

NATIONAL LIBRARY of MEDICINE

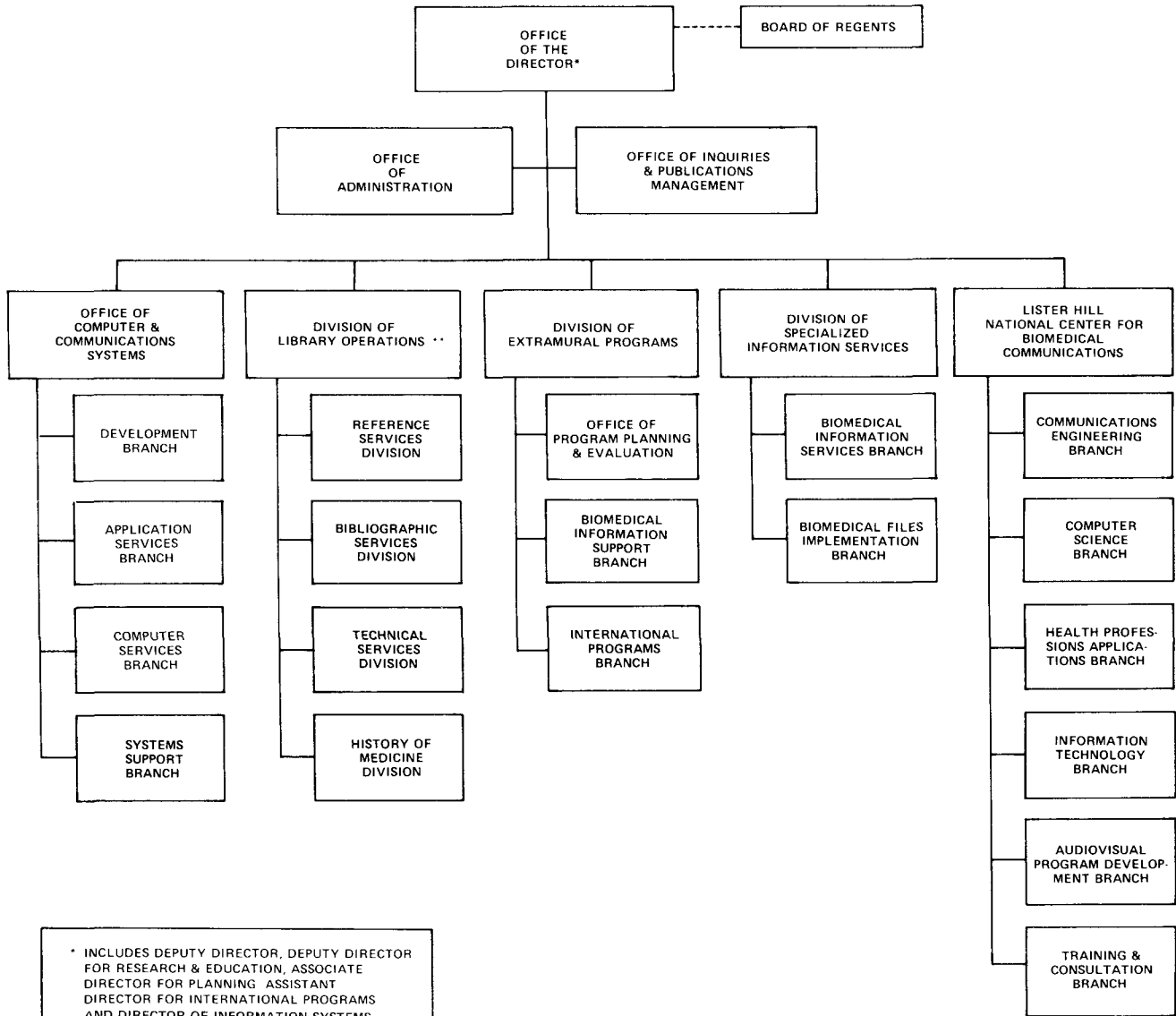
PROGRAMS and SERVICES

FISCAL YEAR 1983

U.S. DEPARTMENT OF HEALTH  
AND HUMAN SERVICES

Public Health Service  
National Institutes of Health

# NATIONAL LIBRARY OF MEDICINE



\* INCLUDES DEPUTY DIRECTOR, DEPUTY DIRECTOR FOR RESEARCH & EDUCATION, DEPUTY DIRECTOR FOR RESEARCH & EDUCATION, ASSOCIATE DIRECTOR FOR PLANNING ASSISTANT DIRECTOR FOR INTERNATIONAL PROGRAMS AND DIRECTOR OF INFORMATION SYSTEMS

\*\* INCLUDES REGIONAL MEDICAL LIBRARY PROGRAM

# **NATIONAL LIBRARY OF MEDICINE PROGRAMS AND SERVICES**

**Fiscal Year 1983**

**(October 1, 1982 - September 30, 1983)**

**U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES  
Public Health Service  
National Institutes of Health**

**National Library of Medicine  
Bethesda, Maryland**

**March 1984**

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## Preface

On the last day of Fiscal Year 1983 the Library's director of 20 years, Martin M. Cummings, M.D., retired. The health science community, indeed the whole nation, owes him a debt of gratitude for the leadership he has provided. During these two decades the scope of NLM's responsibilities has increased dramatically to include an extensive outreach and grant program, vigorous research and development activities in communications, a Toxicology Information Program, and the development and operation of an online information retrieval network that provides services nationally and internationally.

This report chronicles continued achievements in these and other areas of NLM responsibility. This progress would not have been possible without a diligent and devoted staff and without the wise guidance of the Library's Board of Regents. I am confident that the exciting and innovative programs initiated under Dr. Cummings' leadership will continue to evolve, providing future practitioners, scientists, and educators with even more effective information retrieval services.



Harold M. Schoolman, M.D.  
Acting Director

# POLICY AND DIRECTION

Kenneth G. Carney  
*Executive Officer*

## Board of Regents

Among the important issues discussed at the three meetings of the Board in FY 1983 were the reduced support available for NLM's Computers-in-Medicine grant program, a codification and updating of all Regents' policies, pricing policies for NLM services, and future directions of the Lister Hill Center research and development program.

The terms of appointment expired for Dr. Edward J. Huth and Dr. John L. Townsend. Vice Admiral J. William Cox, ex officio member, retired from active duty. Dr. William D. Mayer was unanimously reelected Chairman at the May 1983 meeting. A list of Regents is in Appendix 4.

## Modernization of the Building

The renovation project for the National Library of Medicine is in its final phase and will be completed in the spring of 1984. The project, which began in the summer of 1981, involves major modifications to the Library building to accommodate the many rapid changes in Library activities that have taken place since the original

construction of the building over twenty years ago. The phasing of the project has been successful, allowing Library functions to proceed with a minimum of interruption to services.

Upon completion of the project the Library will have one of the most effective fire and safety systems available for the protection of our staff and priceless collection and will have increased the available stack space by approximately twenty percent.

## Financial Resources

For FY 1983, the NLM had a total appropriation of \$46,402,000. This amount includes a supplemental appropriation received in September to offset pay raise costs. Table 1 displays the FY 1983 NLM budget, including reimbursements collected from other agencies.

The Department of Health and Human Services will begin FY 1984 operating under a continuing resolution. The resolution provides DHHS with funds through November 14, and thus will allow time for the Congress to complete action on appropriations for the fiscal year.

## Personnel

**Staffing Activities** *Martin M. Cummings*, M.D. announced his retirement as Director, National Library of

**Table 1.**  
**Financial Resources and Allocations**  
**FY 1983**  
*(in thousands of dollars)*

<hr/>	
Amounts available for obligation	
Appropriation, NLM .....	\$46,402
Plus: Reimbursements .....	2,273
Total .....	48,675
Amounts obligated	
Medical Library Assistance Act .....	7,593
Intramural Programs and Services .....	35,639
Library Operations .....	(15,230)
Office of Computer and Communications Systems .....	(8,445)
Lister Hill National Center for Biomedical	
Communications .....	(7,996)
Specialized Information Services .....	(3,968)
Direct Operations .....	1,735
Program Management .....	3,708
Total .....	48,675
<hr/>	



Medicine, at the May 1983 Board of Regents meeting. His distinguished career in the Federal Government covered a period of 40 years, the last 20 of which were as head of the Library. An Acting Director, *Harold M. Schoolman*, M.D., has been appointed by Dr. *James B. Wyngaarden*, Director of NIH, and will serve until a new Director is selected and appointed.

*Mary E. Corning*, D.Sc., retired after a career of 34 years with the Federal service. Dr. Corning joined the staff of the Library in 1964 as Chief of the Publications and Translations Division. In 1967 she was named the Director's Special Assistant for International Programs and held that position until she was appointed Assistant Director for International Programs in 1972. Dr. Corning retired on August 31, 1983.

*William G. Cooper*, Ph.D., was appointed Acting Associate Director for Extramural Programs. Dr. Cooper previously held the positions of Acting Director for the Lister Hill Center and the Associate Director for Planning, NLM.

*Richard B. Friedman*, M.D., was appointed Director for the Lister Hill National Center for Biomedical Communications. Prior to his employment with the Library, Dr. Friedman held the position of Associate Professor, Departments of Medicine and Human Oncology at the University of Wisconsin Medical School.

*Joseph Leiter*, Ph.D., retired in April 1983. Dr. Leiter joined the staff of the Library in August 1965 as a consultant in the Office of the Director. In November 1965 he was appointed Associate Director for Library Operations and he held that position until July 1982 when he was designated Special Assistant to the Director, NLM. Dr. Leiter remained in this position until his retirement in April.

*John L. Parascandola*, Ph.D., was appointed Chief, History of Medicine Division, Library Operations. Prior to his appointment with the Library he held the positions of Professor in both the Schools of Pharmacy and the Department of History of Science at the University of Wisconsin. Dr. Parascandola replaced *John B. Blake*, Ph.D., who retired in October 1982 as Chief of the Division after 21 years of service to the Library.

*Bruno M. Vasta* was appointed Chief, Biomedical Files Implementation Branch, Specialized Information Services, NLM. Mr. Vasta previously held the position of Senior Scientific Advisor to the Associate Administrator at the Environmental Protection Agency. Since January 1982, Mr. Vasta has been on detail to the Library as a Special Assistant to the Associate Director, Specialized Information Services.

On August 4, 1983, the Director, NLM, approved the proposed reorganization of the Office of Computer and Communications Systems (OCCS). The purpose of the reorganization was to create two broad functional areas within OCCS: a development area which incorporates the MEDLARS developmental activity and application services, and an operations area which includes computer services and systems support. Each of these two functional areas will operate under a Deputy Director.

**Awards.** *Joseph Leiter*, Ph.D., received the Assistant Secretary for Health Award for Exceptional Achievement.

*Mary E. Corning*, D.Sc., and *Harold M. Schoolman*, M.D., received the NIH Director's Award.

NIH Merit Awards were presented to *Lois Ann Colaianni*, Division of Library Operations; *Robert Curry*, Office of Computer and Communications Systems; *Lou*

**Table 2.**  
**Staff, FY 1983**  
**Full-Time Equivalents (FTEs)**

Program	FY 1983*	
	Full-Time Permanent	Other
Office of the Director	16	4
Office of Inquiries and Publications Management	4	0
Office of Administration	41	10
Office of Computer and Communications Systems	58	7
Extramural Programs	18	2
Lister Hill National Center for Biomedical Communications	74	12
Specialized Information Services	28	3
Library Operations	224	42
Total	463	80
Total FTE usage		543

\* Actual use

## Policy and Direction

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*Knecht*, Division of Library Operations; and *Peri Schuyler*, Division of Library Operations.

*Wyndman D. Miles*, Ph.D., received the NLM Director's Award for his book, *A History of the National Library of Medicine: The Nation's Treasury of Medical Knowledge*.

*Thelma Charen* received the NLM Director's Award in recognition of her outstanding contributions to the development and improvement of NLM indexing.

*John Blake*, Ph.D., received the NLM Board of Regents' Award.

**Equal Employment Opportunity** This year the Equal Opportunity Office developed statistical profiles showing the percentage of awards and promotions going to women and minorities. These statistics are summarized in Table 3.

The NLM Library Associate Program has in recent years, at the urging of the Director, sought to recruit

qualified minority candidates. The group of six Associates that began their training at the end of FY 1983 included one black and one handicapped individual. Over the past 5 years, slightly more than 17% of the Library Associates have been members of minorities.

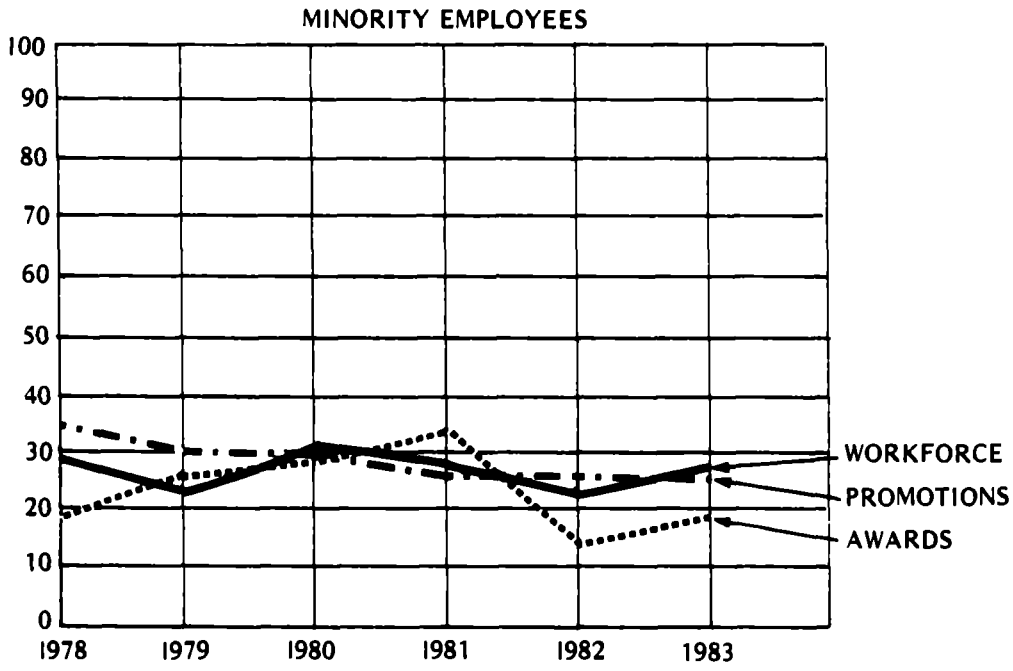
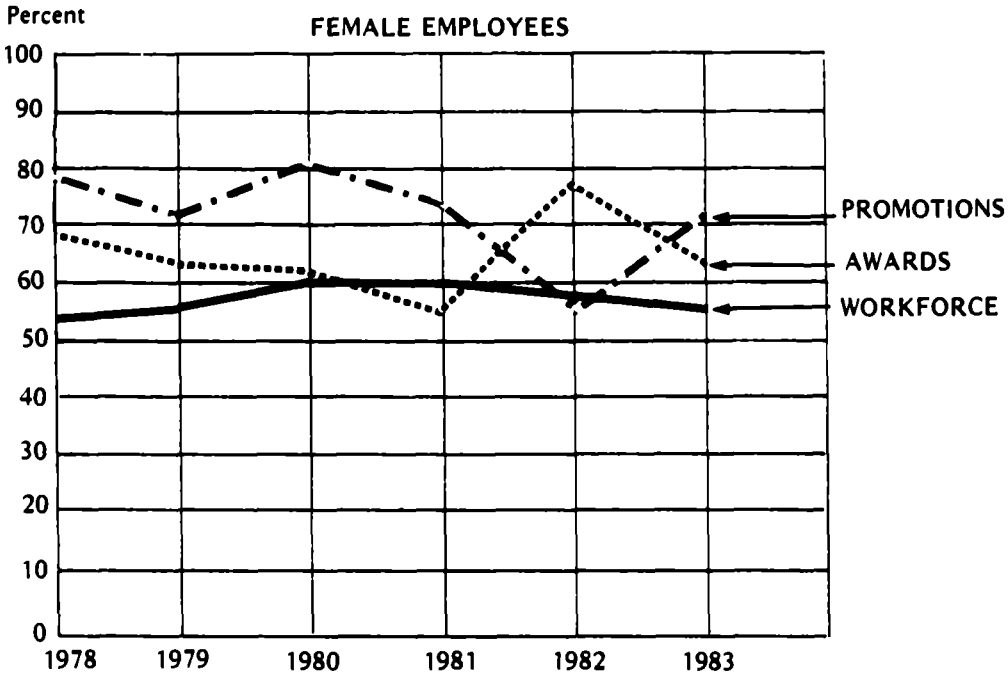
### Lobby Exhibits

Because of the renovation, only one exhibit was installed in the NLM lobby this year. On display from October 1982 through March 1983 was "The Conquest of Smallpox: From Inoculation to Vaccination." This exhibit, containing a variety of printed materials and photographs from the Library's History of Medicine Division, traced the history of smallpox up to its eradication as a naturally occurring disease in 1977.

