of Sciences–National Research Council to serve as a clearinghouse for exchange of research information among several federal agencies concerned with research in the medical sciences. In 1953 the unit was transferred to the Smithsonian Institution as a nonprofit corporation and was redesigned as the Biosciences Information Exchange. During the subsequent years, the scope of its activities expanded to include physical and engineering sciences, and, consequently, the name was changed to Science Information Exchange of the Smithsonian Institution in September 1960 (*185*). SSIE's aim is to "facilitate the planning and management of scientific research by furnishing information about research in progress to scientists, research program managers, and research administrators" (*186*).

SSIE receives input on research in progress from more than 1,300 federal agencies, state and local organizations, foundations, associations, and universities, and it processes information on over 100,000 research projects annually. Its computerized data base, from which a number of products and services are generated, contains records on more than 200,000 ongoing or recently completed research projects in all branches of pure and applied sciences and engineering, including agriculture, medical sciences, and social sciences. The basic record, called the "Notice of Research Project," contains the following items of information on research projects: supporting organization; grant or contract number; name and address of performing organization; name, department, and speciality of the principal investigator; names of coinvestigators; project title; period covered; funding; and, in most cases, a 200-word technical description of the project. Project summaries are indexed according to an average of 14 subject categories, each of which may include as many as five hierarchical subcategories. An on-line search system was implemented in 1973. The following are among the many products and services of the SSIE:

1. Custom searches of the data base for notices of research projects on specific subjects, organizations, geographic areas, or any combination of these.
2. Selective dissemination of information services for users with individualized interest profiles.
3. Catalogs of ongoing research containing summaries of current research projects on specific subjects.
4. *SSIE Newsletter*, published ten times a year.

In addition, the SSIE data base on magnetic tape may also be acquired, with or without the subject index, on a one-time or a periodic, update basis. The data base is also available for on-line searching through the System Development Corporation's SDC Search Service.

Biographical Literature

Literature on the lives and views of scientists and their accomplishments constitutes an important and inescapable part of the literature of science. Advancements in science are facilitated by direct personal communication within the scientific community. Scientists often require biographical information about other scientists, for a variety of reasons:

1. To establish contact with those engaged in similar scholarly or research pursuits for exchange of information
2. To request or disseminate preprints, reprints, and other publications
3. To identify experts who can review manuscripts, books, and grant proposals
4. To identify experts for committee assignments and other professional activities

Biographical information sought may range from the address or telephone number of a known person to exhaustive biodata including education, research interests, previous and current employment data, society memberships, and publications.

GENERAL BIOGRAPHICAL WORKS

General biographical publications such as *Dictionary of American Biography*, *Dictionary of National Biography*, and *Chambers Biographical Dictionary* provide biographical data on scientists also. Besides these general works, very many specialized biographical works are available for obtaining biographical data on scientists and engineers of all countries. The following are representative examples of general biographical publications that include scientists and engineers irrespective of their specialization, national origin, or other factors:

World Who's Who in Science: A Biographical Dictionary of Notable Scientists from Antiquity to Present, edited by Allen G. Debus (Marquis Who's Who, Inc., Chicago, 1968)—this contains about 30,000 entries; approximately one-half of them are biographical sketches of historical figures. Information on living scientists is largely assembled from questionnaires. It is international in scope but most complete for the United States and the Western European countries.

The McGraw-Hill Encyclopedia of World Biography (McGraw-Hill, New York, 1973)—this is especially useful for finding biographical information even when the name of the biographee is not known. This 12-volume encyclopedia has 200 historical maps and about 5,000 articles; the average length of the articles is 800 words, and each article has at least one illustration. The 12th volume contains an index and 17 "study guides," which are topical outlines used in planning the encyclopedia. Each study guide includes the names of biographees. Thus, if one wanted to collect biographical information on European mathematicians of the 17th century, the names of biographees (Pascal, Leibniz, Descartes, and others) may first be ascertained from the study guide on science, and the biographical information on each one of these biographees may then be obtained from the encyclopedia.

SPECIALIZED BIOGRAPHICAL WORKS

Biographical works in science and technology are often limited by the national origin, professional society affiliation, or subject specialization of the biographees. Again, some are retrospective works, listing only deceased scientists, and others are current biographies that include only living personalities. The following are typical examples of biographical works with restrictions of time, national origin, or subject specialization of the biographees.

Dictionary of Scientific Biography (Charles Scribners, New York, 1970–); this is sponsored by the American Council of Learned Societies, and it includes only biographies of deceased scientists, from all historical periods. So far 13 volumes have been published, and the work is still in progress.

American Men and Women of Science (13th edition, R. R. Bowker, New York, 1976); this has approximately 110,000 entries in six volumes. Geographic and discipline indexes make up the seventh volume. The first edition, issued in 1906, had 4,000 entries in a single volume.

Who Is Publishing in Science is an "international directory of scientists and scholars in the life, physical, social and applied sciences," published annually by the Institute for Scientific Information, Philadelphia. This supercedes *International Directory of Research and Development Scientists*, which was an annual cumulation of the author address lists in the weekly issues of *Current Contents*, starting from

1967. The 1975 edition of *Who Is Publishing in Science* included addresses of 320,344 publishing authors from 167 countries.

Biographical Notes upon Botanists (Gale Research Company, Detroit, Mich., 1965) contains biographical details of some 44,000 botanists, taken from the annotated card file maintained in the New York Botanical Gardens Library.

In addition, there are the following: *Who's Who in Science in Europe: A Reference Guide to European Scientists* (Francis Hodgson, Guernsey, British Isles, 1977) has over 40,000 entries in four volumes. *Who's Who in Soviet Science and Technology,* second edition, compiled by Ina Telberg (Telberg Book Co., New York, 1964), is said to be the first biographical directory of Soviet scientists in English; it contains biographical data on some 1,000 living Soviet scientists. For scientists born before the 1917 Revolution, two dates of birth are given: The first date is according to the Julian calendar in use when the person was born, and the second date is its equivalent in the Gregorian calendar in use today. *Soviet Men of Science, Academicians and Corresponding Members of the Academy of Sciences of the U.S.S.R.* (D. Van Nostrand, Princeton, N.J., 1963), compiled by John Turkevich, with financial support from the National Science Foundation, is limited to scientists—engineers and technologists are not listed.

BIOGRAPHICAL SERIALS

Important examples of biographical serials are *Biographical Memoirs of the Fellows of the Royal Society* (The Royal Society, London, 1955–) and *Biographical Memoirs* of the National Academy of Sciences of the United States of America. The former is a continuation of *Obituary Notices of Fellows of the Royal Society* (The Royal Society, London, 1932–1954). The *Biographical Memoirs* of the National Academy of Sciences is a continuing series of volumes published annually beginning from 1877. These volumes are designed to provide "a record of the lives and works of the most distinguished leaders of American science as witnessed and interpreted by their colleagues and peers." Each biographical essay is written by an individual familiar with the discipline and the scientific career of the biographee, and it includes a portrait and a chronological biobibliography. Both the biographical memiors mentioned above include biographies only of deceased members of the respective societies. Biographical sketches of living persons who have achieved prominence and recognition recently may be found in the serial *Current Biography* (H. W. Wilson, New York, 1940–). The aim of *Current Biography* is to provide "brief, objective, accurate, and well-documented biographical articles about living leaders in all fields of human accomplishment the world over." The articles in *Current Biography* are 2–3 pages long, and they contain portraits and bibliographical references. At the end of each year, articles in the monthly issues of *Current Biography* are cumulated in one alphabet, revised, and printed in a single volume known as *Current Biography Yearbook*. Three decennial indexes (for the years 1940–1950, 1951–1960, and 1961–1970) and a cumulated index for the years 1940–1970 have been published.

COLLECTIVE BIOGRAPHIES

Collected biographical works are monographs or anthologies in which each chapter describes the life and accomplishments of an individual biographee. The selection of biographees may be governed by their scientific discipline, time period, or national origin. Some examples of collective biographies are as follows:

Early Seventeenth Century Scientists, edited by R. Harré, Pergamon Press, Oxford, 1965.

The Golden Age of Science: Thirty Portraits of the Giants of 19th Century Science by Their Scientific Contemporaries, edited by Bessie Zaban Jones, Simon and Schuster, New York, in cooperation with the Smithsonian Institution, 1966.

The Laureates: Jewish Winners of the Nobel Prize, by Tina Levitan, Twayne Publishers, New York, 1960. (This is a collected biography of 40 Jewish intellectuals who received the Nobel Prize between 1905 and 1959.)

Makers of Science: Mathematics, Physics, Astronomy, by Ivor B. Hart, Oxford University Press, London, 1923.

The arrangement of entries in collective biographical works is almost always alphabetical by biographee. Other arrangements such as chronological, geographical, or by subject are relatively rare. Isaac Asimov's *Biographical Encyclopedia of Science and Technology* (Doubleday, Garden City, N.Y., 1964) is an example of a biographical work in which the entries are arranged chronologically. It is more common to provide subject and geographical approaches in indexes to supplement the alphabetical arrangement in the main part of collective biographical works. *American Men and Women of Science* (13th edition, R. R. Bowker, New York, 1976) has discipline and geographic indexes in a separate volume.

Entries in collective biographical works often contain a portrait of the biographee and a biobibliography. The *Dictionary of Scientific Biography* lists important original works of the biographee and secondary works about the biographee.

BIOGRAPHICAL MONOGRAPHS AND AUTOBIOGRAPHIES

Prominent scientists and engineers are often the subjects of biographical monographs or may issue their autobiographies. *Coulomb and the Evolution of Physics and Engineering in Eighteenth Century France*, by C. Stewart Gillmore (Princeton University Press, Princeton, N.J., 1971), is a fine example of a biographical monograph. It contains an extensive bibliography of works by and about Coulomb. *Louis Pasteur*, by S. J. Holmes (Dover, New York, 1961); *A Portrait of Isaac Newton*, by Frank E. Manuel (Harvard University Press, Cambridge, Mass., 1968); and *Ramanujan, the Man and the Mathematician*, by S. R. Ranganathan (Asia Publishing House, Bombay, 1967), are other representative examples.

The personal correspondence and papers of scientists are valuable sources of information on their lives, professional contributions, and views. *The Posthumous Works of Robert Hooke*, first published by the Royal Society of London in 1705, is an excellent example of biographical works of this genre. This book was republished in 1969 by the Johnson Reprint Corporation as Number 73 in *Sources of Science*, a series that includes many similar classic biographical works of Newton, Faraday, William Harvey, Kepler, and other famous scientists. The following are some additional examples:

The Born–Einstein Letters: Correspondence Between Albert Einstein and Max and Hedwig Born from 1916 to 1955 with Commentaries by Max Born, translated by Irene Born. Walker and Company, New York, 1971.

The Papers of Joseph Henry, Volume 1: December 1797–October 1832, the Albany Years; Volume 2: November 1832–December 1835, the Princeton Years, Smithsonian Institution Press, Washington, D.C., 1972 and 1975. (These volumes contain Henry's personal and professional correspondence, lecture notes, minutes of meetings, and other documents.)

Partners in Science: Letters of James Watt and Joseph Black, edited with an introduction and notes by Eric Robinson and Douglas McKie, Constable, London, 1970.

A Scientific Autobiography of Joseph Priestly, 1733–1804: Selected Scientific Correspondence, edited with commentary by Robert E. Schofield, M.I.T. Press, Cambridge, Mass., 1966.

Max Born's *My Life and My Views* (Charles Scribner's Sons, New York) and Julian Huxley's *Memories* (Harper and Row, New York, 1970) are typical autobiographies of prominent scientists.

OTHER SOURCES OF BIOGRAPHICAL INFORMATION

Biographical information on scientists may be found in Festschrift volumes. *Stephen Timoshenko: 60th Anniversary Volume* (Macmillan, New York, 1938) consists of "contributions to the mechanics of solids dedicated to Stephen Timoshenko by his friends on the occasion of his sixtieth birthday anniversary." Some dictionaries and encyclopedias of science—such as *Hackh's Chemical Dictionary* (4th edition, McGraw-Hill, New York, 1969) and the *Harper Encyclopedia of Science*—contain biographical entries. General encyclopedias (e.g., *Encyclopedia Americana* and *Encyclopaedia Britannica*) contain biographical articles, often with portraits and bibliographies.

Primary journals are important sources of biographical information. Besides strictly biographical articles, they may contain brief biographical sketches of contributors in each issue or obituary and "personalia" columns.

News digest services (e.g., *Facts on File, Asian Recorder, Keesing's Contemporary Archives*) and membership directories of professional societies are other sources of biographical information.

BIBLIOGRAPHIC AIDS FOR BIOGRAPHICAL LITERATURE

Biographical works can be identified through the standard guides to literature (e.g., Walford, Sheehy, and *American Reference Books Annual*). The following is an extensive bibliography of biographical works: *Biographical Dictionaries and Related Works*, by Robert B. Slocum (Gale Research Co., Detroit, Mich., 1967). The subtitle indicates the scope of this work: "An international bibliography of collective biographies, bio-bibliographies, collections of epitaphs, selected genealogical works, dictionaries of anonyms and pseudonyms, historical and specialized dictionaries, biographical materials in government manuals, bibliographies of biography, biographical indexes, and selected portrait catalogs." About 4,800 biographical and related works are indexed by author, title, and subject. A supplement containing approximately 3,400 additional entries was issued in 1972.

Several retrospective and continuing indexes are available for tracing biographical information. *Index to Scientists of the World from Ancient to Modern Times: Biographies and Portraits*, compiled by Norma O. Ireland (F. W. Faxon Co., Boston, 1962), is an index to biographical information on nearly 7,500 scientists in some 338 collected works in the English language. Another very useful collective index is the *Biographical Dictionaries Master Index* (Gale Research Co., Detroit, Mich., 1975) in three volumes; this is a guide to more than 725,000 listings in over 50 current "who's whos" and other works of collective biography, including *American Men and Women of Science*. The emphasis of the works indexed, and hence of the *Master Index*, is largely on living persons who are prominent in the United States.

A recurring bibliography of biographic material is the *Biography Index* (H. W. Wilson Co., New York, 1947–). This "cumulative index to biographical material in books and magazines" is published monthly, with annual and triennial cumulations. It covers over 1,500 periodicals, books, and incidental biographical material such as prefaces and chapters in otherwise nonbiographical books.

Biographical material can also be traced through abstracting and indexing services and indexes to newspapers (e.g., *The New York Times Index*).

Dictionaries and Thesauri

DICTIONARIES

Dictionaries are among the most commonly used reference books; they consist of an alphabetical list of words with their meaning, definition, etymology, pronunciation, and usage, sometimes with graphic illustrations. Some dictionaries contain biographical entries and names of places also. The terminology of science is extremely specialized, and each scientific discipline has its own terminology that researchers and practitioners use for communication. Of the few thousand specialized scientific and technical dictionaries that exist, some are bilingual or multilingual, especially useful in translation work; others are monolingual. The scope and level of the dictionaries also vary considerably. Some contain terms from all branches of science and technology (e.g., *The McGraw-Hill Dictionary of Scientific and Technical Terms*, 1974, with nearly 100,000 entries and 3,000 illustrations), and others are limited to a narrow branch of science or technology. The following is an example of a very specialized multilingual dictionary:

A. Herzka, comp., *Elsevier's Lexicon of Pressurized Packaging (Aerosols)*, includes English, French, Italian, Spanish, Rumanian, German, Dutch, Norwegian, Swedish, Danish, Russian, Czech, Serbo-Croatian, Slovenian, Bulgarian, Hungarian, Finnish, Greek, Hebrew, Arabic, and Japanese, Elsevier Publishing Company, Amsterdam, 1964.

Some dictionaries go far beyond merely furnishing definitions or meanings of terms; they contain short articles and resemble an encyclopedia. *James and James Mathematics Dictionary* (4th edition, Van Nostrand-Reinhold, New York, 1976) is an example of this type: "Although this is by no means a mere word dictionary, neither is it an encyclopedia. It is a correlated condensation of mathematical concepts, designed for time-saving reference work. Nevertheless, a general reader can come to an understanding of concepts in which he has not been schooled by looking up the unfamiliar terms in the definition at hand and following this procedure down to familiar concepts" (from the Preface to the 3rd edition, 1968). This dictionary describes 8,000 terms, concepts, and formulas, and it has a multilingual index. The appendixes contain: denominate numbers, differentiation formulas, tables of integrals, and a list of symbols and abbreviations arranged by subject.

The following are representative examples of special-purpose dictionaries dealing with abbreviations, signs and symbols, chemical synonyms and trade names, and eponyms:

Acronyms, Initialisms and Abbreviations Dictionary, 5th ed., Gale Research Co., Detroit, Mich., 1976. (This is a "guide to alphabetical designations, contractions, acronyms, initialisms, abbreviations and similar condensed apellations," in three volumes.)

Chemical Synonyms and Trade Names, 7th ed., Chemical Rubber Co., Cleveland, Ohio, 1971.

Dictionary of Mechanical Engineering Abbreviations, Signs and Symbols, Odyssey Press, New York, 1967.

A Dictionary of Named Effects and Laws in Chemistry, Physics and Mathematics, by Denis W. G. Ballentyne and R. D. Lovett, 3rd ed., Chapman and Hall, London, 1970.

Engineering Eponyms, by Charles P. Augers. 2nd ed., The Library Association, London, 1975.

Glossary of Russian Abbreviations and Acronyms, compiled by the Aerospace Technology Division, Reference Department, Library of Congress, United States Government Printing Office, Washington, D.C., 1967.

Trade Names Dictionary, A guide to trade names, brand names, product names, coined names, model names, and design names, with addresses of their manufacturers, importers, marketers, or distributors, by Ellen T. Crowley, Gale Research Co., Detroit, Mich., 1976, 2 vols. (*New Trade Names* is an annual supplement to this dictionary.)

Another example of a special-purpose dictionary is the *Dictionary for Computer Languages* (APIC Studies in Data Processing, No. 6), compiled by Hans Breuer and published by Academic Press (1966) for the Automatic Programming Information Center, Brighton College of Technology, London.

Glossaries of terms are sometimes issued as standards by standardization bodies: *American National Standard Industrial Engineering Terminology: Biomechanics* (ANSI Z94.1–1972) is one of a series of standard terminologies approved by the American National Standards Institute. Other standards in this series include terminologies in cost engineering, data processing and systems design, engineering economy, materials processing, applied mathematics, production planning and control, and similar subjects. The following are typical of glossaries issued by professional associations, government agencies, and international organizations:

Glossary of Oceanographic Terms, 2nd ed., edited by R. B. Baker, Jr., and others, United States Naval Oceanographic Office, Washington, D.C., 1966.

A Glossary of Petroleum Terms, 4th ed., edited by Peter Hepple, Institute of Petroleum, London, 1967.

Glossary of Terms and Definitions in the Field of Friction, Wear and Lubrication (Tribology), Organization for Economic Cooperation and Development. Research Group on Wear of Engineering Materials, Paris, 1969.

IEEE Standard Dictionary of Electrical and Electronic Terms (IEEE Std 100–1972), Approved by the Standards Committee of the Institute of Electrical and Electronics Engineers, Inc., Wiley-Interscience, New York, 1972.

THESAURI

Thesauri are different from dictionaries in that they do not contain meanings or definitions of words, except to a very limited extent in the form of scope notes and synonyms. Thesauri are controlled vocabularies that display relationships among terms in a scientific discipline to facilitate indexing and retrieval of documents. The relationships most commonly displayed in thesauri are: hierarchical (e.g., generic-specific) and collateral (e.g., synonymy and nonspecific coordinate). The *Thesaurus of Metallurgical Terms* (2nd edition, 1976) is a "vocabulary listing for use in indexing, storage and retrieval of technical information in metallurgy"; it is published by the American Society for Metals. A general thesaurus that contains terms from all branches of engineering and science is the *Thesaurus of Engineering and Scientific Terms* (Engineers Joint Council, New York, 1967). This is a list of engineering and related scientific terms and their relationships for use as a vocabulary reference in indexing and retrieving technical information.

A short list of thesauri arranged under subjects may be found in F. W. Lancaster's *Vocabulary Control for Information Retrieval* (Information Resources Press, Washington, D.C., 1972), pages 227–228.

BIBLIOGRAPHIES OF DICTIONARIES

The large number of specialized scientific and technical dictionaries has necessitated the compilation of bibliographies of dictionaries. The following are examples of such bibliographies:

Tibor W. Martin, *Foreign Language and English Dictionaries in the Physical Sciences and Engineering: A Selective Bibliography, 1952–1963*, NBS Miscellaneous Publication No. 258, National Bureau of Standards, Washington, D.C., 1964.

