

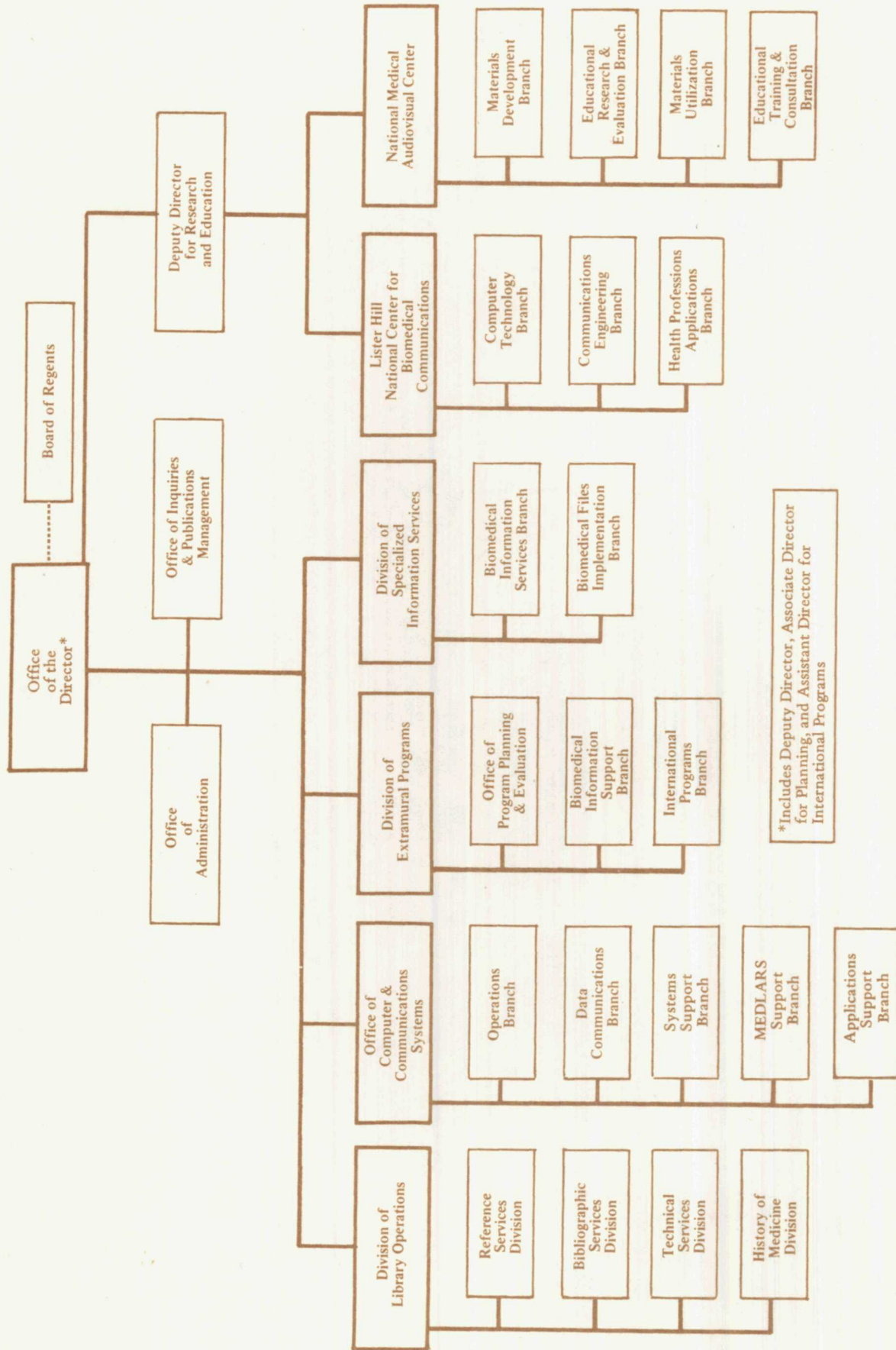
NATIONAL
LIBRARY of
MEDICINE

PROGRAMS
and
SERVICES

FISCAL YEAR 1979

U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
Public Health Service
National Institutes of Health

NATIONAL LIBRARY OF MEDICINE



*Includes Deputy Director, Associate Director for Planning, and Assistant Director for International Programs

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Preface

This year marked the centenary of the first publication of *Index Medicus*. The event, widely noted throughout the medical community, is a tribute both to Dr. John Shaw Billings and to the many organizations and individuals who sustained its publication over the century. On May 25, 1979, there was a special gathering of members of the NLM Board of Regents, physicians, historians, librarians, and Library staff to mark this occasion. The stimulating essays delivered at this meeting will be published in 1980 and made available to those interested in the history of medical bibliography.

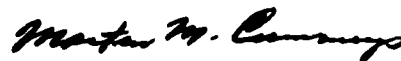
In this, the hundredth year of its publication, the Library has revived the prestigious title of *Editor, Index Medicus*. Clifford A. Bachrach, M.D., who has been named Editor, will strive to continue the accuracy of content and quality of format that has marked *Index Medicus* since its inception.

As reflected in the statistics of this report, the online services network continues to expand both in number of searches and variety of data bases available. Over 1.4 million online and offline searches were performed in FY 1979, a remarkable increase of almost 30 percent over last year. Two important new online data bases became available this year: the Toxicology Data Bank and the Health Planning and Administration file.

The new Lister Hill Center Building is now almost completed. Its specialized communications laboratories, conference facilities, audiovisual capabilities, and computer area will afford NLM the opportunity to develop new communications services for the benefit of biomedical practitioners, researchers, educators, and students. We look forward to moving selected NLM programs into this modern and handsome facility in 1980.

One disturbing note in 1979 was a reduction of 35 positions in the Library's personnel ceiling—from the 503 authorized by Congress to 468. Although this was part of an NIH-wide reduction, this reduction in staff will make it difficult for the Library to continue providing the quantity and quality of services the health-science community has come to expect from us. It will also make it difficult for us to take full advantage of the potential offered by the new Lister Hill Center.

I wish to express my appreciation to the staff of the Library for their diligent efforts—it is they who are responsible for the accomplishments described in this report. The Board of Regents provided sound advice with regard to NLM policies and programs while maintaining a careful overview of our operations. My thanks go also to those in the biomedical and library community who continue to support our efforts, and I invite their suggestions as to how we may serve them better in the future.



Martin M. Cummings, M.D.
Director
National Library of Medicine

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Chapter 1: Policy and Direction

Philip D. Amoruso, Executive Officer

Board of Regents

The NLM Board of Regents met in October 1978, and in January and May 1979 to review a wide range of NLM program policies and grant applications. Among the policy items which they considered were the future roles of the Lister Hill Center and the National Medical Audiovisual Center, procurement of a new computer system, closing the NLM card catalog, evaluation and performance standards of the Regional Medical Libraries, and audiovisual programs and plans.

The National Library of Medicine Act was amended by Public Law 95-622 in November 1978 to provide that Regents be appointed by the HEW Secretary rather than the President. Three existing vacancies on the Board were filled within three weeks of the effective date of this amendment, giving the Board a full complement of members. Those appointed were:

Ismael Almodóvar, Ph.D.
President
University of Puerto Rico
San Juan, Puerto Rico

Emmet F. Ferguson, Jr., M.D.
Jacksonville, Florida

Martha E. Williams
Research Professor
Coordinated Science Laboratory
College of Engineering
University of Illinois
Urbana, Illinois

The terms of Dr. Thomas C. Chalmers and Dr. Kelly M. West were completed in August 1979. The following new Regents were appointed to four year terms on the Board commencing August 3, 1979:

John L. Townsend, M.D.
Chairman, Department of Medicine
Howard University College of Medicine
Washington, D.C.

Edward J. Huth, M.D.
Editor, *Annals of Internal Medicine*
American College of Physicians
Philadelphia, Pennsylvania

The Board of Regents unanimously elected Dr. S. Richardson Hill, Jr., Chairman of the Board for 1979-1980, replacing retiring Chairman Dr. Kelly M. West.

The forthcoming fiscal year will see the Board considering program opportunities afforded by the new research and development facilities to

the Lister Hill National Center for Biomedical Communications and the National Medical Audiovisual Center.

Lister Hill Center Building

As completion of the new facility nears, NLM staff have been busy with activities related to occupancy of the Lister Hill Center. Among these activities are the preparation of laboratories and other special purpose facilities; design and installation of a data communications system; development of specifications for a building security system; planning the relocation of staff from Atlanta (National Medical Audiovisual Center), rental space (Extramural Programs), and the present Library building; commissioning of sculpture and fine art; and planning the dedication of the new building.

Construction has proceeded ahead of schedule since the project was begun, but slowdowns in the final stages may delay occupancy until December 1979, the originally scheduled completion date. As blocks of space are completed they will be released by the builders for acceptance by NIH and occupancy by the following NIH divisions:

- Lister Hill Center
- National Medical Audiovisual Center
- Specialized Information Services
- Extramural Programs
- Office of Computer and Communications Systems
- Bibliographic Services Division
- Photoduplication Section, RSD
- Office of Administrative Management Services
- Office of Contracts Management

The relocation of these programs is expected to be completed by March 1980 when the National Medical Audiovisual Center will be transferred, and the building will be formally dedicated on May 22, 1980.

Renovation

Shortly after the beginning of construction for the new Lister Hill Center Building, NLM staff began planning for the renovation of the present building. The architectural and engineering firm of McLeod, Ferrara and Ensign has been selected to prepare detailed construction plans and specifications for modifying the building. The firm is committed to revise existing space to meet NLM's present and projected needs, within the existing unique interior architectural style and spirit. The design work is expected to be completed by March 1, 1980 with construction taking an additional 18 months.

MEDLARS III

A MEDLARS III Task Force was established in FY 1979 to develop a coherent library automation program which would satisfy NLM's operational and service requirements for the 1980s. The new system is intended to improve, extend, and integrate NLM's internal operations and network services in the areas of technical processing, online bibliographic retrieval, automated publication, and document delivery.

The internal integration will encompass bibliographic and other library functions which are being developed in several parts of the Library. These include activities of the Technical Services Division, Bibliographic Services Division, References Services Division, Specialized Information Services, and the Lister Hill Center. The expanded and integrated network services will provide new and improved capabilities to assist health sciences libraries in the creation of bibliographic records, retrieval of bibliographic and text information, access to national holdings and location information, and ordering and delivery of documents.

The set of functional requirements for MEDLARS III to be developed by the Task Force will be incorporated in the workscope of a request for contract proposal for an overall system



The MEDLARS III Task Force (left to right) Ben Erdman, Betsy Humphreys, Duane Arenales, Richard Dick, Grace McCarn, John Cox, Laura Kassebaum, Lillian Kozuma, and Dr Joseph Leiter (Not pictured, Robert Schultheisz.)

design. Although major portions of the design and implementation will require contractor support, there will be extensive participation by Library staff in implementing parts of the system.

In addition to the goal of providing improved services, MEDLARS III planning will also provide an opportunity to examine basic issues and challenges facing library and information systems and to address the policy decisions facing NLM with regard to its role in emerging national networks.

Financial Resources

The National Library of Medicine's FY 1980 appropriation will provide \$44,000,000. This level represents an increase of \$2,569,000 over the previous year and a reduction of eight positions from the levels authorized for FY 1979.

The budget increase will permit NLM to expand the new Computers in Medicine Program (see Chapter 7) and also provide funding for the

Chemical Structure and Nomenclature System (Chapter 4). This system is the cornerstone of the Chemical Substance Information Network currently being developed in cooperation with the Environmental Protection Agency. A portion of the FY 1980 increase will be used to keep up with the rapidly increasing cost of biomedical literature, especially for NLM's expanding collection of materials concerning health planning and health care delivery.

Personnel

In FY 1979 the NLM Personnel Office completed the final year of the HEW three-year classification review program, having audited a total of 643 positions during the three-year period.

The U.S. Office of Personnel Management (formerly the U.S. Civil Service Commission) conducted an occupational study in August, focusing on the Librarian, Library Technician,

and Technical Information Specialist occupations. The data they derive from this study will be used to revise classification and qualifications standards.

The Library received eight new positions in the FY 1979 Congressional appropriations, bringing the total number of NLM full-time permanent positions to 503. This level was short-lived, and never attained, because of subsequent ceiling reductions by HEW which established a reduced level of 468, 35 positions below the appropriated level. As a result of this, and the imposition of an absolute freeze on hiring in July, the Library's on-board strength at the close of FY 1979 was 458, ten positions below ceiling.

The National Medical Audiovisual Center (NMAC) entered the final phase of transition. As preparations for the March 1, 1980 relocation proceeded, we experienced increasing losses in personnel by the election of individual staff members not to move to Bethesda.

Staffing Activities

Kent A. Smith was appointed to the position of Deputy Director, NLM. Mr. Smith, formerly Assistant Director for Administration, replaced Melvin S. Day, who left to accept the position of Director, National Technical Information Service, Department of Commerce.

Charles N. Farmer, Jr., was appointed Director, National Medical Audiovisual Center, replacing Myron J. Adams, Jr., M.D., who accepted a position with the Center for Disease Control. Mr. Farmer formerly served as a Special Assistant to the Director at NMAC.

William G. Cooper, Ph.D., formerly Vice Chancellor for Programs and Educational Resources at the University of Colorado Health Sciences Center, has been appointed as an Expert Consultant to assist in NLM's planning activities related to determining the effectiveness of existing

biomedical communications programs as well as planning new NLM programs to address future needs.

Tamas Doszkocs, Ph.D., was appointed Chief, Technical Services Division (TSD), Library Operations. Dr. Doszkocs formerly served with the Specialized Information Services program, and he replaces T.D. Tonkery as TSD Chief. Mr. Tonkery accepted a position with the UCLA University Research Library.

Grace McCarn was selected to replace Bruno Vasta as Chief, Bibliographic Services Division (BSD), Library Operations. Ms. McCarn was formerly Head, MEDLARS Management Section, BSD.

A.D. Merritt, M.D., was appointed to the position of Chief, Health Professions Applications Branch, Lister Hill National Center for Biomedical Communications. Dr. Merritt had served on an Intergovernmental Personnel Act Assignment from his position as Chairman and Professor of Medical Genetics, Indiana University School of Medicine.

Philip D. Amoruso was appointed Executive Officer, NLM, replacing Kent A. Smith. Mr. Amoruso was formerly an Administrative Officer with the National Cancer Institute, NIH.

John Cox was appointed Deputy Director, Office of Computer and Communications Systems (OCCS). Mr. Cox was formerly the Chief, MEDLARS Support Branch, OCCS.

Joseph Hutchins was selected to replace Mr. Cox as Chief, MEDLARS Support Branch, OCCS. Mr. Hutchins has been a Computer Systems Analyst with OCCS since 1970.

Duane Arenales was appointed Head of the Circulation and Control Section, Bibliographic Services Division, Library Operations. Ms. Arenales had been Assistant Head of the Section prior to her appointment.

Phyllis Mirsky, formerly with the Biomedical Library, University of California at Los Angeles, accepted the position as Head, Reference Section, Reference Services Division, Library Operations. Ms. Mirsky replaces Edith Blair, who retired last year.

Yvonne Scott was appointed to the position of Head, MEDLARS Management Section, Bibliographic Services Division. Ms. Scott has been a member of the Section since August 1968.

Brenda Swanson was selected to serve as Head, Selection and Acquisitions Section, Technical Services Division, Library Operations. Ms. Swanson has been a member of the Section since 1973.

Honors and Awards

The Association for Hospital Medical Education presented the John C. Leonard Award to NLM Director, *Martin M. Cummings, M.D.* The Award, which recognizes important contributions to graduate education and to community hospital education programs, was presented on May 11 at the annual business meeting of the Association, held in conjunction with the AMA Congress on Medical Education in Washington, D.C.

Jeanne L. Brand, Ph.D., Chief, International Programs Division, Extramural Programs, received an honorary degree from St. Lawrence University at the Spring Commencement Ceremony when the University honored alumnae prominent in the field of medicine and public health.

James J. Hartman, Personnel Officer, NLM, was presented with the NLM Director's Honor Award at the May meeting of the Board of Regents. In making the award, Dr. Cummings cited Mr. Hartman's outstanding performance in providing a sound personnel management program for the National Library of Medicine.

Joseph W. Hutchins, Chief, MEDLARS Support Branch, OCCS, was presented with the NIH Director's Award for his development of sophisticated online data management subsystems for MEDLARS which has substantially improved NLM's processing of technical literature.

Dean W. Darby, D.D.S., Chief, Educational Training and Consultation Branch, NMAC, received a PHS Commendation Medal in recognition of his development of training materials on information transfer and of innovative systems to integrate these materials in the health professional community.

Marguerite L. Pusey, Grants Management Officer, Extramural Programs, received the NIH Merit Award for meritorious contributions to the development of grants administration policies.

Charles N. Farmer, Jr., Director, NMAC, received the NIH Merit Award for his contributions to the development of audiovisual educational technology in schools of the health professions and other health sciences institutions.

