NATIONAL LIBRARY of MEDICINE

PROGRAMS and SERVICES

FISCAL YEAR 1977

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE • Public Health Service • National Institutes of Health

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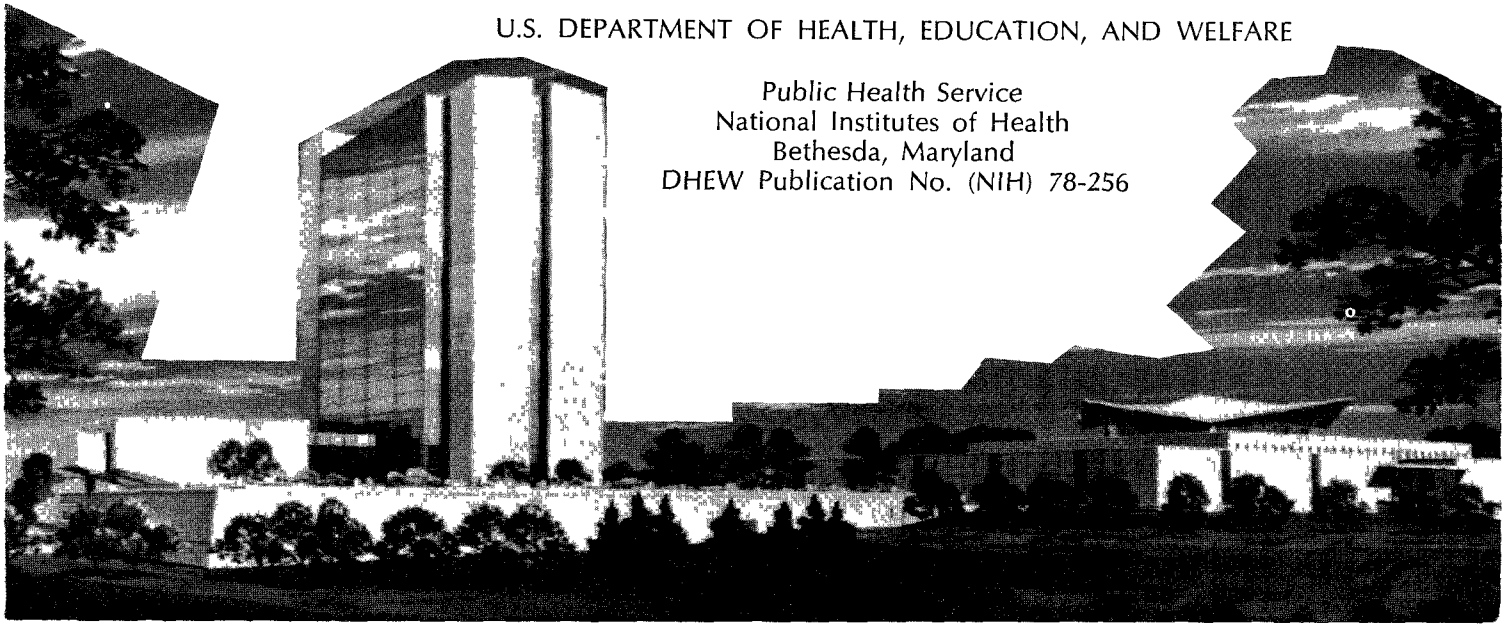

Preface

The past year has been characterized by continued increases in requests for library and information service. We are fulfilling these demands by a steady improvement in our performance aided by new technological applications.

MEDLARS On-Line (MEDLINE) service was introduced to the health community by NLM late in 1971. MEDLINE was followed rapidly by computerized on-line data bases for toxicology information, cataloging, serials, audiovisuals, cancer information, and others. The acceptance of this mode of search and retrieval as a tool for researchers, practitioners, and educators is reflected in the remarkable growth in usage of the system. In Fiscal Year 1977, almost 900,000 on-line and off-line searches were done at the 800 institutions in the U.S. that belong to the NLM network. This represents an increase of about 50 percent over last year.

Impressive gains in productivity were achieved in several areas of reference services. Reference inquiries were up 33 percent in FY 1977 and 13 percent more users were registered in our Reading Room. These patrons requested more material from the stacks than ever before and it is remarkable that the fulfillment rate actually increased. Similarly, the fulfillment rate for interlibrary loans edged upward despite an increase of six percent in the number of requests received. It is a tribute to the people performing these tasks that the gains have been accomplished with no increase in number of staff.

Another area of success described in this report is in the automation of technical services. New computerized procedures have eliminated backlogs in acquisitions processing, speeded up binding, and improved our ability to identify and quickly fill gaps in the serial collection.

Health practitioners will be interested in the description of the Lister Hill Center project to improve the dissemination of research information (Chapter 6). The prototype of a comprehensive bank of authoritative and up-to-date information for the practicing health professional is now being successfully demonstrated. Although unconventional in terms of NLM's traditional involvement with biomedical literature, it holds intriguing promise for future health information systems.

It gives me great pleasure to end this message by reporting that the construction of the Lister Hill Center building is well under way. When the dust settles, early in 1980, we will have a remarkable new communications facility dedicated to applying the benefits of modern technology to the problems of health information transfer.

Martin M. Cummings, M.D.
Director

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Kent A. Smith, Assistant Director for Administration

Board of Regents

The NLM Board of Regents met in January and May, 1977 and reviewed a wide variety of topics and issues including the revision of the NLM Scope and Coverage Manual, computerization of technical processing, procurement of the present IBM 370/158 MEDLARS computers, Toxic Substances Control Act, transfer of research results into practice, Communications Technology Satellite, and the quality of NLM's research grant program.

Special presentations before the Board were made by William J. Welsh, Deputy Librarian of Congress, who gave an illustrated report on Library of Congress activities, and by H. Calvin Meadows of the National Health Planning Information Center, who spoke on the development of that organization's programs.

On the subject of the Toxic Substances Control Act, the Regents passed a resolution recommending to the Director of the National Institutes of Health that the Library not handle proprietary toxicological information for regulatory agencies.

Another resolution concerning appointments to the Board of Regents was sent to the HEW Secretary on January 27, 1977, requesting that the Secretary do all in his power to "expedite the Presidential nomination of ten new members to the Board as required by law." By the end of the fiscal year, the Regents had not been appointed and the scheduled October 1977 Board meeting was cancelled. Review of grant applications scheduled for October will be deferred until a new Board is appointed.

Lister Hill Center Building

A $13.6 million construction contract for the Lister Hill Center building was awarded to the George Hyman Construction Company on June 17, 1977. The Center, which is expected to be completed by the spring of 1980, was designed by the architectural firm of J. Roy Carroll, Jr. and Partners.

The new building will house the communications technology and network engineering programs of the Lister Hill National Center for Biomedical Communications and the closely related functions of the National Medical Audiovisual Center. Extramural Programs, the Office of Computer and Communications Systems, the Toxicology Information Program and selected activities of Library Operations will also move to the new building.

In conjunction with this construction project, renovations to the existing building are also planned. The purpose of the renovations is to return much of the present office space and special purpose areas, such as the computer room, to their originally intended library use. Extensive modifications are also planned to bring the existing building into compliance with the GSA fire code.

Copyright

Copyright legislation was passed by the Congress on September 30, 1976. It was signed into law (P.L. 94-76) on October 19, 1976 by President Ford. This legislation updates the copyright law which had been relatively unchanged since its passage in 1909. The revisions were urgently needed to deal with current copyright issues resulting from photocopying, motion pictures, radio, television, and phonographic recordings.

The law will have an impact on the interlibrary loan activities of libraries since it regulates the reproduction of copyrighted materials. Guidelines and regulations for implementing the Copyright Law will be established by the Register of Copyrights. Most provisions of the law will become effective on January 1, 1978.

Financial Resources

The National Library of Medicine's FY 1978 appropriation request is for $36,746,000. This appropriation, when enacted, will provide for an increase of approximately $1,512,000 over the amount available to the Library in FY 1977. The increase is to be used primarily to sustain and improve the effectiveness of NLM's traditional and on-line services through extension of these services to health care practitioners.

Personnel

The Department of HEW conducted a position management and classification review of the Library in May 1977. The review involved interviews with top management officials, supervisors, union officials, personnel staff, and a group of employees whose positions had been selected for classification review. A review was made of the Library's conformance to principles of good position management and to regulatory requirements affecting position classification. The results reported by the DHEW Audit Team were very satisfactory. The NLM Personnel Office in FY 1977 was also deeply involved in the DHEW Three Year Classification Review Program in which every position is reviewed through a comprehensive desk audit.

The NLM program to hire the handicapped continued to expand in FY 1977. There were

Table 1. Financial Resources and Allocations
(dollars in thousands)

	FY 1977
Amounts Available for Obligation	
Appropriation, NLM	$35,234
Earned Reimbursements	2,530
Total	37,764
Amounts Obligated by Extramural Programs	$ 8,354
Amounts Obligated for Direct Operations	
Lister Hill National Center for Biomedical Communications	$ 3,531
National Medical Audiovisual Center	4,432
Office of Computer and Communications Systems	5,131
Library Operations	7,722
Toxicology Information Program	2,115
Review and Approval of Grants	837
Program Direction	4,936
Subtotal, Direct Operations	$28,704
Total Obligations, NLM	**$37,058**

Table 2. Personnel Ceilings

	FY 71	*FY 72*	*FY 73*	*FY 74*	*FY 75*	*FY 76*	*FY 77*
Office of the Director	13	12	12	11	9	10	12
Office of Inquiries and Publications Management	6	5	6	5	5	5	5
Office of Administration	34	37	36	36	34	35	35
Office of Computer and Communications Systems	58	55	54	51	52	54	52
Extramural Programs	34	31	30	27	22	24	27
Lister Hill National Center for Biomedical Communications	13	15	17	20	22	24	24
Specialized Information Services	17	17	16	17	17	18	17
National Medical Audiovisual Center	104	105	103	100	101	101	88
Library Operations	188	192	192	199	196	201	212
TOTAL	467	469	466	466	458	472	472

12 handicapped persons employed at the Library during the year, an increase of four over last year. The Personnel Office and program managers worked together to expedite the integration of these employees into the Library work force. During the year, a sign language course was conducted for supervisors and coworkers of deaf employees. The course was well received and additional courses are planned.

Instructor Cynthia Saltzman (right) conducts a sign language class for NLM staff to prepare them to communicate with deaf employees. Among the students are Linda Kudrick and Phillip Coleman. Ms. Saltzman broadcasts the morning news for the deaf on a Washington TV station.

Staffing Activities

Kenneth M. Endicott, M.D. was appointed Acting Director of the Lister Hill National Center for Biomedical Communications. He succeeded Robert M. Bird, M.D., who died on December 31, 1976. Dr. Endicott served as Acting Director until June 30, 1977, when he retired from Federal service. During his long and distinguished career as a scientist and medical administrator within the Public Health Service, Dr. Endicott served as the Administrator of the Health Resources Administration.

Harold M. Schoolman, M.D. was appointed Deputy Director for Research and Education. In this capacity, Dr. Schoolman is responsible for two major NLM components, the Lister Hill National Center for Biomedical Communications and the National Medical Audiovisual Center. These two divisions will be merged in Fiscal Year 1980, after completion of the Lister Hill Center building. Dr. Schoolman was also named Acting Director of the Lister Hill Center pending the selection of a new Director.

Lionel M. Bernstein, M.D., Ph.D., was appointed Special Assistant to the Director of the Lister Hill Center and Acting Director of the Center's new Health Professions Applications Branch. Dr. Bernstein also serves as the Assistant Deputy Director for Research and Education. Before accepting his position with the Library, Dr. Bernstein was Special Assistant to the Assistant Secretary for Health, DHEW.

Davis B. McCarn was appointed to head a new office to direct planning activities of the Library. This office will establish and maintain liaison with NIH and other Federal agencies, with scientific organizations, professional groups, and others in the private sector, as well as with the senior staff of the Library. The purpose will be to promote the exchange of information and ideas which will benefit the NLM planning activity. Mr. McCarn was previously Deputy Director of the Lister Hill Center, and since 1972 had directed the Office of Computer and Communications Systems.

Myron J. Adams, Jr., M.D., was appointed Deputy Director of the Library's National Medical Audiovisual Center (NMAC) in Atlanta. Dr. Adams has been associated with NMAC since 1971 and has served as a Medical Advisor and most recently as Chief of the Materials Development Branch. On the retirement of George E. Mitchell, D.M.D., as Director of NMAC on September 30, 1977, Dr. Adams assumed the position of Acting Director.

Erika B. Love, Deputy Associate Director for Library Operations, accepted a position as Director of the Health Sciences Library, University of New Mexico (Albuquerque). Mrs. Love had served as Deputy Associate Director since 1972 as well as Regional Medical Library Director for Region IV. Appointed to fill the position of Deputy Associate Director for Library Operations was James W. Barry. Immediately prior to coming to NLM, Mr. Barry was Director of the Learning Resource Center/Library of the new Uniformed Services University of the Health Sciences. Mr. Barry has also served as head librarian at the Medical Center of the University of Arizona, and previously at Rutgers University. In 1968, Mr. Barry served as a visiting librarian and consultant at the Mahidol University in Bangkok, Thailand.

Stewart H. Rowberry, D.D.S., Ph.D. was appointed Chief, Materials Development Branch, NMAC. Dr. Rowberry was formerly Assistant Chief of the NMAC Educational Research and Evaluation Branch.

James J. Hartman, formerly with the Federal Aviation Administration, was appointed the Library's new Personnel Officer, succeeding R. Brian Makoff, who accepted a position with the Social Security Administration.

Bruno M. Vasta, formerly Chief of the Toxicology Information Services Branch, Spe-

cialized Information Services, has been appointed Chief, Bibliographic Services Division, Library Operations.

Awards and Honors

NLM Director Martin M. Cummings, M.D., was honored by the Medical Academy of Lodz, Poland, where he was awarded the title of *doctor honoris causa*. In presenting the award, Professor Antoni Kotelko, rector of the Academy, cited Dr. Cummings' contributions in organizing and applying modern technology for biomedical communications.

Dr. Cummings was elected President of the American Osler Society at a meeting of the Society held at the Mayo Clinic in Rochester, Minnesota. The Society was organized in 1970 for the purpose of bringing together members of the medical and allied professions who are convinced of the importance of humanism in medicine as exemplified by the career of William Osler (1849-1919).