Charles W. Rechenbach and Eugene R. Garnett, *A Bibliography of Scientific, Technical, and Specialized Dictionaries: Polyglot, Bilingual and Unilingual*, Catholic University of America Press, Washington, D.C., 1969. (1,257 items are listed and indexed by language, subject, and compiler.)

Eugene Wuster, *Bibliography of Monolingual Scientific and Technical Glossaries*, UNESCO, Paris, 1955–1959, 2 vols. (1,043 glossaries in 26 languages are listed.)

For a more complete treatment of scientific and technical dictionaries, see: Denis J. Grogan, *Science and Technology: An Introduction to Literature* (3rd edition, Clive Bingley, London, 1976, pp. 47–66).

Directories and Yearbooks

DIRECTORIES

Directories are basically lists of companies, academic and research institutions, government agencies, products and services, and of individuals, arranged in some systematic order for easy reference. The data presented in directories are usually obtained from the sources themselves (i.e., companies and individuals) through a questionnaire, or they may be compiled from published primary sources. Since factual data on companies, products, and people are likely to change frequently, directories are updated periodically by issuing supplements or by publishing entirely new or revised editions.

Based on the type of material presented, three kinds of directories may be identified: biographical directories, institutional or company directories, and product directories. Some directories are composite in nature and contain more than one type of information. Biographical directories are useful in locating specialists on a given topic and for obtaining biographical information on known personalities. The *Directory of Physics and Astronomy Staff Members* issued annually by the American Institute of Physics contains listings of staff members in North American colleges and universities, federally funded research and development centers, and government laboratories. The information is obtained from chairmen of academic departments and directors of research centers. The 1976/1977 edition of the directory listed approximately 22,000 staff members from about 2,400 institutions. Other sources of biographical information on scientists and engineers are discussed in the preceding section on biographical literature.

Institutional or company directories provide information on academic institutions, government agencies, and private sector companies. Such directories are useful in locating companies offering a certain product or service and organizations engaged in a certain type of activity. The detail of information varies considerably, ranging from a minimum of name, address, and telephone number to exhaustive descriptions of activities, products, personnel, and financial information. In some cases, a directory may describe just one organization. Several examples are mentioned here to illustrate the variety and depth of information provided in directories of this kind:

International Scientific Organizations: A Guide to Their Library, Documentation and Information Services (Library of Congress, Washington, D.C., 1962), prepared under the direction of Kathrine O. Murra, describes 449 international scientific societies, foundations, and commissions. The information was obtained through questionnaires.

International Physics and Astronomy Directory, 1969–1970 (W. A. Benjamin, New York, 1969) is a "unified, comprehensive, and up-to-date directory containing easily accessible facts that answer most of the professional reference needs of physicists and astronomers" (from the Introduction). It lists academic departments and faculties, government and private research laboratories, international organizations, meetings, grants and fellowships, awards, journals and books, and publishers.

Encyclopedia of Associations (9th edition, Gale Research Company, Detroit, Mich., 1975) is a very comprehensive directory of associations, in three parts. The first part consists of descriptions of associations arranged under 19 broad categories. A geographic-executive index makes up the second part. The third part, entitled *New Associations*, is a quarterly supplement. A similar directory also published by the Gale Research Company is the *Research Centers Directory*. The fifth edition, published in 1975, describes 5,491 research centers, including university research departments. The directory is periodically updated by a paperbound interedition supplement entitled *New Research Centers*.

The Scientific Institutions of Latin America, with Special Reference to Their Organization and Information Facilities (California Institute of International Studies, Stanford, Calif., 1970) contains detailed descriptions of scientific institutions in 13 Latin American countries and also some international, European, and United States organizations promoting science and science information in Latin America.

The *Directory of Selected Scientific Institutions in Mainland China* (Hoover Institution Publications Series No. 96, 1970) was published for the National Science Foundation by the Hoover Institution on War, Revolution and Peace, Stanford University, Stanford, California. The directory describes 490 scientific institutions in English; names of institutions, locations, personnel, and publications are also given in Chinese characters.

Industrial Research Laboratories of the United States (14th edition, R. R. Bowker, New York, 1975) has information on 6,661 laboratories belonging to 3,241 organizations. The National Academy of Sciences–National Research Council initiated and published the first 11 editions of this directory.

The *NSF Factbook* (Academic Media, Orange, N.J., 1971) and the *NASA Factbook* (2nd edition, Marquis Academic Media, Chicago, 1975) are examples of directories that describe the organization and programs of single agencies.

Survey of Commercially Available Computer Readable Bibliographic Databases (American Society for Information Science, Washington, D.C., 1973) and the *Directory of Computerized Data Files and Related Software* (National Technical Information Service, Springfield, Va., 1974–) are examples of product directories. The latter is an annual publication. Product directories are also usually composite directories that contain not only descriptions of products, but also information on manufacturing and distributing agencies and their executive personnel. The *World Aviation Directory*, published semiannually in spring and fall by Ziff-Davis Publishing Company, Washington, D.C., contains information on aviation/aerospace companies, including their products and officials.

Many product directories, or "buyers' guides," are special issues or supplements of journals. *Chemical Engineering Equipment Buyers' Guide, Chemical Week Buyers' Guide Issue*, and *Electronics Buyers' Guide* are annual special issues of the journals *Chemical Engineering*, *Chemical Week*, and *Electronics*, respectively, all published by McGraw-Hill, Inc. A catalog of scientific instruments appears as a special issue of *Science* in November each year. Information on special issues and supplements may be found in the *Guide to Special Issues and Indexes of Periodicals*, second edition, by Doris B. Katz and Mary Margaret Egan (Special Libraries Association, New York, 1976).

DIRECTORIES OF DIRECTORIES

The directories mentioned in the previous paragraphs are typical of a very large number of directories covering diverse disciplines, industries, and geographic regions. The following are two directories of directories that are designed to facilitate identification of an appropriate source for a given purpose:

Guide to American Scientific and Technical Directories (2nd edition, Todd Publications, Rye, N.Y., 1975): This is a classified guide to over 2,500 publications covering the social and physical sciences and all industrial and technical areas. Information on each directory includes title, number of entries, method of arrangement, indexes, frequency of publication, publisher, and price. The *Guide to American Directories* (9th edition, Gale Research Co., Detroit, Mich., 1975) describes over 5,200 directories, arranged under 300 subject headings.

YEARBOOKS

Yearbooks are reference books that describe the events pertaining to a particular year. The *Yearbook of Astronomy* (Norton, New York, 1962–) contains data on the phases of the moon, orbits of planets, and similar information especially useful to the amateur astronomer. It also includes a directory of astronomical societies. The *McGraw-Hill Yearbook of Science and Technology* summarizes the developments of the preceding year and is a supplement to the *McGraw-Hill Encyclopedia of Science and Technology*. *Aerospace Facts and Figures* and *Aerospace Yearbook*, both published by the Aerospace Industries Association of America, are examples of yearbooks that contain narrative and statistical accounts of the events of the preceding year.

Statistical Abstracts of the United Nations is a familiar example of yearbooks containing purely statistical information. *Europlastics Yearbook* (IPC Industrial Press, London) and *British Aviation Yearbook* (Hanover Press, London) are more akin to directories than to yearbooks. The *Yearbook of Agriculture* of the United States Department of Agriculture is not a yearbook; it is a monographic series, issued annually. Each issue deals at length with a particular topic such as "Climate and Man" (1941), "Insects" (1952), "Water" (1955), "Soils" (1957), "Land" (1958), "Handbook for the Home" (1973), and "The Face of Rural America" (1976).

Yearbooks and directories are listed in *Irregular Serials and Annuals: An International Directory* (4th edition, 1976/1977), which is issued biennially by R. R.

Bowker Company. *Bowker Serials Bibliography* is an intermittent supplement that updates both *Ulrich's International Periodicals Directory* and *Irregular Serials and Annuals*.

Handbooks and Tables

HANDBOOKS

Handbooks are very commonly used reference books in which quantifiable primary data collected from a great many diverse sources are assembled, categorized, and presented for ready use. Handbooks are useful for answering "ready reference" questions (Voigt's "everyday approach") calling for a specific piece of information or numerical data. From 50% to 80% of the factual questions asked in scientific and technical libraries can be answered from handbooks. Because of the vast amount of diverse data contained in a handbook, usually packed in a single volume, handbooks have been referred to as "one-volume libraries." Most handbooks contain quantitative data, usually presented in the form of tables, charts, and lists, with little expository text. Presentation of data in this format makes the handbook a very convenient reference tool. Elaborate indexes in handbooks further ensure rapid location and retrieval of any desired data element from the vast bulk of data contained in handbooks.

Popularly referred to as the "chemist's bible," or the "rubber bible," the CRC *Handbook of Chemistry and Physics* (Chemical Rubber Company Press, Cleveland, Ohio, 1931–) is perhaps the most widely used handbook. It is revised annually. The 57th edition, for 1976/1977, edited by Robert C. Weast, packs into one volume an incredible amount of physical and chemical data on organic and inorganic chemical substances, 192 pages of mathematical tables, and a very exhaustive table of conversion factors (23 pages). Bibliographic references to original sources of data are given wherever applicable.

Another handbook that is extensively used is the *Chemical Engineer's Handbook* (5th edition, McGraw-Hill, New York, 1973). This is often referred to as "Perry's handbook" after the late John H. Perry, who edited the first three editions.

A multivolume compilation is the German series that is often simply referred to as *Landolt–Börnstein*. The title of the new series, which started appearing in 1961 under the editorship of K. H. Hellwege, is *Landolt–Börnstein: Zahlenwerte und Functionen aus Naturwissenschaften und Technik, Neue Serie* [Numerical Data and Functional Relationships in Science and Technology], published by Springer-Verlag (Berlin). The work is still being published in numerous volumes as and when the appropriate data are accumulated. Each volume concerns one of the following basic areas:

1. Nuclear physics and technology
2. Atomic and molecular physics
3. Crystal and solid state physics
4. Macroscopic and technical properties of matter

5. Geophysics and space research
6. Astronomy, astrophysics, and space research

Contents lists and section headings are given in both German and English.

Two other encyclopedic compilations which have become classics in the literature of chemistry are the *Handbuch der Anorganischen Chemie* (begun in 1819 by Leopold Gmelin) and the *Handbuch der Organischen Chemie* (begun by Friedrich Konrad Beilstein in 1882), commonly referred to as *Gmelin* and *Beilstein*, respectively. Detailed descriptions of these may be found in many articles and guides to literature, including *The Use of Chemical Literature*, second edition, by R. T. Bottle (Butterworths, London 1969).

Because of the predominantly quantitative nature of the material contained in handbooks and the tabular format in which the material is presented, most handbooks are not suitable for continuous reading. In this sense handbooks are very different from monographs and treatises. However, some handbooks do consist of long expository articles, often supported with quantitative material and bibliographies. The *CRC Handbook of Food Additives*, edited by Thomas E. Furia (Chemical Rubber Company, Cleveland, Ohio, 1968), consists of 16 chapters, including an introductory chapter, supported with numerous tables, charts, graphs, and extensive bibliographies. The chapters are written by different authors. The chapter on acidulants in food processing is 41 pages long and lists 395 bibliographic references. A 63-page chapter on nonnutritive sweeteners lists 534 bibliographic references and 90 patents. The Chemical Rubber Company, which is a prolific producer of handbooks, has published the *Composite Index for CRC Handbooks*, 2nd edition (1977); this is a composite index to the contents of some 50 CRC handbooks.

Quantitative data are sometimes published in loose-leaf or journal format. The *Aerospace Structural Metals Handbook* produced by the Mechanical Properties Data Center of the United States Department of Defense is a five-volume handbook in loose-leaf format. The *Journal of Chemical and Engineering Data*, a quarterly journal of the American Chemical Society, publishes experimental and derived data pertaining to properties of pure substances and mixtures and syntheses of new chemical compounds.

TABLES

Data of a purely numerical character are often published in tabular format. The *International Critical Tables of Numerical Data, Physics, Chemistry and Technology* (seven volumes plus an index volume, 1926–1933), published by the McGraw-Hill Book Company for the National Research Council, represents the product of a major effort to compile critical data. A decision to prepare and publish a compilation of critical data was reached at a meeting of the International Union of Pure and Applied Chemistry (IUPAC) held in London in June 1919. The tables were prepared by the National Research Council of the United States of America under the auspices of the International Research Council and the National Academy of Sciences. The work is divided into 300 sections and contains "critical" data compiled by a large number of subject specialists from primary literature published up to 1924. "The word 'critical' in this connection means that the cooperating expert was requested to give in each instance the 'best' value which he could derive from all the information available, together, where possible, with an indication of its probable reliability" (from the Introduction). References to original sources of data are also given. The *International Critical Tables*, published half a century ago, are still widely used.

Mathematical tables are the most common example of tabular compilations. These may be found in general handbooks such as the *Handbook of Chemistry and Physics* and the American Institute of Physics *Handbook of Physics*, as well as in many textbooks on statistics and mathematics. *Table of Natural Logarithms* (National Bureau of Standards, 1941) is a four-volume compilation of tables of natural logarithms to 16 decimal places. The fourth edition of the *CRC Handbook of Tables for Mathematics* (1975) contains new sections entitled "Astrodynamics: Basic Orbital Equations" and "Astrodynamical Terminology, Notation and Usage." *A Million Random Digits with 100,000 Normal Deviates* (Free Press, Glencoe, Ill., 1955), prepared by the Rand Corporation, is one of the most frequently used tables of random digits. Smaller tables of random numbers may be found in handbooks and textbooks of statistics. *Tables of Thomson Functions and Their First Derivatives*, by L. N. Nosova (Pergamon Press, New York, 1961; originally issued by the Computer Center of the Academy of Sciences of the U.S.S.R.), and *Tables of Bessel Transforms*, by Fritz Oberhettinger (Springer-Verlag, New York, 1972), are examples of tables of special functions.

Thousands of mathematical tables have been computed and published during the last 300 years. There are several indexes and guides to mathematical tables; the following are three notable examples:

A Guide to Mathematical Tables, by A. V. Lebedev and R. M. Fedorova; English edition published by Pergamon Press, Oxford, 1960. (This contains a much fuller account of Russian mathematical tables than those found in the *Index of Mathematical Tables* by Fletcher et al. A supplement to the *Guide* was issued in 1960.)

Guide to Tables in Mathematical Statistics, by J. Arthur Greenwood and H. O. Hartley, Princeton University Press, Princeton, N.J., 1962.

An Index of Mathematical Tables, 2nd ed., by A. Fletcher, J. C. P. Miller, L. Rosenhead, and L. J. Comrie, Addison-Wesley, Reading, Mass., 1962. (The first volume is an index to mathematical tables according to functions; the second volume lists the bibliographic sources of the tables indexed and also includes a section listing the errors noted in the mathematical tables.)

Steam tables and tables of astronomical and weather data are other types of data compilations frequently published in tabular format. Typical examples of these are:

ASME Steam Tables: Thermodynamic and Transport Properties of Steam, Comprising Tables and Charts for Steam and Water, American Society of Mechanical Engineers, New York, 1967.

British Electrical and Allied Industries Research Association, *1967 Steam Tables*, St. Martin's Press, New York, 1967.

Smaller steam tables are usually appended to textbooks of physics and thermodynamics.

Another tabular publication is *The American Ephemeris and Nautical Almanac* *for the Year 1978* (U.S. Government Printing Office, Washington, D.C., 1976); this is an annual publication and contains tables showing the projected positions of the sun, the moon, and other planets and satellites of the solar system for the coming year. Since 1960 this has been a unified Anglo-American publication, incorporating *The American Ephemeris and Nautical Almanac* issued by the Nautical Almanac Office of the U.S. Naval Observatory and the *Astrononomical Ephemeris* issued by H.M. Nautical Almanac Office, Royal Greenwich Observatory, England. With the exception of the introductory pages, the publication is printed separately in the two countries from reproducible material prepared partly in the United States and partly in the United Kingdom. The *Astronomical Ephemeris* succeeded the *Nautical Almanac and Astronomical Ephemeris* introduced by Nevil Maskelyne in 1767.

U.S. Standard Atmosphere, 1976, published by the National Oceanic and Atmospheric Administration, the National Aeronautics and Space Administration, and the U.S. Air Force, contains tables of atmospheric properties (temperature, pressure, density, acceleration due to gravity, sound speed, viscosity, composition, etc.) up to 1,000 kilometers in the international system of metric units. *Climatological Data*, published by the Environmental Data Service of the National Oceanic and Atmospheric Administration, is a monthly serial containing tables of daily and monthly precipitation, wind movements, temperature, and the like.

NATIONAL STANDARD REFERENCE DATA SYSTEMS

The importance to the scientific community of critically evaluated physical and chemical data can hardly be overestimated. Several countries, including the United States, the United Kingdom, and the U.S.S.R., have set up national-level organizations to collect, evaluate, organize, and publish the vast amount of numerical data widely scattered in published and unpublished sources. In the United Kingdom, the Office for Scientific and Technical Information (OSTI), established in 1965 as a part of the Department of Education and Science, is responsible for coordinating and stimulating data compilation activities. The OSTI periodically publishes a list of ongoing numerical data projects in that country. In the U.S.S.R., the State Service for Standard and Reference Data (GSSSD) is responsible for determining the data requirements of science and industry, developing standards for testing and evaluating data, and providing standard and reference data to the Soviet scientific and technical community.

In the United States, the National Standard Reference Data System (NSRDS) was established in May 1963 by the Federal Council for Science and Technology, and the National Bureau of Standards (NBS) was charged with its administration. The aims of the NSRDS are twofold:

1. To provide critically evaluated numerical data, in a convenient and accessible form, to the scientific and technical community
2. To provide feedback into experimental work to help raise the general standards of measurement

The scope of the NSRDS program encompasses the following areas:

Atomic and molecular properties
Chemical kinetics
Colloid and surface properties
Mechanical properties
Nuclear properties
Solid state properties
Thermodynamic and transport properties

The principal output of the NSRDS program consists of compilations of evaluated data, and it is disseminated through the following channels:

1. *Journal of Physical and Chemical Reference Data,* a quarterly journal containing data compilations and critical data reviews, published for the National Bureau of Standards by the American Institute of Physics and the American Chemical Society
2. NSRDS–NBS series of publications distributed by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C.
3. Publications of professional societies and commercial publishers
4. Response by NSRDS data centers to inquiries for specific data

Information concerning NSRDS publications is available from the Office of Standard Reference Data, National Bureau of Standards, Washington, D.C., 20234. The following two bibliographies also contain lists of NSRDS publications:

Rao Aluri and Philip Yannarella, "NBS: A Compilation," *Special Lib.,* **65**(2), 77–82 (February 1974).

"National Standard Reference Data System Publications," in *Handbook of Chemistry and Physics,* 57th ed., Chemical Rubber Company, Cleveland, Ohio, 1976 (F356–F366).

At the international level, the Committee on Data for Science and Technology of the International Council of Scientific Unions (CODATA; established in 1966) is concerned with promoting, on a worldwide basis, the production and distribution of compendia and other forms of collections of critically selected numerical data on substances of interest and importance to science and technology. CODATA has produced the *International Compendium of Numerical Data Projects: A Survey and Analysis* (Springer-Verlag, New York, 1969). This is a directory of over 160 numerical data projects and centers in 26 countries that systematically extract, evaluate, and publish scientific and technical data.

Review Literature

INTRODUCTION

The rapid growth in the volume of scientific literature, in recent decades has been noted in an earlier section. This growth is accompanied by two apparently opposite tendencies in scientific research: first, the phenomenon of excessive specialization and, second, the emergence of interdisciplinary team effort. In an attempt to cope with the ever-broadening horizons of science, scientists concentrate on narrower and narrower branches of science, so that they can absorb the information generated in their specialities and keep abreast of current developments. This extreme specialization gives rise to the publication of very specialized scientific papers and reports which fall within the field of interest and competence of only a few scientists. In view of the limited area of interest and competence of any one scientist, scientific research is becoming more and more a collaborative effort, in which the knowledge and skills of a team of specialists are brought to bear on the research process. Because of this collaborative nature of modern scientific research, the individual scientist specializing in a narrow area finds that his specialization is contingent upon and overlaps with the specialization of his fellow scientists. This interrelationship among specialities or subdisciplines makes it imperative that a specialist in any area keep abreast of advances in fields adjacent to his own. But the quantity of published scientific literature is so huge, and its quality so uneven, that no one individual can hope to be able to screen the deluge of literature and then read and digest the items pertinent to his own and related specialities. The review article is a corrective to this situation. In a recent study of review literature in the sciences, Julie A. Virgo highlighted the role of the review article thus:

> Not all that is published is of high quality, nor does every contribution necessarily add something new to the state of knowledge in a particular field. Much that is reported is repetitious to varying extents and of low enough quality that it could be ignored without a loss of significant information. One possible solution, then, to the problem of digesting large masses of published material, could lie in the provision of reviews or summaries of papers dealing with the same topic, synthesizing the pertinent and useful facts from each and sifting out material which contributes nothing new to the subject. Hence one review article could replace a number of primary articles and the reader would need to read only one article in place of many, or he would be directed from the review article to those primary articles that appeared to be especially worthwhile, when viewed in perspective with other articles on the subject (*187*).