Clifford A. Bachrach, M.D., Chief, Medical Subject Headings Section, Library Operations, received the NIH Merit Award for developing and maintaining an effective review system to assure the selection of the most useful periodical literature for citation in NLM publications and data bases.

Equal Employment Opportunity

The NLM EEO Committee, under the Chairmanship of Ms. Peggy Beavers, is continuing to work on the areas identified by the EEO Committee as requiring priority attention. One of these is to develop career ladder opportunities in all areas of the NLM. Each program area is

now establishing career ladders with entry and target level positions identified. These positions, for the most part in grade levels GS-4 through GS-7, will provide competitive upward mobility opportunities for employees who might otherwise find themselves in the dead-end jobs.

A statistical profile of NLM's minorities shows that the total number of minorities as of June 30, 1978 was 125 or 26.3 percent of 478 full-time permanent staff; on June 30, 1979, 124 minorities represented 25.4 percent of 488 full-time employees. A corresponding profile of women shows that the total as of June 30, 1978 was 258, or 55 percent of the work-force; on June 30, 1979 that number increased to 267 or 54.7 percent.

The Selective Placement Program for handicapped employees has developed a successful training program. Over a two-year

period 30 employees, including a significant number of supervisors, have received training in sign language in a course given at NLM to help facilitate communication with deaf employees. Of this initial group, 13 employees continued in an advanced sign language course.

Three recommendations to assist the NIH Selective Placement Program were submitted by NLM to the NIH EEO Council for consideration. They were:

1. To provide a sign language course at NIH for employees and supervisors;
2. To provide manual communication devices for the hearing-impaired in various buildings of NIH; and
3. To provide an interpreter for hearing-impaired NIH staff at meetings these employees are likely to attend.



Balloon ascent from the front of the library in conjunction with the Aerospace Medical Association's 50th Anniversary. Almost-completed Lister Hill Center building is visible on left.

These recommendations were accepted by NIH and are now being implemented.

In March 1979 the EEO Committee conducted an open meeting with NLM employees. The purpose of the meeting was to keep employees abreast of current developments in the EEO program; inform employees about the complaint process; and give employees an opportunity to bring issues and concerns to the Committee for action. Questions were prepared in writing by employees prior to the meeting which allowed for a more complete response to many of their concerns. A record of the concerns discussed and the questions and answers was published in the *NLM EEO Update*.

Exhibits

The first lobby exhibit in the fiscal year (described in last year's report) celebrated the 400th anniversary of William Harvey's birth in 1578 and the 350th anniversary of the publication of his discovery of the circulation of the blood. The exhibit featured a number of portraits and first editions and translations of Harvey's publications.

The Harvey exhibit was followed in February by "Aviation Medicine . . . From the Aeronauts to the Eve of the Astronauts." The exhibit, displayed until mid-May, explored the growth of aviation medicine from its beginnings in high altitude physiology (of concern to balloonists and mountain climbers) to the specialized field required by the development of ever faster and higher-flying aircraft. The exhibit primarily featured aviation medicine literature from the Library's historical collections, although a number of interesting prints, photographs, and artifacts were also included.

The exhibit was assembled by Peter D. Olch, M.D., Deputy Chief of the History of Medicine Division, in cooperation with the Aerospace Medical Association. In conjunction with the exhibit, the Association sponsored a balloon as-

cent from the NLM grounds on May 12. The ascent was made by three members of the Association, who with other members had gathered at the Library to view the exhibit and to celebrate the Association's 50th anniversary.

A third exhibit "The Centenary of *Index Medicus*" opened in connection with a special celebration held at the Library on May 15 (see below). The exhibit, which traced the development of *Index Medicus* from its first issuance in 1879 to the present time, was prepared by Manfred J. Wasserman of the History of Medicine Division.

The *Index Medicus* exhibit, displayed through 1979, explored the roles of the Library, American Medical Association, and Carnegie Foundation of Washington in sustaining and publishing *Index Medicus*, and the challenge posed by the ever-increasing quantity of periodical medical literature. Among the items on display were unpublished letters of John Shaw Billings, William S. Halsted, and Fielding H. Garrison; photographs and printed materials, including a number of issues of *Index Medicus* considered important in its evolution; and several significant medical bibliographies which preceded *Index Medicus*.



The *Index Medicus* celebration brought together three directors of the National Library of Medicine. From the left, Frank B. Rogers, M.D. (1949-63), Martin M. Cummings, M.D. (1964-), and Joseph H. McNinch, M.D. (1946-49)

Centenary of *Index Medicus*: 1879-1979

On May 25, at the National Library of Medicine, a gathering of members of the Board of Regents, physicians, historians, librarians, and NLM staff paid tribute to *Index Medicus* and to its creator and first editor, Dr. John Shaw Billings.

The reading room of the History of Medicine Division was the scene of the program. A series of distinguished speakers, using Billings and the *Index Medicus* as a point of departure, discussed various aspects of physicians, books, and medical bibliography.

In his welcoming remarks NLM Director Martin M. Cummings, M.D., said that *Index Medicus* has proved so socially and scientifically useful that it has been able to overcome

many adversities in its hundred years. He noted that 1979 is also the hundredth anniversary of the invention of the punched card and the construction of the first electric tabulating machine by Herman Hollerith, assisted by Dr. Billings. When Billings and his co-editor Dr. Robert Fletcher issued the first volumes, *Index Medicus* contained references to about 20,000 articles taken from 570 medical journals; today *Index Medicus* lists each year some 250,000 references from 2,500 journals. Dr. Cummings praised the work of those who, over the years, have indexed the literature on which *Index Medicus* is based.

At the morning session, entitled "Medicine and Bibliography," guests and staff heard the following presentations: "Between Two Worlds: American Medicine in 1879," by Charles Rosenberg, Ph.D., Professor of History at the University of Pennsylvania; "The Nineteenth Century Medical Press," by Genevieve Miller,

Table 1
Financial Resources and Allocations, FY 1979
(dollars in thousands)

Amounts available for obligation	
Appropriation, NLM.....	\$41,431
Earned reimbursements.....	1,000
Total.....	42,431
Amounts obligated by Extramural Programs.....	8,987
Amounts obligated for directed operations	
Lister Hill National Center for Biomedical Communications.....	6,062
National Medical Audiovisual Center.....	3,811
Office of Computer and Communications Systems.....	5,516
Library Operations.....	8,903
Toxicology Information Program.....	2,673
Review and approval of grants.....	1,030
Program direction.....	5,449
Subtotal, direct operations.....	33,444
Total.....	\$42,431

Ph.D., Director of the Howard Dittrick Museum of Historical Medicine, Cleveland; "Billings and Before: Nineteenth Century Medical Bibliography," by John B. Blake, Ph.D., Chief of NLM's History of Medicine Division; and "Index Medicus in the Twentieth Century," by Frank B. Rogers, M.D., former NLM Director. The moderator for the morning session was Kelly M. West, M.D., outgoing Chairman of the Board of Regents.

After lunch, William B. Bean, M.D., Kempner Professor and Director of the Institute for the Medical Humanities at the University of Texas Medical Branch at Galveston, presided over a session entitled "The Physician and His Books." Presentations in this session were on "The Physician as Bibliographer and Bibliophile," by K. Garth Huston, M.D., of Los Angeles, and "The Physician as Scholar," by Saul Jarcho, M.D., of New York City.

Table 2. Personnel Ceilings

	FY 73	FY 74	FY 75	FY 76	FY 77	FY 78	FY 79
Office of the Director	12	11	9	10	12	14	12
Office of Inquiries and Publications Management	6	5	5	5	5	5	5
Office of Administration	36	36	34	35	35	38	38
Office of Computer and Communications Systems	54	51	52	54	52	51	51
Extramural Programs	30	27	22	24	27	25	25
Lister Hill National Center for Biomedical Communications	17	20	22	24	24	35	30
Specialized Information Services	16	17	17	18	17	18	19
National Medical Audiovisual Center	103	100	101	101	88	88	76
Library Operations	192	199	196	201	212	221	212
Total	466	466	458	472	472	495	468

Chapter 2: Library Services and Operations

Joseph Leiter, Ph.D., Associate
Director
Library Operations

Highlights

Quality of bibliographic data and timeliness in making records and materials available to the public continue as the primary concerns of Library Operations. With the appointment of Dr. Clifford A. Bachrach as Editor of *Index Medicus*, there is closer quality review and control over citations entering MEDLINE. Long-standing quality control measures in the production-related functions of index scheduling and keyboarding have been improved to insure publication at the earliest possible time.

Throughput time for photocopied interlibrary loans has improved to the extent that 83 percent are filled within four days of receipt and up to 90 percent within ten days. Planning toward cooperative technical processing among the three national libraries holds real promise for the future, particularly when the new Anglo-American Cataloging Rules (AACR-2) are implemented in January 1981. Meanwhile, NLM has

begun a retrospective conversion project for its pre-1965 catalog to put its entire catalog online.

National Library Cooperation

The National Library of Medicine, Library of Congress, and National Agricultural Library (NAL) opened a promising series of meetings in April 1979. The first of these meetings, initiated by the Medical Library Association, attempted to identify long-standing differences and problem areas between LC and NLM that were amenable to a solution and developed an agenda for future meetings. It became apparent that a rational approach to the larger issue of varying practices of the national libraries meant that NAL also should participate. The three U.S. national libraries have committed themselves to resolving differences, promoting beneficial cooperation, and working toward better communication in the area of technical processing.

The principal topics of discussion at subsequent meetings have been cooperation in

building an online name authorities data base, cooperative acquisitions, and cataloging. Cooperative effort in name authority work is fundamental to all other considerations since standardization of bibliographic description depends upon a common authority file. The most noteworthy accomplishment to date is that the three libraries agreed to participate in long-range plans to develop a national online authorities data base. Comparison studies in collection development are expected to identify subject areas of primary responsibility and establish a framework for cooperative cataloging. Consistent practices in establishing name headings and common use of the new AACR-2 rules, effective January 1981, will permit common use of the cataloging copy as produced in any one of the three libraries. Cooperation is expected to extend also to shared use of foreign language capacities between the three institutions.

Bibliographic Services Division

The Bibliographic Services Division is responsible for indexing journal and monographic literature for *Index Medicus*, for entering the references into the data base, and for coordinating the online network that makes these indexed references available via online data bases such as MEDLINE.

Indexing

The total number of journal articles and monographic chapters indexed in FY 1979 was 254,210. An analysis of this figure shows that 230,427 articles were published in *Index Medicus* (including 1,990 monographic citations), and 13,167 entries were indexed for special indexes such as the *Index to Dental Literature*, *International Nursing Index*, and *Population Sciences—Index of Biomedical Research*. One thousand three hundred and eighty-two "articles" were indexed to appear in

the *Index to Audiovisual Serials in the Health Sciences*, 8,138 articles were indexed for the *Health Literature Index*, and an additional 1,096 articles were indexed but not published in FY 1979 for a total of 254,210 indexed citations.

Seminars on indexing consistency, begun in FY 1978, were continued in 1979. These seminars were conducted for members of the indexing staff who are responsible for revising articles indexed for *Index Medicus* and the various data bases. Continued effort is made to ensure that the intellectual content of *Index Medicus* remains high, and that the indexing policies are consistently followed.

During the year additional quality control measures were implemented in order to increase the timeliness and accuracy of data being input monthly into MEDLINE. These included: the implementation of precise methods for alerting NLM staff to possible gaps in the receipt of journal issues as well as the monitoring of journal throughput time; the identification of journal issues which contained no indexable articles; the addition of a final editing step of keyboarded data by NLM indexers and revisers; the refinement and enlargement of the scope of the computer edit program for data in process; and a final online verification of data before their release into MEDLINE.

MEDLARS Management

The MEDLARS Management Section serves as the public contact point for the day-to-day operation of the NLM Online User Network. This Section provides answers to telephone and written inquiries about the use and characteristics of the various data bases, maintains billing records, processes applications for access to the data bases, handles the mailing of offline prints and offsearches, and produces manuals and other descriptive materials. In October 1978, the Online Services Training Unit was created within the MEDLARS Management Sec-

NLM Programs and Services

tion. It is responsible for all training in the use of the online system.

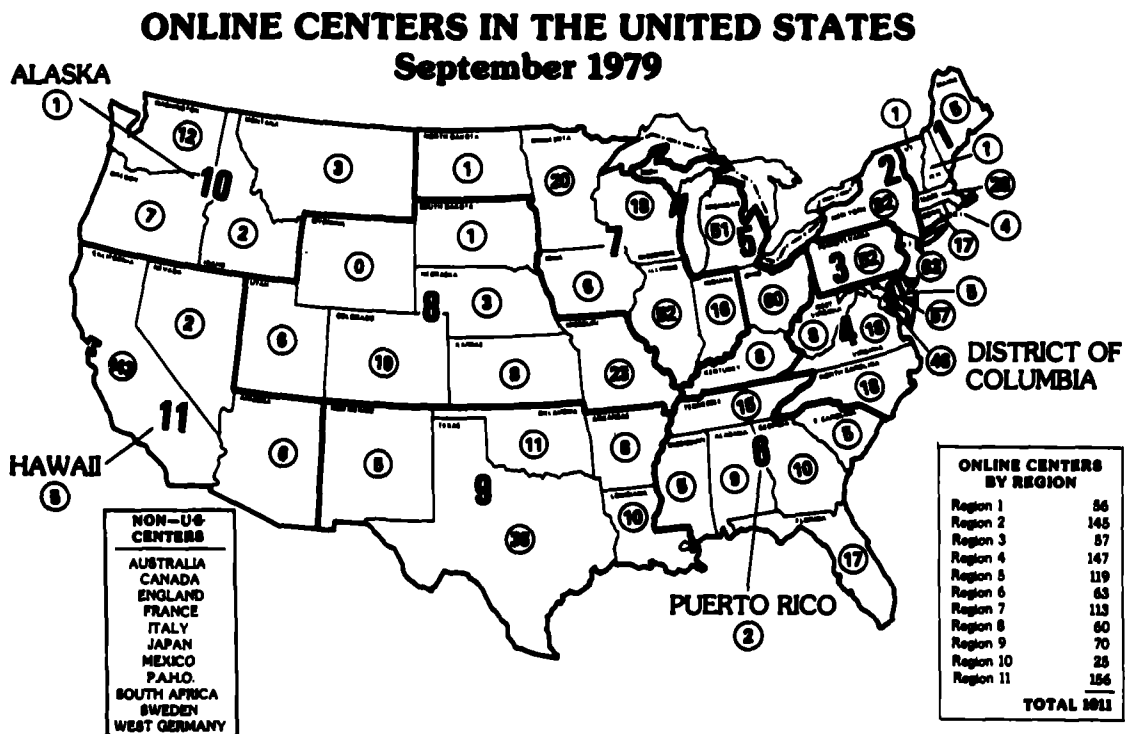
Two new data bases were added to MEDLARS:

- TOXICOLOGY DATA BANK, added October 30, 1978, contains chemical, pharmacological, and toxicological information and data on more than 1000 substances. This data base was developed by the Specialized Information Services at NLM (see Chapter 4).
- HEALTH PLANNING AND ADMINISTRATION, added November 1, 1978, contains citations to literature on health planning, organization, financing, management, and related subjects. This data base serves as the source for the *Hospital Literature Index* and is prepared in cooperation with the American Hospital Association.

The 14-volume 1978 *Cumulated Index Medicus* contained 227,684 citations printed on 11,269 pages. Twenty-eight recurring bibliographies continued to be published, and a new *Quarterly Bibliography on Major Tropical Diseases* was begun on an experimental basis (see Chapter 8).

A number of enhancements to ELHILL were added during FY 1979:

- A new capability called "pre-explosion" was added to facilitate searching. Nine of the frequently needed explosions were accomplished in advance and stored in the computer.
- Two new online print formats became available in April. One is a compressed format which permits all items in a field to be printed across the page rather than ver-



tically, thus saving space. The other is a catalog card format, available from CATLINE and AVLINE.

- Two new print formats for SDILINE and TOXLINE were made available.

The growth of online training continued. Six hundred and forty-four persons were trained in a total of 32 initial and advanced classes. In addition to classes at NLM, classes were also held in Dallas, Chicago, Seattle, New Hampshire, Denver, Atlanta, New York, and Los Angeles. A new advanced training curriculum was used for the first time in January.

History of Medicine Division

During the past year the Library published *A Short Title Catalogue of Eighteenth Century Printed Books in the National Library of Medicine*, listing some 25,000 titles of books and journals in the historical collections. Between 30 and 40 percent will not be found in any of the Library's previously published catalogs or in the *National Union Catalog pre-1956 Imprints*. It thus reveals as never before the wealth of source material in this great national collection and available for historical study of medicine and related sciences in the eighteenth century. Based on the work of many past and present members of the cataloging staff, it was compiled for publication by Dr. John B. Blake.