Dr. Cummings was also elected to the board of directors of the American Association for the Advancement of Science. The AAAS, founded in 1848, has nearly 300 affiliated societies and more than 112,000 individual members. Dr. Cummings' term is for four years beginning January 1, 1977.

Melvin S. Day, NLM's Deputy Director, was elected President of ICSU AB—the International Council of Scientific Unions Abstracting Board—at a meeting of the Board in York, England. The term of office is three years. ICSU AB was established in 1952 as an outgrowth of a joint UNESCO and International Council of Scientific Unions commission organized to study the problem of abstracting the literature of science and technology.

Mary E. Corning, NLM Assistant Director for International Programs, was appointed a Federal Executive Fellow by the Brookings Institution. The six-month fellowship began in January 1977 and enabled Miss Corning to undertake a research study of international cooperation in biomedicine. The Brookings Institution, located in Washington, D.C., is a private, nonprofit organization devoted to research, education, and publication in matters of government, foreign policy, and economics.

Eighth Annual Regents Award

Emilie V. Wiggins, Head of the Cataloging Section, received the 1977 Regents Award in recognition of her efforts to make the NLM catalog file conform fully to the current Anglo-American rules, and for her massive restructuring and modernization of the *NLM Classification*.

Emilie V Wiggins receives the 1977 Regents Award from Board of Regents Chairman Dr Joseph F Volker

NLM Director's Award

On May 6 and 7, 1976, the Library and the Josiah Macy, Jr. Foundation sponsored a "Colloquium on the Bicentennial of Medicine in the United States" at the National Institutes of Health. Several hundred distinguished physicians, scientists, and educators gathered to discuss a series of topics related to U.S. medicine. The Director's Award honored three NLM employees for their participation in the Colloquium: Mary E. Corning, Dr. John B. Blake and Dr. Peter D. Olch. The three staff members each made a presentation at the Colloquium; in addition, Miss Corning was colloquium coordinator, and Drs. Blake and Olch developed a special Bicentennial exhibit.

NMAC Film Wins Award

Right Heart Catheterization, an instructional motion picture developed by the National Medical Audiovisual Center, has received the National Society for Performance and Instruction's 1976-1977 Outstanding Research Effort award. The motion picture, designed for students of basic cardiovascular physiology, was developed by a team of NMAC specialists: Morton J. Oppenheimer, M.D., Margaret L. Brooke, and Richard W. Bell. The film was the outcome of a research project designed to study the use of a motion medium to teach higher level processes (in this case, determining catheter location from blood pressure readings shown on an oscilloscope).

NIH Director's Awards

Ernest M. Allen, Sc.D., (Associate Director for Extramural Programs): "for pioneering efforts in biomedical research grant administration and dedicated service in fostering programs of the NLM, NIH, and PHS."

Charles M. Goldstein (Chief, Computer Technology Branch, Lister Hill Center): "for leadership of a nationally recognized program to explore and develop innovative computer applications for libraries and computer-based education."

Lillian R. Kozuma (Assistant Head, Cataloging Section, Technical Services Division): "for leadership provided in the development and implementation of an on-line data base (CATLINE), which serves the Nation's medical librarians."

NIH Merit Awards

Kenneth G. Carney (Program Analysis Officer, Office of Program Analysis and Legislation): "in recognition of significant contributions to the administrative management of NLM and innovative development of a program analysis and legislation function at NLM."

Laura Eisenberg (On-line Training Coordinator, Bibliographic Services Division): "for work in developing and implementing computerized instructional training programs used to train librarians in the use of NLM data bases."

Thomas D. Tonkery (Deputy Chief, Technical Services Division): "for the design and implementation of an automated system for computer management of bibliographic ordering, invoicing, and production control in the procurement and processing of scientific book literature."

Forty-Year Service Award

Joseph Leiter, Ph.D., NLM Associate Director for Library Operations, received a Forty-Year Length-of-Service Award.

Equal Employment Opportunity

The Library is placing special emphasis on attracting minority students into the Library Associate Program. This effort will include visits and interviews at more than 15 library schools throughout the Nation, as well as letters to library school deans requesting their assistance in encouraging top minority students to apply for the Library Associate Program.

The Administrative Trainee program in the Office of Administration, created through the Affirmative Action Plan of 1971, was expanded to provide two training positions this year. Patricia Ruben and George Franklin were selected for these positions and are being trained in the Office of Administrative Management Services.

During FY 1977, the Equal Employment Opportunity Committee received excellent leadership from its chairman, Alvin Barnes. Elections for FY 1978 were held on September 26, 1977. The new Committee consists

of Phillip Coleman, Gail Yates, Joan Cepko, John Olive and the newly elected members, Peggy Beavers, Lois Terry, Kathleen Nichols, James Snowden, and Valerie Settles. The Committee will be chaired this year by Melvin Spann of the Library's Specialized Information Services.

Exhibits

NLM presented four exhibits in the lobby during FY 1977. The Library's special year-long Bicentennial exhibit (described in *NLM Programs and Services, 1976*) was featured throughout 1976. This exhibit was followed by a display of 32 microscopes from the Billings Collection of the Armed Forces Institute of Pathology. The display illustrated the development of the microscope from the 17th through the 20th centuries.

In May, an exhibit entitled "Medicine and Music" was installed. In addition to books and prints dealing with the relationship between medicine and music through the ages, the exhibit featured a musical recording "describing" a lithotomy.

In September, an exhibit entitled "Health Sciences Communication Technology" was presented. The exhibit described how the innovative use of computer and audiovisual technology can improve the efficiency of professional health education. The exhibit was prepared by the National Medical Audiovisual Center.

Health Sciences Communication Technology exhibit NLM patron examines case containing models used in health sciences teaching

Chapter 2: Library Services and Operations

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

FY 1977 was a year of significant accomplishment in almost all areas of Library activities. First and foremost has been the Library's success in coping with growing demands for materials in its collection. Not only has the Library met most of these demands, which have increased at the rate of approximately 11 percent over last year, but the quality of the service has also improved, despite no increase in staff for this function. Ninety percent or more of the requests for publications from the serial literature and approximately seventy percent of requests for loans of original material are currently being satisfied.

Although there are some signs of leveling off of requests for interlibrary loans there was still a six percent increase in requests over FY 1976. Unless additional manpower resources can be found to support this activity the ability to provide the necessary services will soon deteriorate. Even at this time, minor personnel problems have had a magnified impact on service.

Concommitant with the increase in traditional library services has been the continued expansion of on-line services. The number of searches increased by about 50 percent during the past year. Much of this resulted from the implementation of a monthly SDI (Selective Dissemination of Information) service providing monthly bibliographies to health care practitioners based on an individualized search profile stored in the NLM computer.

During FY 1977, a major consolidation of on-line services was accomplished with the MEDLARS Management Section assuming the role of coordinating all on-line services. The training program for search analysts was restructured and an integrated on-line training program developed for all data bases. Changes were made to allow access to all data bases by all domestic users, and extensive orientations were held to familiarize the users with data bases. Finally, an integrated *NLM Technical Bulletin* was developed and published.

The Library has established a Regional Medical Library Task Group to extend on-line access to more hospitals and direct health care delivery institutions. In addition, a cooperative program with the American Hospital Association is underway to develop an on-line hospital and health care delivery data base. It is scheduled to be available in calendar year 1978. The file will also be used to produce the AHA's *Hospital Literature Index*. A substantial augmentation of the controlled vocabulary was made to capture many of the concepts related to these areas. In addition, the Library's Scope and Coverage policy was completely rewritten to reflect the expanded mission of the Library.

An outstanding accomplishment during FY 1977 was the successful reorganization and implementation of an up-to-date on-line file of non-print materials called AVLINE (Audiovisuals On-line). This now provides educators in many fields of health science with a unique data base of peer-reviewed

audiovisual material that has been critically assessed for quality of content and educational objectives. AVLINE contains sufficient descriptive material to enable the educator to make an intelligent selection for his teaching needs.

The ability to meet service demands which require large manpower resources has been improved by implementing automated procedures in technical services and by extensive and aggressive maintenance and clean-up activities in the Library's collection.

The automation of technical services, begun three years ago, has been paying off handsomely. Backlogs and bottlenecks in acquisitions have been eliminated and, with no increase in staff, it has been possible to mount exhaustive search and acquisition procedures to approach the goal of acquiring all of the significant published literature.

Many new programs in serial and cataloging automation have also been implemented, including automated binding data, gapping files, invoicing, and other technical processing activities. A successful experiment to use check-in and claiming data provided by dealers has been completed and this activity will expand over the next year. In addition, NLM's on-line Name Authority File has been extended to provide on-line maintenance. It remains the *only* on-line, updatable authority file in the library world and it is accessible to all users of NLM's on-line system.

Rigorous housekeeping practices have been implemented. A complete inventory and gapping of our current periodical collection was begun and is scheduled to be completed in 1978. Gaps will be processed in the automated gap files and filling of gaps greatly expanded.

As a result of an inventory of our monographs last year, an overhaul of the collection was completed and, where possible, the deficiencies corrected. A similar survey of older serials on C-level has led to the overhaul of this part of the collection. More than 2,000 older serials, never before cataloged, have been cataloged and are now more readily available to users. The document collection was completely overhauled and improved bibliographic control now provides ready access to this important part of the collection.

Despite the accomplishments reported, and the heroic efforts to support Library services, there are imminent problems if the Library's attempts to obtain additional staff authorizations are unsuccessful. Staff have been stretched to the limit. Any further demands for services will surely exceed these limits. There is ample evidence of fatigue, with highly productive and imaginative librarians who are no longer able to dedicate 10-12 hours daily to maintain production so that automation may also proceed. Other staff can no longer be readily persuaded with the attractions of overtime pay to maintain longer work hours to cope with demands. There have also been significant losses of important staff members to far less demanding and frequently better paying positions.

The Library at this time has an outstanding group of vigorous and imaginative librarians. Unless some assistance can be obtained it is unlikely that the Library will be able to sustain its excellent record of service.

Medical Subject Headings (MeSH)

All phases of the annual cycle of MeSH review, modification, and production proceeded on schedule; the faster-than-usual service provided by the printer enabled us to make the 1978 MeSH available to even the overseas indexing centers comfortably in advance of their scheduled need.

The terminology contained in 1978 MeSH has been strengthened in a number of subject areas. The effort in the field of health care, begun in the previous year, was continued, resulting in the introduction of many new terms dealing with concepts relating to health care financing, health care organiza-

tion, and health care manpower. Many terms related to hospital administration were added in anticipation of the development of a new bibliography requiring broader coverage of hospital administration literature. Added MeSH terminology has facilitated the development and searching of an experimental MEDLARS data base concerned with bioethics. With a consultant provided by the National Institute of Neurological and Communicative Disorders and Stroke, a thorough review of terminology in the field of neurology has begun. In spite of the special attention given to these subjects, every part of MeSH received consideration in FY 1977. New terms were introduced into each of the 15 categories and into 81 of the 107 subcategories.

While about 600 terms were added, either as new concepts, or as replacements for less desirable terminology, 172 were deleted The deleted terms that were not replaced represent concepts that are now rarely written about, these were made cross references to other MeSH terms. Innumerable additional cross references were supplied in 1978. There was a three percent net increase in the number of MeSH descriptors. Seven new subheadings were added to facilitate the linkage of concepts that were previously handled by coordinate indexing.

MeSHup, a new computer program for the on-line maintenance of the MeSH file, became available for use in FY 1977. The program has somewhat simplified the task of modifying MeSH, and reduces the opportunities to introduce errors.

Mid-Atlantic Regional Medical Library (RML IV)

The RML IV Program experienced a year of growth and change, with increased program participation and responsibility being assumed by libraries within the Region. RML IV serves over 500 libraries in health-related institutions in the District of Columbia, Maryland, North Carolina, Virginia, and West Virginia.

A new set of bylaws was prepared and adopted which will result in organizational changes to reflect the Region's goals for developing a cooperative library service network. Beginning in October 1977, the Regional Advisory Council and the Executive Board will provide most of the planning and decision-making for the RML IV Program.

Many of the program achievements of the past year can be credited to the work of the standing committees in four areas: audiovisual, education, interlibrary loan, and on-line services.

Major activities for FY 1977 included continuation of the Regional Core Journal Clearinghouse; initiation of a basic unit development contract, development work on educational packages for medical and library terminology, and on a core reference collection; preparations for workshops on the bibliographic citation, and revision of the Region IV Core Journal Lists.

Table 3 RML IV Statistics

	FY 1977
Interlibrary loans . . .	79,799
On-line centers	108

Bibliographic Services Division

The Bibliographic Services Division is responsible for indexing the journal literature for *Index Medicus* and for coordinating the on-line network that makes the indexed references available via MEDLINE and other data bases. Training for users of the network has become an increasingly important function of the Division and several changes in training procedures are reported in FY 1977 The Division is also the publisher of many of the bibliographic tools issued by the Library.

Six Library Associates selected for training for 1977-78 (standing from left to right): Julia Sollenberger, Marguerite Kelly, Daza Craig, James Cain. Seated: Martha Benzer, Patricia Healy.

Indexing

The number of articles indexed for *Index Medicus* reached 248,346 in FY 1977 including 242,800 journal articles and 5,546 articles from the monographic literature. In addition, 11,634 articles were indexed from journals for special indexes such as the *Index to Dental Literature* and the *International Nursing Index*. Thus, a total of 259,980 articles were entered into the MEDLARS data base, as shown in Table 4.

The number of journals regularly indexed was increased by over 100 to 2,525. The increase in the number of journals was recommended by the Journal Selection Committee, a group of non-NLM advisors who review candidate journals to be added to or dropped from the system. Much of the increase resulted from a special emphasis on the literature of health care delivery, and this category will be expanded even more in the future. All indexed citations, whether prepared by NLM staff, contract indexers, or foreign MEDLARS centers are reviewed carefully by NLM indexers before being entered into the system.

Network Services

The MEDLARS Management Section is the contact point for the day-to-day operation of the on-line network. The network grew to about 800 centers in FY 1977, with almost 900,000 on-line and off-line searches being performed by users. In its role as the contact point for on-line users, the MEDLARS Management Section answers questions, solves problems, maintains billing records, and produces manuals and other descriptive materials on the use and characteristics of the various NLM data bases.