An exhibit of a dozen pen and ink sketches of various buildings on the National Institutes of Health campus (including NLM and the Lister Hill Center) was put on display in the lower lobby of the Lister Hill Center from March through November 1983. The artist, Brent Jaquet, is an NIH employee.

Table 3

### NLM Promotions and Awards \*



\* Includes quality step increases, superior work performance awards, and merit awards.

# LIBRARY SERVICES AND OPERATIONS

Lois Ann Colaianni  
*Acting Associate Director, Library Operations*

Library Operations is the NLM component which selects, acquires, preserves, catalogs, indexes, provides access to, and disseminates the material in NLM's collections. Library Operations is composed of four operating divisions—Bibliographic Services, History of Medicine, Reference Services, and Technical Services; the Medical Subject Headings Section (MeSH); the Regional Medical Library Program; and a small administrative unit including a special liaison for MEDLARS III and a Training Coordinator. The activities of each are discussed in this section of the report.

On October 1, 1982, the functions performed by the Materials Utilization Branch of the National Medical Audiovisual Center (NMAC) were transferred to the Audiovisual Resources Section, a new section in Library Operations' Reference Services Division. This change was part of the reorganization which also merged many NMAC functions into the Lister Hill National Center for Biomedical Communications and provides for coordinated oversight of reference and loan services for all types of library material.

Throughout the year, considerable staff time was spent in moves necessitated by the renovation of the Library building. Programs moved out of areas so that workmen could install sprinklers, carpeting, wall coverings, and modular furniture; settled in temporary quarters; and returned to their renovated areas with minimal effect on service.

Despite these changes and disruptions, staff continued to meet the heavy demands for NLM services. The use of online service at NLM increased 15 percent. Thirty-nine percent of the increase can be attributed to having the MEDLINE backfiles online. Users from over 2,000 institutions in the United States performed more than 2,400,000 searches in FY 1983. The number of offline searches declined 46 percent to 391,834 searches in FY 1983. It has been shown that with newer 1200 baud terminals which are almost four times faster than 300 baud terminals, it is more cost effective when charges are based on connect time to print citations online. Improvements in the processing of journals in the serials checkin and indexing process reduced the time between receipt of a journal and its appearance in cited form in MEDLINE

and *Index Medicus*. Over 90 percent of the most heavily used journals are indexed and cited in 26 days or less.

The Library continues to serve as a backup to the Nation's health science libraries for document delivery. In FY 1983, 211,178 interlibrary loan requests were received, down seven percent from FY 1982. About 91 percent of the loans were sent out within four days. See table 8 for circulation figures. Through the development of the National Biomedical Serials Holdings Database (SERHOLD) and its use in the production of regional union lists, interlibrary loan requests can be directed to the closest library holding the item before referral to NLM. This should provide the actual document to health professionals more rapidly and with less wasted effort by health science library staff.

The retrospective conversion of the card catalog, one of the major conversion projects essential to implementation of MEDLARS III, was completed in FY 1983 after almost four years of work. When all converted records have been added to CATLINE in FY 1984, the file will contain cataloging records for essentially all printed works in the Library's collection from the fifteenth century to the present. During the year 13,427 monographs, 822 serials and 926 audiovisuals were catalogued. Although audiovisuals have been selected, acquired and processed for the Library's collection for many years, onsite use of these programs has increased over the past year due to the efforts of the new Audiovisual Resources Section and the availability of a newly expanded and renovated Learning Resource Center.

Staff at NLM and in the Regional Medical Libraries devoted their energies to making a smooth transition from eleven regions to seven in the Regional Medical Library Program. The seven Regional Medical Libraries are just completing the first year of their three year contracts. The reconfiguration is intended to preserve or improve access to information for health professionals while reducing the administrative costs of the Regional Medical Library Program.

In order to support the fundamental purposes of NLM and meet current and future information needs of health professionals, Library Operations has an ongoing requirement for planning, evaluating, and identifying imaginative and innovative solutions to existing prob-

lems. In FY 1983, with the assistance of NLM's Planning Office, LO senior staff developed a five year strategic plan which identifies four broad objectives for 1984-88:

- to improve internal technical and bibliographic processing;
- to develop and implement programs that make it easier to identify, locate, obtain, and use biomedical information and literature;
- to develop and implement a program for the preservation of the biomedical literature; and
- to ascertain the information needs and information-seeking behavior of health science professionals and the history of medicine community, as a step toward improving Library Operations' products and services.

LO staff are now developing operational plans for the next two years that detail the activities necessary to achieve the four objectives. The strategic planning process is ongoing and will continue to challenge Library Operations staff and to guide their efforts to improve service to NLM's users.

### Training Programs

Library Operations sponsored two formal library-based training programs, the NLM Associate Program and the Librarian Career Development Program. The NLM Associate Program, now in its 17th year, is a one-year post-graduate training experience for library school graduates with high potential for leadership in the health sciences library/information field. In FY 1983 there were four Associates, selected from 61 nationwide applicants. The program is guided by a six-member advisory group and a ten-member faculty.

A major achievement in the 1982/83 program was the introduction of a formal modular-based curriculum organized into 10 broad topics. The modular system groups like functions under one topic and provides for an integrated view of the Library's programs and information services. As a result, the training has shifted from a department-based approach to one which often crosses organizational lines.

The curriculum portion of the Associate Program was presented during October-February with about 100 NLM staff participating as instructors. The Associates benefited from this cohesive view of the many functions, operations, and issues which are facing library and information professionals. With the curriculum well established the faculty and instructors will now focus on minor adjustments and improving the use of educational techniques and modes of training. The second phase of the program is dedicated to two or three individualized projects each Associate undertakes with the guidance of staff project leaders. This year 10 projects were selected from 20 proposals submitted by the operational areas.

The first NLM Librarian Career Development Program sponsored by NIH was completed after two years. The LCDP began in spring 1981 with the following purpose:

- To provide a career advancement opportunity for NIH nonprofessionals with high potential.
- To provide NLM with an additional source of highly-qualified entry-level librarians.
- To help meet Affirmative Action goals of the NLM.

The program consisted of work rotations in seven sections of Library Operations and graduate library science courses at the University of Maryland. The two LCDP participants graduated from the program in July and assumed librarian positions in LO. While the LCDP was successful, there are no immediate plans to renew the program as designed. Training units developed for the LCDP can be transferred for use with NLM staff development activities.

### Regional Medical Library Program

**Network Changes.** Early in FY 1983 the geographical boundaries of the Regional Medical Library (RML) Network underwent a major change when the original eleven regions were reduced to seven. The regrouping, approved by the NLM Board of Regents at its October 1981 meeting, is intended to provide a more cost-effective regional program while preserving or improving the level of service it offers to health professionals. As a result, new competitive contracts were negotiated for all seven regions during the last quarter of FY 1982 and the first quarter of FY 1983. The following major medical institutions received awards as Regional Medical Libraries:

Region 1 (Greater Northeastern Region)—New York Academy of Medicine

*States served:* CT, DE, MA, ME, NH, NJ, NY, PA, RI, VT, and Puerto Rico

Region 2 (Southeastern/Atlantic Region)—University of Maryland Health Sciences Library

*States served:* AL, FL, GA, MD, MS, NC, SC, TN, VA, WV, and the District of Columbia

Region 3 (Regional Medical Library)—University of Illinois at Chicago, Library of the Health Sciences

*States served:* IA, IL, IN, KY, MI, MN, ND, OH, SD, WI

Region 4 (Midcontinental Region)—University of Nebraska, Leon S. McGoogan Library of Medicine

*States served:* CO, KS, MO, NE, UT, WY

Region 5 (South Central Region)—University of Texas Health Science Center at Dallas

*States served:* AR, LA, NM, OK, TX

Region 6 (Pacific Northwest Region)—University of Washington Health Sciences Library  
*States served:* AK, ID, MT, OR, WA

Region 7 (Pacific Southwest Region)—UCLA Biomedical Library  
*States served:* AZ, CA, HI, NV

To ease the transition process NLM phased out existing contracts and phased in new awards over a three-month period from the end of September 1982 through January 1, 1983. The first two awards, effective September 25, went to the University of Washington and the UCLA Biomedical Library, incumbent RMLs in the Pacific Northwest and Pacific Southwest. An award to the University of Texas, incumbent for the TALON Region, followed on November 1.

The New York Academy of Medicine was selected as the RML for the Greater Northeastern Region beginning December 1. The New England, New York and New Jersey, and Mid-Eastern regions and the Commonwealth of Puerto Rico merged to form this region, largest in number of health professionals served. On January 1 the final three awards were made to the University of Nebraska, incumbent in the Midcontinental Region, the University of Illinois in Region 3, and in Region 2 the University of Maryland. Region 3, known as the Greater Midwest Region, was formed through the union of the former Kentucky-Ohio-Michigan and Midwestern Regions plus the state of South Dakota.

The Mid-Atlantic and Southeastern Regions merged to form the new Southeastern/Atlantic Region. In order to provide more effective service to the southernmost portion of this large region, the University of Maryland negotiated with the Lister Hill Library of the Health Sciences at the University of Alabama to serve as a subregional RML center. Effective August 1, Alabama signed a subcontract to provide assistance with document delivery and outreach activities in the states of Alabama, Tennessee, Mississippi, and Florida. The program will be staffed by a full-time RML satellite librarian.

Effective January 1, NLM, previously the headquarters of the Mid-Atlantic Program, relinquished its role as an RML. In accord with a recommendation of the Board of Regents, the Library is concentrating on its policy, management, and backup roles to the approximately 105 Resource Libraries and more than 3,000 Basic Health Science Libraries which make up the RML Network.

**Optional tasks.** The final stage in the almost year long RML contract process was the review of optional proposals submitted by prospective RMLs in three areas: (1) online training, (2) development of training packages for use in RML sponsored workshops and (3) innovative uses of technology for biomedical information transfer. No awards were recommended in the second and third category; however, two RMLs, UCLA and the University

of Nebraska received awards to assist NLM in providing initial online training to users of NLM's databases. Nebraska will offer 28 classes in Omaha and other western and midwestern sites such as Denver, Dallas, and Chicago. UCLA also will offer 28 classes in locations including Los Angeles, Berkeley, Seattle, and Portland. Complementing NLM's training efforts on the East coast, these classes offer new MEDLARS users a wide choice of locations for hands-on experience. Classes are open to health professionals as well as health science librarians.

**Implementation.** By January the RML focus had shifted from reconfiguration to implementation. Programs for fiscal year 1983 through 1985 emphasize improved access to biomedical information for the health professional. Funding at a level of approximately \$2 million per year is anticipated. A basic national goal for the three-year period is to provide health professionals wherever located with at least a minimum acceptable level of information service. By the end of 1983 RMLs had identified underserved areas within their regions and targeted specific programs to begin to improve services.

The new contracts continue to emphasize document delivery. In 1983 support was directed at the first stages of the process—developing and maintaining regional collections and locating and requesting documents. Six RMLs earmarked contract funds for strengthening regional collection resources to improve resource sharing.

The RMLs have a major role in the National Biomedical Serials Holdings Database (SERHOLD), as they coordinate the collection and transmission to NLM of updated automated serial holdings data from academic and hospital libraries within their regions. The first new SERHOLD update took place in the spring and summer of 1983. Union list products produced from the updated data were used in the implementation of the RML Document Delivery Plan effective October 1, 1983. This plan calls for NLM to accept direct interlibrary loan requests for serials not available within the regions. It is designed to provide health professionals with faster, more cost-effective interlibrary loan service through the elimination of unnecessary referrals and is predicated on the availability of an acceptable locator tool for each region.

During the year five central and western RMLs completed a six month test of NLM's pilot automated interlibrary loan system DOCLINE, and selected institutions in the Southeastern/Atlantic, Pacific Northwest and Pacific Southwest Regions participated in the use of electronic mail to transfer interlibrary loan requests to NLM. The Midcontinental Region's automated document request and routing system became fully operational with more than 100 online users. In August an agreement was signed to develop a computer-to-computer link which will permit automatic transfer of ILL requests from the regional system to NLM's DOCLINE. The Greater Mid-

west Region continued development of its online union catalog of monographs and audiovisuals.

The Network also continued to provide training and consultation programs that improve service to health professionals by enhancing the skills of information providers. Here the emphasis was on basic training for nonprofessional library personnel and training in resource sharing activities such as interlibrary loan, consortia formation, and locator tool development. In FY 1983 RMLs began the process of moving training and consultation programs from federal support to a cost-recovery basis, through the imposition of fees to cover a minimum of 25% of actual workshop and consultation costs.

**RML Directors' Meetings.** RML Directors met twice in FY 1983—once in March at NLM and the second time on May 29 in Houston, Texas just prior to the Medical Library Association annual meeting. The March meeting, the first since reconfiguration, dealt primarily with policy issues. Dr. Cummings addressed the group to clarify NLM's objectives and priorities for the next three years. Dr. William Cooper, Associate Director for Planning, discussed the critical importance of RML program evaluation, especially the need for data to demonstrate the impact of the program on health care. Other presentations dealt with implementation of the RML Network Document Delivery Plan, development of regional locator tools, standardization of charges for basic online searches, and the role of the RML Program in education and training. The May meeting focused on strategies for maximizing expenditure of RML funds for services which directly benefit health professionals such as resource sharing and regional mechanisms for obtaining input from health professionals as an aid to program planning. Agreement also was reached on a maximum charge of \$25 for a standard MEDLINE search. RMLs also agreed to conduct a number of regional evaluation projects in 1983–84. Included are projects related to the measurement of ILL turnaround time, cooperative acquisitions, the impact of the RML Program on hospital library development, etc.

**Table 4.**  
**Bibliographic Services**

Services	FY 1980	FY 1981	FY 1982	FY 1983
Total citations published* .....	266,730	279,105	282,950	310,445
For <i>Index Medicus</i> .....	243,873	256,112	259,874	284,856
Recurring bibliographies .....	27	24	25	24
Journals indexed for <i>Index Medicus</i> .....	2,661	2,664	2,697	2,709
Abstracts entered .....	111,629	126,742	124,511	149,851

\* Includes special list articles, audiotapes, and Health Administration citations.

## Medical Subject Headings

To keep the Medical Subject Headings (MeSH) thesaurus abreast of new developments in medicine and current trends in terminology, 130 headings were added, of which 99 are entirely new and 31 replace deleted headings. An additional 82 headings were deleted without replacement, most of which represent rarely mentioned chemical entities. These now have records in the chemical subfile of MeSH. An additional 3,400 records were created in the chemical subfile for chemical entities newly encountered in the literature. A printed version of the subfile was made available to the public. Nine new pre-explodeds were created for the convenience of online searchers, bringing the total to 59.