A significant proportion of the time of HMD staff is devoted to what might be called public events. Notable among them this year was the celebration of the Centenary of *Index Medicus*, for which a day-long program of historical-bibliographical papers was arranged describing the origin and development of *Index Medicus* and some activities of physicians as book collectors, bibliographers, and scholars. Dr. Blake arranged the program and presented a paper on nineteenth century medical bibliography. A

special exhibit tracing the history of *Index Medicus* was also prepared by Manfred J. Waserman. Other exhibits prepared by History of Medicine Division staff and displayed in the lobby during the year commemorated the 400th anniversary of the birth of William Harvey and recognized achievements in aviation medicine beginning with Dr. John Jeffries' pioneer aerial voyage in a balloon across the English Channel in 1785.

The historical collections were enriched by the addition of some 417 books and theses and an estimated 46,000 manuscript items. Book acquisitions ranged in publication date from the fifteenth to the nineteenth centuries. One incunabulum was added this year, Petrus de Argellata's *Chirurgia* (Venice, 1497/98; Goff A-953). Other significant acquisitions ranged from the works of Galen edited and translated by Leonhart Fuchs (4 volumes, Paris, 1550-54) and the rare first German translation of Dioscorides' *De materia medica*, the *Kreutter Buch* published in Frankfurt in 1546, to the first edition of Robert Boyle's *Certain Physiological Essays* (London, 1661). The last is one of the author's important early works in chemistry and includes a discussion of the process of digestion. The Library also enhanced its already outstanding collection of the works of William Harvey by the acquisition of his *Exercitatio anatomica de circulatione sanguinis* (Paris, 1650), which contains the two essays addressed to Jean Riolan answering, for the first time in print, the objections of Riolan and others to the doctrine of the circulation. The essays were first published in Cambridge in 1649 (an edition the Library still lacks); subsequent editions were appended to Harvey's *De motu cordis*. At the other end of the scale of significance in the development of medical science but of much interest to Americanists was the acquisition of Peter Smith's *The Indian Doctor's Dispensatory* (Cincinnati, 1813), the first medical book published in Ohio.

Additions to the manuscript collection included archives from the early years of the In-

ter-Urban Clinical Club and personal papers of Irvine Page, George E. Burch, and W. Henry Sebrell. To them and to other donors the Library expresses its thanks not only for their gifts but especially for making these valuable materials available for the benefit of future historical scholars.

Current historical scholars, meanwhile, have continued to use the existing collection in substantial numbers, in the reading room and through interlibrary loan and special photographic services, as the statistics in Table 7 show. A number of staff members have also continued their historical investigations and have participated actively in the affairs and programs of professional societies. During the year Dr. Peter D. Olch served as Vice-President of the Halsted Society and Lucinda Keister was elected Secretary of the Picture Division, Special Libraries Association.

Reference Services Division

The Division functions as the Library's principal public service arm in the areas of reader, reference, and bibliographic services, interli-



Reference librarian Howard Drew stands beneath the new annunciator board.

brary loan, micropreservation, and maintenance of the collection.

As can be seen from Tables 11, 12, and 13, there were no dramatic changes in the level of services performed by the Division. However, there were two special activities in FY 1979; an experiment in facsimile transmission and the development of a Disaster Recovery Plan (that we hope never to have to use).

The Division participated in the first facsimile transmission test of interlibrary loans using the new International Electronic Post system (INTELPOST). Two articles requested by NLM from the British Lending Library in Yorkshire, England, were scanned by a facsimile reader in London, transmitted via satellite, and received at the Washington Post Office. Copy quality was excellent and further tests are planned.

The Disaster Recovery Plan was developed against the event of water damage to any part of the Library's collections. The plan includes reporting procedures, naming of a Recovery Team, location of necessary supplies and equipment, and procedures for handling wet materials. It also calls for the installation of freezers in the building to accommodate damp or wet volumes for rapid freezing and stabilization in the event of a water accident. Arrangements were made with outside freezer companies to accommodate a larger number of books should the damage exceed NLM's freezer capacity.

Interlibrary loan requests dropped by some 12,000 (from 262,000 to 250,000), most of which was accounted for by a reduction in foreign requests, mainly attributable to the discontinuation of the agreement between the Library and the Agency for International Development in October 1978. Under that agreement, in force for many years, the standard loan charge of \$2 for foreign libraries was entirely subsidized for loans to libraries in AID countries.

The fulfillment rate and timeliness of response to demand continued at satisfactory levels. The leveling off of service demands on the collection and for reference assistance, which began last year, continued. It is still too early to know whether this is a short-term phenomenon or represents the success of attempts to control a demand that was straining the Library's and the network's ability to satisfy it.

Bound journal volumes representing about 20,000 titles for 1963-69 were shifted from the A level to C level during the year. The shift, to alleviate crowded conditions in the current journal collection, necessitated every volume on both floors to be relocated.

The Collection Maintenance Unit completed systematic "gapping" of the entire current journal collection to determine which issues were missing from the collection. Records of the gaps were entered in the computer-based Master Serials File that is used to determine the availability of material for document delivery and for requesting replacement by the Serial Record Section.

Motorized COM (Computer-Output-Microfilm) readers were installed in the reading room and work areas of the Division. Each film reader contains Master Serial File data on 16mm film, including descriptive cataloging with issuing bodies, call numbers, places of publication, and gaps in the run.

Work continued on developing and updating the Library's government documents collection with the hope of making it a model of legislative reference materials relating to the health sciences. During this first year of operation as a Selective Depository, NLM received some 2,000 publications from the Government Printing Office. Also, a collection of Federal laws, Congressional Committee Reports, hearings, and statistics relating to public health is being assembled in microform.

Technical Services Division

Retrospective Conversion

The year's most momentous decision was to prepare for closing the card catalog by converting the shelflist to machine-readable form. In November, the Director invited a panel of experts to meet and review alternatives. The panel reported that retrospective conversion was the most reasonable and appropriate approach to closing the card catalog. Major benefits will include improved in-house processing and provision of a wealth of bibliographic data to the national network.

A data entry system for converting NLM's bibliographic records from 1801 to 1965 was developed by a team composed of representatives from the Technical Services Division (TSD), the Office of Computer and Communications Systems, and the Lister Hill Center. The team defined the system configuration and developed software which will meet the project requirements. A Request for Proposal for the retrospective conversion was prepared by TSD and the contract was awarded in September.

Limited Cataloging

TSD has begun a special project to apply limited cataloging to certain arrearage items—items previously uncataloged but under NLM control in the Inprocess file. Much of the arrearage material was uncataloged because of insufficient resources in the Cataloging Section to handle the volume of acquisitions and the variety of languages represented.

The standard for bibliographic description of limited cataloging is enriched beyond the minimal record defined in the draft version of the *National Level Bibliographic Record—Books*. This draft standard has been reviewed

by research libraries in the U.S. and has been generally accepted as a minimum level record necessary for distribution of cataloging in any national bibliographic system. Subject heading analysis will be applied according to NLM's *Medical Subject Headings (MeSH)*, but subject analysis will be limited to only one or two main headings. Classification is not being applied and the shelf arrangement is by an internal shelving number. It is anticipated that limited cataloging data will be prepared at two to four times the rate of full cataloging.

OCLC

CATLINE monograph data, available to OCLC since FY 1978, were loaded into their online system in August 1979. At this time only current monograph records from August 1979 forward are being added to the OCLC system; the full retrospective CATLINE file is expected to be added in the future. NLM cataloging for new serial titles has been input into the OCLC system since June 1974 as part of NLM's participation in the CONSER Project.

Exchange

The NLM exchange program was updated and automated. NLM has approximately 388 exchange partners in 72 countries. The titles sent to each partner are recorded in an Exchange File. Receipts from these countries are coded in the INPROC record if the title is a monograph. Serial title receipts from these countries have a subscription record created.

Serials

During the past year several new NLM products became available which increase access to bibliographic and location information for biomedical serials. The second edition of the

Index of NLM Serial Titles appeared in February 1979. This keyword-out-of-context index will be generated annually from the SERLINE file. The first issue of *Health Sciences Serials*, a quarterly microfiche publication, was distributed in January 1979. It includes location symbols for resource libraries in the RML network, as well as complete bibliographic information for each title. *Health Sciences Serials* is NLM's first microfiche publication. Two new monthly roll microfilm products, one for use in the reading room and one for staff use, were also produced from the Master Serials System in 1979.

During FY 1979, attention has focused on the need to establish an efficient method for updating regional serials location information in SERLINE. A special RML Task Force on SERLINE was established to provide assistance to NLM in this and other matters related to serials holdings information. NLM is now committed to the storage of actual summary holdings statements in the SERLINE file, using an American National Standards Institute standard which was approved in the summer of 1979. NLM believes that SERLINE should be updated by machine transfer of automated data from existing local and regional files whenever possible in order to avoid duplicate effort. To accomplish this, a one to one correspondence must be established between like titles in SERLINE and external files. During the past year, NLM sponsored a successful experiment to match SERLINE with an external file in order to add NLM control numbers to the external file. A contract will be proposed for FY 1980 to apply this technique to approximately 40 external files.

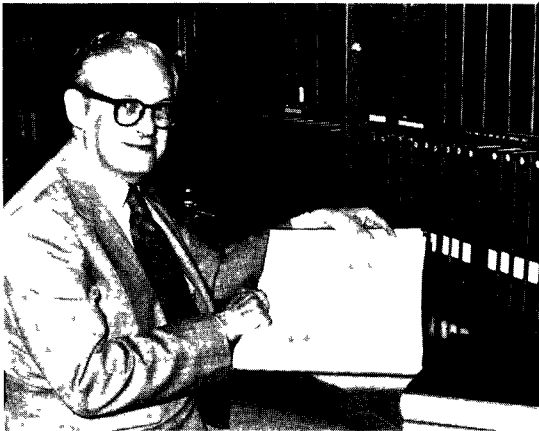
The dealer check-in program continued to expand. A file to hold dealer-supplied automated check-in data was created and procedures were established to process and merge data from three participating dealers. Data from three other dealers will be added to the file in FY 1980 and the merged data will then appear in in-house microfilm products.

Medical Subject Headings

In preparing 1980 MeSH, 366 new headings were added, representing concepts with no directly corresponding headings in 1979 MeSH. An additional 99 new headings replaced existing terms. One new subheading was introduced and seven others were made available for use with additional MeSH categories.

All terminology concerned with family planning and fertility control was extensively reviewed, and terms used by the creators of the POPINFORM data base were mapped to MeSH to make possible the conversion of POPINFORM as the nucleus of an online POPLINE data base. Continuing cooperation with the National Health Planning Information Center resulted in further development of health care delivery terms. A systematic review of the terminology of the digestive diseases and digestive system was begun with the cooperation of the National Institute for Arthritis, Metabolic, and Digestive Diseases.

A limited number of "pre-explosions" were introduced when 1979 MEDLINE was generated. These make possible the searching of some complete categories and subcategories of sub-



Clifford A. Bachrach, M.D., newly appointed editor of *Index Medicus*

ject headings that are frequently wanted but that have previously been impossible to search as a whole because of limitations of online programs. The popularity of this feature prompted many user requests to expand this capability in 1980.

Mid-Atlantic Regional Medical Library Program (RML IV)

The RML IV Program has developed a regional plan for cooperative activities among the Regional Medical Library (NLM), 14 Resource Libraries, and approximately 500 community institutions in the Mid-Atlantic states. This plan serves as a framework for the two major RML program areas: resource sharing and education. Within this framework, detailed operational plans are being developed for specific activities such as document delivery, cooperative bibliographic activities, training, and consultation.

An important accomplishment this year was the approval by the Regional Advisory Council and NLM of a document delivery plan. This plan, to be implemented at the beginning of 1980, establishes an interactive regional interlibrary loan network within and among the Mid-Atlantic states. At the community level, hospitals and other health-related institutions are responsible for limited cooperative services, with more extensive services from the Resource Libraries, and backup support from the Regional Medical Library (NLM). In FY 1979 NLM provided 73,955 interlibrary loans to the Mid-Atlantic Region.

The regional education program concentrated on basic level training for library personnel in hospitals and other health-related institutions. Workshops were presented by RML-trained instructors to 700 trainees on basic hospital library practices, basic reference serv-

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ices, basic cataloging procedures, and management of audiovisuals.

The NLM Online Services Network continued to expand in the Mid-Atlantic Region, with most of the growth attributable to the increasing number of hospitals and commercial organizations joining the network.

Continuing education is provided for the online centers through annual online updates prepared by NLM for presentation by a technical resource person from the Region. In addition, online workshops emphasizing search strategy were presented on the following topics: basic online searching and health care delivery.

Table 3. Online Institutions in the Mid-Atlantic Region

<i>Type of Center</i>	<i>Number</i>
Government agencies	77
Commercial organizations	38
Academic institutions	34
Hospitals	32
Associations	9
Total	190

Table 4. Bibliographic Services

	<i>FY 1977</i>	<i>FY 1978</i>	<i>FY 1979</i>
Total Items Indexed*	259,980	259,807	254,210
For <i>Index Medicus</i>	248,346	232,563	230,427
Recurring Bibliographies	26	28	28
Journals Indexed for <i>Index Medicus</i>	2,525	2,543	2,595
Monographs Indexed	225	87	55
Abstracts Entered	111,467	94,174	98,501

* Includes special list articles, audiotapes, and monograph chapters.

Table 5. Online Searches

<i>Data Base</i>	<i>FY 1977</i>	<i>FY 1978</i>	<i>FY 1979</i>
AVLINE	9,100	10,425	14,387
BIOETHICS	—	1,582	2,403
CANCERLIT	15,841	23,086	36,706
CANCERPROJ	3,863	4,208	5,713
CATLINE	125,455	147,138	184,667
CHEMLINE	25,482	33,009	46,149

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CLINPROT	596	1,017	1,571
EPILEPSYLINE	1,630	2,327	2,028
HEALTH	—	—	23,387
HISTLINE	—	183	3,263
JOURNAL AUTHORITY	898	511	—
MEDLINE	405,653	460,209	548,469
MESH VOCABULARY	2,302	2,303	2,870
NAME AUTHORITY	10,464	4,936	5,327
RTECS	471	5,983	9,788
SDILINE	19,677	19,581	19,394
SERLINE	—	11,914	23,577
STORED SEARCH	45	53	60
TDB (TOXICOLOGY DATA BANK)	1,286	1,572	10,953
TOXLINE	39,432	47,323	64,667
Total	662,195	777,360	1,005,379

Table 6. Offline Searches

<i>Data Base</i>	<i>FY 1977</i>	<i>FY 1978</i>	<i>FY 1979</i>
AVLINE	9	20	17
BACK66	34,600	38,028	42,337
BACK 69	45,185	49,658	56,867
BACK 72	59,388	68,423	76,818
BACK 75	—	58,625	91,956
BIOETHICS	—	1	6
CANCERLIT	1,257	1,472	1,394
CANCERPROJ	286	356	271
CATLINE	87	101	177
CHEMLINE	5	17	54
CLINPROT	6	11	23
EPILEPSYLINE	31	38	20
HEALTH	—	—	325
HISTLINE	—	0	8
JOURNAL AUTHORITY	0	0	—
MEDLINE	26,924	28,846	36,997
MESH VOCABULARY	1	0	0
NAME AUTHORITY	0	0	0
RTECS	12	36	82
SDILINE	39,454	53,856	71,173
SERLINE	—	2	8
TDB (TOXICOLOGY DATA BANK)	12	3	74
TOXBACK	5,628	6,716	7,693
TOXLINE	5,663	7,953	11,976
Total	218,548	314,162	398,276

Table 7. History of Medicine Activities

	<i>FY 1977</i>	<i>FY 1978</i>	<i>FY 1979</i>
Acquisitions			
Books	504	489	417
Modern manuscripts	77,177	15,805	46,006
Prints and photographs.....	606	293	297
Processing			
Titles cataloged.....	3,225	2,782	2,789
Modern manuscripts cataloged	61,290	37,527	61,666
Pictures indexed.....	495	526	320
Articles indexed	6,074	4,887	4,787
Pages microfilmed	152,994	124,158	118,151
Public Service			
Reference questions answered	1,803	2,160	2,187
ILL and pay orders filled.....	2,456	2,362	2,107
Reader requests filled	5,386	7,560	3,923
Pictures supplied	1,848	1,840	2,474

Table 8. Acquisitions Statistics

	<i>FY 1977</i>	<i>FY 1978</i>	<i>FY 1979</i>
Serial Records			
New titles added	990	1,272	1,974
Discontinued titles.....	812	830	828
Current titles received.....	25,831	23,711	22,172
Publications Processed			
Serial pieces	172,804	173,566	174,318
Other.....	25,000	21,793	26,503
Total.....	197,804	195,359	200,821
Obligations for:			
Publications	\$1,350,683	\$1,571,836	\$1,655,000
Included for rare books	79,246	81,185	80,000