One of the most important new activities in the past year was an Automatic SDI (Selective Dissemination of Information) service. Specific searches which are stored in a computer file by the individual users are processed automatically each month against

either SDILINE or TOXLINE, as appropriate. Approximately 150 institutions received about 34,700 printouts in FY 1977 in this manner.

Another major change in FY 1977 is that all new on-line centers automatically have access to all publicly available NLM files. TOXLINE, for example, had previously been available only under a separate arrangement. Existing centers were also given the opportunity to have access to TOXLINE and related files.

In August 1977 the 100th issue of the *NLM Technical Bulletin* was produced. In April 1977 the name of this publication was changed and the formerly separate *Library Network/MEDLARS Technical Bulletin* and the *TOXLINE Technical Bulletin* were merged. Users of NLM's on-line system receive one copy of the *NLM Technical Bulletin* each month so that they may be kept current on system and policy changes, searching strategy hints, new data bases, etc.

Training

Important changes occurred in training during FY 1977 as a result of the merger of MEDLINE and TOXLINE courses into a single On-Line Services Training program. The new courses for initial and advanced training cover all the various data bases which constitute the NLM system. The traditional three-week course, held three times in FY 1977, was dropped from the training program.

Decentralization of training activities, which began in FY 1976, was continued with seven one-week classes being held in Regions IV, VI, VIII and XI. In all, 17 courses were conducted at both NLM and in the field for a total of 254 participants (100 more than last year).

As part of the development of on-line services training, the Library began to plan a continuing education program for users of the system. In cooperation with the Regional Medical Libraries, the Standing Committee for On-Line Retrieval Education (SCORE) was created. As an advisory committee to the NLM Associate Director for Library Operations, SCORE will assess the continuing education needs of search analysts and devise an instructional program to meet those needs. This assessment has begun, and a prototype continuing education course is now being developed.

Staff member Jacqueline van de Kamp (left) assists a graduate student to retrieve references from MEDLINE.

Publications

The Bibliographic Services Division is the publisher of *Index Medicus* and other NLM bibliographic publications including *Cumulated Index Medicus, Abridged Index Medicus,* Recurring Bibliographies in various biomedical disciplines, and Literature Searches. In addition to these, FY 1977 saw the publication of a series of important user guides: *MEDLARS Indexing* Manual (Part II), *Annotated MeSH: Its Content and* Use (for trainee indexers and searchers), and a revised *Tree Annotations* for Medical Subject Headings.

A series of meetings with representatives of the American Hospital Association has resulted in an agreement to have NLM prepare from the MEDLARS data base the publication *Index to Hospital Literature* Arrangements are now being made to implement this decision. In addition, NLM and AHA staff plan to develop an on-line data base for the literature related to hospitals and health care delivery.

History of Medicine Division

During the past year the cumulated *Bibliography of the History of Medicine* for 1970-74 was published from the now computerized data base. The increased speed of production which this provides also made it possible to publish promptly the annual issue for 1975. At the end of the fiscal year the next edition, 1976, was ready for the printer. Progress continued on other planned publications as well, so that the manuscript of a short-title catalog of the 18th century collection was also completed by the end of the year; the catalog is expected to appear in 1978.

Acquisitions

During the year some 500 books and theses were added to the historical collections, as well as over 77,000 items in the manuscript collection and approximately 600 prints and photographs. Book acquisitions ranged from great classic works, such as the second printing of William Harvey's *De motu cordis*, in Emilio Parisano's *Nobilium exercitationum libri duodecim de subtilitate* (4 vol., Venice, 1623-43), to illuminating ephemera, such as a San Francisco fee bill of 1850. Probably the rarest acquisition was a 51-page pamphlet by the English surgeon, Dale Ingram (1710-1793), *An Essay on the nature, cause, and seat of dysentery's*, printed in Barbados in 1744. Ingram later returned to England, where he published several other works and was elected surgeon to Christ's Hospital. Another rare and intrinsically more important addition was a collection of 51 issues of the official Swedish almanac from 1753 to 1771 which together contain the first printing of Nils Rosén von Rosenstein's *Underrättelser om barnsjukdomar*, one of the most widely translated and published pediatric works of the 18th century.

The History of Medicine Division provides access to pre-1871 material in a separate reading room staffed with reference librarians trained in the history of medicine

Additions to the manuscript collection included gifts or bequests of papers from A. Baird Hastings, James A. Shannon, Fred L. Soper, Emile F. Holman and others. The Library is pleased to acknowledge these contributions, which will provide valuable source material for future historians exploring the complex developments of medicine today.

Public Service

While building collections for the future, the History of Medicine Division has as always continued to provide services to readers and to patrons at a distance. During the year over 5,000 volumes were served to readers in the building and nearly 2,500 books and journal articles were provided to others by interlibrary loan—chiefly photocopy—or special paid photographic services. In addition more than 1,800 photographic prints and slides were provided from the prints and photographs collection.

Members of the staff have also participated actively in advancing knowledge of the history of medicine through their participation in the affairs and programs of professional societies and through publication of the results of their research. "Medicine and Music," one of the exhibits prepared by the Division, proved to be a particularly popular one.

Reference Services Division

It is apparent from the demand for on-site and interlibrary loan services that the steady increase in volume which began shortly after regionalization in 1967 has yet to level off. Requests for material from the collection topped the 400,000 mark in FY 1977 and reference inquiries were up 33 percent over the last fiscal year. A new record was set in October, when over 2,000 requests for interlibrary loans were received in one day.

Maintenance and security of the collection continued high on the list of priorities: the older journal collection was shifted in order to open up areas which were tightly packed; systematic "gapping" was initiated to record missing items in the recent journal collection so that recovery attempts could be undertaken; a new module was added to the automated serials file which would permit production of machine generated binding records; the Government Documents Unit staff completed a review and reorganization of the entire Documents collection; the Library's Publication Archive was transferred from the Documents Unit to the History of Medicine Division; and the Division filmed the Library's annual reports, going back to the first one (1868) that mentions the Library as separate from the Army Medical Museum. This 1868 report included a mention of the Library of the Surgeon General's Office as a budget item (lumped together with many others) under "Miscellaneous Expenses of the Medical Department." A collection of histories of health legislation was also filmed for the Archives and printed copies produced and bound for the Documents Collection.

In the Reading Room, a continuing display of new books was installed which has attracted a great deal of attention and favorable comment from the Library's patrons. A modest charge for on-line bibliographic search service was initiated in April. An increasing number of audiovisual packages were received in the Audiovisual Learning Resource Center, so that imprints of 1974 and earlier were moved for shelving to the General Collection to make room for newer materials. Access to audiovisuals in the General Collection is available in the same manner as books and journals.

Interlibrary loan service continued to be the single largest program administered by the Division, and in spite of the increased volume of requests, acceptable throughput time for loans was maintained. Increasing demand for the loan of monographs in the original form resulted in shortening the loan period from four to three weeks and the

installation of a reserve system for monographs currently on loan. Requests for items on loan are held pending return of the book, rather than returning the request noting "not available." Librarians have enthusiastically endorsed the new procedure.

Although micropreservation of the deteriorating portions of the collection has continued under contract, lack of staff by the end of the year eliminated the Division's ability to convert badly worn and brittle material to film format in-house. Micropreservation is a necessary program to fulfill the Library's archival responsibility and if additional staff becomes available, the Library hopes to be able to re-start it if only on a limited basis during the next year.

The second publication resulting from Dr. Jaroslav Nemec's research into medicolegal serials was published during the year, *Highlights in Medicolegal Relations*. Dr. Nemec, now retired from the Reference Section staff, compiled the material which describes "the important events and publications in the medicolegal calendar extending chronologically from ancient times to the present day." It consists of 549 entries from 4000 B.C. to 1973, with name and subject indexes and a bibliography. This is a revised and much expanded edition of an earlier *Highlights*, and is available from the Government Printing Office.

Nursing students from the Washington area scan a computer printout of journal titles in the NLM collection.

Technical Services Division

The Technical Services Division (TSD) acquires and catalogs biomedical monographs, serials, and audiovisual materials for the Library's collections. The Division provides support for such activities as acquisition, authoritative cataloging, reference services, and interlibrary lending both at NLM and in field libraries through its publications and on-line computerized services.

In FY 1977 there was an increase in the number of books processed and sent to cataloging, orders placed, and serial pieces processed. However, the number of titles cataloged has declined due to the loss of specialists with certain language skills, particularly in the Japanese, Russian, and Scandinavian areas. Cataloging backlogs are tracked and controlled by TSD's machine readable on-line Inprocess File (INPROC). All titles for which complete cataloging cannot be provided are brief-listed in INPROC, thus allowing access to the material.

The Division, through contract support, was able to improve collection control by cataloging a backlog of 2,000 serial titles published between 1861 and 1962, and incorporating serial congresses into the Master Serial System. These older serial titles had not previously been accessible because of the lack of bibliographic control.

Division staff, working closely with a subcommittee of the Board of Regents and consultants, produced a new *Scope and Coverage Manual* in FY 1977. The manual defines the subjects pertinent to medicine (scope) and the extent to which material should be collected (coverage), and provides a guide for TSD staff in selecting literature for the Library's collections. The last major revision of the *NLM Scope and Coverage Manual* was completed in 1972. The most significant impact of the new manual is on the literature of health care delivery, an area that is difficult to control because of its diverse pattern of publication.

In FY 1977, the Division became heavily involved in the technical processing of nonprint media. The Division's audiovisual processing staff have produced over 40 percent of the total AVLINE data base since full operation began in January 1977.

The first publications from AVLINE were produced in 1977 with an AVLINE section appearing in the quarterly *NLM Current Catalog* In addition, the *NLM AVLINE Catalog,* a subject catalog of all AVLINE titles for 1975-1976, was published. The AVLINE data base was also the source for the new *National Medical Audiovisual Center Catalog,* which lists titles available from NMAC.

During the past two years the Division has converted most of its manual processing systems to computerized operation. The volume of on-line computer utilization has grown to over 2,500 connect hours per month, in addition to the nearly 1,000 jobs executed off-line in non-prime time.

TSD's dependence on automation touches every aspect of technical processing. Over 30 full-time staff members spend at least 50 percent of the working day at a terminal. With this volume of activity TSD is currently engaged in shifting the load from the IBM 370 to a dedicated minicomputer, part of TSD's Distributed Processing System.

In addition to the implementation of Phase I of the Distributed Processing System (the acquisitions module for both print and nonprint media), the Division, working closely with the Office of Computer and Communications Systems, has designed and implemented an improved on-line real-time Name Authority File. In the past, the system was a batch operation with often a noticeable delay in adding new cataloging records to the CATLINE file. With the new MEDNAM file, names are added to the system on-line and are available for validating cataloging data the same day.

With the conversion of NLM cataloging data into the Library of Congress's MARC format, NLM is providing CATLINE tapes to Trinco, Inc., under a lease agreement. A similar arrangement is being negotiated with the Ohio College Library Center (OCLC). Health science libraries now can obtain catalog cards or book catalog service from Trinco. In addition, the OCLC user community will be able to utilize NLM data and produce catalog cards

A new SERLINE file, containing bibliographic information for approximately 26,000 serial titles, can also be used for verification by network libraries. For example, the resource libraries in Region XI are using the data base to test the usefulness of manipulable holdings data in developing a cooperative serials acquisitions policy at the Regional level. This project, called COSAP, is supported by an NLM grant to the UCLA Biomedical Library.

Improved control of NLM serial records through automation has allowed TSD staff to expand the dealer check-in and claim program. Six major subscription dealers now provide NLM with off-site check-in service. By FY 1978 over 9,000 serial titles will be checked in and claimed by dealers under this program As a by-product, magnetic tapes of machine-readable data produced by the dealers will be sent to update NLM's serial data base on an experimental program beginning in January 1978.

The Division continues to remain an active participant in several cooperative programs, including Cataloging-in-Publication (CIP) and CONSER (Conversion of Serials). Efforts to reduce TSD manpower involved with CONSER are underway Once an agreement is reached, NLM will send magnetic tapes to OCLC to create and maintain NLM serial records in the CONSER data base.

Table 4. Bibliographic Services

	FY 1975	*July 1975-June 1976*	*Transitional Quarter* [1]	*FY 1977*
Articles Indexed				
NLM	49,500	38,400	8,600	39,663
Other U.S.	98,700	100,000	24,500	84,785
Foreign	72,600	116,600	32,600	135,532
Total	220,800	255,000	65,700	259,980
Recurring bibliographies	28	28	28	26
Journals indexed	2,353	2,408	2,410	2,525
Monographs indexed*	—	186	159	225
Abstracts entered	10,000**	103,200	29,100	111,467

* Indexing of selected monographs began in May 1976
** Estimated

[1] July-Sept. 1976

Table 5. On-Line Searches*

Data base	*July 1975-June 1976*	*Transitional Quarter* [1]	*FY 1977*
AVLINE	2,139	868	9,100
CANCERLINE	4,777	1,469	15,841
CANCERPROJ	891	368	3,863
CATLINE	103,307	22,079	125,455
CHEMLINE	9,347	2,773	25,482
CLINPROT	20	7	596
EPILEPSYLINE	339	280	1,630
JOURNAL AUTHORITY	486	132	898
MEDLINE	286,250	77,963	405,653
MESH VOCABULARY	1,189	314	2,302
NAME AUTHORITY	5,598	832	10,464
RTECS	—	—	471
SDILINE	39,353	6,400	19,677
STORED SEARCH	0	0	45
TOXICOLOGY DATA BANK (TDB)	—	—	1,286
TOXLINE	18,356	5,454	39,432
Total	472,052	118,939	662,195

[1] July-Sept 1976

* The method of computing the number of searches for Tables 5 and 6 was changed for this report Figures given here may not be strictly comparable to those of past years Descriptions of the data bases are included in the various chapters of this report

Table 6. Off-Line Searches*

Data base	*July 1975-June 1976*	*Transitional Quarter*[1]	*FY 1977*
AVLINE	6	2	9
BACK66	15,591	7,546	34,600
BACK69	33,686	10,089	45,185
BACK72	37,749	12,098	59,388
CANCERLINE	330	269	1,257
CANCERPROJ	56	27	286
CATLINE	78	15	87
CHEMLINE	3	0	5
CLINPROT	0	0	6
EPILEPSYLINE	18	16	31
JOURNAL AUTHORITY	0	0	0
MEDLINE	14,169	5,348	26,924
MESH VOCABULARY	5	0	1
NAME AUTHORITY	0	0	0
RTECS	—	—	12
SDILINE	8,795	5,245	39,454
TOXICOLOGY DATA BANK (TDB)	—	—	12
TOXBACK	2,149	1,239	5,628
TOXLINE	1,354	1,009	5,663
Total	113,989	42,903	218,548

* See footnote, page 17.