The consultants who advise NLM on the selection of literature for *Index Medicus* reviewed and rated 207 journals that were candidates for indexing in *Index Medicus*. Of these, 55 were accepted for indexing. The consultants also reviewed the journals concerned with gastroenterology, sports medicine, jurisprudence, family medicine and environmental health that are currently indexed. Seventy-one journals were dropped during the year either because they had ceased publication or were adjudged to have limited value for *Index Medicus* users. However, the newly added journals published more articles than those that were deleted. At the end of the year there were 2,689 titles on the actively indexed *Index Medicus* list.

## Bibliographic Services

The Bibliographic Services Division (BSD) is responsible for indexing the biomedical literature for *Index Medicus*, entering the citations into the databases, and coordinating the access and usage of NLM's online network.

**Indexing.** A total of 310,445 citations was added to the various NLM databases in FY 1983. A breakdown of this total shows that 284,856 citations were published in *Index Medicus*; 16,562 entries appeared in the special list categories; 7,693 were for the *Hospital Literature Index* and the Health Planning and Administration database; and 1,334 audiotapes were cited in the *Index*

to *Audiovisual Serials in the Health Sciences*. A decision was made to discontinue the *Index of Audiovisual Serials in the Health Sciences* and include these citations in the *NLM Audiovisuals Catalog* as of January 1984.

Indexing contracts with four commercial firms were extended for another year. Six non-U.S. MEDLARS centers have provided approximately 46% of the articles indexed, either through their own indexing or indexing arrangements with U.S. firms. NLM indexers and commercial contractors each provided approximately 27% toward the total indexing effort.

After having the automated tracking file and the centralized journal distribution system in place for approximately one year, remarkable improvement has been made in lowering the time between receipt of journals in NLM and their being cited in MEDLINE. The average throughput time for 90% of the high priority journals over the past six months is 26 days. These high priority journals represent 13% of the journal titles indexed but 35% of the total article yield. Processing time of other journals indexed was reduced to approximately 3 months from receipt to appearance in MEDLINE. Work will continue on reducing this time.

The *Supplementary Chemical Records* publication, earlier available only for internal distribution, was published for widespread distribution through NTIS in December 1982. This supplement to MeSH was generated from an online chemical dictionary file now containing approximately 33,000 records.

Development of the online indexing capability continued with the detailed system design completed early in FY 1983. The revised date for operational online indexing at NLM is December 1983. The online indexing training syllabus and online indexing manual have been prepared, terminals with screens and bar-code readers have been installed, the systems and acceptance test plans have been completed, and training of indexers has begun. This is the first phase of converting from a manual to an online process. The second and third phases will extend online indexing to local contractors and later to the MEDLARS Centers overseas.

A cooperative effort between NLM and the National Cancer Institute (NCI) has resulted in the elimination of duplicative effort in the indexing, proofreading, and keyboarding of article references from 177 journal titles. Prior to May 1983, articles from these titles indexed by NLM were also indexed by a contractor for NCI. As is the case for all high priority journals, NLM provides a maximum 30-day throughput time for these titles. Citations from these titles are carried in the new NCI database, *CANCEREXPRESS*, and in MEDLINE.

**MEDLARS Management.** The MEDLARS Management Section is the public's contact point in the daily operation of the NLM Online User Network. The staff of the Section

answer telephone and written inquiries about the search system and various databases; maintain billing records; process applications for access to the network; mail offline and offsearch printouts; produce manuals and other descriptive materials; and both coordinate training and provide instruction for the use of the online MEDLARS system. (Tables 5 and 6 show the numbers of online and offline searches, respectively, from FY 1981 to FY 1983.)

MEDLINE and its backfiles were resegmented and all backfiles became available online in December 1982. Also in December 1982, MEDLARS service on the computer at the State University of New York at Albany (SUNY) was discontinued after nearly ten years of operation. Users now have access to all databases on the NLM computer during all hours of operation. Some of NLM's online databases continue to be available through agreements with two U.S. commercial vendors, DIALOG and BRS. Each offers MEDLINE and its backfiles as well as the HEALTH PLANNING & ADMINISTRATION database.

Several new databases developed in cooperation with the National Cancer Institute became available to domestic users as a part of the MEDLARS system during the year.

- Protocol Data Query database (PDQ) became available in October 1982. It contains general descriptions of new cancer treatment methods, with the names and addresses of oncologists at institutions using each protocol.
  - PDQ DIRECTORY file, a companion file to CLINPROT and PDQ, became available in July 1983. It lists names and health care professionals and institutions that specialize in cancer care.
- CANCEREXPRESS, a current awareness 4-month-subset of CANCERLIT, became available in June 1983.

In August 1983, a new database called DIRLINE (Directory of Information Resources Online) became available. Currently the file consists of information developed and maintained by the National Referral Center of the Library of Congress. It contains descriptions of traditional sources of information such as technical libraries, professional societies, and federal and state agencies.

Approximately 9,500 document citations from the National Health Planning Information Center (NHPIC) were added to the HEALTH PLANNING & ADMINISTRATION database. The documents cited are all English-language, non-journal publications for the period 1975–1981 and have been published in *Weekly Government Abstracts: Health Planning Series*.

The EPILEPSYLINE database was removed from the NLM system, effective January 1, 1983.

MEDLARS usage reached a record high of 20,131 hours (excluding MEDLEARN) in March 1983. The pre-



vious high was 18,412 hours in January 1983. Usage for the entire year was 207,096.

Automatic monthly SDI (selective dissemination of information) service was expanded to include CATLINE, AVLINE, and the POPLINE databases. This service continues to be available for the SDILINE, TOXLINE, CANCERLIT, and HEALTH files as well.

The number of domestic online users increased to 2,071 and the number of foreign users decreased to 715, bringing the total number of online users at the end of FY 1983 to 2,786.

In addition to the online training classes held at NLM, classes were also in Dallas, Berkeley, Seattle, Chicago, New York, Atlanta, Omaha and Los Angeles. A total of 775 individuals were trained in 29 initial and 12 advanced classes.

## History of Medicine

The History of Medicine Division is responsible for acquiring, organizing and servicing the historical source materials of the Library, for carrying out research in the history of medicine, and for aiding medico-historical scholarship through the publication of catalogs, bibliographies and other works.

During the year the historical resources of the Library were enlarged by the addition of some 253 books, 46,313 manuscript items, and 346 prints and photographs. Probably the outstanding printed work acquired this year was Denis Dodart's *Memoires pour servir a l'histoire des plantes* (1676), bought at a Sotheby-Park Bernet auction. It contains a famous plate showing Louis XIV being greeted by members of the Académie des Sciences. Two interesting French eulogies were ac-

**Table 5.**  
**Online Searches**

Online DATABASES	FY 1981	FY 1982	FY 1983
AVLINE	20,397	18,376	19,050
BIOETHICS	3,762	3,409	4,047
CANCERLIT	41,457	42,365	45,739
CANCERPROJ	3,700	3,270	3,099
CATLINE	191,314	224,559	250,729
CHEMLINE	55,039	46,375	40,880
CLINPROT	1,825	1,753	3,166
DIRECTORY	---	---	420
DIRLINE	---	---	1,389
EPILEPSYLINE	2,448	1,607	326
EXPRESS	---	---	1,087
HEALTH	61,564	70,735	81,289
HISTLINE	3,652	3,978	4,460
MEDLINE	741,632	784,625	951,582
MED79	---	118,877	28,482
MED77	105,822	144,185	193,796
MED75	---	---	67,478
MED71	---	---	46,211
MED66	---	---	30,415
MESH VOCABULARY	19,044	19,016	20,469
NAME AUTHORITY	7,219	10,618	16,528
PDQ	---	---	7,124
POPLINE	11,616	16,483	18,652
RTECS	14,747	14,741	17,578
SDILINE	17,551	17,770	18,619
SERLINE	37,645	44,916	48,941
STORED SEARCH	115	176	49
TDB (TOXICOLOGY DATA BANK)	14,243	14,466	19,737
TOXLINE	77,135	68,768	67,381
TOXBACK74	2,612	8,864	11,651
TOXBACK65	---	---	411
TOTAL	1,434,539	1,679,952	2,020,515

## Library Operations

quired, one in honor of Francesco Redi, 17th-century pioneer in parasitology, and the other in memory of Anuce Foes, a 16th-century physician who compiled a monumental concordance to Hippocrates. Other important additions to the book collections include four 16th-century editions of Paracelsus and a very rare book on the diseases of seamen, Henry Huntley's *Observationes in morbos nautarum* (1733).

In the area of modern manuscripts, the major acquisitions were the archives of the Society for Research in Child Development, the early records of the Child Research Council, and documents and papers relating to the federal government's National Blood Policy program. One of the more interesting additions to the prints and photographs collections was a fine photograph of Paul Ehrlich as a young man with his fiancée.

As part of the Library's retrospective conversion program, the existing catalog records for pre-1801 publications were converted into machine readable form. Most of these records have been entered into CATLINE; the remainder will be transferred this fall. Catalog records for the modern manuscripts collection were also entered into CATLINE. In preparation for MEDLARS III, planning for conversion of the records for the prints and photographs collection to machine-readable form has begun. Work has initiated on an experimental videodisc project in cooperation with the Lister Hill Center. Approximately 1,000 images from the historical prints and photographs collection will be made available in a video-disc format. HMD staff are completing the bibliographic data (in the AACR 2 format for graphic materials) that will accompany the disc.

**Table 6.**  
**Offline Searches\***

Databases	FY 1981	FY 1982	FY 1983
AVLINE .....	21	33	104
BIOETHICS .....	35	6	18
CANCERLIT .....	6,026	5,385	5,095
CANCERPROJ .....	173	40	31
CATLINE .....	141	145	137
CHEMLINE .....	84	18	14
CLINPROT .....	6	6	7
DIRECTORY .....	---	---	1
DIRLINE .....	---	---	1
EPILEPSYLINE .....	7	7	3
EXPRESS .....	---	---	20
HEALTH .....	902	3,285	7,147
HISTLINE .....	7	11	3
MEDLINE .....	45,779	36,666	26,771
MED79 .....	---	44,817	8,972
MED77 .....	83,864	63,267	35,906
MED75 .....	94,975	72,616	31,212
MED72 .....	70,523	56,646	8,413
MED71 .....	---	---	15,501
MED69 .....	56,409	42,094	5,966
MED66 .....	40,346	30,374	14,166
MESH VOCABULARY .....	7	18	6
NAME AUTHORITY .....	0	1	0
POPLINE .....	765	2,208	6,342
RTECS .....	257	296	124
SDILINE .....	147,109	178,774	197,762
SERLINE .....	15	27	10
TDB (TOXICOLOGY DATA BANK) .....	185	238	117
TOXLINE .....	22,409	21,798	18,591
TOXBACK74 .....	8,919	6,204	4,410
TOXBACK65 .....	8,578	6,731	4,984
TOTAL .....	587,542	571,711	391,834

\* OFFSEARCHES and Automatic SDI's

Dr. Krivatsy completed the manuscript of his *Catalogue of Seventeenth Century Printed Books in the National Library of Medicine*. Volume 17 of the annual *Bibliography of the History of Medicine*, covering material indexed prior to August 1, 1982, was published, and volume 18 was prepared for publication. James Kopp replaced Dr. James Cassidy as editor of the *Bibliography*.

### Reference Services

The Reference Services Division is the Library's principal public service component for the provision of reader, reference, and bibliographic services and interlibrary loans, and is responsible for maintaining and preserving the Reference and General Collections of monographs, serials, and audiovisual media.

Requests for interlibrary loans dropped 7% and for material for use in the Reading Room (Reader Service) 3%, while the number of users of the Reading Room rose 2%. The total number of reference inquiries rose 24%, the result, in part, of activity generated by an expanded Learning Resource Center staffed by the Audiovisual Resources Section. Except for the period of relocation of the Reading Room, the Reader Service fill and throughput rates remained substantially in the very good range, as did the rates for interlibrary loan.

All three Sections of the Division were affected by the renovation of the Library building which continued through the year. The principal impact on the public was the relocation of the Reading Room on June 6 to the area formerly occupied by Technical Services, involving a move of the entire reference, serial, and monograph collections and all of the Reading Room furniture and stacks. The move was accomplished in two days, with

service discontinued for only a day and a half. A repeat of the move was completed two months later when the Room was returned to its permanent location on August 22 following installation of a sprinkler system and new carpeting, wall covering, and furniture.

An expanded Learning Resource Center moved into its new quarters in early June and the Reference Section staff members returned to their permanent location that same month, leaving only a small number of Division staff still to move into renovated quarters at the year's end.

The Materials Utilization Branch of the National Medical Audiovisual Center was transferred to the Division at the beginning of the fiscal year to become the Audiovisual Resources Section. This Section operates the Learning Resource Center and is responsible for public services relating to nonprint materials. "Audiovisual Services of the National Library of Medicine," a document outlining current and planned activities and services in the field of nonprint media within Library Operations, was prepared following a series of planning sessions involving all Divisions of Library Operations. The Section also undertook an inventory of the more than 11,000 audiovisual items in the collection and made this entire collection available for loan to NIH staff. Arrangements have been completed with the American Medical Association to accept a portion of its medical film library for addition to both the collection available for loan and to the Historical Film Program.

Twenty-nine new titles were added to the list of Literature Searches, printed specialized bibliographies prepared and distributed by the Reference Section. Over 68,000 copies of these bibliographies were distributed during the year. Subjects included kepone and dioxin

**Table 7.**  
**History of Medicine Activities**

	FY 1981	FY 1982	FY 1983
<b>Acquisitions</b>			
Books .....	290	248	253
Modern manuscripts .....	133,423	91,953	46,313
Prints and photographs .....	570	475	346
<b>Processing</b>			
Titles cataloged .....	2,870	3,028	862
Modern manuscripts cataloged .....	47,750	53,100	51,353
Pictures indexed .....	150	420	188
Articles indexed .....	4,863	4,498	6,178
Pages microfilmed .....	120,944	103,869	103,930
<b>Public Service</b>			
Reference questions answered .....	2,287	2,421	2,378
ILL and pay orders filled .....	2,244	2,515	2,575
Reader requests filled .....	6,348	5,903	5,236
Pictures supplied .....	1,913	2,427	2,209

toxicology, liver transplantation, toxic shock syndrome, and acquired immunodeficiency syndrome (AIDS) The intense interest in AIDS and the urgency of the subject resulted in preparation of preliminary updates to this bibliography monthly and the issuance of quarterly printed updates and supplements for distribution to a list of scholars and institutions specializing in the subject Many of the Literature Searches are prepared in concert with NIH Consensus Development Conferences and are widely distributed to Conference task forces and attendees.

The Senior Bibliographer of the Reference Section developed the formulation for a Recurring Bibliography on respiratory infections in children, to be distributed by the World Health Organization

The completion of a comparative study of two online public access catalogs, CITE and ILS, early in the year led to the selection of CITE as the user-friendly interface to CATLINE available for Reading Room patrons Members of the Reference Section staff devoted considerable time and effort toward further development of the system, preparing display and "help" messages, participating in tests of a new version, and collecting information based on hands-on use by the public

Beginning October 1, 1983, NLM will institute a charge for filled interlibrary loans of \$5 to domestic libraries and increase the present charge from \$4 to \$7 to libraries abroad This change in policy will serve to encourage the development of resources regionally and locally and to bring NLM practice into conformity with Resource and Regional Medical Libraries in the Regional Medical Library Network. At the same time, NLM will begin to accept interlibrary loan requests directly from basic health sciences libraries in the Network for material not held in the Regions In the past these libraries were required to send requests to a Resource or Regional Medical Library which referred the request to NLM if it was unable to fill it

A long-range plan was developed for installation of additional stacks to house the collection. The plan details a phased acquisition and installation of compact shelving to accommodate growth of the collection through the year 2000

The Circulation and Control Section continued oversight of an extensive binding program, utilizing a new contract binder this year This activity is carried out under a Government Printing Office contract, and the transition to the new binder was smoothly accomplished

The Circulation and Control Section completed a shift of the entire current journal collection as well as portions of the collections on two other stack levels The shift will ease overcrowding and takes advantage of additional stack space for current journals made available by the renovation

The beginning of the fiscal year saw the start-up of a 21-month contract to label the Library's monograph collection with Machine Readable Identifiers (MRI) in the form of bar codes This will permit automated shelf reading and control of both inventory and circulation of the General Collection.