The concept of the review article is not new; it existed even in the age of the encyclopedic scholar, when the magnitude of published scientific literature was such that a dedicated scholar could read all or most of the papers published in a number of disciplines. Many of the learned periodicals of the 17th and the 18th centuries, such as the *Acta Eruditorum* and the *Journal des scavans*, contained book reviews. However, many of the early review journals were preponderantly book-reviewing media and were of short duration. With the appearance of the *Critical Review or Annals of Literature* in 1726, the review journal became an established entity. According to Kronick, who has traced the history of the review journal from 1665 onward, the first scientific review journal of any extent and duration was the *Commentarii de Rebus in Scientia Naturali et Medicina Gestis*, which was published in Leipzig between 1752 and 1798 (*188*). This contained reviews of scientific books, dissertations, and journals.

Although review journals have existed from the beginnings of scientific journalism, their importance to scientists has been accentuated in recent decades by the three current trends noted earlier: the fragmentation of science into narrow subdisciplines, the proliferation of all forms of published and unpublished scientific literature, and the interdisciplinary nature of scientific research—all of which have made it difficult for the scientist and the scholar to remain aware of the developments in the wavefront of knowledge. At the Royal Society Scientific Information Conference (1948) there was a great deal of discussion concerning the role and importance of review literature. The conference made the following final recommendations:

> The Conference has concluded that both critical and constructive reviews, written in particular fields, and reviews by specialists for other workers in science are of great importance, and therefore invites the Royal Society to bring the following recommendations to the notice of those concerned:
>
> Critical, general and specialist reviews should be made informative to non-specialists by a general introduction and conclusion.
>
> Senior scientists should regard the provision of reviews as an important ancillary to the pursuit of knowledge (*189*).

The Washington Conference (1958) also emphasized the importance of review literature for promoting cross-fertilization and browsing in related fields, and for indicating directions for further research (*190*). The Weinberg Report (1963) underscored the important part played by scholarly reviews in easing the information crisis: "They serve the special needs of both the established workers in a field and the graduate student entering the field, as well as the general needs of the nonspecialist" (*191*). The report also urged the government to promote technical reviews of report literature: "Because there are so many technical reports, and most of them are unrefereed and of uneven quality, reviews of technical reports can be particularly useful as discriminating guides to literature" (*192*). More recently, the SATCOM Report concluded that the functions performed by critical reviews and compilations—digesting, consolidation, simplification, and repackaging for specific categories of users—were essential for the effective utilization of scientific and technical information (*193*).

FUNCTIONS OF REVIEWS

The universe of primary scientific literature consists of an ever-increasing mass of unrelated journal articles, reports, dissertations, conference papers, patents, and other forms of primary literature scattered across temporal, geographic, and linguistic dimensions. Each one of these documents is an isolated package constituting a basic building block of scientific literature. Much of this literature is of an ephemeral or tentative nature and is only of temporary significance. For the effective utilization of scientific information, it is necessary that this unrelated mass of primary scientific literature be sifted, organized, and synthesized into a coherent and validated corpus of recorded scientific knowledge. Abstracting and indexing services, catalogs, and bibliographies provide the necessary organizational structure to the universe of primary documents, so essential for the identification and location of individual documents cutting across linguistic and geographic barriers and across variations in the format and physical medium of the documents. The critical evaluation, sifting, synthesis, and integration of the organized primary literature are accomplished in reviews. Reviews are therefore secondary literature based on primary documents. Further compaction and repackaging of primary scientific literature for specific categories of users take place in textbooks, monographs, treatises, encyclopedias, and other derived publications. The individual research papers and other types of primary documents then become archival records of facts, figures, and minutiae. Monographs, textbooks, encyclopedias, and similar derived publications constitute records of evaluated and integrated knowledge for transmission to students, scholars, and scientists for assimilation and utilization. Review publications constitute an essential intermediate link in this gradual evolutionary process of scientific and technical information.

According to Seetharama, reviews aid scientists in the following ways (*194*):

1. In attaining a proper perspective of a field of knowledge, be it a known or an unknown field
2. As alerting services
3. As "reference and finding devices"
4. As a source of inspiration for continued interest for stimulation of work in new directions
5. For selection of a specific subject for research
6. For clarification of ideas and guidance in work
7. As supports for the type of approach adopted
8. For avoiding unintended and unnecessary duplication
9. For modification of work

The three major functions of reviews are: (*a*) current awareness, (*b*) tutorial, and (*c*) bibliographical.

Current Awareness Function

Reviews enable scientists and scholars to maintain current awareness of present activity in one's own and related fields of interest. This is necessary in order to avoid unintended duplication of research effort and to identify areas for further research. In an investigation by Harris and Katter, it was found that the *Annual Review of Information Science and Technology* had suggested new research topics to 45% of its readers (*195*). Besides researchers and specialists engaged in research and education, two other groups need reviews: (*a*) organizers and administrators of scientific research, who need to know what is being done, and where, in the fields with which they are concerned and in related fields; and (*b*) engineers and industrialists who are concerned with the practical application of current advances in science.

Tutorial Function

Reviews are useful to students in understanding new subjects, and to specialists and researchers in continuing education or in obtaining an overview of a subject outside their field of specialization before commencing a new project (*196, 197*). In an attempt to promote cross-fertilization of ideas among the subdisciplines of biochemistry, the editors of the *Annual Review of Biochemistry* have instituted a new section entitled "Perspectives and Summary," beginning with Volume 45 (1976). In this section, which appears in each review chapter, the review authors "are invited to locate their particular district on the biochemical map for those customarily residing elsewhere, and to summarize in more general terms than those provided for the specialist those developments they feel are most noteworthy during the period under review" (from the Preface to the *Annual Review of Biochemistry*, Vol. 45, 1976).

Bibliographical Function

Reviews are almost invariably accompanied by comprehensive bibliographies of the primary documents reviewed, and they are therefore useful as bibliographic tools in making retrospective literature searches. Review articles with 600 or 700 literature references are not uncommon. For example, the article "Analytical Chemistry of the Sulphur Acids" in *Talanta* (Vol. 21, pp. 1–44, 1974) has 883 bibliographic references. In a research paper on review literature presented at the Washington Conference (1958), Brunning reported on the bibliographic function of reviews:

> A good review contains a good bibliography so that a bibliography of reviews is in large measure a bibliography of bibliographies and as such represents a key to a large volume of literature and is often a quicker means of obtaining a number of references on a specific subject than are the abstract journals (*198*).

Earlier studies have indicated that reviews are used fairly extensively for current awareness and tutorial purposes and also as sources of bibliographic references. In general, scientists use review literature in a wider range of subjects than those covered by the primary literature they read. Eugene Garfield has reported that the average review article published in the *Accounts of Chemical Research* was cited five times as often as the average primary article in the *Journal of the American Chemical Society* (*199*). However, the extent of use and the type of review used depends on the category of users. In a survey on the use of scientific literature, Bernal found that "an overwhelming proportion of scientists (76 per cent) read and appreciate reviews and that in fact they must form a very important and increasing part of general background reading" (*200*). The scientists surveyed by Bernal were employed in academic, industrial, and government research laboratories. Brunning's survey indicated that a majority of chemists do read reviews in their own and related fields, while they read reviews of a general scientific nature to a much lesser extent. It was also found that chemists engaged in research need comprehensive reviews on specialized topics with extensive bibliographies, while those engaged in teaching ask for general reviews with key bibliographic references (*201*).

An inquiry carried out by the secretary-general of Editerra (European Association of Earth Science Editors) revealed that students and scientists below 40 years of age use review literature primarily for a first orientation, to become better informed and to keep up to date about their own professional fields (*202*). It has also been observed that, on an average, research workers in commercial companies use reviews more frequently to keep abreast of advances made in fields adjacent to their own than do their academic colleagues (*202*).

CHARACTERISTICS OF REVIEWS

Reviews are essentially a secondary form of scientific literature; they are not based on original research but on other publications that contain primary information. The results of research reported in primary documents—such as journal articles, conference papers, technical reports, and patents—are sifted, evaluated, and synthesized in review literature. Woodward has identified six characteristics of review literature (*203*). Listed in order of decreasing importance, these are:

1. No original research is reported in reviews.
2. Reviews appear in publications devoted to publishing reviews or in review sections of periodicals.
3. Reviews have a title stating that the item is a review.
4. The title or abstract of a review contains one or more of the following words: review, progress, survey, overview, advances.
5. Reviews contain a large number of references.
6. Reviews are indexed or flagged as reviews by secondary services.

Many of these criteria are "external" features that enable one to determine whether or not a particular document is a review. Woodward used the number of references cited in documents as a means of identifying reviews. It was hypothesized that documents citing a large number of references were more likely to be review documents than those that cited fewer references. A study based on the citation data obtained from the Institute for Scientific Information led to the conclusion that to rely solely on the number of references to identify reviews would miss 10–17% of reviews at the 30-references level and 15–25% of the reviews at the 40-references level (*204*).

In a survey of industrial chemists carried out by Brunning, the respondents quoted the following criteria as the most desirable in a good review: (*a*) expert writer, (*b*) critical approach, (*c*) comprehensiveness, (*d*) clarity and balance, (*e*) good bibliography, and (*f*) synopsis—and use of tables where suitable (*205*).

There are three inherent characteristics that are more or less applicable to most reviews. These are: (*a*) integration, (*b*) evaluation, and (*c*) compaction of primary review literature. Unlike an annotated bibliography or an abstracting journal, a review article places each of the articles reviewed in a context, and it integrates them with the existing corpus of knowledge in a field. Some degree of evaluation is also an essential characteristic of a review. While some reviews (e.g., the critical review) are primarily and explicitly evaluative in nature, others (e.g., a descriptive review) only indirectly involve some degree of evaluation; in these there is an implicit evaluation hidden in the very process of selecting or rejecting items for the review.

Compaction of primary literature is an important feature of a review. This can be estimated by determining: (*a*) the average number of references cited per page of text in the review, or (*b*) the ratio of the number of pages of primary documents reviewed to the number of pages in the review document. The degree of compaction varies from field to field; and within a given field, between review articles and long treatises. Herring found that review articles in biology average five or more references per page; those in chemistry, four per page; and those in physics, two or two and one-half per page (*206*). In another study, Cottrell estimated the degree of compaction achieved in the state-of-the-art reports of the Nuclear Safety Information Center by dividing the total number of pages in the primary literature reviewed by the number of pages in the review report. The "compression ratio" in the case of five reports was found to vary from 50 to 216 (*207*). Density of references and compression ratios such as those suggested by Herring and Cottrell are only approximate indicators of the degree of compaction achieved in reviews. Cottrell's note of caution is appropriate:

> It must be noted that compression of pages of information may or may not be synonymous with compression of information, and furthermore the original information pages being compressed will, in many cases, contain information relevant to other subjects, and thus are not involved in the actual compression of information on the subject in question (*208*).

The "terse literatures" and "ultraterse literatures" suggested by Charles Bernier are a relatively new type of secondary literature designed to achieve a very high degree of compaction (*209–213*). However, undue compaction makes the review incomprehensible except to the specialist.

TYPES AND SOURCES OF REVIEWS

Review literature may be classified according to its length, function, expected readership, and other characteristics. A review may be a one-time or occasional publication, or it may be a periodical review published at regular or irregular intervals. Based on intended readership, reviews may be written for subject specialists, students, or general readers. Reviews range from a short review article published in a journal to a review monograph or a multivolume macroreview in which the chapters or volumes are written by different authors. In 1970 the secretary-general of Editerra (European Association of Earth Science Editors) surveyed 253 natural scientists on their usage habits and preferences regarding reviews. For 36% of the respondents, the length of a specialized review did not matter very much, if the quality was good; 18% had a preference for articles between 6,000 and 9,000 words; 15%, for articles of 3,000 to 6,000 words; 13%, for articles of 9,000 to 12,000 words; and 6%, for articles of 12,000 to 18,000 words. In the life and earth sciences specialized reviews may be somewhat longer than those in the chemical and physical sciences. Those who had an opinion on general reviews answered that these could run up to twice the length of specialized reviews (*214*).

Woodward has provided the following classification of review literature (*215*):

1. Critical, evaluative, interpretive, and speculative
2. State-of-the-art reviews
3. Historical and biographical
4. Tutorial
5. Technical and application
6. Article and book reviews, comments

Ignoring finer distinctions, reviews may be broadly categorized into two classes: critical and descriptive. Preparation of a critical review involves a careful and impartial examination of all significant publications in a specific area, with critical evaluation as needed in view of advances in the area (*216*). The critical review is aimed at the specialist, to satisfy his current awareness need. Descriptive reviews are predominantly expository rather than evaluative in approach, and they are ideally suited for the tutorial function.

Annual reviews summarize recent developments in a field. The literature published during a calendar year is assembled and reviewed, often with critical comments by the review author, and the review is published in the following year. These are typically entitled Annual Review of ———, Progress in ———, Advances in ———, etc. State-of-the-art reviews summarize the current state of practice or thinking in a given field, and they are usually nonevaluative. "Literature surveys" found in dissertations are similar to state-of-the-art reviews; these are interpretive rather than critical in approach.

Reviews of books and articles are mainly intended to serve as book selection aids; they are also useful as current awareness aids.

Reviews may be found in a variety of sources: review serials, primary journals, conference proceedings, monographs, technical reports, and secondary services.

Review Serials

These include serial publications exclusively devoted to the publication of review articles; they range from general review journals, typified by *Scientific American*, to annual reviews published in book format. *Annual Reports on the Progress of Chemistry, Russian Chemical Reviews, Progress in Industrial Microbiology, Essays in Toxicology, Physics Reports*, and *Comments on Atomic and Molecular Physics* are examples of review serials. The reviews in these serials are usually written by experts and are aimed at specialists.

The Chemical Society, London, conducted a survey of the subscribers to its *Annual Reports on the Progress of Chemistry* in 1966. The average subscriber claimed to read only 30% of the volume and admitted to ignoring 30%. In order to improve the usefulness of the *Annual Reports*, and also to cope with the increasing volume of primary literature to be reviewed, the Chemical Society started publishing the *Annual Reports* in two volumes, each separately priced, starting from Volume 64 (1967): Section A: General, Physical, and Inorganic Chemistry; and Section B: Organic Chemistry (*217*). Faced with the expanding scope of biochemistry and mounting volume of literature in molecular biology and biophysics, the publishers of the *Annual Review of Biochemistry* (1932–) were forced to take a similar step in 1966: "This year our *Annual Review* has shown behavior akin to a primary biological phenomenon: It has undergone binary fission" (from the Preface to Volume 35, 1966). In order to preserve the integrity of the review, each volume is provided with author and subject indexes covering both volumes. These two examples illustrate the current trend in the growth of review serials.

Primary Journals

A large number of review articles are published in primary journals along with papers reporting original research. Woodward estimated the output of all reviews in primary journals to be between 10,200 and 11,300 items during 1972; this represents between 1.02% and 1.13% of all articles published in primary journals (*218*). Reviews published in primary journals may be unsolicited articles submitted by authors or invited papers prepared by specialists at the request of the journal editorial board. *Talanta* frequently publishes invited review articles. "*Talanta* Reviews" are also sold as separates. The April issue of *Analytical Chemistry* is a special issue dedicated to review papers. Publication of reviews along with original research papers in primary journals is viewed by scientists with mixed feelings. An overwhelming majority of chemists surveyed by Brunning were in favor of confining reviews to review journals and against having review articles interspersed among reports of original work. This objection did not apply to general scientific journals such as *Nature* and *Science* which report preliminary communications and current research (*219*).

Conference Papers and Proceedings

Although the majority of papers presented at conferences report the results of research, very often good review papers are also presented at conferences. Conference organizers sometimes solicit review papers to be presented as introductions to each session. Conference proceedings are occasionally published as review serials of the type, Advances in ———, or as monographs. The plenary lectures presented at the Fourth Polish Conference on Analytical Chemistry, Warsaw, August 1974, were published in *Pure and Applied Chemistry* (Volume 44, Number 3) and supplied to subscribers to this journal as part of their subscription. The same material was again published as a monograph entitled *Analytical Chemistry* (Pergamon Press, Oxford, 1976). The publication practices and bibliographic control of conference papers and proceedings have been discussed elsewhere. Major criticisms of conference reports are that they often appear a year or more after the meetings have been held, and that they are published without adequate indexing or editing (*220*).

Review Monographs

These range from single-volume, advanced-level textbooks to multivolume scholarly treatises such as the *Treatise on Analytical Chemistry* edited by I. M. Kolthoff and Philip J. Elving (Interscience, New York, 1959–). Over 30 volumes have been published so far. The chapters are written by various authors. The Introduction to this treatise states:

> The aims and objectives of this treatise are to present a concise, critical, comprehensive, and systematic, but not exhaustive, treatment of all aspects of classical and modern analytical chemistry. The treatise is designed to be a valuable source of information to all analytical chemists, to stimulate fundamental research in pure and applied analytical chemistry, and to illustrate the close relationship between academic and industrial analytical chemistry. . . . The treatise as a whole is intended to be a unified, critical, and stimulating treatment of the theory of analytical chemistry, of our knowledge of analytically useful properties, of the theoretical and practical fundamentals of the techniques for their measurement, and of the ways in which they are applied to solving specific analytical problems.

Another typical multivolume review treatise is Rodd's *Chemistry of Carbon Compounds: A Modern Comprehensive Treatise*, second edition (Elsevier Publishing Co., Amsterdam, 1964–); over 22 volumes have so far been published.

A large proportion of reviews in pure physics in 1966 were found to be treatises. Also, treatises were found to have been cited most often in a sample of papers in the *Physical Review* (*221*).

Technical Reports

A small number of critical and state-of-the-art reviews are issued in the form of technical reports. A sample survey of government technical reports released in 1972 indicated that approximately 450 were reviews (*222*). Most technical reports contain a well-documented state-of-the-art review as a preamble. In a multivolume report, the first volume is likely to be a literature survey with bibliography.

Secondary Services

Some secondary services—such as *Applied Mechanics Reviews*, *Computing Reviews*, and *Nutrition Abstracts and Reviews*—include commissioned review articles from time to time. These are usually state-of-the-art reviews, but their number is rather small.

BIBLIOGRAPHIC CONTROL OF REVIEWS

Woodward's survey of review literature indicated an estimated output of 22,000 reviews in 1972. Of these, 4,500 were found in review serials, 10,500 in primary journals, and 4,000 in conference proceedings. About 2,500 were books and 500 were technical reports (*222*). Another survey, in the fields of biology and medicine, showed that less than one-quarter appeared in review publications, and over two-thirds were found in primary journals (*223*). The identification and location of reviews are difficult because of their scattering in diverse sources and their uneven coverage in secondary services. Some abstracting services just mention reviews, but do not abstract them. A further handicap is that it is not always easy to recognize reviews; out of 8,601 reviews in the field of chemistry, only two contained the word "review" in the title (*223*).

The following two directories are very useful in locating review serials:

Emanuel B. Ocran, *Scientific and Technical Series: A Select Bibliography*, Scarecrow Press, Metuchen, N.J., 1973.

A. M. Woodward, *Directory of Review Serials in Science and Technology, 1970–1973: A Guide to Regular or Quasi-Regular Publications Containing Critical, State-of-the-Art and Literature Reviews*, Aslib, London, 1974.

Other useful guides to review publications are: *List of Annual Reviews of Progress in Science and Technology* (2nd edition, UNESCO, Paris, 1969); and *KWIC Index to Some of the Review Publications in the English Language*, published in 1966 by the National Lending Library for Science and Technology (now the British Libraries Lending Division), Boston Spa, England.