[1] July-Sept. 1976

Table 7. History of Medicine Activities

	FY 1975	*July 1975-June 1976*	*Transitional Quarter*[1]	*FY 1977*
Acquisitions				
Books	863	904	182	504
Modern Manuscripts	89,563	82,452	13,544	77,177
Prints and photographs	762	815	119	606
Processing				
Titles cataloged	2,866	3,721	695	3,225
Modern manuscripts cataloged	59,355	44,201	16	61,290
Pictures indexed	404	577	136	495
Articles indexed	4,236	3,950	519	6,074
Pages microfilmed	151,130	160,583	59,423	152,994
Public service				
Reference questions answered	1,880	1,782	408	1,803
ILL and pay orders filled	2,214	2,162	578	2,456
Reader requests filled	8,962	5,760	1,322	5,386
Pictures supplied	1,797	1,995	430	1,848

[1] July-Sept. 1976

Table 8. Growth of Collections

	Previous Total (Sept. 1976)	Added FY 1977	Withdrawn FY 1977	New Total
A. Book Materials				
Monographs:				
Before 1500	562	2		564
1501-1600	5,448	35		5,483
1601-1700	9,545	49		9,594
1701-1800	22,702	211		22,913
1801-1870	39,096	154		39,250
Americana	2,272	11		2,283
1871-Present	344,600	9,864	83	354,381
Brief listed-INPROC.	10,220[1]	3,764		13,984
Theses HMD	281,295	16		281,311
Pamphlets	172,021[2]	0		172,021
Bound serial volumes	510,785	34,818	401	545,202
Total Volumes	1,398,546	48,924	484	1,446,986
B. Nonbook Materials				
Microforms	30,158	1,478		31,636
Audiovisuals	3,291	2,103		5,394
Pictures	71,629	606		72,235
Manuscripts	743,131	79,177		822,308

[1] Corrected Figure
[2] In collection before July 1, 1975. Additions now included with monographs.

Table 9. Acquisitions Statistics[1]

	FY 1975	July 1975-June 1976	Transitional Quarter[2]	FY 1977
Serial Records				
New titles added	990	722	288	990
Discontinued titles	404	289	48	812
Current titles received	25,228	18,086	18,326	25,831[3]
Publications Processed				
Serial pieces	137,180	169,726	41,656	182,804
Other	21,553	19,582	5,225	25,000
Total	158,733	189,308	46,881	207,804
Obligations for				
Publications	$723,571	$859,572	$275,997	$1,350,683[4]
Included for rare books	$ 82,136	$ 76,008	$ 26,061	$ 79,246

[1] Does not include history of medicine acquisitions
[2] July-Sept 1976
[3] Includes addition of Serial Congresses to Serial Records; represents open entries for serials included in NLM's machine readable data bases--Master Serials System.
[4] Includes $110,000 in quid pro quo arrangements for services abroad.

Table 10 Cataloging Statistics[1]

	FY 1975	July 1975-June 1976	Transitional Quarter[2]	FY 1977
Completed Cataloging	12,844	15,044	3,051	13,507
Catalog Cards Filed	118,463	118,628	24,992	126,591
Volumes Shelf-Listed	11,843	13,326	3,310	12,182

[1] Does not include history of medicine cataloging
[2] July-Sept 1976

Table 11 Circulation Statistics

	FY 1975	July 1975-June 1976	Transitional Quarter[1]	FY 1977
Number of requests received	320,079	380,475	90,900	423,801
For interlibrary loan	228,755	263,072	64,716	280,512
For readers	91,324	117,403	26,184	143,289
Number of requests filled	247,614	301,965	74,785	343,313
For interlibrary loan	173,642	205,695	51,743	221,517
Photocopy	158,493	184,704	47,153	198,760
Original	15,149	20,991	4,590	22,757
For readers	73,972	96,270	23,042	121,796
Number of requests unfilled	72,465	78,510	16,115	80,488
Interlibrary loan	55,113	57,377	12,973	58,995
Rejected	15,446	18,127	4,585	23,083
Referred	6,645	8,684	2,099	7,946
Returned as unavailable	33,022	30,566	6,289	27,966
Reader service returned as unavailable	17,352	21,133	3,142	21,493

[1] July-Sept 1976

Table 12. Binding Statistics

	FY 1975	July 1975-June 1976	Transitional Quarter[1]	FY 1977
Number of volumes sent to binder	38,178	24,997	6,274	33,045
Obligations for binding	$136,409	$95,508	$25,000	$113,104

[1] July-Sept. 1976

Table 13. Reference Services

	FY 1975	July 1975-June 1976	Transitional Quarter[1]	FY 1977
Requests by telephone	11,509	13,275	4,015	15,043
Government	4,028	3,562	1,201	4,119
Nongovernment	7,481	9,713	2,814	10,924
Requests by mail	1,488	1,446	342	1,140
Government	385	189	43	106
Nongovernment	1,103	1,257	299	1,034
Readers assisted	16,409	17,613	5,819	26,772
Government	4,718	3,793	1,098	4,726
Nongovernment	11,691	13,820	4,721	22,046
Total	29,406	32,334	10,176	42,955
Government	9,131	7,544	2,342	8,951
Nongovernment	20,275	24,790	7,834	34,004
Reading room users registered	22,426	28,384	5,725	32,060

[1] July-Sept 1976

Chapter 3: Computer and Communications Systems

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

The Office of Computer and Communications Systems is responsible for providing data processing and data communications support to all elements of the Library As such, it has a critically important supporting role for Library Operations as well as in Specialized Information Services The present IBM 370/158 multi-process computer system is the equipment workhorse providing this support During FY 1977 the major components of this system —the central processing units, the magnetic tape units, and sixteen disk drives—were purchased As a result, during the three-year period ending in December 1979, the Library will have saved over $1,500,000 in equipment costs as compared with continued lease of these components In addition, for each month of use in 1980 and after, the Library will save the equivalent of $120,000 in lease costs

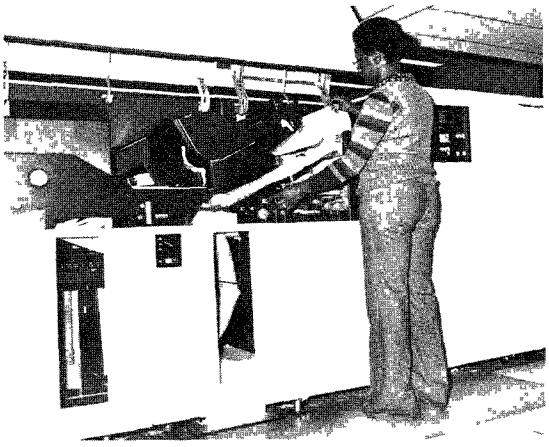
NLM is working with the General Services Administration on a competitive purchase to replace the IBM 370 system in late 1979 to provide the capacity necessary to meet the growing requirements for data processing services This replacement, which has been in the planning stages for over two years, will handle the estimated annual 20-25 percent growth rate until 1985 Installation of the replacement system is scheduled to coincide with the completion of the Data Processing Facility which will be located in the new Lister Hill Center building presently under construction This facility has been designed to house the data processing equipment necessary to support NLM through the 1980s

Considerable emphasis has been placed on improving the performance of the present 370 system so that NLM's data processing requirements can continue to be met on the existing equipment prior to acquisition of the replacement system

Fine tuning of systems performance is being accomplished through the use of sophisticated computer programs which analyze the utilization of all systems components and assist in determining present and potential system bottlenecks

Early in FY 1977 NLM began to work with the Government Printing Office in a project to transfer the typesetting of *Index Medicus* and a number of recurring bibliographies from NLM's Photon 901 photocomposer to the GPO VideoComp 500 Over a six-month period all of NLM's computer-generated publications were converted to the VideoComp and the Photon 901, which had been used for photocomposition since 1969, has been removed

Another major activity in FY 1977 was a complete change in preparing input to MEDLARS II and other NLM data bases The citation processing portion of MEDLARS



Computer operator Linda Ford puts a roll of paper into the new IBM high-speed printer

II was replaced by a new citation input module (MEDCIM). MEDCIM permits initial input and correction of citation records to be performed on-line with cathode ray tube (CRT) terminals. With this program it became possible for the citation proofreaders to enter corrections immediately. This capability has been extended to the other portions of the MEDLARS input and correction process. As a result it is now possible to have initial input and correction performed as a by-product of the intellectual effort associated with citation validation, MeSH changes, and other in-house functions. This development has reduced both errors and the time required to process the data. It also has permitted the Library to dispense with the outdated Keymatic Encoders which had served their useful life and were becoming difficult to maintain.

Early in FY 1977 NLM significantly improved its computer printing capability when it installed an IBM 3800 laser printer. This printer is capable of printing 10,000 pages per hour and it has reduced the amount of time needed to print MEDLARS off-line prints by over 50 percent. This printer, with its laser beam print capability, produces very high quality print and has been used not only to increase the speed of printing but also its quality.

An improved version of ELHILL—the on-line retrieval portion of MEDLARS—was installed in July. This new version, designed to support the experimental Toxicology Data Bank maintained by Specialized Information Services, provides the capability to handle larger records than the previous version. In addition, continued tuning of the retrieval system and the IBM model 370 operating system has provided the capability to handle a 15 percent increase in workload with no degradation of service and terminal response time.

Chapter 4: Specialized Information Services

Henry M. Kissman, Ph.D., Associate Director, Specialized Information Services

The Toxicology Information Program (TIP) is the major activity of the Library's Specialized Information Services component. In FY 1977, the Program began to gear up to meet the demand projected for its services as a result of the passage of the Toxic Substances Control Act (TSCA). Through the Toxicology Information Subcommittee of the DHEW Committee to Coordinate Toxicology and Related Programs, the Program has played an important role in the coordination of toxicology information activities between the Department and the Environmental Protection Agency and has identified some of the information services and data banks that should be developed as a consequence of TSCA.

Query Response

The Toxicology Information Response Center (TIRC), supported by TIP at the Oak Ridge National Laboratory, continues to provide query response and literature search services on request. During FY 1977 the Center completed more than 700 full bibliographic searches for industrial, academic, and Government organizations (the last accounting for about 68 percent of TIRC's services). In addition, TIRC processed more than 900 comprehensive information requests. Charges for these search services are billed through the National Technical Information Service, Department of Commerce, or in the case of Government agencies, are recovered through interagency agreements. The charge rate was increased from $20 to $25 per hour to bring the search service close to a full cost recovery level. TIP supports the purchase of basic library and literature sources for TIRC, in addition to the collection already available at the Oak Ridge National Laboratory. The Program also supports the major portion of the administrative overhead required to provide the query response services. During this year, the above-mentioned interagency agreements for literature search services involved the Chemical Systems Laboratory of the Department of Army, Environmental Protection Agency, National Center for Toxicological Research, and the Food and Drug Administration's Bureau of Foods.

Publications

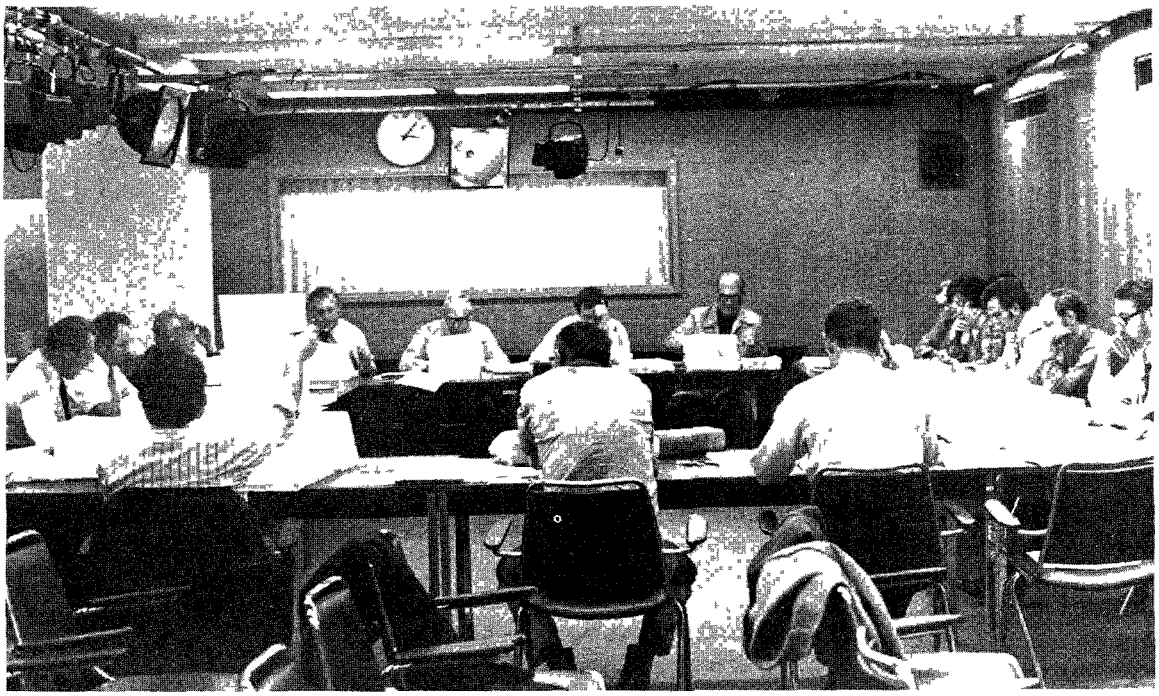
Reviews and annotated bibliographies were prepared by staff of the Toxicology Information Response Center and published in toxicology journals or as monographs by the National Technical Information Service. These publications covered toxic agents of current broad interest such as mercury, lead, mirex, methoxyflurane, trichloroethylene, and kepone. Two indexes for the thousand literature searches completed by TIRC between July 1975 and May 1977, were prepared and sent to the National Technical Information Service for sale and distribution.