Use of the original DOCLINE system on a pilot basis continued in FY 1983, during which design of an enhanced system, based on MEDLARS III specifications, was completed and programming begun. This programming is scheduled for testing in early January 1984 with the help of the Regional Medical Libraries.

A contract was awarded toward the close of the year to vacuum and clean the books and shelves on the two floors containing monographs and current journals This major clean-up was necessitated by an unusual amount of dust generated by renovation activities in the stack areas The three-month effort is to be completed by the end of the calendar year

### Technical Services

The Technical Services Division selects, acquires, and catalogs all post-1870 books, serials, and audiovisual programs added to the Library's collection. The Division is also responsible for the distribution of authoritative cataloging data for the biomedical literature and for the collection, organization, and dissemination of serials locator and holdings data for biomedical libraries throughout the United States

During FY 1983, the Technical Services Division completed the major contract project for retrospective conversion of pre-1965 catalog records for printed materials in the NLM collection Work also progressed on other data conversion and collection activities which are essential groundwork for the MEDLARS III system, and several new automated processing capabilities were implemented as part of the transition to the new system. The Division continued its efforts to improve the quality and quantity of cataloging records distributed; pursued cooperative programs with the Library of Congress (LC) and the National Agricultural Library; and made progress on the revision of the *Scope and Coverage Manual of the National Library of Medicine*.

The Retrospective Conversion Contract ended on August 31, 3 years and 11 months after it began Approximately 324,000 cataloging records representing printed works from the fifteenth century to 1964 were converted to machine readable form during the life of the project. Of the records converted, 265,000 have been released to the CATLINE file, which now contains 509,233 records The remaining converted records will be added to CATLINE in early 1984 At that time, pre-1965 records will be distributed in MARC format and also published in microfiche Most institutions leasing the current CATLINE File have expressed interest in leasing the pre-1965 rec-

**Table 8.  
Circulation Statistics\***

<i>Activity</i>	<i>FY 81</i>	<i>FY 82</i>	<i>FY 83</i>
Requests received: . . . . .	415,315	411,343	391,090
For interlibrary loan . . . . .	236,837	226,991	212,018
For readers . . . . .	178,478	184,352	179,072
Requests filled: . . . . .	327,160	332,356	332,049
For interlibrary loan . . . . .	175,454	175,657	170,070
Photocopy . . . . .	161,017	163,078	159,583
Original . . . . .	14,437	12,579	10,487
Motion picture loan** . . . . .			4,518
For readers . . . . .	151,706	156,699	157,461
Requests unfilled: . . . . .	88,155	78,987	63,531
Interlibrary loan . . . . .	61,383	51,334	41,920
Rejected . . . . .	24,399	22,588	14,160
Referred . . . . .	4,413	1,652	3,718
Returned as unavailable . . . . .	32,571	27,094	24,042
Reader Service			
Returned as unavailable . . . . .	26,772	27,653	21,611

\* The Materials Utilization Branch, National Medical Audiovisual Center was transferred to the Reference Services Division on October 1, 1982 as the Audiovisual Resources Section (AVRS). The statistical data in the Circulation table include that Section's activities for the first time this year.

\*\* Motion pictures are circulated from an off-site contract facility directly to individuals for educational use. The number of requests for films has not been included in the total circulation figure for "Requests received."

**Table 9.  
Reference Services**

	<i>FY 81</i>	<i>FY 82</i>	<i>FY 83</i>
Reference Section			
Requests by telephone . . . . .	12,399	12,886	15,157
Requests by mail . . . . .	427	301	386
Readers assisted . . . . .	<u>30,957</u>	<u>37,297</u>	<u>42,318</u>
Total . . . . .	43,783	50,484	57,861
Audiovisual Resources Section			
Requests by telephone . . . . .			2,123
Request by mail . . . . .			2,300
Readers assisted . . . . .			<u>220</u>
Total . . . . .			4,643
Total reference service . . . . .	43,783	50,484	62,504
Reading Room users registered . . . . .	25,407	22,078	23,096

ords. In FY 1983, the Research Libraries Information Network (RLIN) joined the group of institutions leasing CATLINE, which also includes the Online Computer Library Center, Inc. (OCLC), MARCIVE, Inc., and the University of Toronto Library Automation System (UTLAS). Completion of the retrospective conversion project makes records for the majority of the NLM collection of printed works readily accessible at remote locations and simplifies all NLM service and processing activities which require reference to records for items in the Library's collection.

The National Biomedical Serials Holdings Database, now known as SERHOLD, currently contains 562,306 holdings statements for 1,017 biomedical libraries throughout the United States. In the fall of 1982, preliminary regional COM (Computer Output Microform) products, based on the old eleven-region configuration, were produced for distribution by the Regional Medical Libraries. NLM then reconfigured the holdings database to match the new regional structure and processed the first set of holdings updates received on tape from the seven new regions. In the new union lists, holdings statements for each title are organized by state, which helps the user to find the nearest holding libraries more quickly. During the year, a contract was awarded to OCLC to add NLM's serial control number to records in the OCLC database. The link between OCLC and NLM records established by this project will permit the merger of holdings data from OCLC database into SERHOLD for use in regional union list products and automated routing of interlibrary loan requests.

In May a new online serial checkin system was implemented as a preliminary step in the development of an online indexing system. In addition to providing automated control of receipt and claiming of serial issues, individual item records created for issues of indexed titles during the checkin process will form the basis of the source information in MEDLINE and *Index Medicus* citations. A machine-readable identifier (MRI) attached to each indexed issue during checkin will be used to retrieve and update the automated record for the issue as it moves through the various steps in the indexing process.

During FY 1983, the Division also began to add MRIs to all incoming books and to create individual item records for them. This effort complements the Reference Services Division contract project to attach MRIs to the retrospective book collection. Item records linked to the appropriate bibliographic record and MRIs are two necessary prerequisites for the automated circulation and inventory control function which will be implemented in the MEDLARS III system.

Direct online input of bibliographic and name authority records by NLM catalogers, tested by a small group of NLM cataloging staff last year, was fully implemented in FY 1983. By eliminating some input and proof-

ing steps, the new system reduces the overall time it takes to make completed cataloging record available to the network. The system supports online shelflisting and a true preliminary cataloging workflow, in which catalogers review and upgrade machine-readable records created by senior library technicians. Use of preliminary cataloging records offers the prospect of significant increases in the speed with which NLM cataloging records become available to the field and the more efficient use of personnel.

NLM's arrangements for foreign language cataloging assistance from the Library of Congress and the Central Medical Library of Finland came to fruition in FY 1983, with a total of 514 cataloging records received for items in Hungarian, Finnish, and various Indian languages. Despite these arrangements and NLM's limited cataloging contracts, progress in reducing the monograph cataloging backlog slowed due to higher than expected book receipts during the year. Part of the increase in books acquired is attributable to concerned efforts to claim unreceived orders from previous years.

During FY 1983, NLM extended the use of limited cataloging to certain categories of audiovisuals, including audiocassettes of single speeches. The primary differences between limited and full audiovisual cataloging are that only one authoritative heading is assigned to a limited record and that limited cataloging is done from labels, cases, and accompanying materials rather than from listening to the programs. Use of limited cataloging for some audiovisuals should speed the availability of NLM cataloging records for these materials.

In cooperative activities with LC, NLM continued to contribute name authority records for its serials cataloging records and pre-1970 materials to the LC Authority File as part of the Name Authority Cooperation (NACO) project. Plans were made for an FY 1984 experiment in which NLM will supply its descriptive cataloging biomedical Cataloging-in-Publication (CIP) items to LC for use in LC cataloging records. At least during the test period, NLM will also contribute name headings for CIP items to the NACO file. With current requirements and procedures for submission of name headings to the NACO file, contribution of name authority records involves significant additional work for NLM catalogers. NLM continues to work with LC to identify ways to streamline NACO procedures and reduce their impact on NLM production so that NLM can contribute more name headings to the national file.

The 1976-1980 cumulation of the *National Library of Medicine Current Catalog* appeared in microfiche in late 1982. This is the first NLM catalog to be distributed in microform by the Government Printing Office. Future catalog cumulations are also likely to appear in this format. Another publication, the 1983 *List of Serials Indexed for Online Users*, was expanded to include many ceased

titles which are cited in the MEDLINE backfiles. NLM's Journal Title Code (JC), which is useful for searching for citations from specific journal titles, is now also included in entries in the publication.

The project to review and revise the current Scope and Coverage Manual of the National Library of Medicine (1977) made substantial progress. Certain subject areas (e.g., chemistry, the behavioral sciences, veterinary medicine) and format problems were identified as

needing special consideration. NLM working groups have been formed to develop recommendations for revised and expanded guidelines in these areas. Materials produced by these groups are reviewed by senior Library Operations staff and by a group of outside consultants. Dr. Faye Abdellah, Deputy Surgeon General, Public Health Service, is liaison to the NLM Board of Regents for the project. Publication of a new edition of the manual is planned for 1984.

**Table 10.**  
**Cataloging Statistics**

<i>Item</i>	<i>FY 1981</i>	<i>FY 1982</i>	<i>FY 1983</i>
Completed cataloging			
Full .....	11,203	10,800	11,322
Limited .....	2,468	16,190	7,126
Total .....	13,671	26,990	18,448

**Table 11.**  
**Acquisitions Statistics**

<i>Acquisitions</i>	<i>FY 1981</i>	<i>FY 1982</i>	<i>FY 1983</i>
Current serial titles received .....	23,364	23,694	23,470
Publications processed			
Serial pieces .....	174,585	146,708	127,927
Other .....	20,267	22,342	25,479
Total .....	194,852	169,050	153,406
Obligations (\$) for			
Publications .....	1,809,993	2,618,993*	1,888,933
Included for Rare Books .....	70,408	54,602	57,610

\* Revised figure

*Library Operations*

**Table 12.  
Growth of Collections**

<i>Collection</i>	<i>Previous Total (Sept. 1982)</i>	<i>Added in FY 1983</i>	<i>New Total</i>
<i>Book materials</i>			
<i>Monographs:</i>			
Before 1500 .....	567	0	567
1501-1600 .....	5,612	20	5,632
1601-1700 .....	9,846	35	9,881
1701-1800 .....	23,644	147	23,791
1801-1870 .....	39,521	22	39,543
Americana .....	2,313	8	2,321
1871-Present .....	436,399	11,204	447,603
Theses HMD .....	281,566	19	281,585
Pamphlets .....	172,021	—	172,021
Bound serial volumes .....	685,994	27,571	713,565
Volumes withdrawn .....	(26,584)	(320)	(26,904)
Total volumes .....	1,630,899	38,706	1,669,605
<i>Nonbook materials</i>			
<i>Microforms:</i>			
Reels of microfilm .....	33,278	432	33,710
Number of microfiche .....	105,184	16,966	122,150
Total microforms .....	138,462	17,398	155,860
Audiovisuals .....	39,772	858	40,630
Pictures .....	74,319	346	74,665
Manuscripts .....	1,160,946	46,313	1,207,259



# OFFICE OF INFORMATION SYSTEMS

John E. Anderson  
Director

## MEDLARS III

The MEDLARS III Request for Proposal (RFP) was issued in November 1982 with proposals requested within sixty days. The proposals were received by NLM in February 1983, and after an initial review by NLM's Office of Contracts Management, a Technical Evaluation Team composed of NLM staff, personnel external to NLM, and an observer from the Public Health Service, convened to begin the evaluation. As a part of the evaluation process NLM established a review group of upper-level management personnel both from NLM and external to NLM to review the recommendations of the Technical Evaluation Team. The final recommendation for an award by the Technical Evaluation Team was reviewed by the senior review group and the NIH contracts review board, and an award was made on August 31, 1983, to Logicon, Inc.

Logicon, Inc. is a commercial software development and consulting firm with corporate offices in the Washington, D.C. area. The Operating Systems Division (OSD) of Logicon, Inc. will be responsible for the design and implementation of MEDLARS III. This division is located in Woodland Hills, Ca., a suburb of Los Angeles. Logicon OSD will be using terminals and communications devices for access to the NLM computer. Logicon's proposal included the use of a commercially available Data Base Management System, ORACLE.

The MEDLARS III design and implementation process will take place in three phases. The first phase will require the contractor to design the underlying software, install and test the DBMS (ORACLE), design and implement certain technical services, and develop the information retrieval capability using MEDLINE as the example data base. The target date for completion of Phase I is the spring of 1985.

Phase II will include the design and implementation of the bibliographic control components, cataloging, indexing, and authority control. Phase III will include the design and implementation of the remaining library functions, including an interlibrary loan routing and control system and the collection management activities. The implementation of Phases II and III is scheduled to be completed by the end of 1986.

**Interim Projects.** "Front-end indexing" was a project started under the auspices of MEDLARS III, and involved the design and implementation of an online, interactive indexing system. This project was initiated during FY 1982 as a front-end interim project to improve the processing of article records for *Index Medicus* and MEDLINE. After the project was started the observation was made that the quality control function for journals to be indexed was directly related to the serials check-in process. As a result of this initial analysis, the front-end indexing project was expanded to include the implementation of an online, interactive serials check-in system. This system was installed, tested and made operational during the spring of 1983. Testing was started on the indexing function during August. The newly installed serial records check-in and the entire online indexing function will be operational as a single data stream in November 1983.

The indexing function will replace manual functions now performed by indexers—typing the indexing dataform, and the subsequent revision of the dataform by revisers. These functions are replaced by providing online, interactive access for the indexers for adding the indexing terms directly to an article record in machine-readable form. Subsequent revision of the record by the revisers and indexers will be made by accessing the record online and allowing the reviser and indexer to make corrections to the machine-readable record. All article records are available for further processing into SDILINE, MEDLINE, and *Index Medicus* records as part of the MEDLARS II system.

The interim automated interlibrary loan project has evolved into two separately definable subsystems. The first subsystem involved the design and implementation of the software system for the billing support component of the interim interlibrary loan capability. The second is the interim loan subsystem. The billing support component has been completed and the interim loan subsystem is now scheduled for implementation for January 1984.

## Computer and Communications Systems

The Office of Computer and Communications Systems (OCCS) provides data processing and data communications support for all elements of the Library. It has a critical supporting role for Library Operations as well as

Specialized Information Services. Computer analysts and programmers work closely with subject area specialists to determine their data processing requirements and to convert these requirements into new or improved data processing capabilities. OCCS provides systems and programming support for the MEDLARS II system and is responsible for those capabilities providing the transition to the MEDLARS III system. Support for all of NLM's production data processing is provided by OCCS on an IBM 3033 multi-processor system and Data General 230 and 350 minicomputer systems.

**Equipment.** In 1982, NLM installed its IBM 3033 multi-processor system to support the present MEDLARS system and services as the new capabilities of MEDLARS III are developed. In 1983 a competitive procurement was conducted for the acquisition of new technology magnetic disk storage to replace the disk storage which NLM had acquired over the past ten years. As a result of this procurement NLM obtained IBM 3380 disk storage units. These new units are much faster, more reliable, and have greater capacity than any other drive available today. The first of the new drives was installed in July 1983 and replaced two full strings of 3350 disk storage. The remainder of the new drives will be phased in over the first quarter of FY 1984. Upon installation of all the planned 3380's, NLM will have a storage capacity of over 40 billion bytes of storage—the equivalent of over 12 million pages of information.

With the installation of the IBM 3033 multi-processor system, NLM was in a position to assume the full workload of the online bibliographic retrieval service. Therefore, the computer support which had been provided by the State University of New York at Albany (SUNY) for the past ten years was phased out and all MEDLINE and related online services are now provided at NLM.

**Organization.** Throughout FY 1983 a number of changes were made to assure a smooth transition to MEDLARS III as it is developed and becomes operational. Responsibility for the INQUIRE Data Base Management System and for data communications was moved into the Systems Support Branch to provide tighter control and more responsive support in a changing environment. The programming staff was also restructured to provide improved support for MEDLARS III while continuing to support existing projects and the MEDLARS II system.