Individual review articles and review monographs are covered by secondary services such as *Biological Abstracts, Chemical Abstracts, Computing Reviews*, and *Physics Abstracts*. It is estimated that 6% of the entries in *Chemical Abstracts* are for review articles (*223*). *Science Citation Index* covers reviews and identifies them by the letter "R." Technical reports are abstracted and indexed, notably in *Government Reports Announcements and Index* (National Technical Information Service) and *Scientific and Technical Aerospace Reports* (National Aeronautics and Space Administration).

Many review serials publish cumulative indexes separately in order to facilitate retrospective search. The cumulative index to the first 10 volumes of the *Annual Review of Information Science and Technology* and the cumulative index to *Scientific American* for the years 1948–1963 are examples of separately published cumulative indexes. As an alternative to separately published indexes, it is a more common practice for review serials to include cumulative indexes in the volumes themselves. *Reports on Progress in Physics* (The Physical Society, London, 1938–) published cumulative subject and author indexes to the first 15 volumes in Volume 15 (1952). Since then, cumulative subject and author indexes have been published every 5 years. Cumulative author and subject indexes to the first 60 volumes of *Chemical Reviews* (American Chemical Society, Washington, D.C., 1924–) were published in Volume 60 (1960); cumulative indexes to Volumes 61–70 were included in Volume 70 (1970). Each volume of *Advances in Enzymology* contains author and subject indexes to that volume as well as cumulated author and subject indexes to all volumes beginning with the first. Each volume of the *Annual Review of Biochemistry* contains cumulative indexes of contributing authors and chapter titles covering the current volume and the preceding four volumes; this is in addition to the regular author and subject indexes to each volume of the series.

The need for specialized indexes to review literature has been recognized recently. The following are important examples of indexes dedicated to review literature:

1. Norman Kharasch et al., *Index to Reviews, Symposia Volumes and Monographs in Organic Chemistry* (Pergamon Press, Oxford, 1962–): this covers review papers published in English, French, and German from 1940 onward.
2. *Monthly Bibliography of Medical Reviews* (National Library of Medicine, 1968–): this is a continuation of the *Bibliography of Medical Reviews* (1955–1967).
3. *BASIC* (Biological Abstracts Subjects in Context): this is a subject index to *Biological Abstracts*, and it systematically lists review articles. The titles of review articles indexed in *BASIC* are augmented to include the word "review" and edited to make them more suitable for computer permutation.
4. *Index to Scientific Reviews* (Institute for Scientific Information, Philadelphia, 1974–): this is a semiannual index to more than 28,000 review articles and state-of-the-art reviews in various scientific disciplines, cumulated annually.

REVIEW AUTHORS AND REVIEW PREPARATION

The preparation of reviews is an intellectually challenging task. It involves assembling, digesting, and evaluating scattered primary documents and condensing their contents into coherent and comprehensive packages. Authors of reviews should be scholars or experts in their own disciplines, and should also be willing to invest a great deal of creative thought and effort in preparing reviews. The qualifications of an ideal author of a review were enumerated by Cuadra in his introduction to the first volume of the *Annual Review of Information Science and Technology:*

1. He must have a strong grasp of the basic issues in his field and he must be able to understand and express them in their historical perspective.
2. He must have an established habit of keeping informed by reading reports and published literature and by making effective use of his contacts in the "invisible college."
3. He must be able to write lucid, incisive prose and must be willing and able to make objective value judgement—in public—about the merit and implications of given lines of reported work, research, and experience.
4. He must have, in addition to this technical and literary talent, sufficient prestige in the field to invite the reader's respectful attention to his contribution.
5. He must be willing to do an immense amount of sifting, reading and evaluation on an extremely tight schedule (*224*).

Once an author is committed to writing a review, he is faced with the immediate task of identifying and physically acquiring all the documents to be considered for the review. Indexing and abstracting services are only marginally helpful because of the time-lag of 6 months to 2 years in their coverage of primary documents. The review author has to use a variety of additional sources, including his personal files, current issues of journals and their indexes, book review media, and conversations with colleagues.

Research scientists who have the ability to synthesize volumes of primary literature and prepare reviews appear to be reluctant to undertake the writing of reviews. Both physicists and chemists tend to regard the writing of reviews as less rewarding than original research in terms of prestige (*225, 226*). Scientists who do engage in writing reviews view this activity with mixed feelings. The following two responses made by reviewers for the *Annual Review of Psychology* typify the attitude of scientists who were invited to write review articles:

1. Digesting the material so that it could be presented on some conceptual basis was plain torture. I spent over 200 hours on that job all told. I wonder if 200 people spent even one hour reading it.
2. The *Annual Review* invitation is a miserable job to do. The rewards are 50 reprints, and some intangibles. The selection, however, is a suggestion by the board of Editors (representing the scientific public) that one should know and be interested in a certain arena of our science (*227*).

Various incentives, such as fellowships, sabbatical leaves, and prizes for outstanding reviews, have been suggested to make review writing attractive to capable scientists. Scientists have been exhorted from time to time to regard the writing of reviews as a worthwhile activity essential for the effective utilization of recorded knowledge. The Royal Society Scientific Information Conference recommended that "senior scientists should regard the provision of reviews as an important ancillary to the pursuit of new knowledge" (*228*). The Weinberg Panel of the President's Science Advisory Committee made more explicit recommendations, placing the responsibility for preparing reviews squarely on scientists and engineers:

> We shall cope with the information explosion, in the long run, only if some scientists and engineers are prepared to commit themselves deeply to the job of sifting, reviewing, and synthesizing information; i.e. to handling information with sophistication and meaning, not merely mechanically. Such scientists must create new science, not just shuffle documents: their activities of reviewing, writing books, criticizing, and synthesizing are as much a part of science as traditional research. We urge the technical community to accord such individuals the esteem that matches the importance of their jobs and to reward them well for their efforts. . . . Review writing is a task worthy of the deepest minds, able to recast, critically analyze, synthesize, and illuminate large bodies of results. The relation of the reviewer to the existing but widely scattered bits of knowledge resembles the relation of the theorist to available pieces of experimental information. In order to emphasize the growing importance of the reviewer and also the growing difficulties that he faces, scientific and technical societies should reward his work with good pay and with the regard that has been reserved heretofore for the discoverer of experimental information. Those asked to write reviews or to give invited papers reviewing a subject should be selected by the scientific societies with the same care as are recipients of honors or of appointments to the staff of a university (*229*).

As noted earlier, the preparation of reviews is a time-consuming and tedious process. In terms of intellectual effort, it is no less challenging than original research. "After all, science consists in the creation of simplicity out of the complexity of nature, and it is scarcely less of a feat to create new simplicity out of the complexity of the literature" (*230*). It is therefore necessary to prevent wasteful duplication of reviewing effort and to direct the energies of reviewers to areas where gaps exist. The Royal Society Scientific Information Conference suggested that the organization and production of reviews could best be linked with abstracting and indexing services and learned societies (*231*). Secondary services could easily detect areas where reviews were needed, and the learned societies could recommend specialists with appropriate qualifications to prepare the needed reviews. The SATCOM Committee also recommended that the responsibility for the stimulation of critical reviews should be borne by professional societies:

> Scientific and technical societies must develop, propose and assist in implementing new and better ways to identify needs for critical reviews and data compilations and to further efficient preparation of them. . . .
>
> Each society or association, the membership of which includes many persons concerned with the practice, especially in engineering, medicine, and agriculture, should increase substantially its attention to information programs that will . . . stimulate the production of critical reviews and surveys of contemporary fields of knowledge (*232*).

The Weinberg Panel contended that the specialized information centers, staffed by subject specialists, could provide a better organizational framework for identifying the need for reviews, and for coordinating their preparation (*233*). The specialized information center could also assist review authors by compiling bibliographies and making available copies of needed documents and translations. The Brain Information Service, a specialized information center of the National Institute of Neurological Diseases and Blindness, has proposed a procedure for comprehensive review and analysis of the literature of the neurological sciences (*234*).

The use of reviews by scientists has also been increasing. A survey of 3,201 physicists and chemists carried out by the Advisory Council on Scientific Policy in England demonstrated the widespread use of reviews. Over 90% of the sample had read or consulted a review within the previous month; well over one-half rated reviews as the most useful source for current awareness—more useful than abstracts or conferences; and between 46% and 55% said they would like more reviews (*235*). Another survey, of 2,702 mechanical engineers (who are traditionally far less "papyrocentric" than pure scientists), showed that reviews are used consistently by engineers engaged in all types of activity (e.g., management, research, design, testing, sales, and production). Reviews are used far more frequently than abstracts and indexes by all except those engaged in research. Over one-half of the respondents expressed the need for more review articles (*236*). As pointed out in the Introduction to the 1966 volume of *Macromolecular Reviews*, ". . . the review article is becoming the primary (i.e. the principal) source of information to a large majority of scientists."

Encyclopedias

SPECIALIZED ENCYCLOPEDIAS

The aim of a general encyclopedia is to present in a concise and easily accessible form the whole corpus of knowledge. Encyclopedia articles usually contain an adequate amount of data for obtaining a general orientation on a wide variety of topics. Articles in general encyclopedias are sufficiently exhaustive to provide a general orientation on specific topics not only to the general reader but also to the subject specialist seeking a general background in an area peripheral to this specialization. A specialized encyclopedia differs from a general encyclopedia mainly in two respects: (*a*) The scope of a specialized encyclopedia is limited to a clearly defined branch of knowledge, such as physics, biochemistry, chemical technology, etc.; and (*b*) the level of treatment is likely to be highly technical or scholarly. Thus, a specialized encyclopedia is designed primarily for the use of subject specialists. However, there are many encyclopedias that cover a narrow field of knowledge but are addressed to nonspecialist readers. Some examples of this type are discussed in the following section.

Specialized encyclopedias contain signed articles written by experts. The length of articles may range from a few lines to several pages. The article on ketones is less than one page in *Van Nostrand's Scientific Encyclopedia* (5th edition). On the same topic, the *Kirk–Othmer Encyclopedia of Chemical Technology* (2nd edition) has a 69-page article with a bibliography of 289 items. The articles are usually illustrated, sometimes with color photographs, and they may contain substantial amounts of data in the form of tables and charts. Each article is generally followed by a short bibliography. Besides topical articles, specialized encyclopedias may also contain articles describing organizations and historical events and biographical articles.

SINGLE-VOLUME ENCYCLOPEDIAS

The *Harper Encyclopedia of Science* (revised edition, Harper and Row, New York, 1967) is primarily aimed at the general reader. "We have insisted that articles be written with a minimum of jargon, with maximum clarity consistent with accuracy. The needs of the common reader—the student, the teacher, the nonspecialist—have been our measuring rod" (from the Editor's Introduction). There are nearly 4,000 articles written by about 450 scientists and engineers. The articles are illustrated but do not have bibliographies. However, there is a long bibliography, arranged under subject headings, at the end. There is also an alphabetical index.

A somewhat more technical one-volume encyclopedia is *Van Nostrand's Scientific Encyclopedia* (5th edition, Van Nostrand, Princeton, N.J., 1976). The first edition was published in 1938. The second, third, and fourth editions were brought out in 1947, 1958, and 1968, respectively. When work on the first edition began in 1935, the planners decided that "all topics were to be presented in depth sufficient for the needs—outside their fields of specialization—of scientists, engineers, medical doctors, mathematicians, students of those subjects, and anyone who wanted comprehensive information" (from the Preface to the fourth edition). This same pattern has been maintained in the subsequent editions. The fifth edition has over 7,200 editorial entries and 2,450 diagrams, graphs, and photographs in 2,370 pages. The articles are illustrated, but there is no index or bibliography.

Modern Science and Technology (Van Nostrand, Princeton, N.J., 1965) is a collection of 81 articles taken from the journal *International Science and Technology*. The articles were written "for professional scientists and engineers to read when they want to inform themselves about technical progress outside their own particular field of specialization" (from the Preface). The writers have assumed that the readers would have a vigorous professional interest in technical matters and a familiarity with the fundamental principles of science and mathematics. The articles are illustrated, and each article has an abstract. There is an alphabetical index at the end.

The above three encyclopedias attempt to cover all branches of science and technology. The *Universal Encyclopedia of Mathematics* (Simon and Schuster, New York, 1964) and *Kingzett's Chemical Encyclopedia: A Digest of Chemistry and Industrial Applications* (9th edition, Van Nostrand, Princeton, N.J., 1966) are examples of single-volume encyclopedias limited in scope to one branch of science. There are many one-volume encyclopedias that are highly specialized and technical in both content and presentation. The *Encyclopedia of X-Rays and Gamma Rays* (Reinhold, New York, 1963) and *Chemical Process Industries* (3rd edition, McGraw-Hill, New York, 1967) are examples of this type. The *Encyclopedia of Chemical Elements* (Reinhold, New York, 1968) contains concise articles by 104 contributors on the occurrence, properties, behavior, and uses of 103 chemical elements. In addition, there are 20 general articles on such topics as the periodic law and the periodic table, transuranium elements, isotopes, etc. The articles are 1,400–1,700 words long and are accompanied by references to related literature for further reading. There is an alphabetical index.

MULTIVOLUME ENCYCLOPEDIAS

Multivolume encyclopedias are more likely to be meant for the subject specialist rather than for the general reader. However, there is a very important multivolume encyclopedia intended for use by the nonspecialist, and this is discussed first. In the *McGraw-Hill Encyclopedia of Science and Technology* (3rd edition, 1971), "each article is designed and written so as to be understandable to the nonspecialist. . . . Most articles, and at least the introductory parts of all of them, are within the comprehension of the interested high school student" (from the Preface). The third edition has 14 volumes of text and an index volume; it contains about 7,600 articles. Most of these are illustrated (there are 72 full-color plates) and are followed by a bibliography. The first and second editions were brought out in 1960 and 1966, respectively. The *McGraw-Hill Basic Bibliography of Science and Technology* is a companion publication designed to supplement the *Encyclopedia*. The entries in the *Bibliography* are arranged under the same subject headings as are the articles in the *Encyclopedia*.

The following are some examples of multivolume encyclopedias in chemistry and chemical technology that are very technical in both content and style:

Chemical Technology: An Encyclopedic Treatment (Barnes and Noble, New York, 1968–, 8 volumes): This describes the sources, manufacture, processing and use of materials, both natural and synthetic. An unusual feature of this encyclopedia is that its arrangement is systematic, not alphabetical, to facilitate collocation of related material. Each volume has an index. The text is illustrated, and each chapter has a short bibliography for further reading.

Encyclopedia of Chemical Reactions (Reinhold, New York, 1946–1959, 8 volumes): Information on chemical reactions is arranged under the principal chemical elements and reactants. For each reaction, the conditions and reagents of the reaction, balanced equations, and the bibliographical details of the source document are given. Each volume has an index to reagents and an index to substances obtained.

Encyclopedia of Industrial Chemical Analysis (Wiley, New York, 1966–1974, 19 volumes): The Preface states that this work: "plans to give a comprehensive coverage of the methods and techniques used in industrial laboratories throughout the world for the analysis and evaluation of chemical products. Raw materials, intermediates, and finished products are included, and the treatment covers not only chemical analysis in the widest sense, but also evaluation of finished products for their intended functions." The first three volumes cover general techniques of industrial chemical analysis; the remaining volumes contain articles on the analysis of specific materials. The articles are illustrated and are followed by bibliographies.

Elsevier's Encyclopedia of Organic Chemistry (Elsevier, Amsterdam, 1940–1969, 20 volumes plus several supplements): The articles are arranged according to a systematic (rather than an alphabetical) sequence. The articles contain literature references. Each volume has a subject index and a formula index.

Kirk–Othmer Encyclopedia of Chemical Technology (2nd edition, Interscience, New York, 1963–1972, 24 volumes): The 22nd volume is a supplement, and the last volume is an index to the encyclopedia. The articles are exhaustive and are supported by illustrations, tables, charts, and extensive bibliographies. The article on "aluminum and aluminum alloys," for example, is 62 pages long. There are two exhaustive articles on patents: one on patents (practice and management), 31 pages; and another on patents (literature), 53 pages. The latter has a bibliography of 294 references. A third edition of this encyclopedia is in press.

ENCYCLOPEDIC DICTIONARIES

Like other forms of publications, encyclopedias also suffer from the problem of confusing titles. Some encyclopedias do not have the word "encyclopedia" in their titles and are therefore difficult to recognize as such. For example, *Chemical Process Industries* (3rd edition, McGraw-Hill, New York, 1967) and *Handbuch der Physik* (Springer-Verlag, Berlin, 1956–, 54 volumes) are encyclopedias though they are not so named. *Thorpe's Dictionary of Applied Chemistry* (4th edition, Longmans, Green, London, 1937–1956) is really a 12-volume encyclopedia, the word "dictionary" in its title notwithstanding.

Some "encyclopedias" are really dictionaries or other types of reference works, despite the word "encyclopedia" in their titles. The *Concise Encyclopedia of*

Astronautics (Follet, Chicago, 1968) is in fact a dictionary, and the *International Encyclopedia of Physical Chemistry and Chemical Physics* (Pergamon, Oxford, 1960–) is the collective title of a series of monographs on different subjects.

The difference between a dictionary and an encyclopedia is fairly clear: A dictionary is basically a word list. It gives definitions and meanings of words in the same language as the words or in one or more different languages, with or without illustrations. The definitions are usually short and unsigned. An encyclopedia contains longer and more informative articles, usually signed by the author and supported by illustrations and bibliographies. There are some publications which combine the features of a dictionary and those of an encyclopedia. The *Encyclopedic Dictionary of Physics* (Pergamon, Oxford, 1961–1971) is an example of this genre. This nine-volume publication contains short, signed articles, and many of the articles have bibliographies. The last volume is a multilingual glossary in English, French, German, Japanese, Russian, and Spanish. Four supplementary volumes have so far been issued. The *Atomic Energy Desk Book* (Reinhold, New York, 1963, 3 volumes) is another example of a publication that combines the features of both a dictionary and an encyclopedia.

UPDATING ENCYCLOPEDIAS

Information presented in encyclopedias rapidly becomes obsolete, especially in the fast-developing technical subjects and technologies. Updating of encyclopedias is an expensive and time-consuming process, and it requires continuous effort. There are primarily two ways in which encyclopedias are updated: (*a*) publication of a completely revised edition, at intervals of 5 or 10 years, and (*b*) publication of supplements or "yearbooks" to update multivolume encyclopedias. The first method is usually followed for updating single-volume encyclopedias. The fifth edition of *Van Nostrand's Scientific Encyclopedia* (1976) has 300 more pages than the fourth edition, and it is "essentially a new book, with less than approximately 20 per cent of prior text and illustration taken from the earlier edition." The first edition was published in 1938, and since then a new edition has been published approximately every 10 years. The *McGraw-Hill Encyclopedia of Science and Technology* (3rd edition, 1971) is regularly updated through annual supplements. Five "yearbooks" have so far been issued to cover the years 1971 through 1975.

A combination of these two methods is also used to update multivolume encyclopedias. The *McGraw-Hill Encyclopedia of Science and Technology* was first published in 1960, and the second and third editions were published at intervals of approximately 5 years. Annual supplements were issued to update the encyclopedia during the period between editions. The *Encyclopedia of Associations* (which is really a directory) is updated quarterly. Part 3 of this work, called *New Associations and Projects*, is a quarterly supplement to the first two parts, which are entitled *National Organizations of the United States* and *Geographic and Executive Index*, respectively.

Translations

INTRODUCTION

Scientific information is a supranational entity; no country, however advanced technologically, can afford to ignore the scientific information produced in other countries. In 1956 William N. Locke estimated that the costs to the United States of America of the belated discovery of a Russian paper on the application of Boolean matrix algebra to the study of relay contact networks, comprised a financial loss of the order of $200,000 and a 5-year delay in certain switching circuit developments (*237*). Roughly one-half of the scientific and technical literature of the world is produced in languages other than English. Table 5 shows the distribution by language of the literature covered in six major English-language indexing and abstracting services (*238*).

TABLE 5

Language Breakdown of Literature Covered in Abstracting and Indexing Services[a]

	Percentage of literature covered in:					
Language	*Chemical Abstracts*	*Biological Abstracts*	*Physics Abstracts*	*Engineering Index*	*Index Medicus*	*Mathematical Reviews*
English	50.3	75.0	73.0	82.3	51.2	54.8
Russian	23.4	10.0	17.0	3.9	5.6	21.4
German	6.4	3.0	4.0	8.6	17.2	8.7
French	7.3	3.0	4.0	2.4	8.6	7.8
Japanese	3.6	1.0	0.5	0.1	0.9	0.7
Chinese	0.5	1.0	0.1	0.0	0.4	0.2
Other	8.5	7.0	1.4	2.7	16.1	6.4
Totals	100.0	100.0	100.0	100.0	100.0	100.0

[a] From Ref. *238*.