On-Line Retrieval Services

TOXLINE: This file of bibliographic references on toxicology now provides subscribers with on-line access to more than 470,000 records covering the most recent five years. The records deal primarily with the toxicology/pharmacology of drugs, pesticides, industrial chemicals, environmental pollutants, and hazardous household chemicals. The TOXLINE data base is now updated monthly. The backfile of TOXLINE (TOXBACK) was enlarged to 189,000 records dated before 1971. All records in TOXLINE and TOXBACK are enriched with index terms and/or full abstracts. TOXLINE/TOXBACK now contain the following component files: Toxicity Bibliography, Chemical-Biological Activities, Abstracts on Health Effects of Environmental Pollutants, Pesticides Abstracts, International Pharmaceutical Abstracts, Hayes File (a precursor to Pesticides Abstracts), Environmental Mutagen Information Center data, Toxic Materials Information Center data, Environmental Teratology Information Center data, and a second special file of references in teratology.

During the past year much of the TOXLINE user support was transferred from Specialized Information Services to Library Operations. This was done to improve management of user support by consolidating these functions in one group. In August, all TOXLINE users were permitted access to MEDLINE and other NLM on-line services. New subscribers to these services are now trained to use the MEDLINE, TOXLINE, CANCERLINE, and CHEMLINE files. TOXLINE reached a usage level of over 700 hours per month. During the year more than 36,700 searches were conducted by TOXLINE users, who also requested more than 460,000 pages of offline prints.

CHEMLINE: This file was regenerated and substantially enlarged, bringing its size to



Nongovernment experts and staff of the Toxicology Information Program review records extracted from source materials before the records are entered into the Toxicology Data Bank.

more than 243,000 chemical records (including the 33,000 records on the EPA Toxic Substances Control Act Inventory Candidate List) known by some 550,000 different names. In addition, CHEMLINE now contains Chemical Abstracts Service (CAS) Registry Numbers, molecular formulas, chemical names, synonyms and corresponding name fragments, ring information, some MeSH terms, and a "locator" data element to aid in identifying other files with information about a specific substance. Arrangements were made to facilitate the use of CHEMLINE by industry, EPA, and other interested parties in connection with the chemical product inventory mandated by the TSCA. EPA's TSCA Inventory Candidate List—now a component of CHEMLINE—is a key element of this new capability. On-line usage for CHEMLINE reached 300 hours per month for a total of more than 3,000 hours during the year.

Registry of Toxic Effects of Chemical Substances: A new on-line service is based on the contents of the National Institute of Occupational Safety and Health publication (1976) entitled *Registry of Toxic Effects of Chemical Substances* (RTECS). The file contains acute toxicity data for approximately 21,000 substances known by some 60,000 synonyms. The file also provides some threshold limit values, recommended standards in air, and aquatic toxicity. References to data sources are cited. RTECS will be updated annually.

Toxicology Data Bank. Work continued on the development of the Toxicology Data Bank (TDB) which contains evaluated data on selected chemicals extracted from such sources as textbooks, handbooks, reviews, and criteria documents. The data bank will ultimately contain information on more than 5,000 chemicals, and potential or known biological hazards to which major population groups are exposed. An initial file containing some 600 records was used for systems testing. A regenerated and augmented file with more than 1,000 records is ready for expanded testing of format, content, and data accessibility.

Collaborative Activities with Other Agencies

TIP continued to manage the Toxicology Information Subcommittee of the DHEW Committee to Coordinate Toxicology and Related Programs. This group has taken on a more important role with the passage of the Toxic Substances Control Act (TSCA). Resources were provided by the Committee to support certain continuing Subcommittee projects and to initiate projects that will be developed as a consequence of the enactment of TSCA. The projects being carried out with interagency funds and managed by NLM are:

1. The *Toxicology Research Projects Directory*, Volume II, was published in four issues plus a fifth cumulative index issue in calendar year 1977; it includes some 10,000 project descriptions. The Directory is a subset of "toxicology" project descriptions extracted from the computerized files of the Smithsonian Science Information Exchange. Based on two years' experience with this publication, the decision was made to improve its usefulness by converting it in 1978 to a monthly publication with an annual index. Other changes in format and type style are planned to improve the publication's utility.

2. *Toxicology Testing-in-Progress* (TOXTIPS) is a monthly publication intended to serve as a forum for exchanging information on the long-term toxicology testing of chemicals. Since such testing is very expensive and because testing facilities are in short supply, it is important for Government and industry to avoid inadvertant replication of tests. The importance of disseminating information about testing will increase as the growing requirements of the Toxic Substances Control Act have an impact on the scarce facilities and scientific re-

sources available for long-term toxicology testing.

After a period of experimentation, the format of TOX TIPS has been stabilized. Issues contain from 20 to 30 testing reports; these are indexed by compound tested (and within this category by species, route, and duration of the test) and by organization and investigator. The compound index is cumulated quarterly, while the organization index is cumulated in each issue. A recent successful innovation was to include short bibliographies (from MEDLINE, TOXLINE, and CANCERLINE) on the biological effects of the compounds being tested.

3. The *Laboratory Animal Data Bank* is being developed as an on-line, interactive data retrieval service that provides base-line values and characteristics for selected strains of laboratory control animals. The data for LADB come from industrial, academic, and Government laboratories. The file currently contains husbandry and base-line data on 70 colonies of various species/strains (rodent, dog, and monkey) and about 12,000 animals. Phase I (sponsor) testing of this file was completed on August 31, and Phase II testing, which includes about 30 data donors, has been started. Decisions regarding public access to this file will be made after the results of the two tests have been evaluated.

Chapter 5: Audiovisual Programs

George E. Mitchell, D.M.D.*

The National Medical Audiovisual Center (NMAC), a part of the National Library of Medicine since 1967, is responsible for planning and administering a national program to improve the quality and utilization of learning materials in the health professions The Center is located in Atlanta, Georgia In cooperation with the Library's Lister Hill Center and the Learning Resources Branch of the Bureau of Health Manpower, NMAC emphasizes projects to assist educators in the health professional community in determining instructional needs, implementing effective teaching methods, and developing evaluation techniques

The Center has concentrated on projects with health professional schools and national specialty groups that can continue to function independently after the Center's initial support is withdrawn

Education Research and Evaluation

A wide range of research and evaluation projects was completed or carried forward in FY 1977 These included initiatives in analyzing instructional development and audiovisual design procedures, improving techniques in medical photography, and upgrading existing audiovisual materials The completion of the first phase of a planning document for NMAC training was a major milestone during the year The next step is to begin developing lesson plans for specific instructional materials for NMAC's training programs A test of medical students to determine their different learning styles was also completed This information will provide the basis for experimental studies to see if these styles can be matched with different kinds of instructional modalities to improve effectiveness Work continued on the development of prototype learning materials and problem-based learning packages

A survey on the state of the art of instructional technology in schools of the health professions, based on data obtained from questionnaires sent to 1,479 schools, was completed in FY 1977 A final report on the survey is now being prepared that will contain a description of the purpose, significance, and methodology of the project, a detailed analysis and interpretation of the data, and conclusions and recommendations This report will be sent to the schools that participated in the survey and made available to other interested organizations and individuals

A survey on the status of biomedical communications programs in the United States and Canada is also near completion Preliminary data have been partially analyzed and were presented at a meeting of the Association of Biomedical Communications Directors All responses to the five-page questionnaire have now been coded and entered into the computer As soon as analyses and

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* Dr Mitchell Director of the Center since 1973 retired on September 30 1977 Dr Myron J Adams Jr has been appointed Acting Director

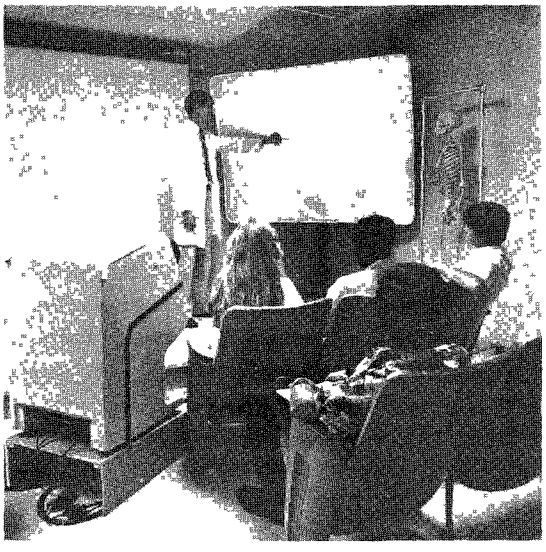
interpretation of the data are completed, a final report will be sent to all who participated in the survey.

Significant findings and products from all research and evaluation efforts are being made available through training, consultation, and a variety of publications.

Media Development

During FY 1977, 91 instructional units were completed through a combination of contractual agreements, collaborative activities, and in-house productions. These included 6 motion pictures, 27 videotapes, 49 slide-tape sets, 6 filmstrips, and 3 print units. (See Appendix 4.)

Students of medicine, nursing, and dentistry continue to be the primary intended viewers of most NMAC sponsored audiovisual materials, although increased emphasis is now being placed on the continuing education needs of health professionals. A number of projects intended primarily for residents and practicing health professionals are in progress. Notable among these are a videotape program on "Acromegaly" and a multi-media course on "Amniocentesis."



Audiovisuals play an important role in health science education. Students studying to be X-ray technicians are shown here from Woodruff Medical Center of Atlanta's Emory University.

Twelve new videotape recordings were made for the series, "Leaders in American Medicine." Two videotapes were recorded in a companion series, "Distinguished Leaders in Nursing," and will be released in early FY 1978.

A new series of videotape recordings envisioned as a long-range, continuing project was begun. Entitled "NMAC Technical Reports," the series offers an audiovisual alternative to print documentation of innovative techniques and procedures developed at NMAC. Two programs in the series, "Making Color Composite Slides with a Rear-Projection System" and "Variable Area Light Control in X-ray Duplication," were completed and placed into distribution.

In the coming year, besides placing additional emphasis on the Center's intramural activities, it is anticipated that a larger portion of the Center's media development effort will be devoted to continuing education for practicing health professionals.

Distribution

In FY 1977 the functions of NMAC's Selection and Reference Section were transferred to Library Operations (in Bethesda). This led to a reorganization of NMAC's Materials Utilization Branch and resulted in two new Sections—the Distribution Section and the Acquisitions and Sales Section.

During the fiscal year, 48,690 loan requests were received and 42,356 motion pictures and videotapes shipped. Some 5,000 NMAC-sponsored teaching packages were sold through the Sales Program of the National Audiovisual Center, General Services Administration (GSA).

The Center acquired 164 new titles in FY 1977 and made them available through the distribution program. Seventy-seven new

titles were placed with the National Audiovisual Center (GSA) Sales Program. Announcements for each of these were distributed by selected mailing keys.

The NMAC videotape distribution program begun last year continued to gain in user demand. In FY 1977, 50 new titles were added bringing the number of videotapes now available on loan to 192.

Three NMAC-sponsored self-study publications were completed and offered for sale through the National Technical Information Service, U.S. Department of Commerce. A total of 2,110 monographs, case studies, and technical reports were distributed by the Center to requesters in the United States and foreign countries.

An inventory of materials in the archival collection was completed, 700 titles were listed and are now being abstracted. Archival films are being transferred to videotape and made available to requesters. Approximately 75 titles have been transferred so far and will be advertised through a promotional flyer.

A new *NMAC Catalog* containing 838 peer-reviewed titles was published during the second quarter of FY 1977. This edition was computer-produced from titles in AVLINE. A special listing of 573 NMAC titles available for purchase from GSA Sales was distributed on mailing keys.

Workshops and Conferences

The NMAC workshop/seminar program is designed to teach health educators how to apply educational technology and systems approaches to instruction. There was an increase in the number of health educators trained in NMAC's six regional training centers and a concomitant decrease in the number trained at NMAC. This reflects progress made in a three-phase plan to discontinue giving certain workshops and seminars at NMAC by placing packaged versions of these same workshops in the regional training centers. A major objective of the plan is to concentrate NMAC resources and staff time in developing and testing new workshops and seminars. Faculty trained at both NMAC and in regional centers increased from 500 in FY 1976 to 659 in this fiscal year. Among the 26 workshops and seminars the following topics were included development and evaluation of audiovisual instructional materials, designing and utilizing simulation and gaming activities in health science education, content analysis, management of learning resources, test construction, learning spaces, television production techniques, enhancement of instructional materials, and a workshop for Regional Medical Library audiovisual consultants.

The NMAC regional training center program begun last year made substantial progress during the period. All six centers—University of North Carolina, Delta College, University of Nebraska, Ohio State University, Loma Linda University, and the State University of New York at Buffalo—have completed Phase II of the program and are conducting workshops with the assistance of one NMAC coordinator The State University of New York at Buffalo (SUNY) entered Phase III of the program and conducted a workshop in August independent of direct support from NMAC staff. The workshop was attended by 14 faculty members from states across the Nation SUNY has reported receiving over 100 inquiries from the field regarding dates and times for future workshops. Centers at the University of North Carolina and Loma Linda University also have scheduled Phase III independent workshops for the near future.

NMAC conducted the third training workshop for Regional Medical Library audiovisual consultants at the South Central Regional Medical Library (Dallas) in February 1977. This workshop, a spinoff from the advanced

seminar conducted during FY 1976, was designed to train a new group of audiovisual consultants as backups to those previously trained. Fifteen participants representing nine of the eleven regions attended.

Dr. Myron J. Adams, Jr., Acting Director of NMAC, discusses a storyboard with Dr Stewart H Rowberry, new Chief of the Center's Materials Development Branch.

Advisory Services

A number of on-site surveys and consultations were conducted in FY 1977. One of these was at the two Medical Centers of the Louisiana State University—in New Orleans and Shreveport. The major objective was to identify areas of the learning resources and audiovisual departments that are useful and efficient and also those that are deficient, inefficient, or redundant. Other on-site surveys were conducted at Oral Roberts University, Boston University Medical Center, University of Texas Medical Branch at Galveston, the American College of Chest Physicians, Beth-Israel Medical Center, Vocational Education Media Center in Atlanta, MLA Program at LSU Medical Center, and the 112th Mid-Winter Meeting of the Chicago Dental Society.

At NMAC, a total of 167 consultations were provided to administrators, faculty, and staff from schools of the health sciences, universities, and hospitals. Coming from all parts of the United States and 11 foreign countries, the visitors discussed educational technology, instructional materials development, learning spaces, equipment and communications systems with NMAC staff.