**Systems Support.** During FY 1983 the Systems Support Branch provided all required support for NLM mainframe operating systems and related software, provided training, and resolved user-reported problems and inquiries. Major efforts this year were to take advantage of the capacity of the new 3033 system and to provide the necessary support for the MEDLARS III interim systems.

Notable activities of the Systems Support Branch during FY 1983 include:

- Installation and maintenance of systems software packages—MVS/SP—the current version of the IBM operating system that provides support for the recently installed 3380 disk storage units as well as increased system reliability and performance.
- Installation of a number of new software products for programmers, users, and systems support staff.
- Installation of the Data Management Supervisor version of INQUIRE which provides greatly improved user interaction facilities and is being used for the online, interactive front end indexing system.
- Major tuning and continuing development of CICS (Customer Information Control System) and the Series/1 protocol converter. The increased use of computer terminals by NLM professional staff required an improved method of providing computer services. CICS provides control for data base/data communications applications and will be one of the critical building blocks for MEDLARS III. The protocol converter provides the ability for ASCII terminals—those used throughout NLM—to use the vast library of 3270 applications and services available on the 3033 system. These systems are an important element in the MEDLARS III interim systems.

**Bibliographic Retrieval.** Much of the MEDLARS support effort provided by the MEDLARS Support Branch is not directly visible to the users of NLM services. Quality and quality control are taken for granted. The Branch continued to support all the existing databases and processes at NLM and, in addition, built new databases for the National Cancer Institute and Specialized Information Services, undertook several special-purpose programming assignments, produced a new COM publication for CATLINE, completed the front-end catalog system, and accepted responsibility for the maintenance of the CITE program that supports online patron access to CATLINE.

In December 1982 the 1983 disk configuration for MEDLINE and its backfiles became operational. All MEDLINE backfiles—from 1966 forward were made available online for searching. The availability of all the MEDLINE back files online has had a significant impact on the use of the system. There was an increase in online printing of search results and a reduction in the number of off-line print requests. In addition, with the consolidation of the MEDLINE data bases into five files, more file searching was done with each search request.

Significant resources were devoted to the National Cancer Institute database processing in 1983. Two major efforts were initiated. First, CANCERLINE access was enhanced with the addition of CANCER EXPRESS which was developed to provide more rapid user awareness of developments in cancer research. Second, NLM

provided major data processing support to the development of the cancer PDQ2 system. Two development prototypes were designed and demonstrated in this effort with an INQUIRE file design being selected as the most appropriate mechanism of creation of this database. These developments were accomplished over an extended period of time and required close coordination between NCI, its contractors, and OCCS.

**Data Communications.** The principal data communications activities during this Fiscal Year included: (1) planning for the extension of the broadband coaxial cable to the Library building; (2) continued development of the coaxial cable local area network for the Library and the Lister Hill Center buildings; and (3) enhancements to the data communications services.

New software and hardware were installed for the TYMNET and TELENET network connections. These upgrades will permit an increase in concurrent users, provide a more efficient access method, and permit the coexistence of TELENET and TYMNET in the same communications controller.

Responsibility for data communications was transferred to the Systems Support Branch in FY 1983. This move will provide closer control of ongoing communications support as the use of online services expands to an increasing number of Library users. A terminal inventory control system was installed using INQUIRE and a number of terminals were modified to satisfy unique user requirements.

**Local Area Network.** Development of NLM's LAN continues for the distribution of data and video throughout buildings 38 (NLM building) and 38A (Lister Hill Center). The cable plant is installed and operational in building 38A. The cable plant installation in building 38 has experienced delays due to the renovation schedule and is expected to be completely connected and integrated in the early spring of 1984. There currently exists a limited capability for data communications on the LAN in building 38A. Approximately 40 BIUs and two video channels are in use. Due to a change in the project management

and personnel in the spring of 1983, an internal and external review of the project was conducted. As a result of this review, a project management plan was developed. The highlights of the plan are a short term and a long term LAN implementation based on NLM's revised requirements.

**Computer Services.** During this Fiscal Year the Computer Services Branch underwent a formal review for contracting out the computer operations activity. This review requires federal agencies to identify activities currently being performed by the agencies that should be performed by commercial business under contract with the government. The review is required to determine whether it would be more cost effective to have the function performed commercially by means of a contract or to continue to have the function performed by government employees (in-house). This review began in November 1980 and was completed in May 1983. One firm submitted a proposal. However, it did not propose adequate staff to accommodate the detailed technical requirements and therefore was unacceptable.

NLM has had contracts with GTE-TELENET Communications Corporation and TYMSHARE (now TYMNET) to provide data communications services to the National Library of Medicine and to NLM sponsored host systems. These services began in 1974 and have grown to the point where they serve all MEDLINE users in the United States. Since the initiation of TELENET and TYMNET services at the NLM, additional connections have been made to (1) minicomputers at the NLM; (2) the New Jersey Institute of Technology; and (3) the Department of Defense Audio Visual Centers. In FY 1983 a competitive procurement was initiated to determine which national communications networks can best support NLM's growing requirements. We expect an award in early FY 1984 with services to be provided from mid-FY 1984 through mid-FY 1987.

An extremely high level of operational readiness has provided a constant accuracy and reliability factor of over 99.8% of operational support. MEDLINE services over this year have been available with excellent response times in the range of one to two seconds.

## SPECIALIZED INFORMATION SERVICES

Henry M. Kissman Ph.D.  
Associate Director

The Toxicology Information Program (TIP), which is the major responsibility of the Library's Division of Specialized Information Services (SIS), was established in 1967 in response to the 1966 President's Science Advisory Committee report, "Handling of Toxicological Information." The objectives of the Program are to (1) create automated toxicology data banks, and (2) provide toxicology information and data services. TIP offers three major types of services: it provides online services, responds to queries, and supports other Government agencies in their information needs.

### Online Services

TIP develops and maintains the NLM Chemical and Toxicological Files, which are online, interactive information and data retrieval services in toxicology. They include CHEMLINE, TOXLINE, RTECS, and the Toxicology Data Bank. In addition, DIRLINE, an online information resources directory file, was made available to MEDLARS users this year.

**CHEMLINE** (Chemical Dictionary Online) is an online chemical dictionary and directory file. It allows users to identify a chemical substance of interest, determine which NLM files contain information for that substance, and aids in the formulation of an appropriate search strategy for other NLM files. CHEMLINE currently contains records for 571,956 chemical substances. It is updated bimonthly, and regenerated at least once annually. The average usage was 277 connect hours per month in FY 1983 compared to 286 in FY 1982.

Two major changes were made to CHEMLINE in FY 1983 in order to improve service to users. In January 1983, the source for the names of the chemicals listed in CHEMLINE was changed from the Chemical Abstracts Service (CAS) Registry Nomenclature Structure System to the *Chemical Abstracts Index Guide*. This change allowed NLM to reduce the price of a prime time connect hour from \$101 to \$54. However, the change also resulted in the loss of a significant number of useful synonyms. In order to rectify this, over 100,000 names from the RTECS, TDB, and MeSH files were added to some 50,000 CHEMLINE records. This gave users most of the utility of the pre-1983 file, but at a significantly lower cost. The source identification of the names in CHEM-

LINE was also provided to allow easier selection of names useful in formulating search strategies in specific NLM files. Several outside sources of authoritative names are being evaluated for inclusion in CHEMLINE.

**TOXLINE** (Toxicology Information Online) is an online bibliographic database covering the toxicological effects of drugs and other chemicals. TOXLINE is updated monthly and, including its backfiles, now encompasses more than 1.4 million records from 1965 to the present. The connect hour cost increased slightly in FY 1983 from \$52/hour to \$55/hour due to increases in royalties paid to file content suppliers. Online usage of TOXLINE decreased somewhat from 8,904 to approximately 8,500 hours during FY 1983. Online usage of TOXBACK74 increased from 1,001 to approximately 1,300 hours. TOXBACK65, which had been available for offline printing only, became available online in September 1983.

New sources of information for enrichment of the TOXLINE file were evaluated. CRISP, the NIH database of research grants awards, was considered for supplying the toxicology-related, NIH-supported research to the RPROJ (Research Projects) subfile of TOXLINE. This component had not been updated for over a year since the cessation of the Smithsonian Science Information Exchange, the original source of research projects information. Specifications for the input of CRISP data have been completed, and inclusion of this material in TOXLINE early in FY 1984 is expected.

**RTECS** (Registry of Toxic Effects of Chemical Substances) is an online, interactive data retrieval service built and maintained from data provided by the National Institute for Occupational Safety and Health (NIOSH). As of September 1983, it contains records for 63,184 substances. Quarterly updates provide both increases in number of substances covered in the file and scope of information relating to the toxicity of chemical substances. Online usage averaged 120 hours per month. The basic acute and chronic toxicity information in RTECS continues to be supplemented with extensive mutagenicity and reproductive effects data.

**TDB** (Toxicology Data Bank) is an online factual database describing chemical substances that may be hazardous and may have significant human exposure.

potential. Records in TDB include information on pharmacology and toxicology, manufacturing and use, environmental and occupational exposure, and chemical and physical properties. TDB is produced in collaboration with the Oak Ridge National Laboratory (ORNL). Data are extracted from tertiary sources such as monographs or handbooks as well as from the primary literature. Completed records are evaluated by the TDB Peer Review Committee, a group of toxicologists associated with the Toxicology Study Section of the NIH Division of Research Grants.

The online file presently contains over 3,500 peer-reviewed records with an additional 569 records in various stages of preparation. During FY 1983, the TDB online usage was about 200 hours per month, a 24 percent increase over FY 1982.

Several major activities to enhance the utility and responsiveness of the TDB file were undertaken partly as the response of the Department of Health and Human Services to the information requirements of the Comprehensive Environmental Response, Compensation and Liabilities Act (CERCLA). These activities ranged from the reformatting of the data within a TDB record to the development of the Remote Data Entry System (RDES), a minicomputer-based database building and maintenance system.

The RDES, developed by NLM's Lister Hill Center (LHC) and adapted to the TDB effort in close SIS-LHC collaboration, provides for multi-site file building and maintenance capabilities. The minicomputer housing the system is linked to the file building organizations such as the Oak Ridge National Laboratory, through dedicated communication lines. More importantly, RDES can easily accommodate expanded and altered versions of the TDB file. In order to expedite the enhancement of TDB, TIP has negotiated an agreement with the Department of Defense (DOD) for services of the Dynamac Corporation, which operates the Hazardous Material Technical Center for DOD, to assist in the expanded TDB file building activities. Other contractors with access to specialized data relevant to TDB's expanded scope also will contribute input.

**DIRLINE** (Directory of Information Resources Online), an online interactive directory pointing users to organizations that can provide information in specific subject areas, was made available to MEDLARS users for an experimental one-year period in August 1983. Currently the file is an online version of the Library of Congress' National Referral Center (NRC) file and contains information on 13,056 resource centers. These centers include public and private organizations, institutions, groups and individuals with specialized information in a particular field. Each record is updated by the NRC at least every two years. DIRLINE will be updated quarterly.

A second component of DIRLINE will be the National Health Information Clearinghouse (NHIC) database, with references to organizations providing information in various areas of health and disease. This file was obtained through an agreement with the Office of Disease Prevention and Health Promotion of the Public Health Service. This file will be available in DIRLINE in FY 1984.

User support services for the NLM Chemical and Toxicological Files have been expanded. The manuals and pocket cards, which were developed to aid users in searching these files, have been revised. A "Sampler", containing file descriptions as well as annotated search examples, was designed to introduce the files to new or prospective users. A slide/tape overview describing the files was created. Audiovisual instruction packages, each consisting of 35 mm slides, a workbook, and a cassette, allowing self-instruction in the use of the files, were developed for CHEMLINE and RTECS. Similar packages will be developed for TOXLINE and TDB in the coming year. In addition, a slide/tape overview on the Toxicology Information Program was created to orient individuals or groups unfamiliar with its products and services. The audiovisual instruction packages are available for purchase from the National Audio Visual Center, GSA. In addition, TIP designed two exhibits illustrating the NLM Chemical and Toxicological Files. These were used by the staff at a number of professional meetings in FY 1983.

SIS staff instructed 18 initial NLM Online Services training classes in the use of the Chemical and Toxicological Files. The staff also provided advanced training at NLM on six occasions, and at the Regional Medical Libraries on five occasions.

**CITE.** In November 1982, the CITE (Current Information Transfer in English) public access online catalog was installed for patrons of NLM's Reading Room. CITE provides user-friendly access to the CATLINE file which contains more than 500,000 items, including all biomedical monographs in the Library's collection published between 1801 and the present. This was accomplished through collaboration among SIS, Library Operations, and the Office of Computer and Communication Services.

### Query Response Services

Literature search and query response services in toxicology are provided by both TIP and the NLM-sponsored Toxicology Information Response Center (TIRC) at the Oak Ridge National Laboratory in Tennessee. In FY 1983, 59 specific search queries were handled by the TIP staff.

TIRC products and services are provided on a cost-recovery basis. Charges for literature searches at TIRC have been maintained at the FY 1982 rate of \$30 per hour

for domestic users and \$35 per hour for foreign users with billing being handled by the National Technical Information Service (NTIS). In FY 1983, TIRC performed 497 searches. Most of the search requests were from Federal agencies that have interagency agreements with NLM for information support from TIRC.

### **Information Services to Other Agencies**

TIP provides information support to several Federal agencies. Current examples of these are the Agency for Toxic Substances and Disease Registry (ATSDR), the National Toxicology Program (NTP), the Food and Drug Administration (FDA), the Department of the Army (DOA), and the National Institute for Occupational Safety and Health (NIOSH). Literature searches and related information services for these agencies are provided by TIRC.

**Hazardous Substances Information Services.** In FY 1983, the major effort of TIP in interagency information services has been in support of Department of Health and Human Services (DHHS) responsibilities under the Comprehensive Environmental Response, Compensation and Liabilities Act (CERCLA), also referred to as the "Superfund Act." These activities were initiated in 1982. The primary objectives are to: (1) enhance the NLM Chemical and Toxicological Files with additional chemical substances and data pertinent to chemical waste dumps or accidental spills; and (2) improve information dissemination capabilities for officials dealing with hazardous chemicals—often in emergency situations.

An interagency agreement was signed with ATSDR on June 28, 1983, for this program. The ATSDR was newly formed to serve CERCLA requirements. Previously, the Centers for Disease Control (CDC) served as lead agency for DHHS Superfund activities, and the NLM agreement was with the CDC.

During 1983, the TIP staff was expanded to include a biologist and an industrial hygienist to work on CERCLA activities. In collaboration with several committees, new data elements for the enhanced Toxicology Data Bank, better data element definitions, and new sources for these data were identified. Computer access methods were improved to allow for remote data entry by several contractors, and a computer-conferencing and electronic mail capability was developed to facilitate peer review of database content.

Additional tasks under the agreement with ATSDR are to: (1) support the DHHS Hazardous Waste Information Evaluation Subcommittee in selecting chemicals for toxicity testing and incorporation of information into the Toxicology Data Bank; (2) conduct a feasibility study for the development of hazardous chemical profiles; and (3) explore the feasibility for use in the field of a micro-

computer workstation functioning as an online terminal as well as a free-standing information processor.

**National Toxicology Program.** TIP continues to provide some information support to the NTP. TIP prepared the tables and indexes for the FY 1983 NTP Review of Current DHHS, DOE, and EPA Research Related to Toxicology, as well as the update forms for the FY 1983 submission. The Program also continues to furnish required chemical information from CAS to NTP.

**Interagency Subcommittees.** As part of its collaborative work with other Federal agencies, TIP chairs the Toxicology Information Subcommittee of the DHHS Committee to Coordinate Environmental and Related Programs, and the Chemical Substances Information Network Subcommittee of the Interagency Toxic Substances Data Committee. The former group sponsors and monitors the following four projects which are operated by TIP.