More recent data for *Chemical Abstracts* show a decrease in the proportion of French chemical literature (*239*):

Language	Percentage of references cited in *Chemical Abstracts*
English	57.5
Russian	23.5
German	5.4
French	3.7
Japanese	3.4
42 other languages	6.5
Total	100.0

Russian scientific literature accounts for almost one-quarter of chemical and chemical engineering literature reported in *Chemical Abstracts* and 17% of physics literature abstracted in *Physics Abstracts*. This dispersion of scientific literature in numerous languages has been of much concern to scientists and science bibliographers alike. An eminent American scientist is reported to have said, after Sputnik: "Either we will have to learn physics, or we will have to learn Russian" (*240*).

BIBLIOGRAPHIC CONTROL OF TRANSLATIONS

Translation of scientific literature is an expensive and time-consuming process, and it calls for a relatively rare combination of skills including expertise in two languages and subject knowledge. Machine translation has not made any significant progress despite much research work in the United States and the U.S.S.R. It is therefore important for scientists and science bibliographers to be able to locate both existing translations and those that are in progress in order to prevent the wasteful effort and expense of duplicate translation. Journal literature constitutes the bulk of translations. Over 300 scientific and technical journals are translated from cover to cover, mostly from Russian into English, by commercial publishing houses (e.g., Plenum Publishing Corporation and Allerton Press) and by scientific societies (e.g., the American Institute of Physics and the Chemical Society, London). The American Institute of Physics alone publishes over 20 cover-to-cover translations of Soviet physics journals. Most of the journals translated are primary journals: for example, *Soviet Physics: Crystallography* (American Institute of Physics) and *Soviet Mathematics* (American Mathematical Society). A few secondary services are also translated: *Russian Chemical Reviews* (The Chemical Society, London) and *Cybernetics Abstracts* (Scientific Information Consultants, London). The latter is an English translation of *Referativnyi zhurnal-kibernetika*. Translated journals are far more expensive than the original editions because of the huge costs involved in translating specialized literature. The time-lag between the publication of the original journal and the translated edition varies from 6 months to 2 years or more.

A Guide to Scientific and Technical Journals in Translation, second edition, by Carl J. Himmelsbach and Grace E. Brociner (Special Libraries Association, New York, 1972), lists cover-to-cover translations and journals containing selected translations. A list of 162 cover-to-cover translations may also be found in: V. K. Rangra, "A Study of Cover-to-cover English Translations of Russian Scientific and Technical Journals," *Annals of Library Science and Documentation* (Vol. 15, No. 1, March 1968, pp. 7–23). A further list of 12 titles not covered in the above article appears in: B. K. Sen, "Cover-to-cover Translations," *Annals of Library Science and Documentation* (Vol. 15, No. 4, December 1968, pp. 216–218).

Each year about 6,000 books in the pure and applied sciences are translated. These translations are listed in UNESCO's annual publication *Index Translationum* (1950–). Translations of single articles, reports, and patents are more difficult to trace because most of these are not published through the regular trade channels. In England, Aslib maintains the "Commonwealth Index of Unpublished Translations" on cards, and also a register of specialist translators. The card index has over 450,000 entries, and it is growing at the rate of 10,000 entries a year. Nearly one-fourth of these comes from sources that do not publish translations and in most cases do not wish it to be known that the topic of the translation is of interest to them (*241*). This index is a location tool, and it includes all translations held by the British Libraries Lending Division and those listed in the *Translations Register Index* of the National Translations Center. Aslib does not supply copies of translations; it refers inquirers to appropriate sources where the desired translations are available. Each year Aslib receives some 15,000 inquiries.

The National Translations Center

The National Translations Center (NTC), housed in the John Crerar Library, Chicago, is a depository and referral center for unpublished English translations of the world literature in the natural, physical, medical, and social sciences. The NTC is a cooperative, nonprofit enterprise, and its services are designed to:

1. Eliminate costly duplication of translation effort, thus freeing funds for translating new material.
2. Disseminate information on available translations.
3. Provide copies of translations on file or refer inquiries to other known sources.

The NTC was formally organized in 1953 after having existed for several years as a volunteer project of the Science and Technology Division of the Special Libraries Association. The center receives translations from scientific and professional societies, government agencies, industrial and other special libraries, academic institutions, and commercial translation bureaus all over the world. The identity of the depositor is obliterated to assure donor anonymity. Index files are maintained by author, journal citation, report number, standard number, or patent number. New additions to the center's collections are announced in the monthly journal *Translations Register Index*; this index journal was begun by the Special Libraries Association in 1967 and was transferred to the NTC in 1971. The entries in the *Index* are arranged under 22 subject fields endorsed by the Committee on Scientific and Technical Information (COSATI) of the Federal Council for Science and Technology. Government-sponsored translations announced in *Government Reports Announcements and Index* of the National Technical Information Service are also indexed in the *Translations Register Index*. The NTC distributes copies of translations available in its collections as well as those available from the British Libraries Lending Division and the European Translations Center in Delft. Translations made prior to 1967 may be found through the following indexes:

Author List of Translations, Special Libraries Association, New York, 1953; Supplement, 1954.

Bibliography of Translations of Russian Scientific and Technical Literature, Library of Congress, Washington, D.C., 1953–1956.

Consolidated Index of Translations into English, Special Libraries Association, New York, 1969.

Technical Translations, Clearinghouse for Federal Scientific and Technical Information, Springfield, Va., 1959–1967.

Translations Monthly, Special Libraries Association, New York, 1955–1958.

Translations required by government agencies and sponsored by the Joint Publications Research Service (JPRS) are listed in *Transdex: Bibliography and Index to the United States JPRS Translations* (CCM Information Corporation, New York, 1971–). *Transdex* is published monthly and cumulated semiannually. The National Technical Information Service collects and distributes all government-sponsored translations and announces them in the *Government Reports Announcements and Index*.

European Translations Center

The European Translations Center (ETC) is a cooperative organization established jointly in 1960 by about 20 Western European countries in cooperation with the Organization for Economic Cooperation and Development (OECD) and the United States. The participating countries have national centers which, together with ETC, form an international translation network. The ETC acts as a referral center, maintains a central information file, distributes translations, announces all translations in the monthly *World Index of Scientific Translations and List of Translations Notified to ETC* (1967–), and maintains lists of translators and translation agencies. The national centers perform similar functions within their national jurisdictions and cooperate with the ETC. The *World Index* is a finding list of translations of periodical articles and patents, primarily from non-Western languages: Russian and other Slavic languages, Finnish, Hungarian, Romanian, Chinese, Japanese, and Arabic.

Another international index to translations is the *Transatom Bulletin*, published monthly by the Commission of the European Communities and the CNRS (Centre National de la Recherche Scientifique, France) for providing information on translations covering Eastern nuclear literature. Both translations completed and those in progress are listed, with full bibliographic information, source for acquisition, and price. Translations available from about 15 countries (including the United States, the United Kingdom, the U.S.S.R., Austria, France, Germany, and Poland) are listed.

DIRECTORIES OF TRANSLATORS

Information on individual translators specializing in various languages and subjects, and on translation agencies and pools may be obtained from the following three directories:

International Directory of Translators and Interpreters, Pond Press, London, 1967. (Over 2,000 translators throughout the world are listed and indexed by subject specialization and geographic location.)

Frances E. Kaiser, *Translators and Translations: Services and Sources in Science and Technology*, 2nd ed., Special Libraries Association, New York, 1965. (Individual translators, translation pools, and bibliographies of translations are listed.)

Patricia Millard, *Directory of Technical and Scientific Translators and Services*, Crosby Lockwood, London, 1968. (This directory lists translation services and about 300 individual translators in Great Britain, which among them cover about 50 languages and almost all major scientific disciplines.)

Despite the existence of several national and international translation centers and translation indexes, information about existing translations and those in progress is not disseminated widely. Grogan has pointed out that owing to this inadequacy of information on translations, scientists are not well informed about the material that is available in translation. There are at least two instances where the same journal is being translated by two agencies: *Moscow University Physics Bulletin* is being translated by Allerton Press, New York, and also by the Aztec School of Languages, West Acton, Massachusetts. Both Plenum Publishing Corporation and the National Technical Information Service are translating the Russian journal *Cybernetics* (*242*). Such duplication is surely an inexcusable waste of manpower and other resources.

Bibliographic Control of Scientific Literature

PROLIFERATION OF LITERATURE

The proliferation of scientific literature originating from many countries in numerous languages, the increase in the number of scientists generating and using literature, and the need for rapid access to the most recent literature—all these factors have emphasized the need for a bibliographic apparatus to facilitate the identification, selection, and acquisition of scientific literature that ~~would~~ cut across the diversities of format, language, and national origin. The bibliographic apparatus should be capable of providing access to scientific literature selectively (excluding all nonpertinent documents), comprehensively (including all pertinent documents), speedily, and economically.

The biggest deterrent to the bibliographic control of scientific literature is its enormous volume—and the alarming rate at which it appears to be growing. At the first annual lecture of the Science of Science Foundation, delivered at the Royal Institution, London, on March 25, 1965, Derek J. de Solla Price said:

> Science increases exponentially, at a compound interest of about 7 per cent per annum, thus doubling in size every 10–15 years, growing by a factor of ten at least every half-century, and by something like a factor of a million in the 300 years which separates us from the seventeenth century invention of the scientific paper when this process began.
>
> . . . this is an alarming rate, much faster than any population explosion, much faster than growth rates of industry; those are standing still in comparison (*243*).

The problem caused by the proliferation of scientific literature has been described by J. C. R. Licklider, thus:

> To simplify back-of-the-envelope calculations, let us take the figures, 10^{13} characters and (say) 12 years, at face value: let us assume that one one-thousandth of all science and technology constitutes a field of specialization: and let us consider the plight of a scientist who reads 3,000 characters a minute, which is a rate more appropriate for novels than for journal articles. Suppose that he gathers together the literature of his field of specialization (10^{10} characters) and begins now to read it. He reads 13 hours a day, 365 days a year. At the end of the 12 years, he sets down the last volume with a great sigh of relief—only to discover that in the interim another 10^{10} characters were published in his field. He is deterred by the realization that not only the volume but the rate of publication has doubled (*244*).

Journal literature constitutes the largest component of the totality of scientific literature; the proliferation of the primary journal has been discussed in another section. Other forms of literature have also been increasing. According to a recent survey by King Research, Inc., conducted for the National Science Foundation (*75*), scientific and technical books in the United States have registered the greatest rise, from 3,379 titles in 1960 to 14,442 titles in 1974 (327% increase); and scholarly journal articles have increased from 106,000 in 1960 to 151,000 in 1974 (42% increase). During the same period, the costs attributed to scientific and technical books increased from $600 million to $2.1 billion (an increase of over 250%), and the costs associated with scientific and technical journals rose from $1.3 billion to $5.6 billion (330% increase). In the United States, patent applications represent a very large component of scientific literature, next only to journal literature. In 1974 approximately 108,000 patent applications were filed; this represents an increase of 28% over the 1960 figure of 84,500. But not all the patent applications are eventually granted patents. In 1960 the number of patents issued was 50,000; in 1974 this number rose to 79,900, showing an increase of 60% during this period.

Technical reports represent the third largest category of scientific and technical literature. The number of technical reports processed by the National Technical Information Service rose from 14,000 in 1965 to 61,000 in 1975, registering an annual mean growth rate of 15.8%. These numbers do not include the report literature processed by the United States Government Printing Office. Doctoral dissertations have also been steadily increasing. The number of dissertations announced in the *Dissertations Abstracts International* rose from 3,387 in 1960 to 15,606 in 1974. This represents a growth rate of 11.5% per year during this period. Data gathered by the National Federation of Abstracting and Indexing Services (NFAIS) from its 40 member services showed a net increase of 145% during the 15-year period 1960–1974.

The total resources expended on scientific and technical communication in the United States have been growing more rapidly than the GNP. In the 15-year period 1960–1974, the GNP increased by 177%, whereas total resources spent on scientific and technical communication grew from $2 billion in 1960 to $8.5 billion in 1974, registering an increase of 320%. The expenditure on scientific and technical communication in 1975 was estimated at \$9.4 billion. This figure includes the costs incurred by authors, publishers, libraries, secondary services, and users in the production and use of the scientific and technical books, journals, reports, and other forms of publications. The ratio of scientific and technical communication expenditure to the GNP has also been increasing steadily. In 1960 scientific and technical communication expenditure accounted for 0.4% of the GNP; it gradually increased to 0.6% in 1974.

At least one probable cause for this enormous growth in scientific and technical literature is the increase in the number of scientists and engineers engaged in research and development as well as in publication. The number of scientists and engineers in the United States rose by 3.8% per annum from 1960 to 1975. It is estimated that there are now approximately 400,000 scientific and technical authors, of whom about one-half are authors of scholarly publications. Price contends that out of every eight scientists who have ever been alive, seven are alive today (*243*). Thus, individual mastery of the literature of even one branch of science such as physics or biology has become impossible. Scientists have reacted to this problem by resorting to narrow specialization within a branch of science. But the solution of problems in science calls for the application of ideas from a larger store of knowledge than an individual can have at his command. In earlier days, when individual mastery of scientific literature was still possible, a scientist working on a research problem could draw pertinent ideas from his memory's store, built up over the years; this method was quite satisfactory although the processes of cognition and recall were not fully understood. With increasing specialization, however, the processes of storing, organization, and retrieval of information have become group processes rather than individual efforts. In the group approach, information storage and retrieval have been delegated to externalized and nonneural bibliographic control systems. Bibliographies (both retrospective and current), abstracting services, and indexing services have been the traditional tools of bibliographic control that aid the users of scientific literature in identifying and selecting documents pertinent to their interests from the totality of scientific literature. These three major bibliographic control tools are discussed in the following sections.

BIBLIOGRAPHIES

The distinction between a current bibliography and a retrospective bibliography is rather temporary and pertains to the time span covered by the bibliography. Retrospective bibliographies describe material published in the past—sometimes including documents published a century or two ago—and are intended to aid comprehensive literature surveys. Current bibliographies include material published recently—usually within a short span of time (a month or a few months or a year)—and are intended to aid in the selection of a few recent documents bearing on a given subject. Very often, current bibliographies are serial publications appearing at specified intervals, each issue covering the material published since the preceding issue. The periodical issues are then cumulated and made available as a retrospective bibliography covering a longer time span. It is also a common practice to prepare indexes to a retrospective bibliography in order to provide alternative or additional approaches to the documents that complement the arrangement of entries in the main part of the bibliography. In this sense, then, most current serial bibliographies that are cumulated over a time span longer than that covered by the individual issues, eventually become retrospective bibliographies. An example of this phenomenon can be seen in the *Bibliography of the History of Medicine,* published annually since 1965 by the National Library of Medicine. The majority of citations are derived from *Index Medicus* and the *Current Catalog* of the National Library of Medicine. The annual issues of this bibliography are then cumulated every 5 years. So far two cumulated editions have been issued, covering the years 1964–1969 and 1970–1974.

Current Bibliographies

Besides regular bibliographies such as the *Bibliography of the History of Medicine,* noted above, acquisition lists prepared by libraries and information centers, and reviews and announcements in journals are useful bibliographic sources for keeping track of recent publications. *New Technical Books,* published by the New York Public Library, and *Aslib Book List* (1935–), are two notable examples. *British Scientific and Technical Books,* published since 1956, is compiled on the basis of the *Aslib Book List.* Annotated lists of additions to the library of the Institution of Mechanical Engineers, London, are published as a regular feature in the monthly journal the *Chartered Mechanical Engineer.*

Thousands of primary journals publish reviews and announcements of recently published scientific and technical books. Notable among these are *Science, Nature, American Scientist, Physics Today, Scientific American,* and *Library Journal,* to name only a few. *Choice* is primarily a book review journal, especially suitable for college-level publications. *Library Journal* publishes an annual special feature on scientific, technical, and medical books, and it also periodically announces new and forthcoming books. Announcements of new books and forthcoming books may also be seen in *Publishers Weekly* and the *Weekly Record.* Publishers' announcements and catalogs also serve as useful sources of information on new and forthcoming books. Some abstracting and indexing services such as *Chemical Abstracts* and *Computing Reviews* also include annotations, abstracts, or reviews of books. *Science Books and Films* (formerly *Science Books: A Quarterly Review*), published by the American Association for the Advancement of Science, is yet another source of reviews of science books.

Reviews of scientific and technical books scattered in thousands of journals may be located through *Technical Book Review Index* (1935–), compiled and edited for the Special Libraries Association in the Science and Technology Department of the Carnegie Library of Pittsburgh. It gives extracts from published book reviews and serves as an index to book reviews in some 2,500 journals. *Book Review Index* (Gale Research Co., Detroit, Mich.), *Book Review Digest* (H. W. Wilson Co., New York), and *Index to Book Review Citations* (H. W.

Wilson Co., New York) are similar indexes to book reviews, but the scope of these is far more general than that of the *Technical Book Review Index.*

Standard lists of books are compiled and published (often periodically) by large libraries, commercial publishing companies, and societies. These are usually designed for particular types of libraries. The following are some examples of standard book lists:

A Basic Collection for Scientific and Technical Libraries, compiled by E. B. Lunsford and T. J. Kopkin, Special Libraries Association, New York, 1975. (Has 2,400 annotated entries arranged by subject.)

British Scientific and Technical Reference Books: A Select and Annotated List, 1976; with 250 entries. (Published by the British Council, London, keeping in view the particular needs of overseas libraries).

Science and Technology: A Purchase Guide for Branch and Small Public Libraries, published annually by the Carnegie Library of Pittsburgh, Science and Technology Department, Pittsburgh, Pa. (This is a classified and annotated list of titles selected, for the student and the nonspecialist adult, from the books received in the library during the preceding year.)

Science for All: An Annotated Reading List for the Non-Specialist, 1964. (Prepared by the National Book League, London, in consultation with the British Association for the Advancement of Science.)

Special mention should be made of the *McGraw-Hill Basic Bibliography of Science and Technology* (1966). This is a companion volume to the *McGraw-Hill Encyclopedia of Science and Technology* and contains lists of books on some 7,000 subjects corresponding to the articles in the *Encyclopedia.* The books listed are aimed at students and general readers.

Bibliographic series issued periodically by libraries, societies, and research institutions are excellent sources of information on current publications. *Science Tracer Bullets* (issued by the Library of Congress, Science and Technology Division) and the *Bibliographical Series* of the Iron and Steel Institute in England are examples of current bibliographies of this type. A number of trade bibliographies, notably those published by the R. R. Bowker Company and the H. W. Wilson Company, are especially useful for bibliographic verification and acquisition. These include such well-known tools as *Cumulative Book Index, Books in Print, Scientific and Technical Books in Print,* and *American Scientific Books.* Books and other publications of societies are described in *Scientific, Engineering, and Medical Societies Publications in Print 1976–1977,* compiled by James M. Kyed and James M. Matarazzo (R. R. Bowker, New York, 1976).

Retrospective Bibliographies

An early bibliography of articles in the publications of scientific societies during the 18th century is the *Repertorium Commentationum a Societatibus Litterariis Editorum . . .*, compiled by Jeremias David Reuss (Henricum Dieterich, Gottingen, 1801–1821; reprinted in 1961 by B. Franklin, New York). This is a 16-volume work:

Volume 1, natural history; Volume 2, botany and mineralogy; Volume 3, chemistry; Volume 4, physics; and Volumes 10–16, science and medicine.

The National Library of Medicine has been responsible for a series of monumental retrospective bibliographies covering the early medical literature, including incunabula. *A Catalogue of Sixteenth Century Printed Books in the National Library of Medicine* (1967), compiled by Richard L. Darling, contains descriptions of over 4,800 imprints. Another bibliography, compiled by Dorothy M. Schullian, is entitled *A Catalogue of Incunabula and Manuscripts in the Army Medical Library* and was published in 1950. A supplement to both these bibliographies was issued in 1972: *A Catalogue of Incunabula and Sixteenth Century Printed Books in the National Library of Medicine: First Supplement, 1972*. This supplement, compiled by Peter Krivatsy, lists 27 incunabula and 272 books published during the 16th century.