Table 14. Selected Statistics, NMAC

	FY 1977
Audiovisuals Requested	48,690
Audiovisuals Shipped	42,356
Titles Added (Film & Videotape)	164
Audiotape Duplication	2,404
Titles to NAC for Sale	77
Teaching Packages Sold Through NAC	5,048
On-site Surveys	1
On-site Consultations	11
In-house Consultations	167
Grants Reviewed	11
Monographs Distributed	2,110
In-house Workshops (314 attendees)	12
Regional Workshops (345 attendees)	14

Chapter 6: Lister Hill National Center For Biomedical Communications

Harold M. Schoolman, M.D., Acting Director

During the period of this report the Lister Hill National Center for Biomedical Communications saw construction start on the new Lister Hill Center building The Public Health Service/Communications Technology Satellite Network installed six stations, and became an operating reality A major new project to help meet the information needs of health care professionals was successfully demonstrated The applications of minicomputers and microprocessors to both library automation and medical education continued to expand.

Dissemination of Research Information

The translation of new research findings into forms useful for health care practitioners is addressed by many different approaches within the biomedical and information science communities A new program area within the Lister Hill Center is aimed at the development, demonstration, and evaluation of innovative mechanisms for information transfer and exchange, with emphasis on the organization and utilization of information.

The health care practitioner is faced with a profusion of words on almost any biomedical topic The practitioner's problem is not so much in being unable to find the sources of information as it is in having the time and access to a source of information appropriate for his needs In principle, the reservoirs of information in medical libraries can be drawn upon to provide answers to the practitioner's questions However, for many busy health care providers, the facts of life are often otherwise The user is confronted with difficult dilemmas in choosing sources of information from which to seek answers In a medical library, for instance, a query may elicit citations to many relevant publications, but no guidance as to which specific article contains the information wanted The requester must obtain the articles (sometimes a difficult process) and read them In those he reads, he may or may not find what he wants Answers might be found in several articles, but disagreeing with one another Obtaining some approximation of a consensus in a controversial area may require investing a considerable number of hours In an area in which the reader is not himself an expert, it is not always easy to know if a view expressed by an author is generally accepted, or is unique and aberrant Information, although relevant, may have quietly and unknowingly become obsolete Added to the user's burdens is a disturbing amount of redundancy in the literature Clearly, the individual practitioner needs help in dealing with the massive amount of available biomedical information

A prototype system to meet the health practitioner's needs, being developed by the Lister Hill Center, aims at providing a comprehensive bank of information which 1) will contain substantive answers to questions posed by practitioners, 2) will provide answers that are current and are the consensus of a group of experts, 3) will be

immediately responsive to inquiries (reliable, ready of access); and 4) will provide data supporting the answers as well as citations to primary publications for more detailed study if desired.

The diseases "viral hepatitis" have been selected to serve as a test model for such an information transfer system. Knowledge pertaining to aspects of the diseases important to the practitioner and/or academician has been synthesized using the information contained in several outstanding syntheses on the subject previously published by hepatitis experts. Relevant information has been selected, placed in a highly organized hierarchical arrangement to permit easy retrieval, and encoded into a minicomputer. The data base, still in draft form, is arranged by topics (headings). For each heading there is an accompanying heading-statement which synthesizes the state of knowledge about the subject. Each heading and heading-statement is supported by "data elements"—paragraphs taken from previously published source documents. Citations included within the data element paragraphs are to the primary publications cited by the experts in their source document articles to back up their conclusions or general statements. This draft hepatitis data base can now be explored via terminals at NLM. A printed copy of the data base Table of Contents serves as a convenient index and allows easy access to whatever information is sought in varying degrees of detail (to match the user's needs).

In the next several months, the Center will work with a group of experts to: (1) validate the content of the initial baseline viral hepatitis information bank; (2) update the content with selected materials published in the last two-and-a-half years; and

Lister Hill Center staff members Dr Lionel M Bernstein (left) and Dr Elliot R Siegel experiment with the on-line hepatitis data base.

(3) maintain currency of the information bank by continuous monitoring of newly published material and modifying the data base monthly.

Once the prototype computerized information bank is established, validated, and brought up to date in the selected disease area, methods of user access to the information will be studied. Access may be direct via a computer terminal or through a trained intermediary using a toll-free dial-access telephone number, users also may receive computer-generated printed material, either in response to specific queries or as a complete document on a given disease. The information bank also will be made available to professional societies and to other producers of health-related information products and services, ranging from scholarly monographs to multimedia instructional packages.

Broadband Biomedical Communications

In its role as technical coordinator for the Public Health Service (PHS), the National Library of Medicine has developed a national experimental biomedical communications network consisting of six earth terminals linked via the Communications Technology Satellite (CTS) The network provides full-duplex (simultaneous two-way) color video and audio communications of high quality and reliability This network is used to conduct experiments in resource sharing, continuing health education, and teleconferencing, in order to explore interactive video as a tool for future health systems. In addition, technical experiments are being designed to identify and evaluate parameters which must be taken into consideration for future operational networks

The earth terminals in this network use 10-foot parabolic dish antennas and operate in the relatively uncrowded K-band (12-14 GHz) of the radio frequency spectrum.

This ground network of small terminals interconnects facilities in six cities distributed over a broad, genuinely "national" geographical area to form the nucleus of the first interactive experimental broadband biomedical communications network. These terminals are located at Bethesda, Lexington, Denver, Seattle, Bozeman (Montana), and Fairbanks.

Although the terminals installed and operated by the Public Health Service form the nucleus of the network, other United States CTS experimenters have shared their facilities with the health community in their localities With the extension made possible by such cooperation on the part of other CTS users, the experimental network can span over 50 communications facilities within the continental United States.

Bethesda is the Network Coordinating Center (NCC). From this location, each of the PHS facilities receives the operational and maintenance coordination required to perform the experiments. Each terminal, however, is equipped to operate as an independent transmission center. The main role of the NCC is to provide a centralized control point for the network and a contact point for the NASA Experiment Control Center.

The Bethesda earth terminal at NLM, in addition to housing the K-band satellite communications equipment, also includes a facility for interactive telecasting that consists of a mini-studio and the Billings Auditorium. Although the facility borrows concepts from the world of standard television broadcasting studios, it is different in function and layout The basic functional difference is in the emphasis on interactive, rather than one-way, communications. This communication mode gives rise to certain problems, such as the "echo problem" that is frequently experienced by interactive communication facilities

Production crew oversees program being telecast by satellite transmission from NLM's new CTS control room

The Lister Hill Center is coordinating user programs with three of the six Public Health Service agencies. The Health Resources Administration, presently the largest of the experimental groups, is sponsoring programs in four health disciplines:

1. Under the project management of HRA's Division of Nursing, a program with the University of Washington has been designed and performed to disseminate research results in the field of predictive nursing involving infants and parents.
2. The American Dietetic Association has developed a continuing education program for professional dietitians in long term care.
3. The Division of Dentistry will present a series of programs in continuing dental education and dental faculty development.
4. The University of Washington's WAMI program (Washington—Alaska—Montana—Idaho) is expanding its program under the Division of Medicine to include faculty sharing, independent student learning, admissions, minority recruitment, student consultation, and legislative process.

The second experimental group, the National Institutes of Health, is planning to produce and distribute a series of continuing education programs for health professionals.

The third group, the National Institute on Drug Abuse under the Alcohol, Drug Abuse, and Mental Health Administration, is exploring the use of teleconferencing to exchange information between drug program centers.

Broadband Telecommunications Research

The Public Health Service/Communications Technology Satellite (PHS/CTS) network is also being used as a communications research laboratory to correct shortcomings revealed by the actual operation of the PHS/CTS system, and to optimize usage of the system. Experimenting with and introducing innovative techniques, such as channel-sharing, will point toward more cost-effective biomedical communications.

The use of the network for simultaneous two-way audio/video communications has uncovered certain problems that limit its effectiveness. The audio channel, for example, suffers both from intermittent fading and from echoes, an undesirable feature of interactive communications. The studio controller copes with these problems at present by manually controlling the channel to maintain constant signal levels, but this is a stopgap solution. Incorporating a voice activated switch and an echo suppressor in the audio channel has only partially solved these problems. An investigation now underway should lead to either an adjustment to the present hardware or to the design and development of an improved version that will rectify the audio impairment.

To increase the interaction between the stations in the network, two video signals were allowed to share one of the two broadband CTS channels by a frequency-division multiple-access technique. The other channel meanwhile was occupied by another video signal, as normally done. This process therefore has allowed three video signals to be "on the air" simultaneously as opposed to the two for which the system was originally planned. Now three stations can be in a full-duplex video communications mode with a fourth conducting full-duplex audio. This increased technical capability has brought about the opportunity to institute and evaluate programs that can effectively utilize, or actually need, more interaction than before.

Telephone transmissions of physiological signals such as EKG's and EEG's are becoming increasingly important in biotelemetry as applied to the areas of remote consultation and computer-aided diagnosis, and potentially for remote medical education. An investigation was conducted into the spectrum requirements to transmit EKG's and EEG's, currently used methods of transmission, and various shortcomings in their implementation. The study also points out possible solutions to these shortcomings, such as digital modulation and coding techniques

Computer-Based Education Materials (CBEM)

The Lister Hill Center has continued to support the health science education community through its program in computer-based education. The Learning Resource Laboratory, completed last year, has continued to serve as a "window" to the world of computer-based educational materials for the many visitors from the health science community Additional projects this year have included the development of a minicomputer/microprocessor CAI system that promises to have great impact on the cost-effective delivery of CBEM A major goal of these endeavors is to demonstrate the transfer of CBEM from centralized large-scale computers or minicomputers to microprocessor-based stand-alone intelligent terminal systems This would merge the advantages of centralized management with the economies of stand-alone delivery

Another major project has been the development of a Plasma Terminal System (PTS). The PTS, when completed, will answer many needs of the health science education community There are presently four CAI languages (systems) of major importance to the health science community

PLATO/TUTOR (University of Illinois, Urbana-Champaign), MUMPS (Massachusetts General Hospital, Boston), Coursewriter (IBM), and PILOT (University of California, San Francisco). Of these four, PLATO/TUTOR is unique in its use of computer-generated graphics; it also requires, at present, a special computer terminal. Since a growing number of medical, dental, and nursing institutions also use the other three languages, they are required to support two different types of computer terminals. The Plasma Terminal System will allow users to access all four CAI languages with one terminal. It will, furthermore, provide the MUMPS, Coursewriter, and PILOT languages with a capability for computer-generated graphics comparable to that available only from PLATO today. Such graphics capability has already been demonstrated with MUMPS in the Learning Resource Laboratory. Last, but not least, the PTS will also allow CBEM material written in the PILOT CAI language to be used by the student in a stand-alone mode *with* graphics; that is, not connected to a remote host computer. The design of the PTS has been completed, and the prototype unit is presently under development. A working system will be demonstrated in the first quarter of FY 1978.

A national workshop was held at the National Library of Medicine, in collaboration with the Association of American Medical Colleges (AAMC), to establish "Guidelines for the Appraisal of Computer-Based Educational Materials in the Health Sciences." This workshop resulted in a set of initial guidelines from which were developed appraisal forms. The AAMC has field tested the guidelines and appraisal forms and is now drafting recommendations for their implementation.

An experimental Lister Hill Center *Newsletter on Computer-Based Education for the Health Sciences* was published and sent to

On April 20, 1977 a CTS satellite transmission allowed students in Bethesda and California to discuss DNA research guidelines with NIH Director Donald S Fredrickson On Dr Fredrickson's right is Allan Ladwig, president of the Forum for the Advancement of Students in Science and Technology.

approximately 1500 members of the health science education community. In addition, a slide-tape presentation of the Center's CBEM programs was produced and shown at the 1976 AAMC annual meeting in San Francisco.

Library Automation

The Lister Hill Center has begun a program to exploit the potential of minicomputer/microprocessor-based systems for cost-savings in libraries. These efforts have as their aim the evolution of a minicomputer-based, integrated library system. Special concern is for effective access, by the minicomputer-based system, to the national library networks.

As a first effort, the Center's Computer Technology Branch implemented, early in FY 1977, a distributed, minicomputer-based input processing system for NLM's Library Operations Division. This system is now operational and supports "selection and acquisition" processing. Now being extended to other NLM applications, the system has already resulted in a great saving in processing costs.

As the only federal library with an in-house R&D program on library automation, NLM was asked to consult on this topic by the Federal Library Committee. As a consequence, the Lister Hill Center staff has provided consultation to numerous federal agencies on minicomputer and microprocessor based library applications.

Efforts of the Lister Hill Center in this area have also been recognized by the General Services Administration and the Army Library, in the Pentagon. The General Services Administration has entered into an interagency agreement with the NLM to obtain technical direction from the Lister Hill Center for a minicomputer-based library system in the Army Library. The first function to be implemented will be capable of integration with the previously described "selection and acquisition" system already operational at NLM.

Other federal agencies are considering the funding of complementary library functions consistent with the Lister Hill Center effort. This potential for cooperative, nonduplicative funding and development among federal agencies is of major interest to the General Services Administration. The federal community, in return, can obtain maximum benefit from parallel research and development efforts underway at the National Library of Medicine.

The Division Directors of the Ohio College Library Center (OCLC) have voted to approve a joint Lister Hill Center/OCLC research and development project to develop a specialized interface to the OCLC nationally shared cataloging network. This interface experiment will use the microprocessor-based "Intelligent Input/Output Buffer (IIOB)" developed by the Lister Hill Center in FY 1977. The IIOB allows communication between different computer systems.

In concert with earlier plans to improve the interface between the user and the technology, a "user-cordial interface" was developed to provide access to the Library's online catalog, CATLINE, without requiring the user to learn a sophisticated retrieval language. The user-cordial interface also formatted the CATLINE record into a card image format familiar to all users of the NLM public catalog. The concepts demonstrated have opened up new alternatives for utilization of general retrieval systems by library patrons.

Chapter 7: Grants for Library Assistance

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

The Extramural Programs of the National Library of Medicine are helping to improve the dissemination of health knowledge by funding a variety of information programs at institutions around the United States. By means of grants and contracts, these institutions can augment their information activities and share in a coordinated national effort to expedite the exchange of information among health researchers, practitioners, and educators.

The Extramural Programs operate under the authorization of the Medical Library Assistance Act of 1965, as amended. Title II of Public Law 95-83, "Biomedical Research Extension Act of 1977," the most recent amendment, provides extended authority for the currently supported programs.