Table 9. Growth of Collections

	<i>Previous Total (Sept. 1978)</i>	<i>Added FY 1979</i>	<i>New Total</i>
A. Book materials			
Monographs:			
Before 1500	564	1	565
1501-1600	5,524	23	5,547
1601-1700	9,658	41	9,699
1701-1800	23,058	168	23,226
1801-1870	39,310	87	39,397
Americana	2,285	10	2,295
1871-Present	363,647	10,972	374,619
Brief listed-INPROC	16,812	3,795	20,607
Theses HMD	281,452	56	281,508
Pamphlets	172,021	—	172,021
Bound serial volumes	576,679	25,591	602,270
Volumes withdrawn	—	(4,081)	(4,081)
Total volumes	1,491,010	36,663	1,527,673
B. Nonbook Materials			
Microforms	78,761	940	79,701
Audiovisuals	8,149	1,903	10,052
Pictures	72,498	297	72,795
Manuscripts	837,913	46,006	883,919

Table 10. Cataloging Statistics

	<i>FY 1977</i>	<i>FY 1978</i>	<i>FY 1979</i>
Completed cataloging	13,507	14,186	13,530
Catalog cards filed	126,591	166,300	285,726
Volumes shelf-listed	12,182	14,166	19,641

Table 11. Circulation Statistics

	<i>FY 1977</i>	<i>FT 1978</i>	<i>FY 1979</i>
Number of requests received	423,801	425,000	417,613
For interlibrary loan.....	280,512	261,969	249,820
For readers	143,289	163,031	167,793
Number of requests filled.....	343,313	329,119	327,118
For interlibrary loan.....	221,517	193,804	186,172
Photocopy	198,760	176,158	168,787
Original	22,757	17,646	17,385
For readers	121,796	135,315	140,946
Number of requests unfilled	80,488	95,881	90,495
Interlibrary loan	58,995	68,165	63,648
Rejected	23,083	28,164	21,072
Referred.....	7,946	7,445	7,616
Returned as unavailable	27,966	32,556	34,960
Reader service returned as unavailable	21,493	27,716	26,847

Table 12. Reference Services

	<i>FY 1977</i>	<i>FY 1978</i>	<i>FY 1979</i>
Requests by telephone	15,043	16,317	13,494
Requests by mail	1,140	753	729
Readers assisted	26,772	30,763	32,241
Total.....	42,955	47,833	46,464
Reading room users registered.....	32,060	33,504	29,758

Table 13. Binding Statistics

	<i>FY 1977</i>	<i>FY 1978</i>	<i>FY 1979</i>
Number of volumes sent to binder	33,045	33,881	31,911
Obligations for binding.....	\$113,104	\$157,426	\$149,520

Chapter 3: Computer and Communications Systems

Harry D. Bennett, Director Office of Computer and Communications Systems

The Office of Computer and Communications Systems (OCCS) provides data processing and data communications support to all elements of the Library. As such, it has a critically important supporting role for Library Operations (Chapter 2) as well as Specialized Information Services (Chapter 4). The present IBM 370/158 multi-process computer system is the equipment workhorse providing this support. NLM purchased the major portion of this equipment in 1977 when it became clear that there would be significant cost savings to the government for each year the present system is used until the planned replacement system is installed in 1980.

NLM is working with the General Services Administration on a competitive purchase to replace the IBM 370 system in early 1980 in order to provide the capacity necessary to meet the Library's growing requirements for data processing services. This replacement, which has been in the planning stages for well over two years, will handle the estimated 20-25 percent

annual growth until 1985. The system will be installed in the Data Processing Facility in the new Lister Hill Center building which is under construction. This facility has been designed to house the data processing equipment necessary to support NLM through the 1980s.

System Improvements

Considerable emphasis has been placed on improving the performance of the present 370 system so that NLM's data processing requirements can continue to be met on the existing equipment until the replacement system is installed. This emphasis will insure that the present system will continue to meet NLM's needs until the new system becomes operational in 1980.

During FY 1978 OCCS began implementing several new online input systems, including MEDNAM (MEDLARS name authority processing). MEDNAM provides for the online input and

maintenance of authority names in support of cataloging. During FY 1979 OCCS continued to enhance the MEDLARS II software system. A new system, MEDIEM (MEDLARS Input-Edit Module), was introduced this year and it has greatly improved the processing of cataloging information. Taken together with MEDNAM, MEDCIM, and MEDVOC, which were previously implemented, these modules constitute a complete conversion of MEDLARS input processing to more efficient online methods.

Enhancements to the ELHILL retrieval system this year included more efficient printing techniques, catalog card format online, and a capability to explode terms with very large postings. Another change now being developed will allow network users to input and edit passwords, saved searches, user codes and other items which previously were available only under NLM control.

During 1979 OCCS was given responsibility for the Data General Eclipse 200 minicomputer and OCCS subsequently made operational various developmental data entry software projects. One project in particular, the Retrospective Data Entry System (RDES) for the closing of the NLM Card Catalog, is being developed by a project team of OCCS and Lister Hill Center analysts. The growth in minicomputer applications and users made it necessary to upgrade this computing power. The Data General System 350 is being acquired to meet this requirement and will be installed in the computer facility of the new Lister Hill Center building.

Another important activity centered on Computer Output Microform (COM) applications, commencing with the quarterly microfiche publication of the *Health Sciences Serials* in January 1979. Other products being developed for internal NLM use will be on 16mm film. The growth of these applications, responding to the need of easy access to voluminous data, led to the acquisition of COM equipment which will also be installed and made operational in the new computer facility.

In FY 1979 OCCS also upgraded INQUIRE, the data base management system that provides management and software support to all the NLM components. This upgrading provides for greater data integrity and allows processing of partial and full text databases.

Data Communications

During this year OCCS personnel have reviewed the varied and complex requirements for data communications of the Library and the new building. In addition to the ongoing services requiring terminals and processors in everyday use (such as MEDLINE), these requirements include research and development of computer-based educational material and research projects such as developing stand-alone terminals and examining the potential of minicomputers/microprocessor-based systems for cost savings in information transfer. A project was begun to develop a total data communications system.

The first step in the project was to document the data communications requirements for all NLM components. Analysis of these requirements highlighted the need for a single and flexible local network that could serve the needs of both buildings. Such a local network should: (a) permit heterogeneous devices to communicate with one another in a "transparent" mode; (b) permit users access to multiple devices (e.g., multiple computer systems); (c) permit the sharing of resources; (d) provide a gateway from the local network to the public packet networks (Telenet and Tymnet); and (e) allow for growth in number of users and types of devices.

The next step was to analyze alternative network architectures that showed promise of meeting the objectives of such a local network. After investigating three possibilities, it was determined that a high speed "coaxial bus" system best met the requirements. The advantages of the coaxial system are good signal

quality, ease of implementation, highly developed components, adaptability to a changing communication system, accommodation of different traffic types, potential for broadcasting, simplicity, potential for high utilization, and the ability to continue operating

even though a component fails. The new system will service the inter- and intra-building data and video distribution requirements of NLM. Final design of this system was started this year; the system will be installed and tested in the third quarter of 1980.

Chapter 4: Specialized Information Services

Henry M. Kissman, Ph.D., Associate Director

The Division of Specialized Information Services is responsible primarily for the operation of the Library's Toxicology Information Program (TIP). The objectives of the Program are (1) to create computer-based toxicology data banks from the scientific literature and from the files of collaborating industrial, academic, and governmental organizations, and (2) to establish and operate toxicology information services for the scientific community.

During the period covered by this report, the HEW Secretary established the National Toxicology Program (NTP) to strengthen the Department's activities in the testing of chemicals of public health concern and to develop and validate new and better test methods. To accomplish these goals NTP has established a Department-wide effort to provide needed information to regulatory and research agencies and to strengthen the science base.

The NLM has agreed to provide, through the Toxicology Information Program, basic information support required by the NTP. This includes building and maintaining information files for

compounds selected by NTP for testing, information support for new areas of NTP research, technical direction for the NTP-sponsored Environmental Mutagen and Environmental Teratology Information Centers at the Oak Ridge National Laboratory, and assistance to NTP in building a data base on human exposure to carcinogens.

Collaborative projects with other agencies continue to be active and with the advent of NTP are indeed increasing. There is continuing increase in the use of online services such as TOXLINE, CHEMLINE, and RTECS, in hours of usage and number of printouts. The size of all the publicly available files has increased during FY 1979.

Online Services

TOXLINE: This bibliographic retrieval service comprises an extensive collection of about 630,000 journal citations and abstracts derived from published human and animal toxicity studies and information about the biological

effects of drugs, pesticides, food additives, industrial and household chemicals and hazards, radioactive materials, toxic pollutants and chemicals in the environment, and analytical chemical and bioassay methodology for toxic substances. TOXLINE is updated monthly and now includes citations and abstracts from the most recent five years of the biomedical and chemical literature. Information older than 1974 is now in the backfile, TOXBACK, which contains about 400,000 records.

TOXLINE/TOXBACK information is gleaned from six major secondary sources and six special collections of referenced biomedical and chemical information. The component subfiles now include selected MEDLARS references from 1968; *Chemical-Biological Activities* from 1965 (Chemical Abstracts, Sections 1-5, and Sections 8, 59, and 60); *Abstracts on Health Effects of Environmental Pollutants* from 1972 (Bio-Sciences Information Services); *International Pharmaceutical Abstracts* from 1970 (American Society of Hospital Pharmacists); *Pesticide Abstracts* from 1966 (Environmental Protection Agency); *Toxicology/Epidemiology Research Projects (RPROJ)* from 1977 (Smithsonian Science Information Exchange); the Hayes File (a precursor to the *Pesticide Abstracts*) 1940-1966; the Environmental Mutagen Information Center File from 1960 (Oak Ridge National Laboratory); the Environmental Teratology Information Center file from 1950 (Oak Ridge National Laboratory); the Toxic Materials Information Center File, 1971-1975 (Oak Ridge National Laboratory); and the Special Teratology File, 1960-1974.

In FY 1979, almost 65,000 online searches were conducted by TOXLINE users involving over 10,000 hours of computer connect time. In the process, more than 3.5 million citations were requested to be printed offline from TOXLINE/TOXBACK, an increase of about 1.5 million over FY 1978.

In April 1979, the newest subfile, identified as RPROJ (Research Projects), was added to TOX-

LINE. The RPROJ subfile contains abstracts that describe planned and ongoing research in toxicology, and epidemiology studies, covering morbidity and mortality resulting from population exposures to hazardous chemicals, drugs, biological agents, and disease organisms. RPROJ is generated from the Smithsonian Science Information Exchange data base by employing an appropriate set of subject profiles related to toxicology and epidemiology. In content, it is equivalent to the monthly publication *Toxicology Research Projects Directory (TRPD)* and the annual *Epidemiology Research Projects Directory (ERPD)*. This data base consists of initial and updated reports of planned or ongoing research projects supported with grants, contracts, or inhouse research funds from a variety of sponsors, mostly Federal. There are now 9,561 research projects in RPROJ. This first version of the subfile represents research projects which were funded from fiscal year 1977 forward. Monthly additions are made as part of the normal TOXLINE updating procedures. RPROJ will grow at a rate of about 1,000 projects per month.

CHEMLINE: This file, which was completely regenerated in April 1979, has almost doubled and now contains 425,112 chemical records for chemical substances known by some 800,000 different names. It includes 43,000 records on the Toxic Substances Control Act (TSCA) Chemical Substances Inventory of the Environmental Protection Agency. CHEMLINE records contain Chemical Abstracts Service (CAS) Registry Numbers, molecular formulas, chemical names, synonyms, ring structure information, some MeSH terms, and a locator data element to aid in identifying other files with information about a specific substance. Total online usage for CHEMLINE, which is made available from both the NLM and the SUNY computers, reached a peak of 520 hours/month for a total of 4,454 hours during the year.

RTECS (Registry of Toxic Effects of Chemical Substances): This file is an online searchable version of the National Institute of Occupa-

tional Safety and Health (NIOSH) publication *Registry of Toxic Effects of Chemical Substances*. By September 1979, RTECS provided online users with acute toxicity data for 36,851 substances. For many of these, the file also contains information on threshold limit values, recommended standards in air, aquatic toxicity data, eye and skin irritation data, and carcinogenicity data. All information in RTECS is referenced back to the source literature. NIOSH continues to maintain responsibility for the content of the file which it updates quarterly and republishes annually.

Toxicology Data Bank (TDB): This data bank has been made available during FY 1979 as an online, interactive data retrieval service. The TDB contains evaluated data describing the chemical and biological properties, as well as the usage, environmental, and occupational characteristics of selected chemical substances that may be hazardous and/or whose exposure potential is significant. Data extracted from sources such as textbooks and handbooks are further evaluated by a peer review committee constituted from the NIH Toxicology Study Section which is comprised of pharmacologists, toxicologists, and analytical chemists. Data extraction and input tasks are performed at the Oak Ridge National Laboratory for NLM. At the end of calendar year 1979 the online file should contain over 1,500 complete and reviewed substance records and another 1,000 references to records in various stages of development.

Laboratory Animal Data Bank (LADB): This data base provides comparative data on laboratory animals used as experiment controls in research and testing institutions. It is an online computer system designed for retrieval and statistical analysis by scientists. Formal training in computer retrieval methodology is not necessary. Eventually, the system will be available through a nationwide telecommunications network.

Using LADB, a scientist may: (1) select and examine base-line data for various physiologic and pathologic values; (2) determine the en-

vironmental and husbandry conditions for each animal group selected; (3) statistically analyze the retrieved data; and (4) print out the data as distributions (such as histograms or data tables) and as complete reports. Control data are contributed to the LADB project voluntarily by industrial, academic, and government laboratories. At present the file contains data from 185 animal groups, 26,203 animals of 28 strains, 9 species on which 371,198 observations (hematology, clinical chemistry, growth, or pathology) were recorded. Formal testing of LADB has been completed and it is expected that the file will be ready for public service in early 1980.

The LADB project is sponsored by the DHEW Committee to Coordinate Environmental and Related Programs, the National Cancer Institute, the National Library of Medicine, the National Center for Toxicological Research, the Environmental Protection Agency, and the Interagency Regulatory Liaison Group.

Query Response and Publication Services

The Toxicology Information Response Center (TIRC) at the Oak Ridge National Laboratory is sponsored by TIP to provide query response services in the form of literature searches. During the past year there has been a 41 percent increase in TIRC services. While this Center responds to search requests from the general biomedical community as well as from government agencies, the services provided to the latter have continued to increase during recent years. Thus, in FY 1979, 93 percent of TIRC services went to Federal agencies as against 79 percent in the previous fiscal year.

The current charge for services is \$30/hour, billed through the National Technical Information Service (NTIS), Department of Commerce. Charges for services to the Federal agencies are recovered through interagency agreements. During FY 1979 such interagency agreements

were negotiated with the Food and Drug Administration, National Center for Toxicological Research, National Institute of Environmental Health Sciences, the National Institute for Occupational Safety and Health, the Chemical Systems Laboratory of the Department of the Army, and the National Toxicology Program.

Recently TIRC has agreed to provide literature searches for the Information Response to Chemical Crises (IRCC) project which is sponsored by the DHEW Committee to Coordinate Environmental and Related Programs, the Department of Agriculture, the Environmental Protection Agency, the National Institute of Environmental Health Sciences, and the National Oceanic and Atmospheric Administration. Federal organizations concerned with toxic substances are occasionally confronted with unexpected events, caused by or related to a chemical substance, which threaten human health and/or the environment; these events are designated as "chemical crises." The primary objective of the IRCC project is to provide the sponsoring organizations with the results of a literature search on an identified chemical substance or topic within 48 hours. A secondary objective is to prepare bibliographies on substances or topics which, although noncrisis in nature, are of interest to the organizations sponsoring this project.

Publications: TIRC publishes reviews and annotated bibliographies in toxicology journals or through the NTIS. During 1979, these bibliographies covered the following topics: *Health and Environmental Effects of Toxaphene* and *Vinyl Chloride*. Two IRCC noncrisis searches were completed: *Asbestos in Air* and *Health and Environmental Effects of Acid Rain*.

TOX-TIPS (Toxicology Testing-in-Progress): TIP continues to produce, for the Toxicology Information Subcommittee of the DHEW Committee to Coordinate Environmental and Related Programs, two publications that describe research-in-progress. The first of these, TOX-TIPS, reports new projects in toxicology testing of chemicals by governmental, industrial, and

academic laboratories. Descriptions of epidemiology studies to determine toxic agents and their effects are also included. The rapid publication of this information is designed to prevent the unknowing duplication of these expensive studies. TOX-TIPS is published monthly through the National Technical Information Service at an annual subscription rate of \$25.

The scope and contents of the second publication, *Toxicology Research Projects Directory (TRPD)*, are much larger. Included are descriptions of about 12,000 government-supported research projects in toxicology and related fields. These descriptions, together with extensive indexes, offer laboratory scientists and administrators the opportunity to learn which organizations support what studies at which institutions. The information is prepared in publication form by the Smithsonian Science Information Exchange from its extensive data base and is published by NTIS at the subscription rate of \$100/year. As stated above, the content of the TRPD is also included, as the RPROJ segment, in TOXLINE.