Another retrospective bibliography covering early medical literature is a contribution from the Department of the History of Science and Medicine, Yale University: *American Medical Bibliography, 1639–1783*, compiled by Francisco Guerra (Lathrop C. Harper, New York, 1962). According to its subtitle, this is: "A chronological catalogue, and critical bibliographical study of books, pamphlets, broadsides, and articles in periodical publications relating to the medical sciences—medicine, surgery, pharmacy, dentistry, and veterinary medicine—printed in the present territory of the United States of America during British Dominion and the Revolutionary War." Material in this bibliography is arranged in three groups: (*a*) books, pamphlets, and broadsides; (*b*) almanacs; and (*c*) periodicals and magazines. The first two parts are arranged in chronological order, with an alphabetical index of authors and titles. The periodicals and magazines section is arranged alphabetically and is followed by a chronological conspectus.

A tremendous amount of studied effort by the National Research Council, the State Department, the New York Public Library, a special committee of book publishers, and many other groups and individuals resulted in what has been hailed as the first comprehensive national bibliography of American scientific literature (*245*): *Scientific, Medical and Technical Books, Published in the United States of America 1930–1944: A Selected List of Titles in Print with Annotations*. This bibliography, edited by R. R. Hawkins and published in 1946, listed 6,413 titles published in the years 1930–1944. Two supplements were issued. The first supplement, issued in 1950, covered literature published during the period 1945–1948; literature published during 1949–1952 was covered in the second supplement, issued in 1953. A second edition of the entire work—also edited by Hawkins, and prepared under the direction of the National Academy of Sciences–National Research Council's Committee on Bibliography of American Scientific and Technical Books—was published in 1958. "The purpose of this bibliographic series is to supply descriptions of the outstanding scientific, medical and technical books written by citizens of Canada and the United States of America, published in the United States of America, and available for both domestic and foreign distribution" (from the Preface to the second edition). The entries in this bibliography are arranged under subjects. A directory of publishers, an author index, and a subject index are also included.

A somewhat unusual bibliographic tool is a composite index to a large number of books: *Index to All Books on the Physical Sciences in English, 1967 through January 1974* (Marc 2 Research, Inc., Rockville, Md., 1974). This is an alphabetical subject index of over 200,000 terms providing subject access to about 22,000 monographs published during the years 1967–1974.

Published book catalogs of large libraries serve as valuable retrospective bibliographies. Printed catalogs of the John Crerar Library, Chicago; the Library of the Academy of Natural Sciences of Philadelphia; the Library of the Museum of Comparative Zoology, Harvard University; and the Engineering Societies Library, New York, are representative examples. All these and many similar catalogs of large libraries and special collections are published by G. K. Hall and Company of Boston, Massachusetts. The John Crerar Library catalog consists of the following three parts:

Author–Title Catalog, The John Crerar Library (Chicago), G. K. Hall, Boston, Mass., 1967 (599,000 cards; 28,554 pages; 35 volumes).

Classified Subject Catalog, The John Crerar Library (Chicago), G. K. Hall, Boston, Mass., 1967 (730,000 cards; 33,167 pages; 42 volumes, including subject index).

Subject Index to the Classified Subject Catalog, G. K. Hall, Boston, Mass., 1967 (47,000 entries; 610 pages; 1 volume).

The John Crerar Library is one of the major scientific, technical, and medical libraries in the world, with a collection of some 1,100,000 volumes and pamphlets including current and historical research materials in the pure and applied sciences. The collections, which include the holdings of the Illinois Institute of Technology, are of research strength in: the basic sciences, such as physics, chemistry, and biology; medicine, including anatomy, physiology, biochemistry, and pharmacology; agriculture, especially agricultural engineering and chemicals; and in technology, including all branches of engineering.

The Gray Herbarium Index (G. K. Hall, Boston, Mass., 1968) is a reproduction of a special index maintained at Harvard University. The index contains approximately 259,000 cards with single or multiple entries devoted to names and literature citations of newly described or established vascular plants of the Western Hemisphere. Literature from 1886 onward is covered. The printed index is a massive publication of 8,121 pages in 10 volumes. These two examples illustrate the scope and magnitude of published library catalogs that serve as comprehensive retrospective bibliographies.

Printed catalogs of private collections are also useful as retrospective bibliographies. These are typified by the *Catalog of Botanical Books in the Collection of Rachel McMasters Miller Hunt* (Carnegie–Mellon University, Pittsburgh, Pa., 1958–1961).

Other types of retrospective bibliographies include catalogs of books displayed in exhibitions and biobibliographies of scientists. *One Hundred Books Famous in Science,* based on an exhibition held at the Grolier Club and compiled by H. D. Horblitt (Grolier Club, New York, 1964), is an example of book exhibition catalogs. *A Bibliographical Checklist and Index to the Published Writings of Albert Einstein,* compiled by Nell Boni and others (Pageant Books, Paterson, N.J., 1960), and *A Bibliography of the Honourable Robert Boyle*, compiled by J. H. Fulton (Clarendon Press, Oxford, 1961), are typical of biobibliographies.

Special Subject Bibliographies

Most of the retrospective bibliographies discussed above are very broad in scope and encompass several or all branches of science, medicine, engineering, and technology. Numerous specialized bibliographies, limited in scope to one scientific discipline or subdiscipline, provide access to literature in specific subject areas. Only a few representative examples are listed here, in order to indicate the scope of such specialized bibliographies:

A Select Bibliography of Chemistry, 1492–1897, by Henry Carrington Bolton (The Smithsonian Institution, Washington, D.C., 1893): A supplement was published in 1899 to include the works omitted in the main volume and those published during the year 1897. A second supplement was brought out in 1904 to cover the books published during the years 1898–1902, both years inclusive. The bibliography is organized into eight sections: (*a*) bibliography, (*b*) dictionaries, (*c*) history, (*d*) biography, (*e*) chemistry, pure and applied, (*f*) alchemical literature in the 19th century, (*g*) periodicals, and (*h*) academic dissertations. "No attempt has been made to *index* books and periodicals, as this is accomplished in the *International Catalogue of Scientific Literature*, directed by the Royal Society, London, and that undertaking is not duplicated in the present work" (from the Preface to the second supplement).

A Bibliography of Birds with Special Reference to Anatomy, Behavior, Biochemistry, Embryology, Pathology, Physiology, Genetics, Ecology, Aviculture, Economic Ornithology, Poultry Culture, Evolution, and Related Subjects, by Reuben Myron Strong (Field Museum of Natural History, Chicago, 1939–1946), with 25,000 entries in three volumes: Volumes 1 and 2 comprise the author catalog; the third volume, published in 1946, is a subject index. The library in which the publication was found during verification is indicated at the end of each entry.

A Bibliography of Meteorites, by H. S. Brown (Chicago University Press, Chicago, 1953): The earliest entry in this bibliography dates back to 1491.

Parkinson's Disease and Related Disorders: Cumulative Bibliography, 1800–1970 (National Institute of Neurological Diseases and Stroke, Bethesda, Md., 1971): This is a three-volume work with over 2,000 pages.

Bibliography of Aeronautics (The Smithsonian Institution, Washington, D.C., 1910): Published as Volume 55 of the Smithsonian Miscellaneous Collections, this bibliography covered the materials published prior to 1909. On July 1, 1918, the United States Congress approved publication of a further series of bibliographies by the National Advisory Committee for Aeronautics. The *Bibliography of Aeronautics, 1909–1916*, covering the literature published from July 1, 1909, to December 31, 1916, was brought out in 1921. A further volume covering the literature of the period 1917–1919 was issued in 1922; this was followed by a series of volumes issued by the National Advisory Committee for Aeronautics (which subsequently became the present National Aeronautics and Space Administration) until 1932. In all these volumes, citations of the publications of all nations have been included in their original languages. The arrangement is in dictionary form, with author and subject entries interfiled in one alphabetical sequence.

Bibliographies of Bibliographies

Besides numerous separately published bibliographies and bibliographic serials of the type described above, a very large number of "hidden" bibliographies appear as parts of other documents such as books, dissertations, technical reports, and review articles. Because of the very large number and diversity of sources of bibliographies, some bibliographic control of bibliographies themselves is necessary. Compilation of bibliographies is a tedious and time-consuming endeavor, calling for a great deal of effort. In order to avoid unintended duplication of bibliographic effort, it is important for science bibliographers and users of scientific literature to be able to identify and use existing bibliographies. *A World Bibliography of Bibliographies and of Bibliographical Catalogues, Calendars, Abstracts, Digests, Indexes and the Like,* by Theodore Besterman, is a monumental work in five volumes, in which 117,187 bibliographies are listed under 15,829 subject headings in an alphabetical dictionary arrangement. The fourth edition of this retrospective bibliography of bibliographies was published in 1965/1966 by Societas Bibliographica, Lausanne.

Another retrospective bibliographic guide prepared by Besterman is: *Early Printed Books to the End of the Sixteenth Century: A Bibliography of Bibliographies* (2nd edition, Societas Bibliographica, Lausanne, 1961). Both these works are of very broad scope and cover bibliographies in all subjects.

The following retrospective bibliographies of bibliographies are available for tracing special subject bibliographies:

Bibliography of Bibliographies on Chemistry and Chemical Technology, 1900–1924, by Clarence J. West and D. D. Berolzheimer: This was published as Number 50 of the *Bulletin of the National Research Council* (March 1925). The entries are arranged in five parts: (*a*) general bibliographies, (*b*) abstract journals and yearbooks, (*c*) general indexes and serials, (*d*) bibliographies on special subjects, and (*e*) personal bibliographies. Two supplements, covering the periods 1925–1928 and 1929–1931, were issued as Numbers 71 and 86 of the *Bulletin* in 1929 and 1932, respectively. The National Research Council had earlier published two other bibliographies as special issues of its *Bulletin.* These were: *Catalogue of Published Bibliographies in Geology, 1896–1920,* by Edward B. Mathews *(Bull. National Research Council,* Number 36, 1923), and *Classified List of Published Bibliographies in Physics, 1910–1922,* by Karl K. Darrow *(Bull. National Research Council,* Number 47, 1924).

Other retrospective bibliographies are: *Physical Sciences: A Bibliography of Bibliographies,* by Theodore Besterman (Rowman and Littlefield, Totowa, N.J., 1971, 2 volumes); *World Bibliography of Agricultural Bibliographies,* by R. Lauche (BLV, Munich, 1964); and *Botanical Bibliographies: A Guide to Bibli-*

ographic Materials Applicable to Botany (Burgess, Minneapolis, Minn., 1970).

In addition, the *Bibliography of Scientific and Technical Bibliographies,* by M. Bloomfield et al. (Hughes Aircraft Co., Culver City, Calif., 1968), may be obtained as AD 676 797 and AD 676 798 from the National Technical Information Service, Springfield, Virginia. In the first part of this guide, 6,677 bibliographies are listed alphabetically by author/compiler/corporate source. The second part is a subject index to the bibliographies listed in the first part.

The above-mentioned bibliographic guides are especially useful for locating older bibliographies. For identifying current bibliographies and "hidden" bibliographies which appear as parts of other documents, the *Bibliographic Index* (H. W. Wilson, New York, 1945–) is a useful tool. First published in 1945 to cover the period 1937–1942, this index is now published three times a year and is cumulated annually. Bibliographies of more than 50 items appearing as parts of articles in a large number of scientific and technical journals and other documents are indexed in the *Bibliographic Index*. Other abstracting and indexing services such as *Chemical Abstracts* and *Physics Abstracts* also cover bibliographies; the latter has a separate index to bibliographies. Mention should be made of a series of 10 bibliographic essays published in a special issue of *Library Trends* (Vol. 15, No. 4, April 1967). These essays describe bibliographic tools for many branches of science, engineering, and medicine that have been published in many countries, including England, Germany, France, and the U.S.S.R.

ABSTRACTING SERVICES

Francis J. Witty has traced the development of indexing and abstracting from antiquity to the Middle Ages (*246*). Abstracts, summaries, and digests of documents have always been used as substitutes for full documents by scholars, scientists, and busy executives. According to Witty, a device similar in function to an abstract was first used "on some of the clay envelopes enclosing Mesopotamian cuneiform documents of the early second millennium B.C. The idea of the envelope of course, was to preserve the document from tampering; but to avoid having to break the solid cover, the document would either be written in full on the outside with the necessary signature seals, or it would be abstracted on the envelope accompanied likewise by the seals" (*247*). In the days of the great Alexandrian library, abstracts of plays and historical works were prepared for the benefit of scholars who found it difficult to read large numbers of papyrus rolls. Borko and Bernier have pointed out that written or oral abstracts of documents were used not only by scholars and scientists, but also by statesmen, rulers, and religious leaders in ancient and medieval times for private communication and current awareness (*248*). In the 17th century, the use of abstracts changed from a means of private communication to a system of public dissemination of information, but the function of the abstract remained the same: to facilitate the identification and selection of documents pertinent to one's field of inquiry, and in some cases, as a substitute for the full document.

In 1664 Sir Denis de Sallo, a counselor in the Court of Parliament in France, proposed a project to start a secondary journal. A royal privilege was signed on August 8, 1664, and the privilege was registered on December 30, 1664. The first abstracting journal, *Le Journal des scavans* [Journal of Learned Men] began publication in Paris on January 5, 1665. It was a weekly journal, edited by Denis de Sallo. The intent of the journal was, among other things, to inform the reader of what was new and significant in the fields of physics, chemistry, the other sciences, and the arts. The *Journal des scavans* inspired many similar publications in Europe during the 17th and 18th centuries. Many of these early secondary journals were the result of individual efforts, and they ceased when the prime mover lost interest or resources. Because of sustained support from the French Academy of Sciences, the *Journal des scavans* has survived through the centuries; it is still being published, as a primary journal entitled *Le Journal des savants.*

During the 19th century, many specialized abstracting journals began. Notable among these are: *Pharmaceutisches Central-Blatt* (1830–), *Engineering Index* (1884–), and *Science Abstracts* (1898–). The United States Patent Office started its weekly *Official Gazette* in 1872. The number of abstracting services has continued to increase in the 20th century. A few representative examples are: *Chemical Abstracts* (1907–), *Biological Abstracts* (1926–), *Mathematical Reviews* (1940–), *Bulletin signaletique* (1940–), *Excerpta Medica* (1947–), *Applied Mechanics Reviews* (1948–), *Analytical Abstracts* (1954–), *Referativnyi zhurnal* (1954–), *Excerpta Botanica* (1959–), *International Aerospace Abstracts* (1961–), and *Astronomy and Astrophysics Abstracts* (1969–). Both *Bulletin signaletique* and *Referativnyi zhurnal* are large, omnibus, abstracting services sponsored by the respective national governments. In the United States, there is no one centralized national bibliographic agency comparable to VINITI in the Soviet Union or the CNRS in France. Instead, a large number of abstracting services are published by commercial, academic, and governmental agencies and scholarly societies. The *Guide to the World's Abstracting and Indexing Services in Science and Technology,* prepared by the National Federation of Abstracting and Indexing Services in 1963, listed 1,885 abstracting and indexing services originating from some 40 countries. This directory is now out of date, and a new directory is in the process of being published by the NFAIS in collaboration with the International Federation for Documentation and the National Science Foundation. This new directory is expected to contain descriptions of approximately 2,500 abstracting and indexing services.

Besides an increase in the number of abstracting services, there have also been substantial increases in the number of items covered in each of these individual services. *Chemical Abstracts* provides a picture of continued growth from its inception in 1907. In 1976 it scanned over 13,000 journals and cited nearly one-half million documents. The rate of growth of *Chemical Abstracts* has been steadily increasing, as can be seen from Table 6. It took nearly 32 years (from 1907 to 1938) to produce the first million abstracts. The second million was reached in 1956 (18 years); the third million was reached after 7 years, in 1963; and the fourth million, in 1968 after 5 years. The fifth million took only 3 years; it was reached in 1971.

TABLE 6

Growth of *Chemical Abstracts*[a]

Year	Number of abstracts and citations	Cumulative total number of documents cited
1907	11,847	11,847
1915	18,981	175,622
1920	19,326	256,122
1925	27,097	379,726
1930	55,146	586,029
1940	53,680	1,206,377
1950	59,098	1,662,559
1960	134,255	2,613,069
1970	309,742	4,907,588
1973	356,549	5,993,290
1974	375,663	6,368,953
1975	454,245	6,823,198
1976	458,508	7,281,706

[a] See Ref. *249* for sources.

Because of their extensive coverage and wide scope, large abstracting services such as *Physics Abstracts*, *Chemical Abstracts*, and *Biological Abstracts* have become too large and too "general" to meet the needs of individual scientists specializing in very narrow branches of science. A noticeable trend in the last few decades has been the emergence of specialized abstracting services covering narrow subject areas: *Helminthological Abstracts* (1932–), *Apicultural Abstracts* (1950–), *Rheology Abstracts* (1958–), *Electroanalytical Abstracts* (1963–), *Journal of Current Laser Abstracts* (1967–), *Nucleic Acid Abstracts* (1971–), *Amino Acid Peptide and Protein Abstracts* (1972–), and so on. Abstracting services devoted to technical reports are also of recent origin. *Government Reports Announcements and Index* of the National Technical Information Service started as the *Bibliography of Scientific and Industrial Reports* in January 1946. *Scientific and Technical Aerospace Reports* of the National Aeronautics and Space Administration began in 1963.

Growing concern with sociotechnological issues such as environmental pollution and energy conservation has spurred an enormous output of literature in these areas in recent decades. Inevitably, this increase in the volume of interdisciplinary literature is accompanied by various bibliographic control tools. Notable among these are: *Pollution Abstracts* (1970–), *Air Pollution Abstracts* (1970–), *Water Pollution Abstracts* (1972–), *Abstracts on Health Effects of Environmental Pollutants* (1972–), and so on.

INDEXING SERVICES

The origin of alphabetical subject indexing has been traced back to antiquity (*250*). According to Francis Witty, the earliest approach to an alphabetic subject index appears in an anonymous work of the fifth century, the *Apothegmata,* a list of sayings of various Greek fathers on certain theological topics (*251*). An alphabetical approach to medicinal herbs was introduced in the early-sixth-century codex of the *Materia Medica* of Dioscorides Pedanius. Although alphabetical indexing was used throughout the Middle Ages (mainly in works on theology, philosophy, and law), indexing of scientific literature did not gain momentum until the 18th century when the scientific journal became firmly established as the favored medium for the dissemination of scientific information. A subject index to the publications of scientific societies during the 18th century was compiled by Jeremias David Reuss: *Reportorium Commentationum a Societatibus Litterariis Editorum* . . . (Henricum Dieterich, Gottingen, 1801–1821; reprinted in 1961 by B. Franklin, New York). This work, in 16 volumes, covers all branches of science, including natural history and medicine.

The Royal Society of London was responsible for two monumental indexes to the scientific literature of the 19th century and the early 20th century. The *Catalogue of Scientific Papers*, published in 19 volumes between 1866 and 1925, is an author index of articles in over 1,500 scientific periodicals of the 19th century (items from some European and American periodicals were covered). A subject index was published between 1908 and 1914, but this covers only mathematics, mechanics, and physics. Because of various problems, the project had to be discontinued after publishing only three of the projected 17 volumes (*252*). The *Catalogue of Scientific Papers* was continued by the *International Catalogue of Scientific Literature*, published by the Royal Society between the years 1902 and 1921 in 14 annual volumes, covering the scientific literature published during the period 1901–1914. This was an author and subject index to books and journal articles in all branches of science. This second monumental effort was also given up because of numerous organizational and economic problems, and because of the disruption caused by the First World War.

Zoological Record (1864–) and *Index Medicus* (1879–) are among the notable indexing services that began during the 19th century. The following are some of the numerous indexing services that began during the 20th century: *Applied Science and Technology Index* (supersedes, in part, *Industrial Arts Index*, 1913–1958), *Biological and Agricultural Index* (started in 1916 as *Agricultural Index*), *Bibliography of Agriculture* (1942–), *Air University Library Index to Military Periodicals* (1949–), *Science Citation Index* (1961–), *British Technology Index* (1962–), and *Pandex: Current Index to Scientific and Technical Literature* (1967–).

CHARACTERISTICS OF ABSTRACTING AND INDEXING SERVICES

Scope, Coverage, and Speed

The major function of abstracting and indexing services is twofold: (*a*) to facilitate retrospective literature searches and (*b*) to satisfy the current awareness needs of scientists. In order to facilitate comprehensive retrospective searches, a secondary journal should have the widest possible coverage; besides, the abstracting journal is also required to provide indexes for easy and rapid location of the desired abstracts. For a secondary journal to be an efficient current awareness tool, it is essential that the journal be produced with minimum delay so that scientists can use it to identify current literature of interest to them. It is apparent that comprehensiveness of coverage and speed of production are mutually incompatible characteristics, and that any attempt to improve one of them will tend to have an adverse effect on the other. Publishers of secondary services have attempted to tackle this anomalous situation in primarily two ways: (*a*) reducing the scope and coverage of the secondary service and (*b*) producing separate products to meet the retrospective and current awareness needs.