Regional Medical Libraries

A highly visible example of cooperative effort is the Regional Medical Library Network. When Congress first considered the authorities that established the Extramural Programs in 1965, it appeared that the increasing amount of health information generated by research, on the one hand, and the increased need to have access to this information, on the other, represented a long-term trend. Furthermore, even with modern communications, dispersal of the health community posed difficulties for rapid access to knowledge. It seemed clear that some form of regional organization could best assure adequate health information services for the entire country.

The Francis A. Countway Library of Medicine, at Harvard Medical Center, received a grant for regional services in 1967. Within 18 months, nine other regions of the country had also established Regional Libraries with support from the National Library of Medicine. (The NLM acts as the eleventh regional medical library.) In FY 1977, Regional Medical Library obligations amounted to $3,086,000.

In the regions, the librarian of a contracting institution acts as Regional Medical Library Director. For day-to-day regional services there is usually a separate staff. Frequently, certain activities are subcontracted to other libraries. Each region also has at least one advisory group, representing health information users and providers. The combined RML staffs include 42 professional librarians.

The eleven Regional Medical Library Directors meet twice a year. In FY 1977 they met in Bethesda in December, and at the annual meeting of the Medical Library Association in Seattle in June. In cooperation with NLM staff, the Directors have sponsored training for regional audiovisual library consultants. In February, 1977, for example, 30 librarians met in Dallas for a week of intensive training and orientation in this field.

Planning is very important in developing coordinated services in the regions In Region VII (Indiana, Illinois, Iowa, North Dakota, Wisconsin, Minnesota) a planning organization has evolved to solicit the views of librarians from city and country, medical center and isolated community hospital, and to integrate these views into mutually agreed-on priorities In Region II there are area groups corresponding to Health Systems Agencies (HSAs) which meet regularly to convey their needs and plans to the RML Other regions have developed other mechanisms

An essential function of the Regional Medical Library Network is the exchange of documents among participating members These interlibrary loans flow in a hierarchical pattern Material not available in a basic unit, such as a community hospital, is requested from a larger library, such as an academic medical center If this library is unable to fill the request, it is forwarded to the Regional Medical Library If the RML is unsuccessful, it may send the request on to the National Library of Medicine Health professionals, no matter where they are located, now can draw upon the Nation's collected health knowledge conveniently and quickly In 1977 the network provided more than a million interlibrary loans within the regions In the past year, Extramural Programs staff and the RML Directors have been working on a plan to establish fiscal stability within the network by an appropriate allocation of responsibilities among the various public and private organizations and institutions involved

Resource Project Grants

Resource Project Grants to support information activities are awarded to institutions on behalf of their health libraries The institution must show how it will maintain a successful project after the period of grant support

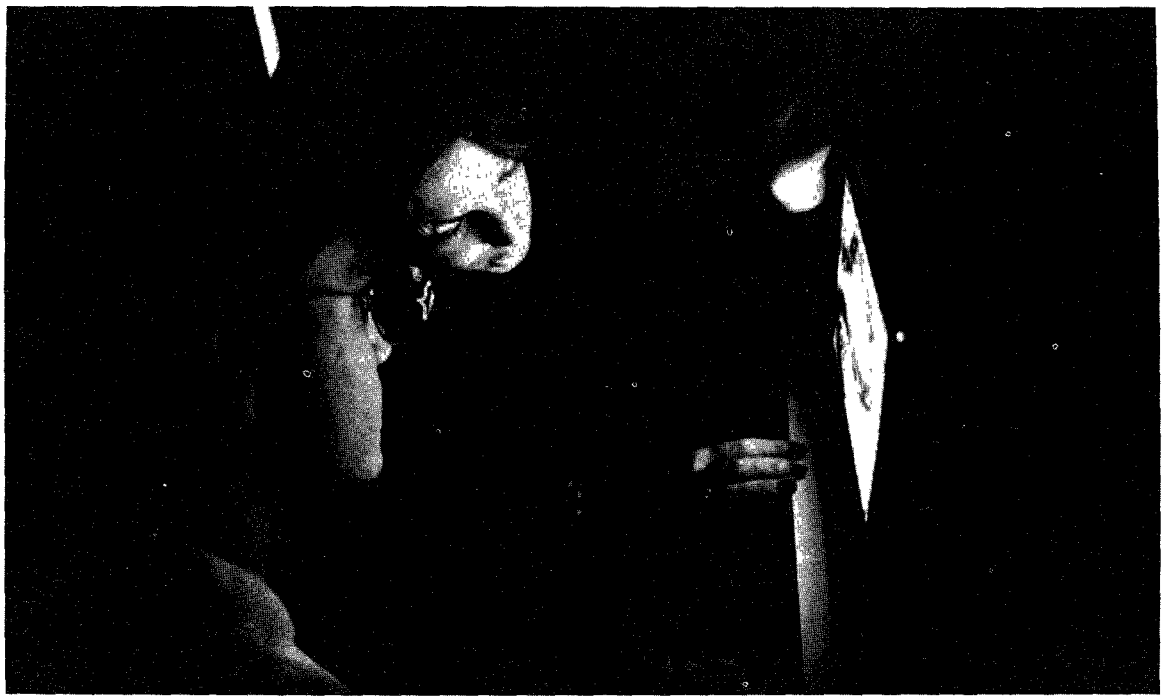
In FY 1977 the Extramural Programs funded 37 new projects and continued nine into an additional grant year Of the new projects, 15 involve arrangements for interinstitutional cooperation or resource sharing, 12 are for alteration and renovation of space, 5 are for new information services, primarily for educational programs 3 will enable academic medical center libraries to adopt advanced computer systems The final two projects are for preserving significant source documents in the history of medicine

The comparatively large number of projects for resource-sharing arrangements continues a program direction begun several years ago by NLM The new projects, reflecting careful local planning, seek to raise professional standards, to improve communication, and to develop arrangements for perpetuating shared activities after the grant runs out

A particularly ambitious resource-sharing project is the development of a network in Idaho—IDA-HEAL-NET Because Idaho does not have a medical school, the state library has assumed responsibility for coordinating a health information network The 52 hospitals in the state are small, only 12 have more than 100 beds Few have identifiable libraries or information functions A full-time health sciences librarian will serve as coordinator, working with three area health education consortia located in each of the state's natural geographic regions Network projects include a list of serials, coordinated on-line services, better statistics, and workshops for the staff providing information services

In addition to statewide cooperative efforts like IDA-HEAL-NET, project grants support local and regional associations of health institutions The Northwest Indiana Health Science Consortium, for example, sponsored by the Indiana University School of Medicine, will enable a group of six hospitals to coordinate programs and activities in a densely populated but medically underserved area

In the New York-New Jersey region, the Regional Medical Library staff and academic



First year medical students at the Albany Medical College view audiovisual instructional materials in the Schaffer Library of the Health Sciences. The library's multimedia services were developed with the assistance of a two-year grant from NLM.

medical librarians have organized to develop audiovisual services. Their model is a sophisticated audiovisual (AV) resource center at the College of Medicine and Dentistry of New Jersey. An advisory task force used this experience as a guide in planning region-wide shared audiovisual services. The task force members designated certain institutions to serve as AV resource libraries within geographically defined areas. Following the master plan, grant supported AV projects have been started at SUNY-Buffalo, SUNY-Upstate Medical Center at Syracuse, and the Albany Medical College. Project activities include developing collections of audiovisuals, shared reference and technical services, and union audiovisual lists.

Resource Improvement Grants

While Resource Improvement Grants will continue to help small or isolated institutions start health libraries, the primary interest and priority changed in FY 1977 to one of fostering local health information consortia. The grants make start-up funding available to groups of institutions to plan cooperative programs. A second award then helps provide basic print materials. These local cooperative arrangements, where some institutional matching funds are required, seem the best way to help smaller institutions participate more effectively in the Regional Medical Library Network.

An Improvement Grant for first year planning was awarded to the Laurel Highlands Health Sciences Library Consortium, a group of 12 members headquartered at Conemaugh Valley Memorial Hospital in Johnstown, Pennsylvania. Membership includes hospitals, community health agencies, and several educational institutions with health manpower programs.

A Resource Improvement Grant has been awarded to the Health Sciences Libraries of

Central Georgia for the second budget increment period. The eight-member HSLCG consortium was organized in October 1975. Considerable planning and organization had taken place so that a first-year award for planning was not needed. The grant funds will help the smaller members of the consortium strengthen their collections of books and journals.

Research, Development, and Demonstration Grants

The discovery of new knowledge and the testing of new technologies are necessary to advance the state of medical librarianship and to meet health information needs. On July 22, 1977, a special task force met at NLM to examine the Research Grants Program and to make recommendations for improving the quality of NLM research grants. Dr. John F. Sherman, Vice President of the Association of American Medical Colleges, presided. Task force members were drawn from a variety of disciplines and organizations including library schools, medical schools, private industry, and other Federal agencies.

The task force discussed the need to define NLM goals in this area so that the limited research funds are used for areas of high programmatic interest, the need for a proper balance between basic and applied research so that both immediate information problems and future issues are addressed, grant support for salaries of promising young researchers; a small research grant program (under $10,000) with a more rapid review cycle to support modest, short-term projects, assumption of responsibility by NLM for basic research in computer medicine; cross-fertilization between intramural and extramural R & D efforts at NLM; development of synergistic relationships with other Federal agencies; and a greater emphasis on disseminating the results of communications research and applying them to medical library practice.

A small working group of task force members and NLM staff is scheduled to meet early in FY 1978 to consider the discussions and to prepare a report with specific recommendations. It is anticipated that the quality of NLM research grants will be enhanced as result of these activities.

Training Programs

Since 1971 the Training Grant Program has concentrated on preparing health professionals for our increasingly computerized world. The ultimate goal is to promote the complete and effective integration of computer technology into all phases of medicine —teaching, research, and practice.

The approach selected is to provide interdisciplinary training in the computer and health sciences for teachers and potential faculty members, especially those with career goals in biomedical research. Graduates of the programs can be expected to instill in their own students and colleagues an awareness of the potential of computer applications of medicine, in short, to act as translators between the computer sciences and the health field.

One new program leading to a master's degree in computer science after two years of intensive training was funded in FY 77 at the University of Illinois at Champaign-Urbana. The first class of four trainees was enrolled in September 1977. The students are physicians who have completed all or most of their residencies. The School of Basic Medical Science and the Department of Computer Science are collaborating in offering coursework and supervising research projects for the trainees. With this award, Extramural Programs now sponsors ten such training programs. Seventy-eight individual trainees received stipends during the 1976/77 academic year.

Special Scientific Projects

These awards enable outstanding scholars to analyze, evaluate, and synthesize what is known—although frequently published very

diffusely--into single treatises on broad health topics These treatises provide the serious inquirer with complete and documented interpretation of a major subject Only a few projects are supported each year, although the range of program interest covers all of health and medicine

One project begun this year is a study of national policies and priorities for health research and development Professor Robert F Rushmer of the University of Washington Center for Bioengineering will explore the origins and current trends of policies and priorities adopted by Federal agencies in their support of health-related research He will assess the relationship of future research and development to pressures for budgetary reform, to changing public attitudes toward science and technology, and to the public's role in research and development decisions

Dr Ernst Jokl, Professor Emeritus of the University of Kentucky School of Medicine, has received a grant for a book on the social and medical implications of the growing field of sports medicine He will describe the sports movement as it has developed in this century, in several countries, with special reference to its medical implications The varied studies and experiments he will describe illustrate the potential contribution of sports to national fitness and health

Four persons who received Special Scientific Project awards in earlier years have sent their manuscripts to publishers The new works are expected to appear on publishers lists in early 1978

Biomedical Scientific Publications

Publication Grants facilitate the dissemination and sharing of scientific information important to medical progress and public health Both domestic and international resources are utilized in this effort International support is through Special Foreign Currency Agreements and collaborative, bilateral programs in certain countries The international biomedical publication program, authorized under Public Law 480, is described in the chapter on International Activities

The domestic Publication Grant Program supports biomedical publications of a nonprofit nature The Program includes the preparation and publication of critical reviews and monographs in health fields, publications in library and information science and in biomedical communication, pilot or temporary support for periodical publications, studies in the history of medicine, translations of current foreign biomedical monographs, publication of symposia proceedings and secondary literature tools in the health sciences, such as atlases, catalogs, and bibliographies

In authorizing NLM funds for biomedical publication grants, the Congress recognized the continuing growth in quantity and specialization of biomedical knowledge The need persists for tools to analyze, synthesize, repackage, and disseminate information for U S health professionals Expanding knowledge and new concepts of health care require evaluation in both current and historical perspective In developing the publication support program NLM staff has called on U S professional societies, university presses, research investigators, health practitioners, and public and private health support agencies to examine their information needs and resources

During FY 1977, 42 Publication Grants, totaling $738 135, were funded Of these, 26 were new awards, including a comprehensive monograph on endemic goiter and cretinism, the proceedings of a conference on the early diagnosis of compressed air illness, and a history of radiation protection standards Some priority is given to the award of small grants for projects which are underway and scheduled for early publication This priority is reflected in the

average amount of all Publication Grants awarded in FY 1977—under $18,000.

Among the studies published in FY 1977 was the multi-authored *Review of Allied Health Education:2* (Lexington, Kentucky: The University Press of Kentucky, 1977), the second in a series of current appraisals of developments in allied health education and research, ranging from the general topic of education in the health sciences, to specific health care disciplines such as mental health. The Library's continuing interest in the interrelationships between medicine and society was also reflected in an article published with NLM support by a leading U.S. historian, Dr. Gerald N. Grob, entitled, "The Social History of Medicine and Disease in America: Problems and Possibilities." Writing in the *Journal of Social History* (June, 1977), the author points to the serious need for systematic, historical studies of morbidity and mortality patterns and their influence in various societies. (For a complete listing of books, periodicals, and journal articles resulting from NLM Publication Grants, received in FY 1977, see Appendix 2.)