TOX-TIPS (Toxicology Testing-in-Progress) is a monthly publication that describes toxicity testing and related epidemiological studies reported voluntarily by governmental, industrial, and academic laboratories. Each issue also carries an alerting service entitled, "Methods of Testing Chemicals for Biological Effects." TOX-TIPS is published monthly through NTIS and is available at annual subscription rates of \$45 domestic and \$90 foreign. The number of subscriptions has remained stable at approximately 625 worldwide. Contributions to the publication were received chiefly from Federal agencies and some industrial testing programs.

Two TOXLINE components, Research Project (RPROJ), carrying information on ongoing research in toxicology, and the Toxicology Document and Data Depository (TD3) with information about the report literature in toxicology, are also sponsored by the Subcommittee. A fourth project, Information Response to Chemical Concerns, through which bibliographies on current topics of interest in toxicology are produced by TIRC and published by the Federation for American Societies of Experimental Biology, this year issued a bibliography on the Effects of Chemicals on the Human Reproductive System.

As the name indicates, the CSIN Subcommittee monitors the activities of the interagency CSIN (Chemical Substances Information Network) project which provides integrated access to specified files on MEDLARS, the Chemical Information System, CAS ONLINE, and ORBIT. CSIN facilitates online searching through a minicomputer-based software package that functions between the user's terminal and the target files. It uses the preprogrammed search capabilities, SCRIPTs, which prompt the user for the information needed for the search, and TRANSFORMs, which automatically format a file for use in a particular system.

In FY 1983, NLM supported the development of a distributed microcomputer version of CSIN that encompasses most of the capabilities of the centralized, mini-computer version. The microcomputer workstation,

which is undergoing testing at NLM, will support direct searching, where the user accesses target online files directly with minimal CSIN mediation, and SCRIPT-based searching, where the workstation automatically performs sophisticated searches for the user.

# LISTER HILL NATIONAL CENTER FOR BIOMEDICAL COMMUNICATIONS

Richard B. Friedman, M.D.  
*Director*

On January 1, 1983, the Secretary of the Department of Health and Human Services approved the merger of the National Medical Audiovisual Center and the Lister Hill National Center for Biomedical Communications. The functional statement for the merged organizations was published in the *Federal Register* (48, 3873-74, January 27, 1983). The new Lister Hill National Center for Biomedical Communications has six branches:

- Communications Engineering
- Computer Science
- Information Technology
- Audiovisual Program Development
- Health Professions Applications
- Training and Consultation

This is the first combined report of the two organizations. Activities of branches that were merged or renamed will be reported under their present names.

In June 1983, Richard B. Friedman, M.D. became Director of the LHNCBC. Leadership during the period before Dr. Friedman's appointment was provided by the Acting Deputy Director, Earl Henderson, formerly Chief of the Communications Engineering Branch.

## Communications Engineering

**Electronic Document Storage and Retrieval Program.** The LHNCBC has completed the first phase of a research and development program in electronic document storage and retrieval (EDSR). The long-term goal of the program is to introduce new technology to help the Library fulfill its mission as a national archive for biomedical literature. The first phase of this program to design, develop and demonstrate an experimental prototype system has been completed. This system will be used to conduct experiments in document capture, storage, retrieval and display.

Document capture techniques are being explored to scan electronically both loose-leaf as well as bound documents containing textual and graphic material. Document storage in the prototype system is provided by high-density magnetic disks. This storage medium will later serve as buffer storage for an archival storage subsystem, probably implemented by optical disk technology. Documents are retrieved and displayed in both softcopy (electronic display) and hardcopy (paper) forms. This research

effort will use the prototype system as a test bed to evaluate and correct problems encountered in capturing images, transferring images to storage media, retrieving and displaying images on output devices, and evaluating factors such as display image quality, system reliability, maintainability, the man-machine interface, and the utility of such a system to the NLM mission in information processing.

## Computer Science

Prior to the January 1983 reorganization, this Branch, as the Medical Computer Science Research Group, had been a component of the Health Professions Applications Branch.

The Computer Science Branch is currently developing frame-based representation systems, using the subjects of viral hepatitis and gastrin as examples for semantic structure. A display system built around a bit mapped terminal has been developed and is now being used for the display of the viral hepatitis text database, and for the development of the framebased representation system.

A relational database machine, the IDM-500, has been installed and is being used for two projects:

- The development of conceptual indices in human genetics.
- The representation of the Current Medical Information and Terminology database.

Branch activities during the coming year will focus on the Knowledge Base Retrieval Project and the Automatic Indexing Project. The first, an outgrowth of work begun in the Knowledge Base Project, is designed to discover general methods for the representation of concepts from printed documents in order to simulate the functions of library indexers. The Automatic Indexing Project will investigate extracting concepts from printed documents to simulate the functions of library indexers.

## Information Technology

Until the January 1983 reorganization this program was carried out by the Computer Technology Branch. Three projects are reported here.

**Integrated Library System.** Work on the Integrated Library System (ILS) was started in FY 1977. The objective was to develop an integrated library system that would



exploit the state-of-the-art in computer hardware and software, and serve as a model to the biomedical community. There are now 35 libraries which either have, or are in the process of acquiring ILS, either directly or through one of the contractors now offering ILS as a service. Most recently, OCLC, Inc. has decided to market ILS to its 3200 member libraries and others under the name LS/2000. OCLC has some 40 personnel identified with their ILS effort and a budget for FY 1984 of one million dollars for ILS marketing and support. Their goals are to have an installed base of 24 libraries by the end of this fiscal year.

Other benefits that have accrued from this program include enhancements to the MIIS Operating System, an Issues Tracking System (ITS), an Interprocessor Communications System (IPC) and a sophisticated Electronic Mail System (EMS). Although these enhancements started with the ILS program, they are independent capabilities of great potential value to all members of the biomedical community using the MIIS Operating System, and a model for all users of standard MUMPS.

**Advanced Terminal System (ATS).** The objective of the ATS project was to develop, test, and demonstrate a single integrated terminal/system which could

- Act as a fully functional PLATO V terminal
- Act as a standard ASCII terminal for network access
- Provide locally a superset of PLATO graphics for augmentation courseware on nongraphics systems
- Act as a local stand-alone Computer Based Education (CBE) development and delivery system with graphics.

Four ATS-3 terminals were built by a contractor and placed in the field for testing at four sites. All stated objectives were successfully met. In addition, the field test sites all found courseware transportability to be feasible, although some manual translation was needed to create PILOT equivalents.

LHC ATS PILOT was shown to have an instruction set sufficiently rich to reimplement sophisticated courses originally developed in other CBE languages. The ATS versions were effective and had adequate performance, frequently executing faster on the ATS than in their native environment. More than 40 publications have resulted directly from the ATS project, with 10 more on the ATS software and results of the field test pending.

In 1981 a variant of LHC ATS PILOT was released to NTIS for distribution. This variant, LHC 8080 PILOT, runs under the CP/M operating system used on most of the 8-bit microprocessors. It provides the community with the most powerful existing microprocessor implementation of PILOT.

In 1978-1979 the Lister Hill Center contracted with Micropi to reimplement COMMON PILOT in the programming language UCSD PASCAL. With the knowledge

and approval of LHCBC, Micropi, after completing their work under the contract, sold the product to Apple Corporation, which renamed it APPLE PILOT and released it as a supported product. While many manhours and much money have been spent in APPLE PILOT development at Apple Corporation, the Lister Hill Center has had a pivotal role in making this version of PILOT available to the community.

#### **Distributed Information System (DIS) Program.**

The DIS program encompassed numerous projects related to the effective distribution (as opposed to centralization) of modern, advanced information systems technology. Several projects are underway and/or nearing completion. These include:

- IIMS (Interactive Information Management System)
- Electronic Mail System (EMS)
- Inter Processor Communication System (IPC)

The Interactive Information Management System is a collaborative project of the LHCBC Information Technology Branch and NLM's Specialized Information Services (SIS). IIMS builds on a previous LHCBC project, the Distributed Information Delivery System, DIDS, which demonstrated the feasibility of delivering a full-text, encyclopedic database, the Hepatitis Knowledge Base, on a distributed microprocessor-based system. The basic concepts developed during the DIDS project are being enhanced within the IIMS to include:

- Integrated maintenance facilities to support larger, more complex data bases, including hierarchically organized free text,
- Online peer review and editorial control,
- Item management tracking, and
- Appropriate user-friendly retrieval interfaces.

SIS is applying these developments to the creation, maintenance and online peer review of the Toxicology Data Bank (TDB). TDB is a file which contains full-text information on 4000 toxic compounds. SIS was particularly concerned about the high costs associated with producing the database and the difficulties users have had in retrieving information from it.

Another LHCBC developed system, the NLM Retrospective Data Entry System (RDES), originally designed for retrospective conversion of the NLM card catalog, was made an integral part of IIMS and adapted to TDB's needs. The entire data entry and maintenance system was transferred from the Oak Ridge DEC System-10 to a Data General Eclipse minicomputer located at a contractor's site in Kensington, Maryland, and will eventually be transferred to an NLM computer. Phase-in of the data entry portions of IIMS was completed in April 1983.

The primary benefits of the IIMS project to date have been an overall improvement in management of the TDB.

file. The most quantifiable benefit has been the cost-savings that have resulted since the system became operational in March 1983. Monthly costs for the new system are approximately \$6,300 compared with the lowest previous monthly cost of \$14,500. Even with the reduced cost, the new system permits the entire TDB file to be accessible online and supports all the new features such as online peer review.

**Electronic Mail System (EMS).** Initially developed as part of the Integrated Library System program, EMS is a sophisticated electronic mail system which transcends existing systems in its ability to manage information communicated electronically. EMS represents a powerful facility for distributed information systems in general and it is currently in use by peer review members and SIS staff in compiling and updating the Toxicology Data Bank. The evaluation of its use within the ILS and SIS communities will assist in identifying further system requirements and/or changes.

**Inter Processor Communication System (IPC).** Like EMS, the IPC effort was initiated during the ILS development. The IPC addresses a function which is key to distributed systems, the communication between computers. IPC supports two modes of communication—computer to computer, and computer to/from terminal. The computer-computer mode provides automatic error detection and retrotransmission of data or text. This is the most desirable and secure way of transmitting data online. The terminal mode automatically configures a distributed computer to appear as a standard terminal to another (perhaps centralized) system. The IPC also provides for automatic dialing as well as logon for remote computers, a very important aspect of user friendly (or cordial) interfaces.

**ANNOD.** The Information Technology Branch has enhanced the cordiality of user access to the Hepatitis Knowledge Base by developing a free text searching capability, ANNOD (A Navigator of Natural Language Organized Data). ANNOD is a natural language query system that allows a user to ask questions in whatever words he/she chooses and have the relevant paragraphs of the database displayed in response to the query.

The Hepatitis Knowledge Base was the file used for testing ANNOD. Responses to a series of users' natural language queries were evaluated by three testers. Information needed to answer 85-95 percent of the queries was located and displayed in the first few selected paragraphs.

### **Audiovisual Program Development**

With the merger of NMAC and LHNCBC, the former NMAC Materials Development Branch became the Audiovisual Program Development Branch (APDB). Pro-

gram emphasis shifted from traditional learning materials development to the application of newer electronic technologies to the educational, research, and information transfer needs of the health sciences community.

The APDB program has two goals:

- The design and development of *visual data bases* appropriately indexed for retrieval in the context of instructional objectives well established in health sciences teaching institutions.
- The design and development of *prototype instruction materials* using learning principles that have evolved from computer based and audiovisual self instruction.

**Visual Database Projects.** Work was begun on a "Dermatologic Diagnosis" videodisc project in which a visual data base of high quality color photographs of skin disorders is being assembled on videodisc and controlled by microcomputer programming. The demonstration database will be tested in medical education settings to evaluate its utility as a teaching/learning tool and as an aid in diagnostic decision making.

At the request of the Armed Forces Institute of Pathology, APDB is creating a test videodisc, to ascertain (1) if videodisc recording provides sufficient resolution for cataloging and analyzing brain sections; and (2) to determine if photographic copies can be used in the disc production process rather than the actual sections.

More than 1,000 selected images from the NLM History of Medicine Division's Prints and Photographs Collection have been recorded on magnetic video devices for development of another optical videodisc. The disc will be interactive in design, programmed for internal player microprocessor retrieval or by external computer control, and tested in other medical libraries.

**Prototype Learning Materials.** With the advent of the laser videodisc under microcomputer control, the research and development role of the Branch in designing learning materials takes on new dimensions. This tool opens the door to the testing of new instructional strategies that can be undertaken by instructors at medical institutions. The Lister Hill Center's facilities are to be opened to faculty who are willing to devote creative time and resources to collaborative projects on the design of health sciences learning materials at the LHNCBC.

In collaboration with Dr. Frank Allen, Department of Anatomy, the George Washington University School of Medicine, a "Microanatomy Data Bank Videodisc" project was begun. Specific learning units will be created by interfacing a prototype visual database of normal histology slides-on-videodisc with microcomputer programs designed by Dr. Allan and other experts at G.W.U. and the Lister Hill Center.

Examples of more traditional development activities during FY 1983 include the production of a documentary videotape on "John Shaw Billings: 19th Century Medical Genius," which highlights the many accomplishments of the man sometimes referred to as "the father of the National Library of Medicine." This presentation received favorable reviews from medical historians and educators and was turned over to the Library's Audiovisual Resources Section for distribution.

In collaboration with the Food and Drug Administration, the Center began the design and recording of a series of training modules on the application of Federal guidelines and regulations dealing with informed consent and other aspects of the protection of human subjects in research.

About 20 short excerpts from the 44 one-hour videotaped interviews with "Leaders in American Medicine" were selected and organized into a pilot videotape to illustrate the medical research philosophies of these outstanding leaders.

**Learning Resources Laboratory.** Work in the LHCBC Learning Resources Laboratory continues on three optical videodisc projects.

The videodisc project in Basic Medical Pathology was initiated in FY 1982. Field testing of the first products began in August 1983 in about 25 schools of the health professions. These products consist of a two-sided videodisc in Basic Medical Pathology accompanied by computer programs to control the videodisc. Each side of the disc contains a single concept presentation of the first two topics presented in most courses in medical pathology: "Cellular Alterations and Adaptations" and "Cell Injury and Cell Death."

The second project addresses another medical content area—radiology. It was initiated in 1983 and field testing of the product will begin in FY 1984. One single-side videodisc has been produced. The project began as a collaborative effort with the Food and Drug Administration. It is an outgrowth of research in Filmless Radiology conducted jointly by the FDA and DOD (the Teleradiology Project). The current videodisc contains all the radiographs from 22 cases selected from the American College of Radiology Learning File. (The entire file contains some 1400 cases represented by about 5,000 radiographs.)

Once the videodisc containing radiographs was available, attention was turned to devising a computer program which would control the videodisc player to present the radiographs in an educationally meaningful setting. One such prototype program has been produced. It has been presented at two national meetings and to many practicing radiologists. No radiologist has been unable to arrive at the correct diagnosis after viewing the videoradiographs.

The third optical disc project involves the presentation of a dental case simulation utilizing the videodisc and computer. This project was initiated by the Computer Technology Branch in 1978. The University of Nebraska Dental School developed several case simulations suitable for presentation by videodisc under computer control. Computer programs were originally written for the PLATO system.

In 1981 the Learning Resources Laboratory had one of the Nebraska simulations reformatted (from videotape) to videodisc. The associated computer programs have been translated from TUTOR (the PLATO language) to 8080 PILOT. The version of PILOT used runs only on a highly specialized research microcomputer. Learning Resources Laboratory personnel are now translating the programs to run in APPLESOFT BASIC so that they can be tested and used by health professions schools.

**Operational Support Activities.** Among the support activities is the scheduling and operation of conference facilities. These may be used to transmit the most elaborate of conference presentations, including by earth satellite to distant locations or, as needed, reliable AV services in seminar/classroom spaces throughout the NLM and the Lister Hill Center. Graphics and still photography continue to provide visual information media for presentation over electronic systems both in support of APDB projects and for other needs throughout the Library.