Collaborative Projects

The involvement of the Library's Toxicology Information Program with interagency projects has continued throughout the fiscal year and has been mentioned previously in this chapter: planning activities related to the National Toxicology Program, the Laboratory Animal Data Bank project, the publications *TOX-TIPS* and *Toxicology Research Projects Directory*, and the Information Response to Chemical Crises Project.

Work continued during the past year on the Chemical Data Bases Directory, previously identified as an integral part of the Chemical Substances Information Network (CSIN), which underwent substantive changes in function and data format during FY 1979. A prototype file of records was created describing relevant data sources and a suitable indexing methodology

NLM Programs and Services

was developed for experimental online access using modified ELHILL II capabilities.

In the summer of 1979, the TIP accepted responsibility for managing the CSIN Subcommittee of the Interagency Toxic Substances Data

Committee, the group primarily responsible for overview of the CSIN project. In the coming year, the TIP will work on another key component of CSIN, the Chemical Structure and Nomenclature System, for which CHEMLINE can be considered a forerunner.

Chapter 5: Audiovisual Programs

Charles N. Farmer, Jr., Director National Medical Audiovisual Center

The National Medical Audiovisual Center (NMAC) is the component of the National Library of Medicine with primary responsibility for planning and administering a national program to improve the quality and use of audiovisual learning materials in health professional education.

In March 1980, NMAC will move from Atlanta to the new Lister Hill Center in Bethesda. Although extensive preparations for the impending changes in location have been made, NMAC's major programs— Educational Research and Evaluation, Training and Consultation, Media Development, and Distribution—will be continued.

Educational Research and Evaluation

A wide range of research and evaluation projects were completed or carried forward in FY 1979. Included were studies concerned with analyzing and validating instructional design and audiovisual development models, developing cost effective techniques in medical photography, and developing experimental visual excerpts for existing audiovisual materials.

The completion of a planning document for NMAC training in FY 1978 has resulted in the development of 50 lesson plans for faculty training material. Nine of the lessons are currently being developed for integration into the Center's training program. A test of medical students' learning styles was completed and validated. A workshop was held at NMAC to train health education researchers in the administration and interpretation of the test. Many attendees expressed their interest in utilizing the test in their local setting.



Materials Development Branch staff plan for the location of production equipment in the new Lister Hill Center building. Left to right, Clement Fowler, Jack Kirkland, Edward Burris, and George Maloney

Prototype learning materials in immunology and problem-based learning have also been developed. In addition, a project to develop and validate a system for field testing instructional programs in medical schools was completed. The system includes specifications for test development, procedures for conducting student tryouts, and techniques for reporting results.

Three literature reviews were initiated in FY 1979—in psychomotor skill training, inservice education programs in schools of the health sciences, and clinical evaluation. In addition, a project was begun with the Association of Biomedical Communication Directors to develop a model for conducting program evaluation. A workshop on program evaluation is being developed for presentation at the ABCD annual meeting in June 1980.

During FY 1979 a reevaluation of NMAC's loan and sales distribution program was completed. Results of the evaluation, based on a survey of over 3,500 clients, are available from the Center.

Workshops and Seminars

The NMAC workshop/seminar program develops and conducts faculty development workshops to demonstrate a variety of research-oriented training methodologies for health professional trainers. Workshops are initially conducted, evaluated, and improved at NMAC, and are then shared with NMAC's Field Training Centers across the nation.

Thirty-five workshops were conducted by NMAC and the nine regional training centers this fiscal year. The 766 participants who attended represented medicine, nursing, dentistry, allied health, and audiovisual support personnel. Workshop/seminar topics included: Development and Evaluation of Instructional Materials, Slide Art Techniques, Basic Television

Production Techniques, Learning Spaces, Basic Photography for Health Science Faculty, Test Construction, Interpersonal Skills, Development and Evaluation of Instructional Materials, and Design of Simulation Activities.

Two contracts supporting the NMAC workshop/seminar program were completed in FY 1979. The first, entitled "Analysis of Clinical Teaching Skills," provided a representative national sampling of teaching skills in medicine, dentistry, and nursing. The second contract was entitled "Use of Videotechnology to Teach Interpersonal Skills." Three new workshops, two volumes of resource documents, three videotape programs, and seven training manuals resulted from this contract.

Advisory Services

One hundred and forty consultations were provided to domestic and foreign visitors during the reporting period. Subject areas discussed include: teaching/learning methods using audiovisuals, updating audiovisual producing methods, the NMAC training program, mediated instructional materials, facilities design and hardware selection, audiovisual equipment needs, classroom design, applications of audiovisual educational technology, and various aspects of initiating and operating an audiovisual department.

Foreign countries represented by visitors include Australia, Canada, Japan, India, Switzerland, China, Scotland, and the Soviet Union. The four U.S.S.R. delegates who visited NMAC were accompanied by Miss Mary Corning, NLM Assistant Director for International Programs, and an interpreter. Their interests included medical information, indexing approaches, and library resources.

At the request of the National Naval Dental Center in Bethesda, a two-day site survey was conducted to evaluate the present Learning Resources Center and to make recommendations for the design of a future LRC and

classrooms in a proposed remodeling project. A site visit was also made to the School of Nursing of the William Cary College in New Orleans to provide analysis and recommendations on the development and management of a learning resources program at the school.

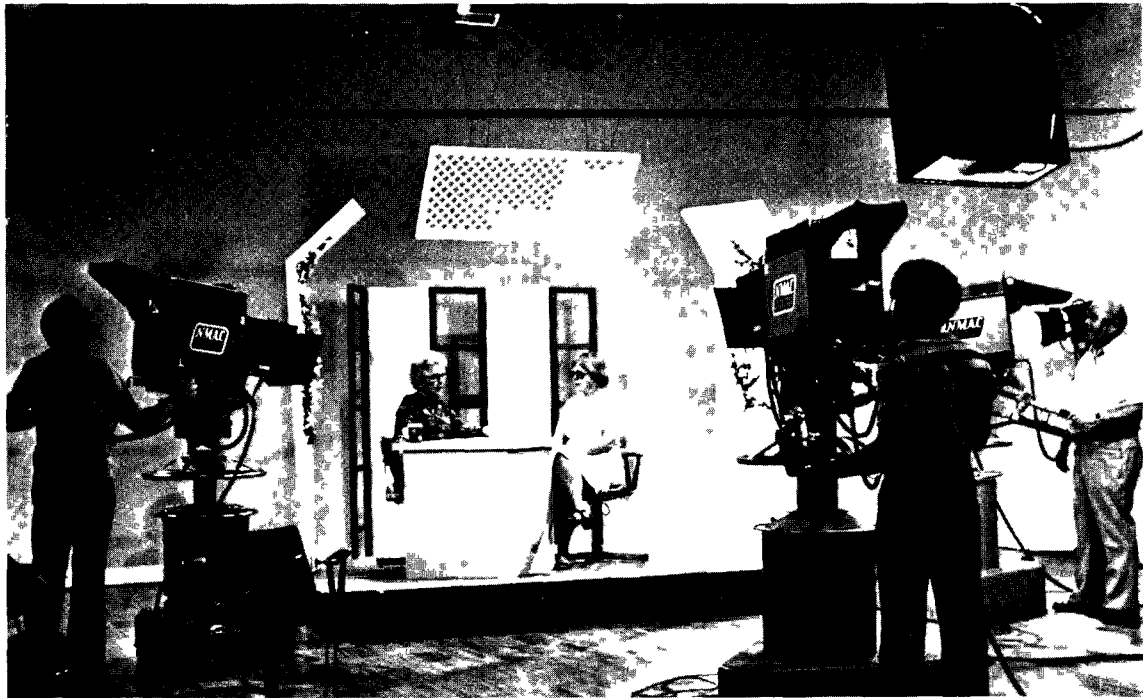
Media Development

Moving to the new Lister Hill Center next March will require the dismantling, shipping, and reinstallation of many items and systems essential to NMAC's media development program. Consequently, audiovisual production will be disrupted for several months. A concerted effort is being made to complete as many ongoing projects as possible while normal production capability exists; new projects are being initiated only if they can be completed quickly. One major exception will be

joint LHC/NMAC efforts, including audiovisual support for NLM data bases.

During the fiscal year, 101 productions intended for general distribution (58 slide/audiotape units, 30 videotape programs, and 13 motion pictures) were completed. Several topic series, notably "Leaders in American Medicine," "Distinguished Leaders in Nursing," "Rural Health," "Cell Biology," "Gross Anatomy," and "Human Physiology" accounted for a large share of the total production effort.

Five additional sound/slide and videotape units were developed for use in NMAC-sponsored workshops. Three videotapes—"MeSH Category D," "Immunology," and "Neoplasm"—were developed and delivered to NLM's Bibliographic Services Division, and three filmstrips were produced for the Pan-



NMAC's TV production crew record a *Distinguished Leaders in Nursing* videotape. Lucille Petry Leone, former Assistant Surgeon General and Chief Nurse Officer, USPHS (left) was featured and interviewed by Ruth Hepler, R.N., Ph.D. (right).

American Health Organization. A complete list of productions completed in FY 1979 is in Appendix 4.

Distribution

NMAC maintains and distributes a large collection of medical motion pictures and videotapes, available to requesters on a free-loan basis. The Center also places selected films, videotapes, and slide/audiotape programs with the Sales Program of the National Audiovisual Center, General Services Administration.

During the current fiscal year, 45,508 motion pictures and videotapes were shipped in

response to requests for loans. Fifteen new films and fifty-four videotape programs were added to the list of titles available. Combined sales of motion picture prints, videotape cassettes, and slide/audiotape packages totaled 3,114 units for the year, and 124 new titles were placed with the Sales Program.

Abstracting of selected films in NMAC's archival collection was continued, along with a study to determine the historical value of individual motion pictures in the collection.

Distribution of 1,827 copies of NMAC-sponsored monographs was made during the fiscal year.

**Table 14. Selected Statistics
NMAC**

	FY 1979
Audiovisuals requested	44,404
Audiovisuals shipped	45,508
Titles added (film and videotape)	69
Audiotape duplication	2,976
Titles to NAC for sale	124
Teaching packages sold through NAC	3,114
On-site surveys and consultations	6
NMAC-based consultations	140
Monographs distributed	1,827
NMAC-based workshops (215 attendees)	9
Regional workshops (766 attendees)	26
Audiovisual units completed	107

Chapter 6: Lister Hill National Center for Biomedical Communications

**Lionel M. Bernstein, M.D., Ph.D.,
Director**

During the year of this report the Lister Hill Center phased out one program and greatly expanded the scope of another.

June 27, 1979, was the date of the last broadcast over the Public Health Service/Communications Technology Satellite network. During its 818 days of operation the network had logged 2082.7 broadcast hours. Over 16,000 people had appeared before the cameras, logging a total of 46,372 participant hours. A summary evaluation of this experiment appears later in this chapter.

During the past year the Health Professions Applications Branch has undergone significant enlargement. A Branch Chief was selected in May and by year's end seven professionals were recruited. This nucleus should allow the further development of the Knowledge Base Program and associated studies during the coming year.

Health Professions Applications

Knowledge Base Program

A Knowledge Base Program has been established in the Health Professions Applications Branch, with collaborative support from the other Lister Hill Center branches and National Medical Audiovisual Center. A "Knowledge Base" is one in which information is selected, reviewed, compacted, and synthesized to form a total package of "knowledge" in a subject for use by a specified audience, such as medical practitioners.

The busy practitioner does not usually gain access to the formal literature via reference retrieval and interlibrary loan, nor should the

physician be expected to be expert in the necessary online access techniques. Furthermore, the physician does not have the time to process the mass of information likely to be available on any given problems relating to his practice. The Knowledge Base Systems being developed by the Lister Hill Center have the potential of extending the practitioner's ability to acquire, analyze, synthesize, and translate available biomedical information in solving the day-to-day problems of diagnosis, prognosis, and treatment of illness.

Knowledge Base Systems have the following characteristics: 1) computer-based, condensed representations of published information; 2) organized with varying levels of specificity; 3) citations selected to provide authority; 4) illustrations available to complement textual material; 5) current data amenable to continuous updating; 6) based on expert consensus; and 7) convenient for users—simplified interactive information access through text and illustrations.

A prototype Knowledge Base in the field of viral hepatitis was established in 1977 and has been subsequently refined. The Hepatitis Knowledge Base has been made available on an experimental basis for field testing at nine major medical centers and biomedical libraries. Its utility for assisting in medical decision making and in medical education is now being assessed.

The Hepatitis Knowledge Base experience has demonstrated the feasibility of the concept. Medical subject areas especially appropriate for this approach are those characterized by rapid increases in knowledge stemming from new research findings. The availability of such online information should have the potential to impact a major health area that has a significant proportion of clinical illness associated with its presence. Clinical areas characterized by a complex, rapidly expanding, and already extensive literature are especially appropriate. Thus, the Knowledge Base Program is now being ex-

tended to two additional areas—peptic ulcer and human genetics.

These areas, in particular human genetics, involve the application of new technology to augment the capabilities of computers to store and retrieve digital information. Optical videodisc technology permits the storage of large numbers of illustrations, either in the form of still pictures or motion pictures supplemented with audio. Contemporary systems can support the random access of over 50,000 individual frames of video information. This capability allows an almost endless variety of illustrative information as well as composites, tables, and drawings to be stored and displayed. Microprocessors allow terminal control and integration of these illustrative materials. Such information must, of course, be appropriately structured and indexed for random access and correlated with the textual content of the Knowledge Base.

The Knowledge Base system is presently being supported by a Data General Eclipse C-330 minicomputer using the MUMPS/MIIS data



Dr Merritt and Dr Siegel of the Health Professions Applications Branch demonstrate the Hepatitis Knowledge Base to Dr Raymond Koff (left), a member of the hepatitis panel of experts

base management system and a Hewlett-Packard 2648A display terminal. The Hepatitis Knowledge Base was demonstrated to more than 200 visitors during the past year.

Another technology developed to facilitate access to the Knowledge Bases was an automated telephone access system. This experimental system is based on the use of the touch tone telephone to have access to an array of audio messages that provide immediate answers to questions pertaining to hepatitis. The system was required to have unattended operation 24 hours a day with rapid response to user questions. The messages vary in length from 30 seconds to 10 minutes. Voice grade quality audio was required along with the ability to modify and update an individual answer without taking the total system out of service. Expansion of the answer bank to 100 messages per subject area and the augmenting of one message with information contained on another were also considered requirements. The cartridges can be selected instantly and in random order, and the basic system has been modified to allow the simultaneous selection of one tape by multiple users.

By dialing a single telephone number, a physician has access to any of the answers in the data bank. Selection of the desired tape is made through the appropriate number entered from the touch tone panel. Brief answers are provided, and more detailed answers are available as are references to other related tapes. The answers are updated as the Knowledge Base is updated. The Telephone Access System has been tested in the Lister Hill Center and demonstrated to a large number of individuals. The system is now being prepared for testing by selected physicians in a health care setting.

Biomedical Communication Costs

A study was conducted by the Health Professions Applications Branch on total expenditures associated with the formal biomedical communication activities in the United States. Data

are reported for the period of 1960-1977 and projections are made to 1985. The study covers: 1) the amount of time devoted by scientists as authors, reviewers, and editors of the biomedical literature; 2) publishers as reproducers and distributors of literature; 3) libraries and secondary services as literature managers; and 4) biomedical personnel as users of the literature. Overall biomedical communication expenditures are estimated at \$0.9 billion for 1960, \$4.7 billion for 1977, and \$8.4 billion for 1985, reflecting costs for researchers, educators, and physician-practitioners. These expenditures represent approximately 25 percent of all scientific and technical communication costs in the United States.

Information Technology

The research and development activities of the Center's Computer Technology Branch for FY 1979 have included the Integrated Library System (ILS), Knowledge Base Program, Videodisc, and the Advanced Terminal System (ATS) developments. Among the system development activities were the design and implementation of a Retrospective Data Entry System (RDES) for Library Operations.

Integrated Library System (ILS)

The goal of the Center's research and development program addressing problems of library automation is to develop a modular Integrated Library System. Other objectives of this program are to: (1) overcome problems associated with the transportability of such systems; (2) provide for multilevel online user interfaces; (3) allow system access to network resources (shared cataloging, interlibrary loan, etc.); and (4) achieve processing efficiencies that will allow various minicomputer, microcomputer, and large-scale computer implementations.

Initial efforts have concentrated on an integrated online catalog and circulation control system. During FY 1979 prototypes of all sub-

system components have been developed and many have been tested. These initial modules will be in operational test during the first quarter of the next fiscal year. The Army Library, Pentagon, has collaborated in and provided partial funding for this initial subsystem. While not a biomedical library, this installation will provide an invaluable test site for these developments as they relate to small and medium size libraries.