The scope of a secondary service refers to the subject area that it attempts to cover; its coverage refers to the exhaustivity with which primary literature within the chosen subject area is monitored. Expansion of the scope and coverage of a secondary service will improve its efficiency as a retrospective search device, but only at the cost of its efficiency as a current awareness tool, because of the greater delay involved in its production. Because of the enormous volume of scientific literature currently published, secondary services encompassing all branches of science and technology are becoming a rarity. *Applied Science and Technology Index* and *British Technology Index* are two examples of indexing services that attempt to cover all or most branches of science and technology. The coverage of these services is rather limited. The *Applied Science and Technology Index* covers fewer than 250 journals published in English, mostly in the United States. These journals are chosen by the subscribers themselves in a poll conducted periodically by the H. W. Wilson Company. The *British Technology Index* covers a similar number of journals, with a heavy emphasis on British publications. Considering the wide scope of these publications, their coverage is extremely limited. This is not to say that these two indexing services are of limited usefulness; because of the balanced and careful selection of primary journals monitored by them, both these indexing services are used very heavily in libraries.

A relatively recent multidisciplinary index with a broader coverage is *Pandex: Current Index to Scientific and Technical Literature* (CCM Information Services, New York, 1967–), which is published biweekly, with quarterly and annual cumulations. This is a computer-generated subject and author index and claims to cover 2,200 journals, 5,000 patents, 40,000 research reports, and 6,000 books annually. The index is also available on microfilm and microfiche.

Omnibus abstracting services such as *Referativnyi zhurnal* and *Bulletin signaletique* are not single publications but are "families" of large numbers of separate sections, each section being devoted to a specific branch of science or engineering. *Referativnyi zhurnal* is published in over 65 sections and *Bulletin signaletique* in some 50 sections; the sections are available separately.

When *Chemical Abstracts* began publication in 1907, it was a semimonthly publication, and each issue had fewer than a thousand abstracts. It was relatively easy for chemists to scan each issue of *Chemical Abstracts* for current awareness. With the increasing volume of chemical literature, the semimonthly issues of *Chemical Abstracts* became unmanageably large, and beginning in January 1967, the semimonthly issues were split into two parts, the first 34 sections being published as oddnumbered weekly issues, and sections 35 through 80 as even-numbered issues every alternate week.

Separation of the retrospective and current awareness functions of secondary services is a phenomenon that has become increasingly noticeable in the last few decades. The International Information System for the Physics and Engineering Communities (INSPEC) of the Institution of Electrical Engineers, London, is now publishing three current awareness services: *Current Papers in Physics*, *Current Papers in Electrical and Electronics Engineering*, and *Current Papers in Computers and Control*. These are primarily current awareness tools. The three abstract services of INSPEC, viz., *Physics Abstracts* (1898–), *Electrical and Electronics Abstracts* (1898–), and *Computer and Control Abstracts* (1966–)—collectively called *Science Abstracts*—serve primarily as retrospective search tools.

In 1960, when Chemical Abstracts Service was processing about 2½ million abstracts annually, it started publishing a separate biweekly alerting service called *Chemical Titles* to take over the current awareness function, leaving *Chemical Abstracts* to serve primarily as a tool for comprehensive retrospective literature search. *Chemical Titles* is basically a computer-generated keyword-in-context (KWIC) index to the titles of articles in some 700 journals in chemistry. Because of its smaller coverage and its amenability to computerized production with minimal human indexing effort, *Chemical Titles* appears with much less time-lag than the abstracting service and is thus more useful as a current awareness aid.

Faced with a rapidly growing volume of primary literature to be monitored, *Referativnyi zhurnal* responded similarly in 1966 by starting a separate series of current awareness journals. As the number of abstracts processed annually approached 1 million in 1966, the delay of 6 to 8 months in the publication of *Referativnyi zhurnal* necessitated a separate series of current awareness publications entitled *Express informatsii*. This is a series of over 70 separate sections that appear with an average delay of about 8 weeks. In general, indexing services are faster than abstracting services. The average time-lags of indexing in the *Applied Science and Technology Index* and the *British Technology Index* are 11 and 7 weeks, respectively.

Overlap and Gaps in Coverage

It is estimated that there are about 3,000 abstracting and indexing services published throughout the world; of these, about 2,000 services cover scientific and technical literature. These secondary services process about 8 million references annually; but the annual output of scientific and technical articles is about 2 million items. Nevertheless, all of these documents are not covered by the abstracting and indexing services. In practice, large numbers of documents are covered by several secondary services, and an indeterminate number of documents are not covered by any secondary journal. This twin problem of overlap and omission in the coverage of secondary services was observed by S. C. Bradford in 1937 (*253*). He noted that nearly two-thirds of scientific and technical papers were not covered in indexing and abstracting periodicals, while the remaining one-third of the papers were covered in several secondary periodicals. In a statistical test on abstracting journals carried out for Aslib, it was discovered that 46% of a sample of 1,634 references were abstracted more than once, and 27% were not covered by any abstracting journal (*254*). In a further study of 3,420 references by John Martyn, it was discovered that 47% of the references were covered more than once, 32% were covered only once, and 21% were not covered by any of the six abstracting services studied (*255*). In the same study it was also found that 22% of the literature on biological control of insects, pests, and weeds was covered in four abstracting journals.

One possible reason for such overlap in abstracting could be that each abstracting journal prepares a slanted abstract, keeping in view the particular needs of its clientele. The Commonwealth Agricultural Bureaux often prepares three or four slanted abstracts of the same paper emphasizing different aspects, for publication in its various abstracting journals. But this intentional multiple abstracting is an extremely rare phenomenon, and it is not the cause of overlapping coverage of abstracting services. In the Aslib study mentioned above, John Martyn found little evidence of genuine slanting of abstracts. Most of the secondary services use the author's abstract that appears with the journal article. The American Society of Civil Engineers (ASCE) receives 99% of its abstracts from authors for the *ASCE Publications Abstracts* (*256*). Original abstracting is done only when the author's abstract is either unavailable or unsatisfactory. Hence, overlap in abstracting may be attributable to overlap in the lists of journal titles monitored by the secondary services.

Another investigation was undertaken by Wood, Flanagan, and Kennedy to study the overlap of journal titles monitored and journal articles actually abstracted by the Biosciences Information Service of Biological Abstracts (BIOSIS), the Chemical Abstracts Service, and *Engineering Index*. Of the 14,592 different journals monitored, 1% were monitored by all three services, 27% were monitored by two of the three services, and 72% were monitored by only one of the services (*257*). In a sample of 29,182 articles drawn from the journals covered by all three services, a maximum of only 822 articles could have been abstracted in all three abstracting services (*258*). It was felt that the number of occurrences of all three services having selected the same article for abstracting and indexing was not great enough to warrant concern.

A massive investigation was conducted recently by the National Federation of Abstracting and Indexing Services with financial support from the National Science Foundation to study the coverage overlap among 14 major science abstracting services (*259*). Of the approximately 26,000 journals covered by at least one of the 14 services studied, one or more articles from the 1973 issues of 5,466 journals were covered by two or more services; the articles selected by the services from each journal were not necessarily the same. The 5,466 journals were then studied to estimate the actual overlap at the individual article level. It was found that 23.4% of those articles abstracted or indexed by any of the secondary services from the 5,466 journals were covered by at least two of the services.

Multiple coverage of the same paper in several secondary services is in itself not an undesirable process; it ensures that articles of peripheral interest are not overlooked by scientists using any of the secondary services. What is undesirable is the avoidable duplication of intellectual effort involved in repeated indexing and abstracting of the same documents by several secondary services. A solution to this situation lies in the use of authors' abstracts and the exchange of surrogates by secondary services. While most secondary services use authors' abstracts whenever these are available, exchange of surrogates is not practiced widely because of administrative and technical problems and lack of standardization.

In at least two instances, extensive duplication of coverage has triggered major changes. In 1967 it was noticed that there was about 80% overlap in the coverage of the *Review of Metal Literature* of the American Society for Metals and the *Metallurgical Abstracts* of the Institute of Metals. The two societies then integrated their secondary services and started a new set of publications entitled *Metals Abstracts* and *Metals Abstracts Index*, published jointly by the two societies since 1968. More recently, *Nuclear Science Abstracts* was discontinued in June 1976 because of the substantial duplication of its contents in *Atomindex*, which is published by the International Nuclear Information System.

The problem of omission of coverage is more serious than that of overlap in the coverage of secondary services. In the Aslib study referred to above, 21% of the 3,420 references were not covered by any of the abstracting journals studied. According to one estimate made in 1962, less than a quarter of the published literature in biology was actually abstracted and indexed in secondary journals. The coverage of secondary services is often influenced by geographic and linguistic predilections. *Applied Science and Technology Index* covers only English-language journals, mostly those published in the United States. The time and expenses required for indexing and abstracting foreign-language material are deterrents to the coverage of such material in English-language secondary services. Also, expanded coverage of secondary services tends to increase production delays and costs, which in turn tend to decrease the number of subscribers. Thus, owing to economic limitations as well as geographic and linguistic barriers, an indeterminate quantity of primary literature remains unnoticed in secondary services.

Indexes to Abstracts

It has been said that a collection of abstracts is only as good as its indexes. Most abstracting services arrange the abstracts under broad subject categories or according to a subject classification scheme. In order to provide a subject approach to abstracts at a more specific level than the broad subject categories under which the abstracts are usually grouped, it is necessary to have a specific subject index. Besides this specific subject approach, additional access points (e.g., by author's name, patent number, or report number) are also required to facilitate identification of abstracts pertinent to a given inquiry. In *Chemical Abstracts*, for example, the abstracts are grouped under 80 broad sections (e.g., general biochemistry, enzymes, immunochemistry, physical organic chemistry, general physical chemistry, electric phenomena, and inorganic analytical chemistry). These broad section headings are not further subdivided into more specific subheadings, with the result that hundreds of abstracts appear in each of these sections in the weekly issues. Each issue of *Chemical Abstracts* carries a keyword index that provides a specific subject access to the abstracts; three additional indexes, viz., numerical patent index, patent concordance, and an author index, provide alternative approaches to the abstracts.

While indexing is necessary in order to provide alternative and additional access points to the abstracts in an abstracting journal, periodical cumulation of the indexes is also important to facilitate retrospective literature searches over extended periods of time. One of the recommendations of the Royal Society Scientific Information Conference of 1948 was that abstract publications should issue a consolidated subject index at least once in every 10 years. At the end of each volume, in June and December each year, *Chemical Abstracts* provides the following volume indexes: General Subject Index, Specific Substance Index, Numerical Patent Index, Patent Concordance, Author Index, Molecular Formula Index, and Hetero-Atom-in-Context Index. The patent and author indexes for the volume are simple cumulations of those appearing in the weekly issues, but the subject indexes are not simple cumulations of the weekly keyword indexes. The general subject index and the specific substance index appearing at the end of each volume are more complete and systematically prepared indexes, based on a controlled vocabulary. The various cumulative volume indexes are very specialized in nature; they are described in the *Chemical Abstracts Index Guide* and its supplements. For retrospective searches spanning over several volumes of *Chemical Abstracts*, the collective indexes are useful. From 1907 through 1956, these were decennial indexes; starting from 1957 the collective indexes have been published quinquennially. The eighth collective index to *Chemical Abstracts*, covering the years 1967–1971, is a massive publication of over 75,000 pages in 35 volumes. The ninth collective index, for the 5-year period 1972–1976, is expected to be 60% larger than the previous collective index.

Abstracts of technical reports in the *Government Reports Announcements and Index* of the National Technical Information Service are arranged under 22 major subject fields, and each field is further broken down into a number of subfields. These subject fields were endorsed by the Committee on Scientific and Technical Information (COSATI) of the Federal Council for Science and Technology in 1964. To provide alternative approaches to the abstracts, each issue of *Government Reports Announcements and Index* contains the following five indexes:

1. Subject Index
2. Personal Author Index
3. Corporate Author Index
4. Contract or Grant Number Index
5. Accession/Report Number Index

Annual cumulations of these indexes are published separately by the National Technical Information Service.

The *Scientific and Technical Aerospace Reports* (STAR) of NASA and the *In-*

ternational Aerospace Abstracts of the American Institute of Aeronautics and Astronautics both use a common scheme of 10 major subject divisions and 75 specific subject categories for arranging abstracts. The abstracts in STAR are indexed by subject, personal author, corporate source, contract number, and report/accession number; those in the *International Aerospace Abstracts* are indexed by subject, personal author, contract number, meeting paper and report number, and accession number. The coverage of STAR is mainly limited to technical reports and patents; journal articles, conference papers, and other forms of literature are covered in the *International Aerospace Abstracts.*

Provision of a subject index to abstracts is even more essential in those secondary services that use a classification scheme such as the Universal Decimal Classification. Mention should be made of *Physics Abstracts*, in which the abstracts are arranged according to a special classification scheme for physics and astronomy. Each semimonthly issue of *Physics Abstracts* has the following indexes:

1. Subject Index
2. Author Index
3. Bibliography Index
4. Book Index
5. Conference Index
6. Corporate Author Index

The subject index in each issue of *Physics Abstracts* is an abbreviated alphabetical index to the classes in the classification scheme. A detailed cumulated subject index to the individual abstracts is published separately twice a year, covering the periods January–June and July–December.

The frequency of cumulation of indexes varies considerably among individual abstracting services. Annual cumulations are most common. Cumulations covering a longer time span (5 or 10 years, as in the case of *Chemical Abstracts* indexes) are more useful for retrospective searches as they minimize the number of separate indexes to be scanned. In the case of most abstracting services, only the indexes are cumulated at various intervals. *Engineering Index* is a unique example in which the entire publication, including the abstracts, is cumulated annually. The *Engineering Index Monthly* issues may be discarded when the annual cumulated edition is received.

Some indexing services (e.g., the *Applied Science and Technology Index* and the *British Technology Index*) also cumulate periodically. The monthly issues of these indexes may be used as current awareness tools, and these may be discarded upon arrival of the annual cumulated volumes, which are more useful for retrospective search.

Various types of indexes are provided in abstracting services, depending upon the nature of the material abstracted. Abstracts of technical reports call for a corporate source index and a report/accession number index, as in the case of the abstracting services of NASA and NTIS. The *Official Gazette* of the United States Patent Office provides a subject matter index and an index to inventors and assignees of patents. *Biological Abstracts* contains a number of specialized indexes particularly suitable for biological literature. These include: a generic index and a biosystematic index, which are especially appropriate for searching by taxonomic categories; a concept index (formerly called computer rearrangement of subject specialities, or CROSS, index); and a KWIC index to document titles augmented with appropriate additional keywords.

The depth and the quality of indexes vary widely in abstracting services. In his tests on abstract journals, John Martyn observed many inconsistencies in the subject indexes to abstracts, and he concluded:

> . . . if 80 per cent of the coverage of the particular topic on which the information required be available from one abstracting and indexing service, the searcher is unlikely to be able to find more than three-quarters of this *via* the subject indexes, and he is unlikely to be able to find more than half without the exercise of considerable ingenuity or a good knowledge of the subject (*260*).

GUIDES TO LITERATURE

The literature of science and technology is an intricate, and often bewildering, maze in which it is difficult to locate recorded information on any given specific subject. The difficulty of bibliographic access is due to the diversity of languages, formats, and media in which the information may be recorded, and as discussed earlier, to the growing number of published and unpublished records. It is this difficulty that prompted Frank T. Sisco to remark, in frustration, that "if a research job costs less than $100,000 it is cheaper for us to do it than to find out if it has been done before and is reported in the literature" (*261*). This remark was made in 1957, when the bibliographic control apparatus for scientific and technical literature was not as well organized and developed as at present. For one thing, electronic digitial computers were still in the early stages of development, and their application to bibliographic information storage and retrieval had barely begun. In recent decades, the volume of secondary literature has been rapidly growing in order to keep pace with the growth of primary literature. A stage has now been reached when "tertiary" bibliographic devices have become necessary to keep track of the growing volume of secondary literature. In response to this need, a number of guides to the literature of science and technology are being published (a list of these is included in the Bibliography under "Guides to Literature"). These guides are not bibliographies or indexing services; they are tertiary bibliographic devices that are designed as aids in the use of scientific literature. They identify the surrogated secondary sources (e.g., bibliographies and indexes) that may be used for current awareness or retrospective searching, and also the repackaged and condensed secondary sources (e.g., directories, reviews, and encyclopedias) that are useful for answering specific reference questions and for background reading.

Two classical guides extensively used in libraries are A. J. Walford's *Guide to Reference Materials* (3rd edition, The Library Association, London, 1973) and Constance M. Winchell's *Guide to Reference Books* (8th edition, American Library Association, Chicago, 1967). Eugene Paul Sheehy's *Guide to Reference Books* (9th edition, American Library Association, Chicago, 1975) is an expanded and updated version of Winchell's *Guide* and its supplements. Although these are general guides to the literature of all branches of knowledge, they are nevertheless extremely useful in "getting into" scientific literature. Volume 1 of Walford's *Guide* is entirely dedicated to science and technology.

Besides identifying and describing secondary services and reference works, some guides include chapters on the principles and procedures of literature survey, hints on how to use the library, and practice exercises for students of scientific literature. *Literature Sources for Chemical Process Industries* (Advances in Chemistry Series, No. 10, American Chemical Society, Washington, D.C., 1945) has two very instructive chapters on the principles of literature searching (*262, 263*). R. T. Bottle's *The Use of Chemical Literature* (2nd edition, Butterworths, London, 1969) and M. G. Mellon's *Chemical Publications: Their Nature and Use* (4th edition, McGraw-Hill, New York, 1965) contain hints on the use of bibliographic tools in libraries and practical exercises useful to students of chemical literature. Solutions to the exercises are also provided in Bottle's book.

Grogan has identified two types of guides to literature: the "textbook" type and the "reference book" type. In the textbook type of guide, the emphasis is on the exposition of various forms of literature and search procedures rather than on comprehensive listing of individual works. Bernard Houghton's *Mechanical Engineering: The Sources of Information* (Clive Bingley, London, 1970) is not intended as a "bibliography of mechanical engineering literature or as a listing of titles, but as a map to help the engineer find his way through the varying forms of literature" (from the Introduction, p. 7). The reference book type of guide is designed as a working tool for the reference librarian and the bibliographer, and it aims at comprehensiveness. An example of this type is *Sources of Information on the Rubber, Plastics and Allied Industries*, by E. R. Yescombe (Pergamon Press, New York, 1968), in which "every effort has been made to include all important sources" (p. ix).

Guides to literature are published by professional societies and library associations as well as by commercial publishers. *Literature of Chemical Technology* (Advances in Chemistry Series, No. 78, American Chemical Society, Washington, D.C., 1968) is one of a series of guides to literature published by the American Chemical Society. The American Society for Engineering Education (ASEE) has put out a number of short guides to literature. *Guide to Literature on Metals and Metallurgical Engineering* (1970) and *Guide to Literature on Mining and Mineral Resources Engineering* (1972) are two examples; both these guides were compiled by Virginia Lee Wilcox. The ASEE guides are short lists of reference books, secondary journals, and bibliographies, without annotations. The Special Libraries Association has published several bibliographies and guides, including *Guide to Metallurgical Information*, by Eleanor B. Gibson and Elizabeth W. Tapia (2nd edition, 1965).

How to Find Out About the Chemical Industry, by Russell Brown and G. A. Campbell (1969), and *How to Find Out in Iron and Steel*, by D. White (1970), are two publications in a series of guides to literature published by Pergamon Press. The Management Information Guides of Gale Research Company are a set of guides including such titles as *Textile Industry Information Resources* (Management Information Guide No. 4, 1964) and *Computer and Information Processing Information Sources* (Management Information Guide No. 15, 1969).

There is considerable variety in the scope of the guides to literature. Some attempt to cover all branches of science and engineering: Volume 1 of A. J. Walford's *Guide to Reference Materials*, mentioned earlier, and *Science and Engineering Literature: A Guide to Reference Sources*, by Harold R. Malinowsky and others (2nd edition, Libraries Unlimited, Littleton, Colo., 1976), are examples of this type. But most guides are limited to the literature of one discipline, for example: *Use of Physics Literature*, by Herbert Coblans (Butterworths, London, 1975).