In June, the Office of Training Facilities Coordination was removed from APDB and placed under the supervision of the Office of Inquiries and Publications Management. However, APDB continues to support audiovisual presentations and supply recording and directing skills, as required, to meet the needs of meetings held in the LHC Auditorium and other training facilities throughout the Library.

During FY 1983, 70 meetings were held in the Auditorium, an increase of 20 percent over FY 1982. Individual attendance increased by 30 percent, to 7,191. More than 1,500 person-hours of audiovisual skills support were required by the Auditorium meetings.

**Table 13.**  
**AV Production Statistics, FY 1983**

Audiotapes .....	70
Photo prints/slides .....	13,573
Slide/tape Units .....	2
TV Productions .....	5
Optical Videodiscs .....	3

### Health Professions Applications

As a result of the January 1983 reorganization, this Branch lost its Medical Computer Science Research

Group, which became the Computer Sciences Branch, and gained the Health Professions Resource Group.

**Knowledge Base Research Program.** The Knowledge Base Research Program (KBRP) was a fundamental research program that required long-term support. Its purpose was to find new ways to structure medical knowledge, to organize it, and to represent it in the computer in ways that can be responsive to the information needs of health care professionals.

A derivative product of the KBRP from the Human Genetics Knowledge Base (HGKB) project was the preparation of machine-readable tapes, an expanded index, an author index, and introductory material for publication of the sixth edition of *Mendelian Inheritance in Man*, 1983. This book provides the latest synthesis of textual and reference information for approximately 3,400 genetic phenotypes which have been reviewed by a panel of experts. It was intended to be a focal point for expanding textual entries; restructuring information; and identifying, selecting and indexing visual coordinated with textual information.

The activities of the Program were directed toward the computer representation of medical information, building on our experience with the experimental Hepatitis Knowledge Base and other text databases in human genetics and peptic ulcer diseases. The goal of this activity was to merge modern technology with biomedical textual and visual information to provide rapid transfer of appropriate knowledge to health professionals to assist the medical decision-making process. However, the untimely death of Dr. Martin N. Epstein, Director of the Medical Computer Science Research Group, has drastically curtailed activities. It is noteworthy that within two months of Dr. Epstein's death, two memorial awards were established by the Symposium on Computer Applications in Medical Care and the Institute of Electrical and Electronic Engineers.

**Educational Research and Evaluation.** The activities of the Educational Research and Evaluation Branch, before

and after its merger with the Health Professions Application Branch include the following:

Dr. S. W. Chan of Michigan State University under an NLM contract had prepared a monograph on computer-based test item banking techniques, especially in health education settings. The author's manuscript required extensive editing by staff. This was completed early in FY 1983. The monograph was forwarded to the National Technical Information Service for distribution. (Computerized Item Banking and On-Line Test Construction for Medical and Professional Education. S. W. Chan, PB 83-205-377, \$13.00.)

The data collection phase for the Materials Utilization Branch Survey ended late in 1983, when there were about 3,000 survey responses in hand from health educators who have borrowed film or video-cassette materials from NLM's audiovisual loan program. Preliminary results indicate that a few titles were used a lot (9 AV's had over 25 uses,) and a lot used very little. Three fourths of the loaned materials were used in schools; the remaining quarter for continuing education of professionals. Nurses were the primary in-school users, medical doctors the primary continuing education users. The project report will be issued early in FY 1984.

### **Training and Consultation**

The Training and Consultation Branch assisted health professionals in planning, designing, using, and evaluating audiovisual technologies. A great percentage of staff effort was devoted to organizing, consulting, and developing resources to begin assisting health professionals to use computer technologies effectively. Plans were developed for the creation of a National Demonstration Center for Education Technology at the LHCNCBC. The Demonstration Center will provide a location where teachers, health care practitioners, and researchers can come to see demonstrated, have "hands on" experience with, and learn to operate the latest in microcomputer and audiovisual technology programs.

The Training and Consultation Branch provided over three hundred in-house consultations to health professional teachers, researchers, and administrators.

# EXTRAMURAL GRANTS AND CONTRACTS

William G. Cooper, Ph.D.

*Acting Associate Director, Extramural Programs*

The National Library of Medicine's Extramural Programs, authorized by the Medical Library Assistance Act (MLAA) of 1965 and extensions, support improvements in health information services and biomedical communications by providing grants to develop and extend library services, strengthen information resources, conduct research in ways of improving communication and knowledge transfer, train health information personnel, and produce critical reviews and other publications on important health topics. In addition, contracts provide for a national network of Regional Medical Libraries with the necessary resources and services to give backup support for local health science libraries. (See details on RML program on page 6) During FY 1983, awards were made for 52 new grants, and 46 continuation grants for activities begun in prior years.

The total MLAA expenditure for FY 1983 was \$7,500,000 (see Table 14). This amount was made available as the result of a continuing resolution for FY 1983 which extended, for yet another year, the FY 1982 spending level. This 1982 budget authority was determined by the Omnibus Reconciliation Act of 1981. The impact has been a reduction of support levels for current projects, and fewer awards than in FY 1981. However, such reductions should not be presumed to be related to congressional disenchantment with the MLAA authorities. The House and Senate reports on the extension of the MLAA programs acknowledge the important role of NLM in supporting research and improvement in biomedical communications.

The Congress is presently considering legislation to renew MLAA authority for all programs for three years (FY 1984-86). The House bill specifies amounts of 10, 11, and 12 million dollars, and the Senate bill specifies 10.5, 11.025, and 11.576 million dollars.

## Research Program

The program goal is to achieve new understandings of how health knowledge is organized, retrieved, and used in health care, research, and education. Ever expanding medical knowledge and changing dimensions of health care delivery raise fundamental issues calling for investigation by highly qualified individuals and multidisciplinary teams. This program, called "Computers in Medicine/Medical Informatics," addresses questions

about the role of knowledge in professional life, new structures for managing this knowledge, and computerized means for bringing relevant information to clinical settings. In this program, NLM necessarily distinguishes health information studies from investigations which are primarily concerned with learning about biomedical phenomena or disease treatment.

Research activities within the program scope include: analyses of the nature of medical knowledge and its place in clinical activity; the impact of computer systems on knowledge acquisition, transmission, and utilization; and underlying principles of knowledge base design or computerized knowledge representation. Such studies may include analyses of how medical literature is organized, maintained, and disseminated; how health professionals utilize information for decision making; and how new managerial and organizational structures may be developed for improved information delivery. There is a clear need to understand better how health professionals perceive their information requirements and how academic medical institutions can utilize new technologies, such as artificial intelligence and advanced computer systems, for higher levels of information access.

These research projects are carried out by investigators from many disciplines. They include the computer, cognitive, and information sciences, as well as medical librarianship and a wide range of basic medical sciences and clinical specialties. Some examples of projects follow.

At Tufts/New England Medical Center, NLM supports an investigation to formulate a detailed description of causal reasoning in the medical area of sodium and water balance disorders. To develop a program, which ultimately will reason about these disorders at the level of a human expert consultant, empirical data about reasoning and problem solving will be obtained from clinicians at different levels of expertness. Analysis of transcripts of their reasoning about these nephrological problems will form the basis for formal mathematical model and, eventually, a computer program utilizing artificial intelligence techniques.

At Dartmouth Medical School, a grantee is studying diagnostic and therapeutic problems where laboratory

information is necessary for sound decision making. The project includes the development of an analysis system for laboratory medicine and ancillary training for health care personnel in quantitative clinical decision making. This project represents an innovative approach to decision analysis of laboratory findings in a variety of clinical settings. The project's success will contribute not only to scientific decision analysis but also to biomedical computer science.

The randomized control trial is a frequently used methodology for evaluating new therapeutic techniques and drugs. As a methodology, such trials can be used to evaluate almost everything that practicing physicians do. At Mount Sinai School of Medicine, published randomized trials are being critically analyzed to determine objectively how well they are performed, how adequate controls are, and how scientifically valid the reported results are. The result of this investigation and its numerous component parts will take the form of better scientific standards for designing these trials and for objective editorial criteria for selecting which reports ought to be published. Consequently, physicians will be able to draw upon the vast clinical trial literature with greater confidence, and those who design these trials will have better guidelines for assuring scientific validity.

### **Training Program**

Research issues in the health information and health computer sciences call for highly trained, creative talent, able to articulate medicine with computers and health care with information science. There is a particular need in academic medicine for a new discipline—health information or health computer science. Through its training program, NLM provides grants for research career training in this field.

The program direction reflects ten years' successful experience with training grants in the health sciences and computer technologies. The training goal was to raise the level of computer science understanding on the part of clinical and scientific leaders, and to a large degree that need has been met.

In 1983, the need for a specific focus on research career training became clear. A request for training grant applications in this field drew a wide response from academic medical institutions. Following a selective review in late 1983 and early 1984, the most highly regarded proposals will be selected for funding.

### **Medical Library Resource Grants**

This grant program is intended to improve health science libraries by expanding their resources and service capabilities. There are two forms of support—the Resource Improvement Grant and the Resource Project Grant. The Improvement Grant assists the development of basic collections; it is available to individual institu-

tions and to consortia of various organizations involved in health education, research, and care. The Resource Project Grant enables health science libraries to undertake new services or expand existing ones.

In 1983, NLM announced a new initiative for the program. With Resource Project Grants NLM will foster the planning, development, or implementation of Integrated Academic Information Management Systems (IAIMS). The goal is to assist entire institutions in better managing health sciences knowledge, relying on existing libraries as the logical center for organizing, accessing, retrieving, and disseminating recorded knowledge and information. (For a discussion of other IAIMS activities undertaken by NLM, see page 35).

One example of a Project Grant is the award to Mercer University, Macon, Georgia, on behalf of the Georgia Interactive Network for Medical Information. The network will have a central node at the medical library of Mercer University School of medicine and satellite nodes consisting of hospital libraries and practice sites of selected physicians in rural practice. This project will place the Mercer Medical Library in a fully electronic mode via an automated, integrated library system. It will make available to the end user the full range of resources and services of the library.

A Project Grant was awarded to the University of Wyoming for a statewide Health Sciences Information Network Project. The objectives are the continued growth and development of the basic unit libraries which provide for immediate in-house informational needs; the continued development of health science library consortia, which provide expanded access to biomedical information through cooperative development and sharing of resources; and the continued development of the network so as to improve document delivery, information flow, and the statewide sharing of resources. This project is described in an article by Pride, R.B.; Keiter, L.; and Bub, K. "Development of a State-wide Health Sciences Information Network: A Cooperative Effort," (*Bull Med Libr Assoc* 1983 July; 71:287–298).

Another Project Grant was awarded to Altoona Hospital, Altoona, Pennsylvania, to develop and program a microprocessor-based system for medical library operations in a medium-sized community teaching hospital located in a small city. It will include a master index of nursing services manuals, provide a machine-readable list of the library's holdings for immediate inquiry and for sharing with other institutions, maintain ongoing statistics, have an online catalog, maintain a list of AV holdings, act as a word processor, provide a terminal link with the Allegheny Family Practice Residency Program, provide time for the librarian to act as a clinical librarian, reduce costs by eliminating need for additional clerical personnel, and provide a link with the Altoona Area Public Library.

## Extramural Programs

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Twenty-nine Medical Library Resource Improvement Grants were awarded in FY 1983. Fifteen of these awards were to consortia involving 125 member institutions.

### Publication Grants

The Publication Grant Program, a domestic program authorized under the Medical Library Assistance Act, provides selective, short-term support for a variety of not-for-profit biomedical publications, expediting access and availability of health information for U.S. practitioners, research scientists, planners and educators. The companion NLM international scientific publication program, authorized under Public Law 480 and also administered by the International Programs Branch of NLM's Extramural Programs Division, is described later in this report, under "International Activities."

Projects prepared and/or published under the domestic program include critical reviews and monographs on special areas of medical research and practice; publications on biomedical communications and in library and information sciences; secondary literature tools (such as annotated bibliographies, atlases and catalogs); temporary support for periodical publications; studies in the history of medicine; translations of current foreign biomedical monographs; and proceedings of symposia related to U.S. health needs.

During FY 1983, 19 Publication Grants were awarded, totaling \$440,010. Of these, 12 were new awards, including a study on the pathophysiology of pulmonary edema which will critically review and evaluate existing knowledge on this important research field, which has undergone tremendous changes in the last 25 years. The continuing emphasis in this program upon high-quality, but low-cost, projects that are scheduled for early publication was reflected in the average amount of a Publication Grant in FY 1983—approximately \$23,000, including direct and indirect costs.

Among the 44 studies received in FY 1983 which had been supported earlier in the Publication Grant Program was a *Dictionary of Epidemiology*, edited by John Last, *et al.* (N.Y.: Oxford University Press, 1983) in which the definitions, examples of usage, graphic illustrations and synonyms were arrived at by a consensus of an international panel of epidemiologists working under the sponsorship of the International Epidemiological Association. This is the first dictionary of epidemiology to be published. A significant, multi-authored volume published this year aims at providing a description and understanding of the pathogenesis of infection and disease both within the community and within the individual—Alfred S. Evans and Harry A. Feldman, eds., *Bacterial Infections of Humans: Epidemiology and Control* (New York: Plenum Medical Book Company, 1982). Also completed this year with support from this NLM program was a historical

study of changing roles and perceptions of the elderly in America before the twentieth century, focusing on the creation of models of old age and superannuation that still influence the way we perceive and treat the elderly in contemporary America, written by Carole Haber: *Beyond Sixty-Five: The Dilemma of Old Age in America's Past* (New York; Cambridge University Press, 1983). A major study on *Mental Illness and American Society, 1875–1940* (Princeton: Princeton University Press, 1983), written by a leading American medical historian, also reached print during Fiscal Year 1983.

(See Appendix 2 for a complete listing of books, periodicals, and journal articles received in FY 1983 resulting from NLM Publication Grants.)

### Planning Office

Because Dr. William G. Cooper, in addition to his position as Acting Associate Director for Extramural Programs, is Associate Director for Planning, the report of the Planning Office is appended to the Extramural Programs' report.

One of the major activities of the NLM Planning Office in FY 1983 has been to initiate a new program to develop Integrated Academic Information Management Systems (IAIMS) in academic health sciences centers. The IAIMS effort is a response to an Association of American Medical Colleges report which called on NLM to assume leadership in stimulating and guiding the development of new ways for institutions to better cope with the flood of information that must be managed to operate efficiently in the modern electronic age.

Institutional IAIMS will take a variety of forms depending on the computing environment of the organization. An example of an IAIMS might be an integrated system that allows a health professional using a desk top terminal to query a number of different but related files with a few keystrokes. Such a system could enable the individual to consult a patient's record, review the results of laboratory tests, order other tests, examine the professional literature, consult other files such as a tumor registry in another state, refer to clinical decision systems and other expert knowledge bases, and monitor the progress of students.

To realize this scenario, given the present state of technology and the diffusion of it in academic centers, will require careful strategic planning. On August 31, 1983, NLM announced that four contracts were awarded for IAIMS strategic planning to Columbia University, Georgetown University, the University of Maryland at Baltimore, and the University of Utah. The contracts are cost-sharing and will run from September 26, 1983, to September 25, 1984. Contractors will initiate a strategic planning process for academic information management, conduct a series of self-studies to assess the technological capabilities of the institution and functional

academic information management goals, and develop an implementation plan for an institutional IAIMS.

Another IAIMS site is the Oregon Health Sciences University (OHSU), Oregon's only academic health center. To assist the OHSU in creating a "national prototype for the biomedical library of the 21st century," special legislative authority and appropriations were provided by Congress under P.L. 98-63 through the sponsorship of Senator Mark O. Hatfield of Oregon and Senator Warren Rudman of New Hampshire.

Aside from the IAIMS activities, the Planning Office has been engaged in assisting NLM programs and leadership in planning and evaluating the activities of the Li-

brary. These activities include producing the NLM Research Plan and Evaluation Plan, preparing for the annual Planning Session with the NIH Director, compiling and updating the policies of the NLM Board of Regents, and providing staff assistance to Library Operations in their strategic planning process. The Planning Office has also compiled an index to the minutes of the Board of Regents meetings, developed a computerized bibliography of published articles and reports that evaluate NLM products and services, and continues to coordinate the preparation of a number of recurring reports with NLM management and staff, including the annual reporting of R&D expenditures to OMB and NSF.