Knowledge Base Program

The minicomputer system previously developed by the Computer Technology Branch for the Hepatitis Knowledge Base was expanded and extended in FY 1979 to allow online access by nine academic institutions throughout the United States. Studies were also undertaken to allow for greater flexibility and transportability of the stand-alone microcomputer version of the delivery system. Efforts are underway to generalize the system capabilities to allow easy addition of other Knowledge Bases.

Advanced Terminal System (ATS)

The Advanced Terminal System (ATS) represents a new level of sophistication and cost-effectiveness for the delivery of computer-based educational materials in the health sciences. The ATS affords, from a single terminal system, the following capabilities: access to all network CAI systems, including PLATO; the incorporation of PLATO-commensurate graphics (including animation) in all other non-PLATO CAI systems; and creating and delivering computer-based educational materials with full graphics in a local stand-alone system. The latter, stand-alone capability, merges the advanced terminal technology of ATS with the extended LHC-PILOT CAI language developed by the Computer Technology Branch. This stand-alone terminal, costing about \$10,000, offers a level of sophistication surpassed only by PLATO. The latter has start-up costs of over one million dollars (a PLATO terminal, alone, costs approximately \$5,000).

During FY 1979, delivery was taken on a second pre-production ATS prototype which included two floppy diskettes. This prototype version will be used for field testing at up to seven health sciences educational institutions in the coming fiscal year.

Videodisc Program

The optical videodisc technology has been developed by, and for, the entertainment industry. Consumer model videodisc players are being marketed by Magnavox-Phillips for the home TV market for approximately \$700. These units will play disks with up to one hour of video programming per side. An "industrially" formatted optical videodisc will have only one-half hour of video programming per side but will format this material into 54,000 randomly accessible frames. An "industrial" videodisc player will cost, in production, about \$2,500. It will allow computer-controlled, random access to any one of the 54,000 frames, or to any video sequence.

The potential applications of this technology for the delivery of health sciences graphics are many, including computer-based education, online medical encyclopedias, etc. Even more exciting is the potential for encoding textual information and storing up to five billion characters per side on a videodisc. It would thus be possible to store all of MEDLINE (about three million citations) on one side of one disk. In addition, the cost of replicating these disks is estimated at less than \$10 each in quantities of a thousand.

The Lister Hill Center has two prototype industrial videodisc players. The Computer Technology Branch has built and programmed an "intelligent videodisc interface controller" (VIC) that is presently being used to control the videodisc players for testing. The Branch is also developing circuitry and computer protocols to allow the storage and retrieval of text rather than video information.

Retrospective Data Entry System

The Retrospective Data Entry System (RDES), a project undertaken in FY 1979 by the Computer Technology Branch in cooperation with Library Operations and the Office of Computer and Communications Systems, is an online capability to support the contract to convert retrospective records from the NLM card catalog. The RDES represents a mini-cataloging capability with special consideration given to optimizing the entry of bibliographic data from catalog cards which may contain a great deal of redundancy. Design of the RDES borrowed heavily from studies conducted for the Integrated Library System and many of the innovative features of the RDES will be used in the creation of the bibliographic edit module for ILS. RDES itself represents an important system capability and is of interest to libraries considering closing their card catalogs.

PHS/CTS Program

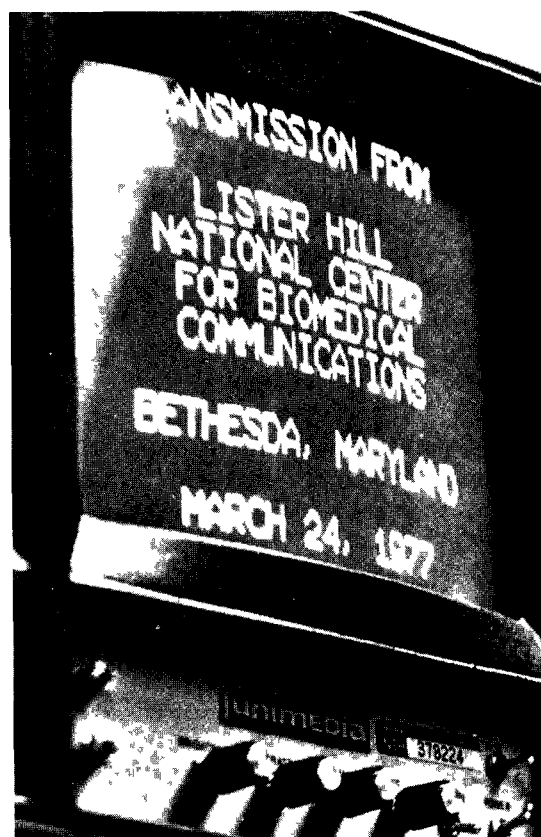
Since 1977 the Lister Hill Center has provided technical coordination and installation support for 20 experiments conducted by the Public Health Service using the Communications Technology Satellite (CTS). As the world's most powerful communications satellite, CTS is capable of transmitting simultaneous two-way color television programs between widely separated sites. Its high transmitting power and the use of a high frequency band (12-14 GHz) permitted the employment of small, relatively inexpensive ground terminals which have enabled various groups to engage in satellite-based video teleconferencing experiments. For the past two years the Public Health Service has sponsored two-way video teleconferencing among ground stations located in Bethesda, Maryland; Bozeman, Montana; Denver, Colorado; Fairbanks, Alaska; Lexington, Kentucky; and Seattle, Washington. Network experiments were concluded this past June. (A list of the 20 experiments is available from the Communications Engineering Branch, Lister Hill Center) Several

evaluation efforts were undertaken to determine whether the original goals were met

System Evaluation

In order to evaluate broadband communication as a tool for transmitting information among health science groups, each of the 20 CTS projects conducted over the past two years was reviewed by the Mitre Corporation. The primary elements of this system evaluation were: the potential for effectively disseminating information, potential for curriculum and resource sharing, potential for continuing education, and the use of broadband satellite communication as a substitute for travel

As a medium for wide dissemination of health science information, broadband satellite



First broadcast via the CTS satellite

communication was found to have unlimited potential. Broadcasts using existing networks and terrestrial retransmission can greatly increase audience participation via the CTS satellite, which is capable of transmitting between three sites as widely separated as six time zones. Less than four percent of the total number of program hours experienced satellite-related difficulties.

Curriculum and resource sharing via the CTS resulted in reduced travel by the faculty, which meant more time could be devoted to classes. Direct interaction with experts in the health sciences community was promoted through CTS experiments. These benefits were brought about with a minimal investment by the participating groups.

Learning was found to be about the same when the lecture was presented interactively (two-way transmission) as in a classroom situation. Lecturers who had difficulties usually lacked familiarity with the mechanics of TV production, such as not looking at the proper TV camera and nervousness while on camera. A recurring problem was the use of graphic/visual aids which could have been more effective if properly adapted to television specifications. While CTS teleconference projects demonstrated that the broadband two-way mode is an acceptable substitute for face-to-face communication, users who assessed the programs generally preferred the latter.

The Mitre Corporation report is available from the National Technical Information Service: *Biomedical Communications Experiments Using the CTS: System Evaluation*, PB-295-549, \$5.25.

Technical Evaluation

This evaluation assessed the technical performance of the network in terms of channel

quality, system availability, and equipment maintainability; its capability for broad geographical coverage, channel sharing, and digital transmission were also looked at. Another objective was to identify causes for deficiencies observed in performance, and to investigate corrective measures.

Among the highlights of the technical evaluation:

- The PHS/CTS network demonstrated high quality reception of color video and audio signals under both simplex and full duplex modes of operation.
- The ground terminal equipment demonstrated a high overall reliability. In fact, the rigid specifications on important ground terminal elements may be relaxed with no significant degradation in performance, thereby opening up the possibility of lower cost substitutions.
- Where deficiencies in performance were observed, such as the unwanted presence of echo, satisfactory corrective action was taken.
- "Outages," or loss of scheduled terminal time were rare, but when they did occur, they were caused by malfunctioning of earth terminal or studio elements.
- Programs were successfully conducted among stations geographically separated in larger coverage areas than had been originally assumed to be possible.
- It was of importance to find that with some perceptible, but not annoying degradation, it was possible to share the higher powered band between two video signals. Several programs were successfully conducted using this feature for which the system was not originally designed.

The technical evaluation, conducted by Lister Hill staff members, is available as a report from the Center's Communications Engineering Branch.

Chapter 7: Extramural Grants and Contracts

**Ernest M. Allen, Sc.D., Associate
Director
for Extramural Programs**

The National Library of Medicine administers a program of grants and contracts to improve information access for health professionals, and to assist health institutions in developing improved library services. During FY 1979, 152 grants and 9 Regional Medical library contracts were awarded for \$8,962,000. These awards are authorized by the Medical Library Assistance Act of 1965 and extensions, the most recent, P.L. 95-622, covering the period through FY 1981.

The NLM Office of Extramural Programs continues to emphasize the development of a national biomedical communications network by supporting activities of the Regional Medical Libraries and assisting other health sciences libraries. The newly appointed Regional Medical Library Coordinator assumed an active role in the management and direction of the RML programs and activities. In April 1979 a joint NLM/RML planning meeting was held to assess RML progress and to consider future developments and goals.

This year NLM funded improvements in consortia of libraries in 150 local health institutions, primarily hospitals, through the Medical Library Resource Improvement Grant Program. This consortia support, begun in 1977, is aimed at helping cooperating groups of health institutions, rather than individual institutions, so that coordinated information services may be planned and implemented for health professionals in a large geographic area. These 150 institutions supported through 19 consortium grants in FY 1979, when added to institutions supported in FY 1977 and 1978, mean that NLM has achieved the 1977 five-year goal of supporting 250 new institutions in only three years. This result proves the efficacy of consortia support in extending cooperative library development and national networking.

Recommendations of a 1978 task force to improve the quality of NLM-sponsored research were implemented by creating three new programs. New Investigator Awards provide funding for researchers who are, for the first

time, seeking support for research projects of their own design. Research Career Development Awards provide support for more established researchers who have shown outstanding potential for contributions to health-related information science. The support of studies of computer applications in health-science communication was initiated with the awarding of Program Project Grants.

There is a continuing interest on the part of institutions and individual scientists in both the publications program of the Library and the Special Scientific Project Grant Program. The foreign component of the publications program, which uses Special Foreign Currency Funds (P.L. 480), is reported in Chapter 8, "International Activities."

Regional Medical Library Program

The Regional Medical Library (RML) Program is a national network of eleven Regional libraries and more than 100 Resource Libraries coordinated by the National Library of Medicine. The network provides access to information in support of health services delivery, education, and research. Supported by ten contracts (NLM functions as the eleventh RML) the Regional and Resource Libraries share their resources through the following services: document delivery, bibliographic access to journal and monograph information, and cooperative technical processing. Also, RMLs promote network participation, especially by hospital libraries, through programs of consultation, training, workshops, and continuing education. The RML staffs administer, coordinate, publicize, and evaluate regional activities and provide NLM with advice and information to improve the network. In FY 1979 the RMLs placed increased emphasis on extension activities involving the hospital-library community. During FY 1979 nearly \$3 million was awarded to the Regional and Resource Libraries to fund RML

programs. Approximately half was used to support document delivery activities.

This year the Regional Medical Libraries implemented regional document delivery plans based on network-wide principles of cost sharing, increased local responsibility, and user charges. Performance standards for document delivery and analyses designed to determine optimal levels of fulfillment by network participants were issues examined in detail by NLM and RML Directors. Two decisions made during the year will have significant impact on the RML program now and for years to come.

First, NLM has decided to request competitive proposals from qualified institutions in the regions for future RML contracts. In eight of the ten regions supported by NLM contracts, this change will mean the first occasion of open competition since the RMLs were established in 1967-70. Proposals to perform RML services were solicited in June from institutions in Regions I, VII, and X. Libraries in Regions II, III, VIII, IX, and XI will compete in FY 1980 when their present contracts terminate. Regions V and VI will compete in FY 1981. Standards for fulfilling interlibrary loans were included in the contract statement of work for the first time. New awards will be made for three years, with annual incremental funding.

The second major decision was to hold a national planning meeting of RML Directors and Associate Directors, and key NLM staff. Atten-



Regional Medical Library Directors at their November 1978 meeting at NLM.

dees met on April 18-21 to assess the progress of the RML Program and to suggest ways to improve the effectiveness and efficiency of the national network. The intent was to lay the groundwork to plan for allocating resources, evaluating progress, and continuing network-wide planning. Discussions emphasized the importance of cooperation and sharing within the network and the need to develop a philosophical framework within which regions could participate in a coherent national system. Seven task groups were formed at the meeting to work on the following issues:

- 1) Measurement of regional performance
- 2) Network configuration
- 3) Content and format of RML Directors' meetings
- 4) Basic network services
- 5) Communication
- 6) Funding sources
- 7) Roles and responsibilities of network components

In addition to the national planning meeting, the RML Directors met twice during the year. Discussions at the fall meeting concentrated on the document delivery cost sharing plan. In their summer meeting, the Directors agreed to serve on committees to continue the work begun by the task groups listed above. The Directors also agreed to a revised structure and organization of future RML meetings and to alternate the location of the fall meeting between RML sites and the NLM.

Advances were made in other areas as well. The RML Directors held a series of meetings with the Association of State and Cooperative Library Agencies of the American Library Association to improve network interaction with state and public libraries; approval was given on a statement of the responsibilities of the Medical Library Association, the RMLs, and the NLM for continuing education; a network position on the Joint Commission on Accreditation of Hospitals consultation standards was developed, and a SERLINE task force was

established to provide regional input on union list activities.

This year might be viewed as a transition year for the RML Program. Though the network has been a model for the library community and often acclaimed the most successful national activity of its kind, its participants realize that evaluating services and establishing future priorities are essential to continued effectiveness. The phase-in of cost sharing plans signaled a change to increased local responsibility. This year the network began to concentrate more on evaluative efforts. Issues relating to the optimal network configuration for efficiently delivering services, appropriate standards for performance, improvement of the capability of libraries to make information available more extensively and rapidly, and the impact of technological advances, will require cooperation from libraries at all levels of the network. The commitment was clear in 1979; the results will be measured and defended in the future.

Resource Project Grants

The Medical Library Resource Project grant provides assistance to the established health science library to stimulate new health information services or to add a new dimension to existing services. Emphasis is placed on projects that support resource sharing and on institutions that are involved in outreach services. These activities reinforce and strengthen the Regional Medical Library network.

The National Library of Medicine made 44 awards for resource projects in FY 1979. Twenty-two of these were specifically for the support of consortium or network development. Such a grant, for example, was made to the Alabama Hospital Association to establish a health information network in sixteen rural counties across central Alabama. The network would link together a number of health-related institutions: The Alaha headquarters in Montgomery, the Tuskegee VA Hospital, a state junior college, and numerous small health-care facilities.

An additional 11 awards supported audiovisual activities that had an outreach service component. For example, a Resource Project Grant awarded to Springdale Memorial Hospital, Springdale, Arkansas, established an audiovisual center to serve 11 cooperating community hospitals in Northwest Arkansas. The primary holdings of audiovisuals will be used for shared in-service hospital training programs.

The remaining 11 awards were for a variety of activities to facilitate resource sharing. For example, an award was made to the University of Florida, Gainesville, for a study of the problems involved in converting slide-tape programs to microfiche format. The results obtained by this library, an active participant in the RML Network, should prove useful to other libraries.

Resource Improvement Grants

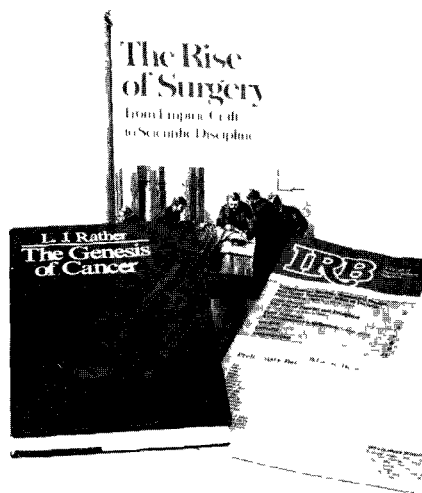
The Medical Library Resource Improvement Grant is available to assist small libraries to develop basic collections of books and journals. Support is offered to single institutions and to consortia of libraries. For consortia, two-year support is available. In the first year, funds may be used to employ a coordinator to organize the consortium and conduct a collection needs assessment. In the second year, member institutions are eligible to receive up to \$4,000 to purchase books and journals if they can contribute matching funds up to \$1,000. Single institutions may receive up to \$4,000 for one year to develop a basic library collection. Conditions of the award include a half-time library manager and matching funds based on a ratio of 4 to 1.

In FY 1979 NLM made awards to 15 single institutions for \$57,881. Start-up awards totaling \$97,669 were made to 13 consortia to allow them to plan, organize, and conduct a collection needs assessment. Six established consortia received a total of \$113,593 which enabled 23 institutions to purchase books and journals.