Guides to literature may also appear as journal articles, conference proceedings, catalogs of holdings of individual libraries, encyclopedia articles, or chapters in handbooks. The following are a few examples that illustrate the diverse sources of "hidden" guides to literature:

1. *How to Obtain Information in Different Fields of Science and Technology: A User's Guide* (AGARD–LS–69, 1974): This is a collection of papers presented at a NATO conference.
2. "Current Reference Materials for the Physical Sciences" is an article by Raphaella Kingsbury in *Special Libraries* (Vol. 63, No. 9, September 1972, pp. 394–399).
3. "Environmental Update: A Review of Environmental Literature and Developments" is a regular feature published in *Library Journal* in May each year.
4. "Metallurgical Libraries and Literature," by Carol Mulvaney (*Encyclopedia of Library and Information Science*, Vol. 17, pp. 464–472, 1976), is one of a number of similar articles in this encyclopedia.
5. "Literature of Chemistry and Chemical Technology" is a two-part article in the *Kirk–Othmer Encyclopedia of Chemical Technology* (2nd edition, Vol. 12, pp. 500–528).

Abstracting and indexing services, reviews in journals, and other book selection aids may be used for identifying guides to literature. The following bibliographies and guides are useful in locating guides to literature:

American Reference Books Annual, Libraries Unlimited, Littleton, Colo., 1970–.

Best Reference Books: Titles of Lasting Value Selected from American Reference Books Annual, 1970–1976, Libraries Unlimited, Littleton, Colo., 1976.

R. W. Burns, "Literature Resources for the Sciences and Technologies: A Bibliographical Guide," *Special Lib.*, **53**, 262–271 (1962).

Readers Advisory Service: Selected Topical Booklists, Science Associates International, New York, 1973–. (This is a series of subject bibliographies and guides to literature prepared by professional societies, libraries, and research centers. Approximately 75 guides and bibliographies are issued annually.)

Reference Books in Paperback: An Annotated Guide, 2nd ed., Libraries Unlimited, Littleton, Colo., 1976.

Gertrude Schutze, *Bibliography of Guides to the Literature of Science, Technology, Medicine*, The author, New York, 1958; Supplements, 1963 and 1967.

General guides to literature (including those by Walford and Sheehy) and reviews in journals (e.g., *Choice*, *Library Journal*, *RQ*, and *Reference Services Review*) are also important sources of information on guides to literature.

Current Trends and Prospects

The exploitation of scientific and technical information for advancements in the economic and industrial sectors, national defense, transportation, pollution control, education, and related sociotechnical issues has become a major national concern in most countries. Significant advances have been made in the technological and organizational aspects of the generation, bibliographic control, dissemination, and utilization of scientific and technical information. So numerous and diverse are the plans, projects, and systems that are being designed and implemented at international, national, and local levels that it is futile to attempt a comprehensive and coherent account of these developments. Undoubtedly, the most important single force that has touched almost every aspect of scientific and technical communication is the electronic computer. The computer has not only added new dimensions to the very process of research, it has also enhanced by several orders of magnitude both the speed of data processing and the volume of data that can be manipulated in the communication of scientific information. The computer has made possible alternative modes of primary publishing, besides speeding up the traditional modes of publishing research results. The editorial processing center and the "electronic journal" have been discussed in an earlier section. Three other major trends that are readily discernible are: (*a*) integration of primary and secondary publishing and the development of integrated information systems; (*b*) structural and procedural changes in the bibliographic control of scientific and technical literature; and (*c*) increasing international cooperation in scientific and technical communication, more particularly in the bibliographic control and dissemination of scientific and technical information. It is easy to see that these are interrelated phenomena rendered possible by the recent developments in the technology of information storage and distribution. Optical character recognition (OCR), video-display terminals for on-line composition and editing, computer-output micrographics (COM), computerized data processing, and on-line information retrieval systems are only some of the developments that have added new dimensions to the total process of scientific and technical communication in recent years.

INTEGRATION OF PRIMARY AND SECONDARY PUBLISHING

For some years now, both the American Chemical Society and the American Institute of Physics have been attempting the integration of primary and secondary publishing processes. Traditionally, the production of secondary journals has been a separate process, sequentially following the production of primary journals. The separate production processes have involved: (*a*) considerable duplication of clerical and intellectual effort and (*b*) a long delay between the publication of primary literature and that of its surrogates in secondary journals. The integration of primary and secondary journal production is based on two concepts: First, secondary information (e.g., index entries, abstracts) about research articles can be generated as a by-product of and concurrently with the primary journal publication process. Second, converting the edited and indexed manuscript into machine-readable format early in the production process facilitates manipulation of the material for generating, simultaneously or in rapid succession, a variety of products including the primary journal, separates or offprints of articles, current awareness services, and retrospective search tools. A secondary data base containing abstracts and/or indexes may also be generated and marketed to libraries, information centers, and data base vendors. Such an integrated production of a variety of primary and secondary products from a single input process holds promise of considerable savings in time and in intellectual and clerical effort. The American Institute of Physics—which publishes a large number of primary journals and some secondary services including the SPIN (Searchable Physics Information Notices) data base—has been rigorously pursuing experimental and developmental work in this direction (*135*).

The American Chemical Society has been experimenting with the integrated production of primary and secondary journals through an interlinked manuscript-processing system in which two tasks proceed simultaneously: the editing of a manuscript for publication in a primary journal (e.g., the *Journal of Organic Chemistry*) and the assignment of index entries (including registry numbers for new chemical compounds). Early indications are that such an approach can significantly lower the costs of production and eliminate much redundant editorial processing effort (*13, 264*).

A similar integrated approach is being tried by a team of researchers at the University of California, Los Angeles, to expedite the production of books with indexes by treating index preparation as an integral part of a computerized text-processing system (*265*).

COMPUTER-BASED BIBLIOGRAPHIC CONTROL SYSTEMS

The advent of the electronic digital computer has had a very profound influence on secondary services. The use of computers has not only greatly speeded up the production of abstracting and indexing services, it has made possible the creation of large, integrated information systems that can generate a variety of products and services from a central data base. Interactive on-line searching of data bases has become a common practice in the bibliographic control of scientific literature. The best-known examples of large-scale computerized bibliographic control systems are the Chemical Abstracts Service of the American Chemical Society and MEDLARS (Medical Literature Analysis and Retrieval System), of the National Library of Medicine. A large body of published literature exists on these and other similar systems.

Index Medicus, which has been in existence since 1879, was computerized in 1964 (when it was ripe for mechanization, having some 13,000 citations per month). This has become one of the largest computerized systems, with a variety of spin-off products such as: the *Bibliography of Medical Reviews* (monthly); *Toxicity Bibliog-*

raphy (quarterly); TOXLINE, which is an on-line version of *Toxicity Bibliography*; and MEDLINE (MEDLARS On-line), the most widely used on-line bibliographic reference retrieval system. At the present time, the computer is used to automate and expedite predominantly clerical tasks such as sorting, alphabetizing, collating, composing for printing, and generating permuted title word indexes. The intellectual tasks of subject analysis and assignment of index terms are still very much a human endeavor, although a great deal of experimental work on automatic indexing has been going on.

Computer-based methods of chemical information handling at Chemical Abstracts Service began in the late 1950s when the postwar spurt of research and development activities resulted in a rising tide of scientific and technical literature. The traditional methods of producing and publishing abstracting and indexing services became very time consuming and uneconomical, and mechanization became imperative in order to minimize the delay and expenditure involved in the production of secondary services. In the traditional, manual methods of producing secondary services, human effort is involved in: (*a*) the intellectual tasks of analyzing the primary documents, preparing abstracts, and assigning index terms; and (*b*) the clerical tasks of organizing and arranging the material for publication or duplicating and of keeping track of the individual records in several processing streams, each leading to the production of one publication or service. With financial aid from the National Science Foundation, the National Institutes of Health, and the Department of Health, the Chemical Abstracts Service has been developing a fully integrated secondary information system for the production of a variety of secondary services. In the computer-based system that is now emerging, the products of subject analysis and surrogation—viz., bibliographic citations, index entries, and abstracts—are all recorded on a machine-readable data base early in the production process. A variety of bibliographic packages can then be produced by extracting the appropriate records from the master file, repackaging the data elements in any desired format, and photocomposing the product for conversion into offset printing plates. All these clerical tasks are accomplished largely through the computer. In the Chemical Abstracts Service, the data base called Chemical Condensates is available for on-line searching. Some of the many derivative products generated from the master file are: *Chemical–Biological Activities* (CBAC), which parallels eight sections of *Chemical Abstracts* covering the literature on the interactions of chemical substances with biological systems; and *Polymer Science and Technology—Patents* (POST-P) and *Polymer Science and Technology—Journals* (POST-J), which parallel the macromolecular chemistry sections of *Chemical Abstracts*. Besides the generation of these and other spin-off products, the production of the various indexes to *Chemical Abstracts* is also computerized. General subject index entries, molecular formulas, and registry numbers of chemical compounds are ordered and merged by computer programs to produce the semiannual and 5-year collective general subject indexes, the chemical substances indexes, and the molecular formula indexes.

The chief advantages of computerizing the chemical information system of Chemical Abstracts Service are claimed to be: savings in the costs of personnel directly involved in producing *Chemical Abstracts* and its indexes, a decrease in the average cost of processing a document, and more economical and faster production of indexes. The semiannual volume indexes can now be issued within 6 months or less after the completion of a volume of abstracts; this time-lag was as much as 20 months in the late 1950s. The eighth collective index, which was the first to be produced after the system was computerized, was completed within 22 months of the end of the collective period (1967–1971); nearly 4 years had been required to produce the much smaller seventh collective index manually. Besides general gains in productivity, efficiency, and speed, additional revenues can be expected from the sale of machine-readable data bases either directly to customers or to information dissemination agencies such as the System Development Corporation.

ON-LINE ACCESS TO SCIENTIFIC LITERATURE

A direct consequence of the application of computers to information processing has been the availability of a large number of bibliographic data bases for information retrieval. Bibliographic data bases are produced by national libraries, scholarly societies, mission-oriented government agencies, and commercial enterprises. In the United States, all three national libraries produce bibliographic data bases. The MARC (Machine Readable Catalog) data base of the Library of Congress is used widely for catalog card generation, literature search, and selective dissemination of information. The weekly MARC tape service is available on a subscription basis. The National Agricultural Library produces the CAIN (Cataloging and Indexing) data base. The *Bibliography of Agriculture* is produced from CAIN. The MEDLARS and MEDLINE data bases of the National Library of Medicine are used extensively for disseminating biomedical bibliographic information. *Chemical Condensates*, of the Chemical Abstracts Service of the American Chemical Society; and SPIN (Searchable Physics Information Notices), of the American Institute of Physics, are examples of data bases produced by scholarly societies. Mission-oriented government agencies such as NASA (National Aeronautics and Space Administration) and NTIS (National Technical Information Service) also produce machine-readable bibliographic data bases. COMPENDEX (Computerized Engineering Index), produced by Engineering Index, Inc., and the uniterm index to United States chemical patents produced by IFI/Plenum Data Corporation are two examples of data bases generated by commercial concerns. The *Science Citation Index* of the Institute for Scientific Information is also available on magnetic tape. Over 300 bibliographic data bases are now available in all branches of science and technology; about one-half of these are available for interactive online access through terminals. Detailed information on bibliographic data bases can be obtained from the following directories:

Kenneth D. Carroll, *Survey of Scientific and Technical Tape Services*, American Institute of Physics, New York, 1970.

Ruth Finer, *A Guide to Selected Computer-Based Information Services*, Aslib, London, 1972.

Guide to a Selection of Computer-Based Science and Technology Reference Services in the USA, American Library Association, Reference Division, Chicago, 1969.

S. Herner and M. J. Vellucci, *Selected Federal Computer-Based Information Systems*, Information Resources Press, Washington, D.C., 1972.

A. T. Kruzas et al., *Encyclopedia of Information Systems and Services*, 2nd ed., Edwards Brothers, Ann Arbor, Mich., 1974.

Survey of Commercially Available Computer-Readable Bibliographic Databases, American Society for Information Science, Washington, D.C., 1973.

Machine-readable bibliographic data bases contain large volumes of surrogate data and are frequently updated. They can be manipulated by electronic digital computers at very high speeds. In large systems, as many as 30 or 40 searches on different search profiles may be conducted simultaneously. In time-shared computer systems, a number of remote users can access and use the data base simultaneously for interactive searching and scanning. Data bases are useful in conducting on-demand retrospective literature searches using complex search logic. Selective dissemination of information (SDI) is also possible as a continuing service for selectively and expeditiously disseminating bibliographic information on recent literature to research and development workers and managers.

However, there are a few problems associated with machine-readable bibliographic data bases. Data bases are very expensive, and many small and medium-sized libraries cannot afford to acquire them. The 1977 volume of COMPENDEX cost $6,900 if leased for in-house use only, and $7,400 plus royalties if used for providing literature search service for a fee. In either case, there was an additional charge of $300 to be paid toward the cost of 12 magnetic tapes for the monthly updates. Access to an appropriate computer facility, software, peripheral equipment, and trained personnel are other requirements.

One of the biggest problems is the multiplicity of formats, coding schemes, and access languages used by the producers of bibliographic data bases. The American National Standards Institute has developed a standard (ANSI Z39.2-1971) for bibliographic information interchange on magnetic tape. The Technical Committee on Documentation of the International Organization for Standardization has produced a standard (ISO/TC 46) for the general form of bibliographic recording on magnetic tape (*266*). The National Federation of Abstracting and Indexing Services is concerned with the development of standards for bibliographic data bases. The federation has produced a document entitled *Data Element Definitions for Secondary Services*; this is useful in specifying bibliographic descriptions on magnetic tape.

While attempts are being made by all concerned to combat the problems of high cost of acquisition and the multiplicity of formats, codes, and access languages of data bases, a new solution seems to be emerging. A new type of agency, commonly known as the information dissemination center (IDC), has recently come into existence. The main function of the IDC is to act as an intermediary among the growing number of data base producers, on the one side, and the numerous libraries and information centers, on the other. The IDC acquires data bases from many sources, reduces them to a common format or develops a common search language, and (with the help of specialized telecommunication agencies) provides "retail outlets" to small users of data bases. Thus, small libraries that cannot afford expensive computer facilities and specialist personnel can still access many data bases in an on-line mode through inexpensive terminals, without having to worry about the problems mentioned above. At present, three major data base vendors—viz., System Development Corporation (ORBIT System), Lockheed Missile and Space Company (DIALOG System), and Bibliographic Retrieval Services—are providing on-line access to about 60 data bases in the United States and in some European countries. The advent of information dissemination centers is a very recent development that will undoubtedly have a far-reaching impact on the accessibility of scientific literature.

SCIENCE INFORMATION: A GLOBAL CONCERN

Large-scale computerization of bibliographic control systems has opened up the possibility of interagency cooperation at both national and international levels. At the national level, the large information systems from both the private and the public sectors are gradually moving toward a concerted effort to promote more efficient bibliographic control and dissemination of scientific literature. The Chemical Abstracts Service (CAS), for example, is participating in many joint projects with other information systems: It provides the chemical substances registry data to the United States Environmental Protection Agency and to the National Institute of Neurological and Communicable Diseases and Stroke; supplies data in machine-readable form to support the National Library of Medicine's TOXLINE and CHEMLINE information retrieval systems; operates the National Cancer Institute's Drug Research and Development Chemical Information System; and is exploring possibilities of cooperating with BIOSIS in covering the literature of taxonomy and chemical substance identification.

At the international level, Chemical Abstracts Service has concluded agreements with West Germany's Internationale Dokumentationsgesselschaft für Chemie and with the Chemical Society, London. Both these organizations pay a share of the cost of producing the Chemical Abstracts Service data base, and they have unrestricted right to use the data base and the exclusive right to market all CAS products in their respective nations. In addition, the Chemical Society, London, prepares abstracts and index entries for papers and patents originating from the United Kingdom, and it transmits the surrogate records to CAS in machine-readable form for input to the CAS data base. The national chemical information systems of West Germany, Switzerland, and France are also using the registry structure files and other computer-readable products of CAS (*267*). Similar cooperative arrangements exist between the Institute of Electrical and Electronics Engineers, New York, and the Institution of Electrical Engineers, London, in the production and distribution of the products of INSPEC (International Information System for the Physics and Engineering Communities).

Another noteworthy example of direct international cooperation is the integrated publication of *Metals Abstracts* and *Metals Abstracts Index*, produced jointly by the American Society for Metals and the Institute of Metals, U.K., as noted in an earlier section. Avoidance of wasteful duplication by pooling resources to create a strong, unified product was the dominant consideration that led to this international cooperative venture.

The International Nuclear Information System (INIS) is a multinational cooperative venture for the bibliographic control of the literature of nuclear science and technology. INIS was created by the International Atomic Energy Agency (IAEA), Vienna, in 1969 "to improve and expedite the exchange of scientific and technical information between IAEA member states on the basis of multilateral cooperation, and to eliminate the overlapping and duplication in the processing of literature." A master file is created by the INIS from the input received from the member states, and this file forms the basis for a number of products and services, including the abstracting journal *Atomindex* (*268*). The United States Energy Research and Development Administration (ERDA) also sends abstracts and indexes of atomic energy literature to the INIS data base. In order to prevent unnecessary duplication, ERDA discontinued the publication of *Nuclear Science Abstracts* as of June 1976.

A number of international agencies (e.g., UNESCO, the International Council of Scientific Unions, and the Organization for Economic Cooperation and Development) have been actively promoting the coordination of scientific information activities at a global level. UNESCO and the International Council of Scientific Unions established a central committee in January 1967 to carry out a feasibility study for a world science information system. After 4 years of study, in 1970 the committee produced a report entitled *UNISIST: Study Report on the Feasibility of a World Science Information System by the United Nations Educational, Scientific and Cultural Organization and the International Council of Scientific Unions.* UNISIST is a world science information system based on the principle of voluntary cooperation among existing and future national and international systems in a flexible network arrangement. According to the study report, "UNISIST is a contemporary expression of a long-standing tradition of free interchange of information among the world's scientists." A major function of UNISIST is to foster information sharing by creating opportunities for further cooperative arrangements among governments, international organizations, and operating services. UNISIST is not a centralized, giant structure: "There will be no international center in Paris which will unify, collate, store and disseminate information. The Utopian concept of a world center conserving all documents, which was common in the eighteenth and also in the nineteenth century, was already hopelessly out of date in the inter-war years. . . ." (*269*). The five main objectives of UNISIST are, briefly:

1. Improvement of systems interconnections
2. Strengthening the role of institutional components of the information transfer chain
3. Development of specialized manpower
4. Development of scientific information policies and structures

5. Assistance to developing countries in the development of scientific and technical information infrastructures

The activities of UNISIST are regularly reported in the *UNISIST Newsletter* and also as a regular feature entitled "Focus on UNISIST Programmes" in the *Annals of Library Science and Documentation*, starting in 1973.

INIS and UNISIST are examples of world information systems, based on the principle of coordination and voluntary cooperation at the international level. However, many of the developing countries, which are just beginning to lay the foundation for a national information infrastructure, cannot participate in these sophisticated worldwide systems. To remove this imbalance in the levels of national information systems and to enable every country, regardless of its stage of development, to participate meaningfully in international information systems, a new worldwide program has recently been launched by UNESCO, in collaboration with other international agencies. This program, known by the acronym NATIS, was established as the outcome of an Intergovernmental Conference on the Planning of National Documentation, Library and Archives Infrastructures convened by UNESCO, the International Federation of Library Associations (IFLA), the International Federation for Documentation (FID), and the International Council of Archives (ICA). The NATIS concept is based on the following two concerns: (*a*) the need for systematic planning of information infrastructures to enable every participating country to utilize its national information resources fully, and to benefit from existing and future world information systems; and (*b*) the need for coordinated planning of information resources at both national and international levels (*270, 271*). The NATIS concept implies that governmental agencies at national, state, and local levels should maximize the availability of information through documentation, library, and archive services to all categories of users. The main objective of NATIS is to enable each country to develop its own information system, in accordance with its needs, so that all countries can enjoy full access to the information they need for their national development.

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Scientific and Technical Communication
Characteristics of Scientific Literature
The Primary Journal
Patents
Conference Literature
Dissertations
The Smithsonian Science Information Exchange
Data Compilations and Encyclopedias
Review Literature
Translations
Bibliographic Control of Scientific Literature
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0-8247-2026-1