**Table 14.**  
**Extramural Grant and Contract Programs**  
**(in thousands of dollars)**

<i>Category</i>	<i>FY 1981</i>		<i>FY 1982</i>		<i>FY 1983</i>	
Research .....	(31)	\$2,774	(31)	\$2,574	(29)	\$2,782
Resource Projects .....	(21)	895	(14)	520	(11)	575
Resource Improvement .....	(35)	747	(25)	551	(29)	636
Training .....	(10)	1,308	(9)	930	(9)	733
Special Scientific Projects .....	(7)	289	(2)	22	(1)	34
Regional Medical Libraries* .....	(9)	2,999	(9)	2,399	(7)	2,300
Publications .....	(34)	818	(20)	504	(19)	440
<b>Total .....</b>	<b>(147)</b>	<b>\$9,830</b>	<b>(110)</b>	<b>\$7,500</b>	<b>(105)</b>	<b>\$7,500</b>

NOTE: Figures in parentheses refer to number of projects.

\* Includes contract funding.



# INTERNATIONAL ACTIVITIES

Mary E. Corning, D. Sc.\*

*Assistant Director for International Programs*

The International programs of the National Library of Medicine are a natural extension of NLM's domestic responsibilities. These activities are cooperative in nature and have relevancy to both the developed and the developing world. During the past year, NLM has continued its bilateral cooperative MEDLARS agreement with individual countries; its cooperation with international governmental organizations such as the World Health Organization and the Pan American Health Organization; and international non-governmental organizations such as the International Council of Scientific Unions Abstracting Board. The Special Foreign Currency Program is active in the production of critical reviews and history of medicine projects. Other NLM international activities have included specialized training for colleagues from abroad, the NLM publications exchange program, as well as numerous professional visitors from abroad.

## International MEDLARS Agreements

Table 15 lists the existing non-U.S. MEDLARS Center countries and their nature of access to the MEDLARS system. Following the meeting of the International MEDLARS Policy Advisory Group in September 1982, the MEDLARS Centers continued to fulfill their mandate and functions to serve as national resources for the provision of biomedical research, education, and health information. As of July, the Kuwait Ministry of Health began its formal implementation of the MEDLARS arrangement

**Table 15.**  
**Non-U.S. MEDLARS Centers**

<i>Tapes</i>	<i>Tapes/Software</i>	<i>Online NLM</i>
Germany	Australia	Canada
Japan	PAHO	Colombia
Switzerland	Sweden	France
		Italy
		Kuwait
		Mexico
		South Africa
		United Kingdom

and will proceed to serve the information needs of its country.

Site visits for specific discussions concerning these MEDLARS arrangements were conducted by the Assistant Director for International Programs in France, Switzerland and Kuwait; and by the Director of the National Library of Medicine in Italy and Australia.

## Collaboration with the World Health Organization

The National Library of medicine and the World Health Organization Special Program for Research and Training in Tropical Diseases continued to cooperate in the publication of the *Quarterly Bibliography of Major Tropical Diseases*. NLM prepares camera-ready copy which WHO prints and distributes to approximately 6,000 institutions in the developing countries. The bibliography is prepared from the MEDLINE system and covers those diseases WHO had identified for special attention—filariasis, leishmaniasis, leprosy, malaria, schistosomiasis, and trypanosomiasis.

NLM has begun its second year of collaboration with the WHO programs for control of diarrheal diseases in a recurring *Bibliography of Acute Diarrheal Diseases*. The same mechanism of NLM producing camera-ready copy from MEDLINE and WHO printing and distributing is used for both recurring bibliographies.

NLM and WHO continued the collaborative arrangement for provision of photocopy of journal articles

\* Dr. Corning retired in August 1983.

to developing countries of the WHO Regions of Africa, Eastern Mediterranean, and South East Asia. Under the arrangement, WHO supports one individual who is in residence at NLM to provide this service. The activity is essential but it can only respond partially to the existing biomedical and health information needs of developing countries.

### **Collaboration with the Pan American Health Organization**

The Pan American Health Organization requested NLM's assistance in the development and preparation of a recurring *Bibliography of Respiratory Infections in Children*. This bibliography will be drawn from the contents of the MEDLINE system with NLM providing PAHO with camera-ready copy which PAHO will print and distribute.

The Library's Assistant Director for International Programs is a member of the Scientific Advisory Committee for the PAHO Regional Library of Medicine—BIREME. BIREME is unique in the world as a regional resource. It provides library services, computer-based bibliographic services from the subset of the MEDLINE database, trains Latin American librarians and has produced a *Latin American Index Medicus*.

### **Collaboration with the Chinese Academy of Medical Sciences**

The Assistant Director for International Programs is the U.S. Coordinator for US/PRC cooperation in biomedical communications. She participated in a meeting of the US/PRC Joint Health Committee and presented a status report.

The National Library of Medicine has a cooperative quid-pro-quo arrangement with the Chinese Academy of Medical Sciences, Institute of Medical Information. This arrangement was implemented in February 1981 when Dr. Shi Ji-zhao of the Capital Hospital, Beijing, and Dr. Ma Jixing of the Academy of Traditional Chinese Medicine, Beijing, worked for five months on identifying, verifying, and cataloging the Chinese traditional medical literature in the NLM collection. In return for the work of Dr. Shi and Dr. Ma, NLM trained Mr. Peng Li-yan, Deputy Head, Dept. No. 2, Institute of Medical Information, Chinese Academy of Medical Sciences, and Dr. Wu Lan-cheng, Vice Editor-in-Chief, "Abstracts of Traditional Chinese Medicine", Department of Information, Academy of Traditional Chinese Medicine in indexing and cataloging. In addition, NLM provided them with an opportunity to review modern development in library management and technology. The program for Mr. Peng and Dr. Wu was for six months in duration.

In addition, NLM continues its extensive exchange of publications with not only the Chinese Academy of

Medical Sciences but the Chinese Academy of Sciences, the Chinese Medical Association of Beijing and Shanghai and numerous other Chinese institutions.

### **Special Foreign Currency Program**

The oldest of the Library's extramural support activities, the Special Foreign Currency Program makes it possible to utilize foreign manpower and other resources to prepare and publish biomedical studies useful to the U.S. health professions. Initially authorized by Public Law 480, the program is not funded in U.S. dollars, but employs foreign currencies which accrue from the sale abroad of U.S. surplus agricultural products. The program complements and extends the Library's domestic missions of assisting the advancement of the medical sciences and aiding in the dissemination and exchange of scientific and other information important to the progress of medicine and public health.

Ancillary to NLM's domestic Publication Grant Program and also administered in the Library's International Programs Branch, the P.L. 480 Program in FY 1983 sponsored 80 projects totaling \$1,070,573 equivalent in foreign currencies in India, Yugoslavia, Egypt, Poland, Israel and Pakistan. Thirty-four percent of the program is currently carried out in India, about 32 percent in Poland, and 17 percent in Egypt. With the phase out of P.L. 480 funding in Israel and Yugoslavia, the Library's program in those countries constituted only 16 percent of the FY 1983 total.

Following a comprehensive review of the Library's Special Foreign Currency Program in May 1983 by the NLM Board of Regents, arrangements were made to extend the NLM "Translations, Publications and Science Information Program" with the Amerind Publishing Company, Pvt. Ltd., New Delhi, India for five additional years.

About half of the current program supports the preparation and publication of critical reviews and biomedical monographs identifying the status of research and practice in various health fields and emerging trends for future development. Another third of the program funds scholarly research monographs and the translation and publication of classics in the history of medicine. The program also supports the publication of proceedings of significant international symposia, secondary literature tools in the health sciences and translations of current foreign biomedical monographs.

Among some of the new projects initiated at the close of FY 1983 was the reprinting of a series of classics in the history of medicine, including Daniel Le Clerc's *The History of Physick* (London, 1699) and Max Neuburger's *The Doctrine of the Healing Power of Nature Throughout the Course of Time*. (New York, 1932) as well as a translation of J. J. Petersen's *Main Points in the Histor-*

*ical Development of Medical Therapy*, (Copenhagen, 1877).

Among the studies received in FY 1983 under this program was *Cancer Surgery*, published in Warsaw, Poland and distributed by Urban & Schwarzenberg, Baltimore, Maryland, 1982. This 800-page work presents cancer as a biological, social and medical problem, in which surgery is only a part of the treatment. Information on chemotherapy, radiotherapy and combined modality therapy is included. The senior author, Professor Tadeusz Koszarowski, is the director of the Marie Sklodowska-Curie Memorial Institute of Oncology in Warsaw. Another significant study received in FY 1983 was Dr. E. D. Khomskaia's *Brain and Activation* translated in Pakistan, printed in Yugoslavia, and distributed from New York, N.Y. by Pergamon Press, 1982. This book has been widely recognized as a seminal work, the result of ten years of intensive research at the Burdenko Institute of Neurosurgery in Moscow. The results show the direct involvement of the frontal lobes of the brain in the regulation of the activity state of man. The author is an outstanding neuropsychologist and collaborator of Professor A. Luria, the foremost Russian authority in this field.

Recently published studies in the history of medicine included *The Physicians of Pharaonic Egypt*, by Dr. Paul Ghalioungui, written under the Library's program with the Al-Ahram Publishing House in Cairo, Egypt, published in 1983 in collaboration with the German Institute of Archeology in Cairo, and distributed in the United States by the National Technical Information Service. This book, written by the Professor Emeritus of Medicine at Ain Shams University in Cairo, draws widely on archaeological collections in Egypt in attempting to identify the ancient Egyptian healers, their corporate structure, social standing, and something of their social life. (For a complete list of books and journal articles resulting from the NLM P.L. 480 Program received in FY 1983, see Appendix 3.)

### **International Council of Scientific Unions Abstracting Board (ICSU AB)**

The Assistant Director for International Programs of the National Library of Medicine is the representative to the International Council of Scientific Unions Abstracting Board and serves as an elected member of the Executive Committee. The Assistant Director attended meetings of both the Executive Committee and Subsequently the Full Board where information organizations of a number of countries participated. Topics included collaborative undertakings, status of document delivery in various regions including the proposals of the Commission of the European Communities, generations of and downloading of databases, the information needs of the scientific community, working groups in various subject matter fields,

copyright, and an examination of the future role of ICSU AB in international, scientific and technical activities.

### **Latin American Activities**

The National Library of Medicine was recently honored by a special diploma awarded by the Escola Paulista de Medicina of the Universidade Federal de Sao Paulo, Brazil recognizing the invaluable cooperation provided by the National Library of Medicine. The diploma was signed by the Dean of the Escola Paulista, Professor Dr. Magid Iunes. The presentation was made during a 50-year commemoration of the founding of the Escola Paulista de Medicina. The NLM was represented at the ceremony by a member of the U.S. Consulate in Sao Paulo. The Escola Paulista is a medical school which includes undergraduate medical and postgraduate education and nursing. The Escola has an excellent reputation for research. Dr. Iunes is noted for his research in diabetes and innovation in medical education.

The National Library of Medicine has cooperated with the Escola Paulista and the Pan American Health Organization in the establishment of a PAHO Regional Library of Medicine. The Escola Paulista participated in this activity by making available its staff, facilities and collection to serve as the core of this undertaking. BIREME has been operational since 1969 and has provided approximately two million services to South America and has had an extensive training program for medical librarians.

The Assistant Director for International Programs gave an invited lecture on information systems in biomedicine and health and participated in meetings of the Federacion Panamericana de Asociaciones de Facultades de Medicina (FEPAFEM) in Buenos Aires, Argentina, November 17–20, 1982.

### **Visitors and Specialized Training**

The National Library of Medicine received several foreign officials for specialized training. In connection with the bilateral arrangement with Kuwait, NLM trained two nurses—Nawal Khairalla Malik and Balkees A.H. Al-Sultan—as search specialists. George Guirguis, Regional Office Librarian, World Health Organization Egypt, was trained in indexing. M.K. Bhatt, Documentation Officer, National Medical Library, India, was trained in overall NLM programs; and special programs were developed for two Egyptians: Dr. Samiha Samy Faltas, Director, Drug Information Center, National Organization for Drug Control and Research and Dr. Mervat Salem, Manager of Drug Control, Pharmaceutical Sector, Ministry of Health. In connection with NLM's bilateral agreement with the Canada Institute for Scientific and Technical Information, Suzanne Maranda, MEDLARS coordinator, was trained. In addition six-months training was provided to Mr. Peng

Li-yan and Dr. Wu Lan-cheng under the NLM/CAMS cooperative agreement.

NLM received numerous international visitors representing developed and developing countries throughout the world who had an opportunity to have detailed discussions with NLM staff on activities of mutual interest.

Formal delegations included those from China, Taiwan, Japan, India, Pakistan, France and Egypt. Topics of general interest included international communications, the needs of the health professional, library management and resources, information systems management and the impact of technology.

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## APPENDIX 4: BOARD OF REGENTS

The NLM Board of Regents meets three times a year to consider Library issues and policies and make recommendations to the Secretary of Health and Human Services on matters affecting the Library.

### **Appointed Members:**

L. Thompson Bowles, M.D., Ph.D.  
Dean for Academic Affairs  
George Washington University

Gwendolyn S. Cruzat, Ph.D.  
Professor of Library Science  
University of Michigan

Lois E. DeBakey, Ph.D.  
Professor of Scientific Communications  
Baylor College of Medicine

Shirley Echelman  
Director  
Association of Research Libraries

Charles C. Edwards, M.D.  
President  
Scripps Clinic and Research Foundation

Albert E. Gunn, M.D.  
Medical Director  
M.D. Anderson Hospital and Tumor Institute

John K. Lopez  
Executive Vice President  
Medicalelectrographic Sciences

William D. Mayer, M.D. (chairman)  
President  
Eastern Virginia Medical Authority

David O. Moline, D.D.S.  
Asst. Professor of Dentistry  
University of Iowa

Charles E. Molnar, Sc.D.  
Director, Computer Systems Laboratory  
Washington University

### **Ex Officio Members:**

Librarian of Congress

Surgeon General  
Public Health Service

Surgeon General  
Department of the Air Force

Surgeon General  
Department of the Army

Surgeon General  
Department of the Navy

Chief Medical Director  
Veterans Administration

Assistant Director for Biological Behavioral, and Social  
Sciences  
National Science Foundation

## **APPENDIX 5: BOARD OF SCIENTIFIC COUNSELORS**

The Board of Scientific Counselors meets periodically to review and make recommendations on the Library's intramural research and development programs.

### **Members:**

Samuel J. Dwyer III, Ph.D.

Director of Diagnostic Imaging and Radiological Sciences  
University of Kansas Medical Center

Leonard D. Fenninger, M.D.

Vice President

American Medical Association

Joseph C. R. Licklider, Ph.D.

Professor, Dept. of Electrical Engineering and Computer Sciences  
Massachusetts Institute of Technology

Donald A. B. Lindberg, M.D.

Director, Information Science Group  
University of Missouri School of Medicine

Stephen G. Pauker, M.D. (chairman)

Professor of Medicine

Tufts University School of Medicine

Harry E. Pople Jr., Ph.D.

Associate Professor of Business  
University of Pittsburgh

Mitchell W. Spellman, M.D.

Dean for Medical Services

Harvard University Medical School

## APPENDIX 6: BIOMEDICAL LIBRARY REVIEW COMMITTEE

The Biomedical Library Review Committee meets three times a year to review applications for grants under the Medical Library Assistance Act.

### Members:

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University of Arizona

Robert M. Braude  
Director, McGoogan Library  
Univ. of Nebraska Medical Center

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Veterans Administration Hosp.  
Hines, Illinois

Henry Riecken, Ph.D.  
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Univ. of Pa. School of Medicine

Edward H. Shortliffe, M.D., Ph.D. (chairman)  
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Stanford Univ. School of Medicine

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Computing  
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