Biomedical Scientific Publications Grants

NLM's support for biomedical publications facilitates the dissemination of scientific information important to the U.S. health community. Administered in the International Programs Division, these programs utilize both domestic and international resources. The international publications program, authorized under Public Law 480 and funded with special foreign currencies, is described in Chapter 8, "International Activities."

The domestic Publication Grant Program provides selective support for nonprofit biomedical publications, including critical reviews and monographs in health fields; secondary literature tools (such as bibliographies, atlases, and catalogs); publications in library science, biomedical communication, and information science; temporary support for periodical publications; studies in the history of medicine; translations of current foreign biomedical



Three recent publications resulting from the Publications Grant Program.

monographs; and the publication of symposia and conference proceedings related to U.S. health needs.

During FY 1979, 35 Publication Grants were awarded in a total amount of \$745,798. Of these, 12 were new awards, including a reference volume on human bacterial infections, an authoritative handbook in ophthalmology on the physiology and pathology of the pupil for use by clinicians and researchers, and a review on the development of British forensic medicine. The continuing emphasis in this program upon high-quality, but low-cost, projects that are scheduled for early publication was reflected in a drop in the average amount of a Publication Grant in FY 1979—slightly over \$21,000, including both direct and indirect costs. About 30 percent of the total funding supported analytic critical reviews and monographs in the health sciences.

Among the studies published in FY 1979, which had received earlier support in the Publication Grant Program, was L.J. Rather's, *The Genesis of Cancer* (Baltimore: Johns Hopkins University Press, 1978), a history of Western medical thought on the genesis of tumors. The first issue of a newsletter dealing with human experimentation, *IRB: A Review of Human Subjects Research*, was published by the Institute of Society and Ethics and the Life Sciences, from Hastings-on-Hudson, New York. This NLM-supported periodical is expected to contribute to the protection of people who participate in experiments as volunteers. A major study by a distinguished American surgeon and his wife also reached publication: O.H. and S.D. Wangenstein's *The Rise of Surgery* (Minneapolis: University of Minnesota Press, 1978). The result of many years of research, for which NLM provided only partial support, the book explores surgery's progress from an empiric craft to a scientific discipline. (See Appendix 2 for a complete listing of books, periodicals, and journal articles received in FY 1979 resulting from NLM Publication Grants.)

Special Scientific Project Grants

These awards support the preparation of authoritative treatises on major health topics. In a time of rapidly growing literature, where problem areas attract the attention of many disciplines, there is a need for an authoritative treatment of a major issue in a way that brings the relevant literature together and sets it forth in a cogent, reliable interpretation. Such treatises are written for a broad professional or multi-professional audience.

These works make heavy demands upon scholarship and call for the ability to organize great amounts of material. They require a cogent, graceful prose style, with the perspective of mature scientific experience. Their documentation must be impeccable. Grants can help qualified scholars or scientists find the time and the supporting resources necessary to accomplish these demanding tasks in a relatively brief time.

Applications for Special Scientific Project Grants are reviewed competitively as are other NLM grants. Reviewers seek evidence that the proposed work is likely to fill an identified need, that pertinent materials and documents are available or will become available, that the proposed organization of the treatise is appropriate, and that a reputable publisher is interested in publishing it. The project period may cover one or several years. Earlier grant-supported authors have found that writing the manuscript takes at least one year, and that additional time is required after delivery of a manuscript to a publisher. While the book is in press, indexing, final verification of sources, and work with editorial staffs require close attention.

This year NLM initiated four new Special Scientific Projects:

Tom H. Christoffel, J.D.
University of Illinois
"Health and the Law"

Leon Gordis, M.D.
The Johns Hopkins University
"Epidemiology of Cancer in Children"

Tom L. Beauchamp, Ph.D.
Georgetown University
"Informed Consent"

Dorothy Noyes Kane, Ph.D.
Early Childhood Education, Inc
"Environmental Hazards of Small Children"

A grant-supported treatise appeared in December, 1978. Wesley W. Spink, M.D., *Infectious Diseases, Prevention, and Treatment in the Nineteenth and Twentieth Centuries*, University of Minnesota Press, 1978.

Research Grants

Using a number of grant mechanisms to support a variety of research activities it has been possible to implement the principal recommendations of the Task Force which had evaluated NLM's Research Grant program in 1977 and 1978. The Task Force had recommended the support of major studies in the area of "computers in medicine" and had also encouraged NLM to help develop talented younger persons as research scientists in biomedical communications. In collaboration with the Lister Hill National Center for Biomedical Communications, several major studies were inaugurated in the form of Program Project Grants. Additionally, two new kinds of grants were implemented to support the development of seven potentially promising researchers.

Research, Development, Demonstration

These awards are investigator-initiated projects that address problems of health information access, retrieval, and utilization. The projects may investigate fundamental research

problems, they may undertake to develop theoretical findings into practical applications, or they may demonstrate the value of new technologies in operating situations. Two examples illustrate the range of NLM interest in providing support.

- At North Texas State University new methods of document indexing, using certain techniques of bibliographic analysis, are being explored. The possibility of automating the indexing process could have many advantages for computerized bibliographic information systems.
- At the University of Southern California, library reference services and continuing medical education assessment are being combined to develop individualized library services for medical office practice. This specialized information service brings to the physician's attention current published information relating to his patients' problems.

New Investigator Research Grants

These are small project awards to help young scientists advance to maturity as independent research investigators in the general area of biomedical communications. Eligibility is limited to those who have received the doctorate within five years but not yet served as principal investigators on a research grant or contract. The amount of support is limited to \$90,000 over a three-year period. Four New Investigator Research Grants were awarded this year.

Research Career Development Awards

These awards enable institutions to further the career development of young scientists with three or more years of relevant post-doctoral experience by making it possible for them to devote substantially full time to research in biomedical communications. Support may con-

tinue for five years and provide up to \$30,000 a year for salary. Applicants are evaluated on their potential for further growth in research, the suitability of their environment for the work, and their research plans. Three Research Career Development Awards were made in FY 1979.

Computers in Medicine

The Task Force found that advances in computer sciences with potential application to improved biomedical communication will require the support of large scale studies. Although computers are clearly a part of modern medicine, achieving their full potential as aids to decision-making, information handling, and health education requires the coordinated efforts of many disciplines. For this reason, Program Project Grant applications were sought in November 1978. The Program Project is a group of discrete but related research efforts with a central leadership and common focus. This form of support is widely used throughout the National Institutes of Health.

Although the announcement of this program came late in the year, 23 proposals were received and reviewed, of which seven were recommended for approval. It was possible to award five program project grants totaling nearly \$1,150,000. These funds were not awarded under the Medical Library Assistance Act but were provided by the Lister Hill Center. However, general program development strategies, the application review process, and grant administration are carried out exclusively by the Extramural Programs.

The five program project awards are:

Edward A. Feigenbaum, Ph.D.
Stanford University
"Biomedical Knowledge Representation"

Robert A. Greenes, M.D., Ph.D.
Peter Bent Brigham Hospital
"Investigations in Clinical Decision Making"

C. Frank Starmer, Ph.D.
Duke Medical Center
"Medical Databases and Clinical Investigation"

Peter Szolovits, Ph.D.
Massachusetts Institute of Technology
"Artificial Intelligence and Clinical Problem Solving"

Arthur S. Elstein, Ph.D.
Michigan State University
"Studies in Clinical Reasoning and Information Theory"

The large response to the first announcement of the program was a gratifying indication of widespread interest in this field, and the Board of Regents has recommended continuation of the program. Because the requirements for a program project application can impose undue constraints on some individuals and institutions, the research community has been advised that applications may take the form of either major single research projects or program projects.

Training Grants

The National Library of Medicine's Training Grants Program in Health Sciences and Computer Technology was begun in 1972. One of its objectives is to promote a more effective integration of computer technology into all phases of clinical medicine—teaching, practice, and research.

In FY 1979, \$1,472,000 was expended in support of this program. Approximately one-half of the training funds covered direct training expenses (stipends, tuition, etc.) the other half reimbursed the grantee institutions for some of the added expenses generated as a result of the training grant. In FY 1979, 84 individuals received training; 44 were predoctoral students, 40 were postdoctorals. These grants supported training activities in 10 institutions located throughout the United States.

NLM Programs and Services

Seven of the training program directors have shared information about the current activities of individuals having completed their training programs. Sixty-five individuals were so identified, 36 of whom had been postdoctoral trainees. Twenty-nine of the postdoctorals were physicians. Of the predoctoral trainees, eight had obtained the Ph.D. degree while under the auspices of the training grant. As to the current positions held by former trainees: 22 are faculty members at a variety of academic institutions, others are in private practice or are acting as private consultants. Ten individuals are pursuing postdoctoral experience which is not grant supported, others are working in industry or with the government. Of the 65 trainees, only two are not utilizing the experience which they had obtained from NLM training grants.

The results of this initial survey indicate that the NLM training grant program has both ac-

celerated and lent coherency to what otherwise would be a diffuse set of academic activities. It has supported the training of a substantial number of individuals who have gone on to careers in medical computing, some of whom will be future leaders in this area. The momentum generated by the NLM supported training programs has been taken advantage of and added to by the academic and professional communities.

In addition to the grants for training, NLM has a contract with the Council on Library Resources to support management interns at selected health science libraries. The objective of this program is to provide an experience which will qualify librarians for director-level positions. In this fiscal year, three interns have completed their internship: William E. Maina, Carol G. Jenkins, and Faith A. Meakin.

**Table 15. Extramural Grant and Contract Programs
(in thousands)**

	FY 1977		FY 1978		FY 1979	
Research	(15)	\$1,165	(13)	\$1,111	(22)	\$1,658
Resource Projects	(46)	1,696	(39)	1,848	(44)	1,735
Resource Improvement	(20)	77	(13)	165	(34)	284
Training*	(10)	1,207	(11)	1,459	(10)	1,472
Special Scientific Projects	(3)	109	(7)	248	(7)	215
Regional Medical Libraries*	(9)	3,086	(9)	3,020	(9)	2,848
Publications*	(42)	738	(47)	1,071	(35)	750
Other	(4)	276				
Total	(149)	\$8,354	(139)	\$8,922	(161)	\$8,962

Figures in parentheses refer to number of projects

* Includes contract funding

Chapter 8: International Activities

Mary E. Corning, Assistant Director for International Programs

The NLM has continued its international cooperative undertakings designed to improve library and health information services with the ultimate objective of enhancing biomedical research, education, and health care. The programs relate to the developed and the developing world.

International MEDLARS Agreements

The current NLM MEDLARS partners are Australia, Canada, France, Germany, Italy, Japan, Mexico, South Africa, Sweden, United Kingdom, and the Pan American Health Organization. Italy became a new collaborator during this past year; and Iran ceased its MEDLARS operations.

An International MEDLARS Technical Meeting was held at NLM on March 21-23, 1979 with 25 representatives of the non-U.S. MEDLARS Cen-

ters in attendance. These individuals met with NLM staff to share technical information and operational experience. There were sessions on network developments, user services, training, new data bases, computer hardware and software limitations, and systems evaluations.

A European MEDLINE Workshop was held in Paris in June 1979 which was attended by Miss Mary E. Corning, Assistant Director for International Programs; Dr. Joseph Leiter, Associate Director for Library Operations; and Mrs. Peri Schuyler, Head of Unit A, Index Section. Dr. Leiter gave a review of technical developments and Mrs. Schuyler participated in the technical workshops and conducted an indexing course. Miss Corning, attending at the invitation of the Director, Institut National de la Sante et de la Recherche Medicale (INSERM), described NLM's international activities within the context of U.S. domestic mandates and responsibilities, and she represented NLM on policy matters.

The Workshop provided an excellent opportunity for formal and informal discussion among

members of the European Centers and for the members to meet with the NLM representatives. The Directors of the MEDLINE Centers had special discussions, and there were working groups on training and user information needs, multifile searching, relationship between main and associate centers, and searching problems. Special presentations described the status of, and planned developments in, network development and telecommunications.

US/USSR Cooperation in Biomedical Information

Background

In 1976 during the course of a visit to the USSR by an NLM Delegation consisting of the Director, Martin M. Cummings, M.D., W.N. Hubbard, Jr., M.D., Mary E. Corning, and Dr. Vladimir Slamecka, a memorandum for future collaborative efforts was signed by Dr. Cummings and Dr. Hubbard for NLM, and by Dr. Lisitsyn for the USSR's All-Union Scientific Research Institute for Medical and Medico-Technical Information (VNIIMI). This memorandum recommended the establishment of a Joint Working Group to implement specific projects and to consider future prospects.

On March 5, 1979 NLM received a USSR Delegation on Biomedical Information led by Academician A.S. Pavlov, Chairman of the Ministry of Health's Scientific Council and Vice President of the Academy of Sciences, to discuss implementation of the memorandum.

Joint Working Group Established

A Joint US/USSR Working Group was established in March 1979. The US/NLM side consists of Miss Corning, Chairman; Dr. Henry

M. Kissman, Associate Director, Specialized Information Services; Dr. Joseph Leiter, Associate Director, Library Operations; James W. Barry, Deputy Associate Director, Library Operations; and Dr. Clifford A. Bachrach, Head, Medical Subject Headings Section, Library Operations. The Soviet side consists of Dr. Yuri Lisitsyn, Director, VNIIMI, Chairman; Dr. N.A. Yakunin, Director, State Central Scientific Medical Library (SCSML); and Dr. Elena I. Dubinina, Chief, MEDINFORM Department, VNIIMI.

Participating in the discussions of the Joint Working Group were Professor A.S. Pavlov; Dr. Cummings; and NLM Consultants W.N. Hubbard, Jr., M.D., former Chairman of the NLM Board of Regents; G. Burroughs Mider, M.D., former NLM Deputy Director; and S. Paul Ehrlich, Jr., M.D., former Assistant Surgeon General of the U.S. Public Health Service.

Addendum Signed

As a result of a detailed examination of the 1976 memorandum, the Joint Working Group prepared an addendum to that document. This addendum, signed by Dr. Cummings and Dr. Lisitsyn, represents a program for implementing the original 1976 memorandum. The proposed cooperation includes projects for immediate implementation in the exchange of biomedical



Dr. Pavlov, Miss Corning, and Dr. Hubbard at the March 1979 meeting on US/USSR cooperation in biomedical communication

literature, interlibrary loans, and exchange of experts. Programs requiring better definition in order to determine the feasibility of pilot projects are: vocabulary development in public health and social hygiene, and information exchange in toxicology and pharmacology.

Exchange of Biomedical Literature

Exchange of biomedical literature will be executed on an equivalent basis and will take into account differences in the subject scope of NLM, VNIIMI, and SCSML and in materials which each has available for exchange purposes. Materials for exchange were identified and agreement was reached on procedures. James Barry is responsible for NLM aspects of the exchange of biomedical literature; the Soviet counterparts are N. D. Ponomareva, Branch Chief, SCSML, and G. A. Serova, Head of a group of the MEDINFORM Branch, VNIIMI.

Interlibrary Loan Cooperation

The NLM and the SCSML agreed to transmit to each other requests for photocopies of articles contained in journals in the collections of the counterpart institution. The transmission of these requests may be either by telex linkage between the USSR Ministry of Health and the U.S. Department of Health, Education, and Welfare or by air mail. Agreement was reached on procedures, forms, and copyright requirements.

Exchange of Personnel in Health Information

Under the leadership of NLM and VNIIMI, the exchange of U.S. and Soviet experts may take any of three forms: (1) exchanges within the context of agreed-upon joint cooperative projects, (2) experts to engage in work/study/training programs, and (3) individual exchanges which will be decided on a case-by-case basis.

To move rapidly from these agreed-upon concepts of exchanges to a specific cooperative

project, NLM proposed a work/study/training program of mutual benefit. Illustrative examples were discussed, such as a Soviet expert knowledgeable in the content of the medical literature and in Soviet medical terminology who will work with NLM specialists in indexing and subject classification of Soviet literature. In return, NLM will provide specialized training to the Soviet individual in the management and administration of modern medical library technology. Such a project at NLM may be followed by a second similar project to be proposed by VNIIMI, in which a U.S. expert will engage in a work/study/training project in the USSR.

Vocabulary Development

The Joint Working Group discussed a pilot project in the vocabulary and nomenclature of public health and social medicine. The concepts of "public health and social medicine" are different in the U.S. and the USSR. The Medical Subject Headings and vocabulary used by NLM have been reviewed by VNIIMI, but NLM experts have not had the benefit of knowing VNIIMI's vocabulary and classifications of public health and social medicine literature. VNIIMI will provide copies of their vocabulary and classification to NLM.

Each side will have an expert staff member study the materials to determine whether, within the general area of public health and social medicine, a carefully circumscribed area can be selected for comparison of both concepts and terminology. A report and recommendation will be submitted to the Joint Working Group. The appointed experts are Dr. Clifford A. Bachrach, Head, Medical Subject Headings, and E. I. Dubinina, Head of the MEDINFORM Branch, VNIIMI.

Pharmacology/Toxicology Information

The Joint Working Group examined the area of pharmacology and toxicology. It recognized the scientific and social significance of these

fields but, after extensive discussion, the Group acknowledged that the specific development of a pilot project needs further study, examination, and definition

As a beginning, each side will identify one expert to exchange views and correspondence to learn the responsibilities of each institution in the area of pharmacology and toxicology information. Based on this informal exchange of views, the two experts will submit a specific statement to the Joint Working Group for further examination in order to determine any future course of action. The designated experts are Dr. Henry Kissman, Associate Director, Specialized Information Services and A. M. Nevzorova, Senior Researcher, VNIIMI.

This Addendum to the 1976 Memorandum will be presented to the next meeting of the Joint US/USSR Committee on Cooperation in Public Health and Medical Sciences.

The Soviets reviewed in detail the functions and programs of the National Library of Medicine, including its National Medical Audiovisual Center in Atlanta. In addition, the USSR Delegation met with Dr. Julius Richmond, HEW Assistant Secretary for Health, and Dr. Donald Fredrickson, Director of the National Institutes of Health. The Delegation visited and was briefed by the staff of several NIH institutes, the American College of Cardiology, the Emory University School of Medicine, the Southeastern Regional Medical Library Program, the National Technical Information Service, and the Library of Congress.

United States/People's Republic of China Cooperation

During FY 1979 there has been an increase in cooperative efforts between NLM and the Peo-

ple's Republic of China. A few weeks before the announcement by President Carter of the establishment of diplomatic relations between the United States and the People's Republic of China, NLM Director Dr. Martin M. Cummings traveled to China as part of a delegation of the American Association for the Advancement of Science. The trip consisted of a three-week tour of scientific and medical institutions in Peking, Shanghai, Canton, and other parts of China. NLM Board of Regents member Dr. Eloise Clark was also a member of the delegation. The AAAS arranged a return visit from the Scientific and Technical Association of the People's Republic of China (STAPRC) to the United States. A delegation led by Pei Lisheng, Vice Chairman, STAPRC, was received by NLM in May 1979.

With the resumption of a number of Chinese publications, there has been an increase in the exchange of publications between NLM and the Chinese Medical Association and Chinese Academy of Medical Sciences. NLM now receives 17 Chinese journals regularly in return for which the Library sends NLM publications.

As a result of Dr. Cummings' visit, a *quid-pro-quo* arrangement was agreed upon with Professor Huang Chia-ssu, President of the Chinese Academy of Medical Sciences. NLM has agreed to receive three individuals who will perform specialized cataloging of Chinese material in the NLM collection in return for which they will receive NLM training in modern medical technology. On June 22, 1979 a formal United States-People's Republic of China Protocol on Cooperation in the Science and Technology of Medicine and Public Health was signed by Secretary of Health, Education, and Welfare Califano and Minister of Public Health Qian of the People's Republic of China. Under this agreement, medical information science was identified as one of the areas for collaboration. Dr. Cummings was named the Coordinator for the United States and Professor Li Sigiao, Associate Professor, Institute of Information, Chinese Academy of Medical Sciences, for the PRC.

Collaboration with WHO/PAHO

Recognizing that biomedical and health information is essential in the fostering of research and training, Dr Sune Bergstrom, Chairman of the WHO Global Advisory Committee on Medical Research suggested that the National Library of Medicine might produce a specialized bibliography on tropical diseases from its computerized storage and retrieval system, MEDLINE. As a result, the NLM and WHO are now collaborating on such a quarterly bibliography.

The *Quarterly Bibliography of Major Tropical Diseases* is a cooperative undertaking of NLM and the Special Program for Research and Training in Tropical Diseases sponsored by the United Nations Development Program, the World Bank, and the World Health Organization. The Special Program for Research and Training in Tropical Diseases is a concerted effort to control six major tropical diseases: filariasis, leishmaniasis, leprosy, malaria, schistosomiasis, and trypanosomiasis. This Special Program includes research and development for preventive, diagnostic, therapeutic, and vector control methods as well as the strengthening of research capability within the developing countries.

The new quarterly bibliography prepared through NLM's MEDLINE system covers these six major tropical diseases; it is distributed by WHO to scientists and institutions in tropical countries. The first pilot issue (Vol 1, No 1, 4th quarter 1978) was produced by NLM, printed with funds from the Medical Information Center (MIC) of the Karolinska Institutet, and distributed by the WHO Tropical Disease Program. Issues for 1979 (beginning with Vol 2, No 1, January-March 1979) are being produced and printed by NLM for distribution by WHO in Geneva, Switzerland. This is an experimental arrangement which will be continued during 1980 while WHO assesses the usefulness

of the bibliography in order to determine a future course of action.

The WHO Advisory Committee on Medical Research Subcommittee on Information, which is chaired by Professor Bergstrom, met in Washington, D C September 11-13, 1979. Members of the Committee are Dr Cummings, Professor B O Osuntokun, Dean, Faculty of Medicine, University of Ibadan, Nigeria, Dr A S Pavlov, Vice-President, Academy of Medical Sciences of the USSR, Mr M A P Sendahira, University of Sri Lanka, Dr Abraam Sonis, Director, PAHO Regional Library of Medicine, Sao Paulo, Brazil, and Mrs Tsu Ping Woodhull, University of Malaysia. The NLM hosted the group for one day during its meetings.

In September 1979 a Memorandum of Understanding was signed between NLM and WHO for the provision of MEDLARS computer searches and interlibrary loans (photocopies of journal articles) for the 84 developing countries in the WHO Regions of Africa, Southeast Asia, Eastern Mediterranean, and the Western Pacific. This is an experimental one-year arrangement in an effort to develop a mechanism to respond to the needs of the developing countries. Under this arrangement, WHO will pay the equivalent of one and one half people who will be in residence at NLM to provide 1,400 MEDLINE searches and 2,500 interlibrary loans for one year beginning October 1, 1979. This is a modest number of services compared to the total needs of the developing countries. This year of experience will provide useful data to determine future activities.

The NLM has continued to provide technical expertise and service support to PAHO's Regional Library of Medicine (BIREME) as well as receive BIREME staff for specialized training. As a member of the Scientific Advisory Committee for BIREME, Miss Corning attended the eleventh meeting of this group in Sao Paulo in May 1979. This Committee provides policy guidance to the Director of PAHO on the organization and functions of BIREME and its role as a

regional health information resource for South America. The Committee studied BIREME's functions and activities in 1978, including interlibrary loans, bibliographic searches and publications; reviewed BIREME's budget and problems; and examined the relationship of resources to needs.

Special Foreign Currency Program

The oldest of the Library's extramural activities, the Special Foreign Currency Program, supports the preparation and publication of biomedical studies in seven cooperating countries: Poland, Yugoslavia, Israel, Egypt, Tunisia, India, and Pakistan. Initial authorization for the program derives from Public Law 83-480, as amended. The program is also currently funded through collaborative, bilateral agreements in Israel and Poland.

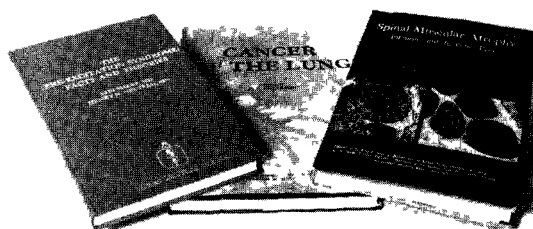
Ancillary to NLM's domestic Publication Grant Program (see Chapter 7), the Public Law 480 Program enables the Library to draw upon foreign scientific personnel and resources in obtaining and disseminating information important to U.S. health educators, practitioners, and researchers. Among the P.L. 480 projects currently funded are critical reviews and monographs analyzing medical practice and research; the translation of foreign monographs in the health sciences; the publication of major international symposia and conference proceedings; the preparation of bibliographies, atlases and other secondary literature tools; and studies in the history of medicine.

The projects are multiyear, and during FY 1979 there were 108 active projects, totaling \$1,648,439 equivalent in foreign currencies. Almost 60 percent of the program is currently carried out in Poland and Israel, about 20 percent in Yugoslavia, and some 15 percent in Egypt. New critical reviews and monographs in health fields constitute almost 65 percent of the projects, with English translations of foreign-

language books representing another 20 percent

Among the new P.L. 480 projects activated in FY 1979 were a critical review of international medical experience with prostaglandins and myocardial infarction, carried out by two distinguished Polish scientists at the Medical Academy of Krakow, Poland; a critical review by an Israeli investigator at Hadassah Medical School in Jerusalem, on "Suppressor Cells: Permitters and Promoters of Malignancy"; and a historical study, by a senior Egyptian scholar, of the structure of the medical profession in ancient Egypt.

Among the studies published under this program in FY 1979 was a major review on the "Pathophysiology of Blood Disorders: Red Cell Disorders I," written by Drs. Chaim Hershko and Gabriel Izak and published in the *Israel Journal of Medical Sciences*, Vol. 14 (November, 1978), pp. 1101-1201. A summary of Russian research on lung cancer, translated in Pakistan and published in Yugoslavia under the Library's P.L. 480 program, also appeared in FY 1979: B.D. Peterson, ed., *Cancer of the Lung* (published by the NOLIT Publishing Co., Belgrade, and distributed by the P.S.G. Publishing Company, Littleton, Massachusetts, 1979). From Poland, a monumental three-volume study by Drs. T. Korzybski, Z. Kowszyk-Gindifer, and W. Kurylowicz on *Antibiotics: Origin, Nature and Properties* reached publication this year (Washington, D.C., American Society for Microbiology, 1978). (For



Three recent publications resulting from the NLM Special Foreign Currency Program (P.L. 480)

a complete listing of books and journal articles resulting from the NLM P.L. 480 Program received in FY 1979, see Appendix 3.)

Visitors and Specialized Training

NLM receives about 1,000 international visitors annually. During FY 1979 these individuals represented 68 countries and many interests such as medical research and education, health care, information and library science, administration and development of biomedical and health information programs, and construction of new library buildings. Meetings have been held with visitors representing the Ministry of Health from 17 different countries.

Formal delegations from the PRC included groups from the Scientific and Technical Association of the People's Republic of China, the Chinese Academy of Sciences, the Chinese Medical Association, a delegation in connection with a medical center project in Peking, and a study mission in quarantine and surveillance of communicable diseases. Japanese delegations included study groups on medical/health information systems in the United States, on the practical use and management of data bases, and from the Japanese Government Ministry of Health and Welfare. Other delegations were from Brazil, Italy, and Poland. Participants from around the world attending a Pan

American Health Organization seminar on continuing education visited NLM, as did a group of reference librarians sponsored by the International Communications Agency and several information systems workshops sponsored by the National Technical Information Service.

In connection with NLM's bilateral MEDLARS agreement, NLM has received Anthony Cheung of the Canada Institute for Scientific and Technical Information and Steve Rossouw of the Institute for Medical Literature, South African Medical Research Council for advanced MEDLINE training. Based on requests from the WHO, training in management and special operations was provided to George Guinguis, Regional Office Librarian, World Health Organization, Alexandria, Egypt; Mrs. S.L. Chinnappa, Documentation Office, Institute for Research in Reproduction, Indian Council of Medical Research, Bombay, India; Dr. Cecile W. Istasi, Director, National Documentation Center, Khartoum, Sudan; Dr. Aron Nowinski, Coordinator, and Kenneth Collins, staff member from the PAHO Regional Library of Medicine, Sao Paulo, Brazil; Dr. H.M.K. Saxena, Deputy Director, Indian Registry of Pathology, New Delhi, India; and Dr. Carlos Sanguinetti, National Medical Library of Uruguay.

These arrangements are made when an individual has national or international sponsorship. The training at NLM is usually part of a broader study/training program undertaken by the individual.

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Appendix 4: NMAC Audiovisual Materials Produced

Motion Pictures

Recognition of Signs and Symptoms in Life-Threatening Emergencies series

Hemorrhage—Professional Version

Hemorrhage—Non-Professional Version

Cardiovascular Signs—Professional Version

Cardiovascular Signs—Non-Professional Version

Family Oriented Maternity Care by the Nurse Clinician series

Post Partum

Beyond Compliance—A Film on Patient Education for the Primary Care Resident

Medical Legal Aspects of Amniocentesis for Prenatal Diagnosis

Amniocentesis

Ziehl-Neelsen Staining Procedure

Fluorescent Acid-Fast Staining

Primary Isolation of Mycobacteria Using the N-Acetyl-L-Cysteine-NaOH Method

Use of the Pneumatic Otoscope

Trichrome Stain for Fecal Specimens

TV Productions

Leaders in American Medicine series

James V. Warren, M.D.

H. W. Magoun, Ph.D.

William P. Longmire, Jr., M.D.

Irving H. Page, M.D.

Abraham White, Ph.D., D.Sc.

Dorothy M. Horstmann, M.D.

Alexander D. Langmuir, M.D., M.P.H.

Dorothy Smith, R.N.

Distinguished Leaders in Nursing series

Colloquium Highlights—The Nature of Nursing, Is It Changing?

Ruth Freeman, R.N., Ph.D.

Virginia Henderson, R.N.

Animated Images from Still Projectors (NMAC Technical Report No. 3)

Flame Photometry

Technique for Making a Slide Culture

Blood Gas Analysis: Tonometry

Single Beam Spectrophotometer—Wavelength Calibration

Nutrition and Total Health

Food Nutrition Misinformation

Cholesterol and Other Lipids in the Diet

Nutrition and Preventive Medicine

Technique for Making a Lactophenol Cotton Blue Preparation

Workers in Tropical Medicine (3)

Auxanographic Methods in Yeast Identification

Major Medical Syndromes series (5)

Slide/Tape Sets

Intestinal Function and Diarrhea series

- Classification and Abnormal Physiology of Diarrhea**
- Malabsorption and Diarrhea**
- Intestinal Fluid Secretion—Secretory Diarrhea**
- Osmotic Diarrhea and Carbohydrate Intolerance**
- Nonspecific Diarrhea**
- Special Features of Infectious Diarrhea in Infants**
- Diagnostic Approach to Chronic Diarrhea (The Initial Encounter)**
- Diagnostic Approach to Chronic Diarrhea (Further Diagnostic Steps)**
- Pharmacology of the Symptomatic Treatment of Diarrhea**

Rural Health series

- Beef Cattle Zoonoses**
- Swine Zoonoses**
- Sheep Zoonoses**
- Poultry Zoonoses**
- Zoonoses of Agricultural Environment**
- Zoonotic Diseases: An Overview**
- Introduction to Agricultural Traumas**
- Agricultural Traumas: Traumas to the Head**
- Agricultural Traumas: Traumas to the Trunk and Extremities**
- Agricultural Respiratory Problems**
- Toxicology of Cholinesterase—Inhibiting Insecticides**
- Toxicology of Commonly Used Herbicides**
- Toxicology of Fungicides, Rodenticides, and Fumigants**
- Dairy Zoonoses**
- Pesticide Poisonings and Injuries: Where, When, and How**

Cell Biology Study Program

- Introduction to Cell Membranes**
- Introduction to Membrane Chemistry**
- Membrane Lipids**
- Membrane Proteins**
- Membrane Carbohydrates**
- Membrane Receptors**
- Intercellular Junctions**

Gross Anatomy series

- Bones of the Head and Neck—Part I**
- Bones of the Head and Neck—Part II**
- Survey of the Cranial Nerves**
- The Meninges and Dural Sinuses**

The Suboccipital Region

- Foramina of the Skull**
- The Thoracic Wall—Part 1**
- The Thoracic Wall—Part 2**

The Thoracic Wall—Part 3

The Thoracic Wall—Part 4

The Breast

Human Physiology series

Acid-Base Imbalance

Temperature Control

Pulmonary Function: Mechanics and Ventilation

Exchange of Respiratory Gases

Chemical Control of Respiration

Physiology of Vision

Regulation of Body Water and Electrolytes

The Physiological Properties of Blood

Energy Flow Within the Cell

Coronary Circulation and Cardiac Metabolism

Learning Resources Centers: Past, Present, and Future

Puerperium Evaluation

Recognition of Signs and Symptoms in Life-Threatening Emergencies series

Surface Phenomena—Professional Version

Surface Phenomena—Non-Professional Version

Hemorrhage—Professional Version

Hemorrhage—Non-Professional Version

Development of a Slide/Tape Instructional Presentation

Filmstrips

Saneamiento En El Matadero—Partes III Y IV

Educacion En Los Servicios De Planificacion Familiar

Certificacion De La Causa De Defuncion

Print

Shock: Pathophysiology and Implications for Nursing Care

DISCRIMINATION PROHIBITED: Under provisions of applicable public laws enacted by Congress since 1964, no person in the United States shall, on the ground of race, color, national origin, sex, or handicap, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving Federal financial assistance. In addition, Executive Order 11141 prohibits discrimination on the basis of age by contractors and subcontractors in the performance of Federal contracts. Therefore, the National Library of Medicine must be operated in compliance with these laws and executive order.