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

	FY 1975		*July 1975-June 1976*		*Transitional Quarter*[1]		*FY 1977*	
Research	(20)*	$1,292	(14)	$1,147	(3)	$ 206	(15)	$1,165
Resource Projects	(47)	1,387	(27)	663	(2)	26	(46)	1,696
Resource Improvement	(28)	82	(10)	26	(4)	11	(20)	77
Training (including Fellowships)	(9)	891	(11)	1,056	(2)	333	(10)	1,207
Special Scientific Projects	(4)	153	(2)	59	(1)	13	(3)	109
Regional Medical Libraries**	(9)	2,194	(8)	2,721	(2)	630	(9)	3,086
Publications**	(36)	614	(40)	606	(4)	62	(42)	738
Other							(4)	276
Total	(153)	$6,613	(112)	$6,278	(18)	$1,281	(149)	$8,354

* Figures in parentheses refer to number of projects.
** Includes contract funding.
[1] July-Sept. 1976

Chapter 8: International Activities

Mary E. Corning, Assistant Director for International Programs

The NLM continues as a national resource with international impact. Its international activities include: bilateral *quid-pro-quo* MEDLARS agreements; exchange of biomedical literature; information services to the developing countries through an NLM/Agency for International Development (AID) agreement; special foreign currency program for the support of publications; participation in international organizations; providing technical consultation; and receiving non-U.S. colleagues for specialized training.

International MEDLARS Agreements

Today, NLM has eleven international MEDLARS partners: Australia, Canada, France, Germany, Iran, Japan, Mexico, South Africa, Sweden, United Kingdom, and the Pan American Health Organization (PAHO). The most recent—Iran, Mexico, South Africa, and PAHO—achieved operational status during the past year.

The *quid-pro-quo* bilateral agreement which is the basis for this collaboration, continues as an effective mechanism for cooperation. Together, these bilateral arrangements constitute essentially an international network in which the value of biomedical information is recognized as vital to the advancement of medical research, education, and the improvement of health.

Table 16 summarizes the modes of access to the NLM data base. In April 1977 the British Library, which had been accessing the NLM computer on-line, mounted the data base in the U.K. for the direct operation of a computerized biomedical information activity. It continues, however, to access the NLM on-line for supplemental use of data bases on the NLM computer. In the same manner, Sweden, in addition to operating the MEDLARS system in Stockholm, is supplementing its usage with on-line access to NLM.

With the advent of on-line operations on the European scene, Sweden, Germany, France, and the United Kingdom are providing extensive on-line services outside of

Frieda Vaghar searches MEDLINE from the terminal in the Pahlavi Library of Medicine, Tehran, Iran

their national boundaries. Table 17 shows the data bases now being searched on an operational basis by our partners. Some who are not currently using the TOXLINE and CHEMLINE data bases intend to use them within the next year.

The World Health Organization, which had been providing MEDLARS services to its staff and to the developing countries, has decided to terminate its MEDLARS activities as of December 1977. This raises a serious issue of availability of resources to provide services to the developing countries.

Preparations are underway for the next meeting of the NLM International MEDLARS Policy Advisory group This body consists of policy officials from NLM and the participating countries Topics to be studied and reviewed will be networking, regional services with special attention to the developing countries, document delivery systems, and data base building.

International Exchanges and Services

The NLM, after reviewing its international publications exchange program, is continuing this activity with institutions in other countries when an equitable exchange balance can be achieved. This program is in addition to NLM's regular acquisitions program and often provides both NLM and the participating country with material not easily obtained otherwise.

The NLM provides interlibrary loans of published and audiovisual materials internationally for a fee. Exceptions are made for countries with which the United States Agency for International Development has a health program. Under an agreement between AID and NLM, the Library has provided during the past year approximately 30,000 interlibrary loans, 22 reference replies, 273 MEDLARS searches, 52 subscriptions to *Index Medicus* and 48 subscriptions to *Abridged Index Medicus* Approximately 20 percent of these were for technical support to PAHO's Regional Library of Medicine in Sao Paulo, Brazil, 39 percent to Turkey, 12 percent to Indonesia and 8 percent to Korea

Special Foreign Currency Program

The types of projects funded in the P L 480 program are similar to those sponsored in the domestic Publication Grant Program —critical reviews and monographs analyzing biomedical research and practice, translations of foreign monographs in the health sciences, studies in the history of medicine, the publication of major international symposia and conference proceedings, and the preparation and publication of authoritative bibliographies, guides, and other literature tools in the biomedical sciences.

During FY 1977, 96 scientific projects were active in seven participating countries. Of these, 18 were new awards Critical reviews and biomedical monographs continued to be the most frequent type of overseas NLM project, constituting 55 percent of the FY 1977 program. Sixty percent of all the projects were undertaken in two countries—Poland and Israel The remaining 40 percent of the studies were carried out in India, Egypt, Tunisia, Yugoslavia, and Pakistan.

Among the new projects activated in FY 1977 were a critical review of lipoprotein metabolism in man, publication of the proceedings of the Fourth International Congress on Trichinellosis, and a clinical, biochemical and genetic review of cystinosis—a congenital, metabolic disturbance.

Several of the Polish studies published under the NLM program in FY 1977 have aroused considerable interest in the U S. scientific community A substantial book on current trends in *Burn Therapy and Research*

by Witold Rudowski, *et al,* has been authoritatively described as an outstanding report, which will be the principal source material on burns for many years to come. S. Baranski and P. Czerski's *Biological Effects of Microwaves* also provides a useful summary and reference for safe exposure levels in effect in various countries, as well as an extensive view of Soviet and Eastern European research in this important field. (For a complete listing of books and journal articles resulting from the NLM P.L. 480 program received in FY 1977, see Appendix 3).

Among some of the more important developments in the Library's international publication program in FY 1977 were the conclusion of special NLM arrangements for the publication of biomedical monographs in Egypt, under the National Science Foundation contract with the Al-Ahram Publishing Company, the largest publisher in the Arab world; a three-year extension, through funding awarded by the U.S.-Israel Binational Science Foundation in Jerusalem, of NLM's collaborative program with the *Israel Journal of Medical Sciences;* and a three-year award to continue the cooperative NLM "Health Research Communications Program" with the Ministry of Health and Social Welfare in Poland.

Regional Resources and Biomedical Information

Dr. Abraam Sonis, formerly medical officer, Pan American Health Organization (PAHO) Latin American Center for Health Care in Argentina, was appointed director of the PAHO Regional Library of Medicine (BIREME) succeeding Dr. Amador Neghme on October 1, 1976. BIREME continues to be a unique model of a regional resource for providing biomedical information services. Increased emphasis is being placed on extending these services effectively throughout South America.

The staff of BIREME has been training librarians from South America and developing a library network within Brazil. BIREME performs approximately 45,000 services every year, including exchange of materials, reference services, interlibrary loans, and more recently computer based information services from the MEDLARS data base. PAHO/BIREME now has an operational MEDLARS activity, using a specialized portion of the total data base to respond to the information needs of its user community.

Dr. Cummings, Director of NLM and Chairman of the Scientific Advisory Committee for BIREME, attended the Ninth Meeting of this Committee in Sao Paulo, Brazil, May 5-7, 1977. The Committee reviewed both policy considerations and the operational status of BIREME.

The Pahlavi Library of Medicine, established in Tehran, Iran, in 1975, has made rapid progress in recruiting a specialized staff and in developing a broad collection of biomedical literature. The World Health Organization (WHO) has designated the Pahlavi Library of Medicine as a WHO Regional Center for providing biomedical information services to the WHO Eastern Mediterranean region beginning in 1978.

Visitors and Specialized Training

World-wide interest in NLM's programs is evidenced by the many international visitors from the health, library, and information-science communities. Over 1000 foreign visitors are received annually. During FY 1977 these individuals represented 49 countries and many specialized interests—medical research and education, health care, government organization and administration of biomedical information, information and library science.

Formal delegations included a medical delegation from Poland, a delegation of engineers, information specialists, and librarians from Japan, scientific and technical information specialists from Bulgaria, health officials from Egypt, representatives from

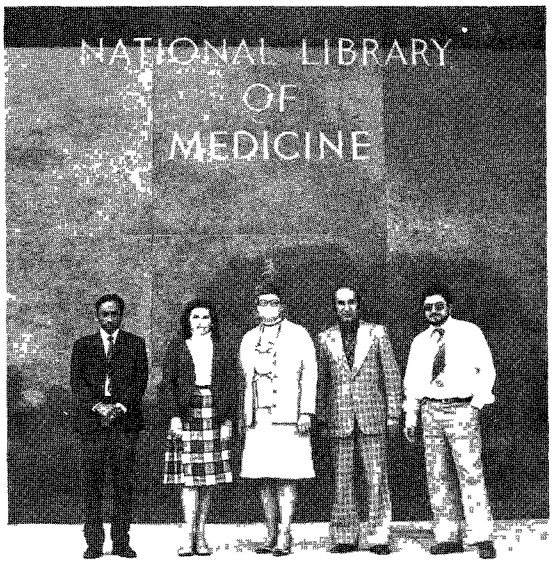
twelve Latin American countries participating in the development of information systems and services, the World Health Organization Regional Advisors on Cancer, Soviet groups under the US/USSR program for cooperation in health, and specialists from the International Atomic Energy Agency and the Food and Agriculture Organization.

Dr. Julian Knox of London was appointed as a Scholar-in-Residence at NLM on July 1, 1977. He will be in residence until May 1978 working on a study in "development of consumer functions in programs and policy making of health systems agencies," which is a joint project of DHEW's National Center for Health Research and the NLM.

Dr. Knox is a member of the Royal Society's Council for Science and Commission on Health Technology Assessment. Until recently he was the ranking staff member of the Community Health Council, Islington, London, and he has published a collection of consumer oriented guides to health services planning and management. In 1972 and 1973 he was in the U.S., with visiting fellowships at Yale School of Medicine and Georgetown University School of Business Studies. He undertook studies of consumer participation in various types of health organizations.

The NLM does not have nor does it fund a formal program for trainees from abroad. It does, however, try to respond to special requests from other governments or institutions where a person's experience qualifies him for specialized training which can be applied upon his return home.

In FY 1977 NLM received for specialized training a number of individuals associated with NLM collaborative programs: Miss Rahadoust and Mrs. Vaghar from the Pahlavi



Miss Corning (center) is shown with four foreign trainees who have been working at NLM From left, they are Shree Nath Agarwal (India), Maria Helena Piegas (Brazil), Amir M Nikbakht (Iran), and Andre Roussel (France)

Library of Medicine in Iran; Mike Hyman from the British Library; Michael J. Phillips from the Institute for Medical Literature, South African Research Council; Mrs. Maria Helena Piegas from the PAHO Regional Library of Medicine in Brazil; and Dr. Cesar Macias from the Centro Nacional de Informacion y Documentacion en Salud in Mexico. In addition, Mr. V. P. Choudhry, Medical Librarian at the National Medical Library in India received specialized training in indexing, Mr. André Roussel of the Bibliotheque Interuniversitaire de Rennes studied interlibrary loan processing, Mr. Shree Nath Agarwal of the Industrial Toxicology Research Centre in Lucknow, India, examined the development and production of information services in toxicology, Mr. A. M. Nikbakht, Director of the Library, School of Dentistry, University of Tehran, Iran, studied library operations with particular emphasis in the field of dentistry, and Mrs. Mawiya Shour, Executive Assistant to the Minister of Health in Syria concentrated on library design and planning.

Table 16 International Access to MEDLARS

Tapes	*Tapes/Software*	*On-Line NLM*
Germany	Sweden	[Sweden]
Japan	United Kingdom	[United Kingdom]
	Australia	France
	PAHO	Canada
		Iran
		Mexico
		South Africa

Table 17 Data Bases Searched by Non-U S Centers

	Medlars	*Toxline*	*Chemline*	*Catline*	*Cancerline*
Australia	●				
Canada	●	●	●	●	●
France	●	●	●	●	●
Germany	●				●
Iran	●				
Japan	●		●		
Mexico	●				
South Africa	●				
Sweden	●	●	●		●
U. K.	●	●	●	●	●
PAHO	●				

Appendix 1. Staff bibliography

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Appendix 4. NMAC audiovisual materials produced

Motion Pictures

"Right Heart Catheterization"

Preschool Screening Series
- "Preschool Articulation Screening"
- "Preschool Vision Screening"
- "Preschool Hearing Screening"

"Introduction to the Denver Development Screening Test (DDST)"

"The DDST—Demonstration and Review"

Videotapes

Head and Neck Anatomy Series
- "The Larynx—Part I"
- "The Larynx—Part II"
- "The Larynx—Part III"

"Making Color Composite Slides with a Rear-Projection System"

"Variable Area Light Control in X-ray Duplication"

"Acute Myocardial Infarction" Series (5)

"The Ionic Basis of the Action Potential"

"Introduction to the Denver Developmental Screening Test (DDST))"

"The DDST—Demonstration and Review"

Leaders in American Medicine Series
- George W. Thorn, M.D.
- Henry G. Schwartz, M.D.
- David Seegal, M.D.
- Russel V. Lee, M.D.
- Franz J. Ingelfinger, M.D.
- Dwight L. Wilbur, M.D.
- Maxwell Findland, M.D.
- Jonathan E. Rhoads, M.D.
- John P. Hubbard, M.D.
- Robert H. Williams, M.D.
- A. McGehee Harvey, M.D.

Making of a Clinician Part 1 and Part 2

"World Within a World—Maximum Containment Lab"

"Demonstration of Isolation Chamber Setup and Use"

Slide Series

"Gross Anatomy" series (13)

"Recognition and Management of the Neonate with Heart Disease" series (4)

"Anesthesia Gas Systems and Machines" series (6)

"Intestinal Function and Diarrhea" series (5)

"An Introduction to Plastic Embedding"

Preschool Screening Series
- "Preschool Articulation Screening"
- "Preschool Vision Screening"
- "Preschool Hearing Screening"

"Three-Stage Developmental Screening"

Human Physiology Series
- "The Heart as a Pump Mechanical Correlates"
- "Mechanical Properties of Muscle"
- "Microcirculation I"
- "Microcirculation II"
- "Introduction to Cardiovascular Physiology"

Health Sciences Consortium
- "Calculating Ambient Gas Tension"
- "Anatomy of Major Arteries to the Lower Extremities"

Dental Consortium—Curriculum Forum II
- "Clinical Signs of Dentinogenesis Imperfecta"
- "Lesions of Epithelial Tissue Origin"
- "Evaluation of the Gingiva in the Periodontal Examination"
- "Clinical Characteristics of the Gingiva and Alveolar Mucosa"

Head and Neck Anatomy Series
- "The Larynx—Part I"
- "The Larynx—Part II"
- "The Larynx—Part III"

"On-Line MEDLARS Searching"

Pediatric Ambulatory Series
"The Nephrotic Syndrome in Children"

Filmstrips

"El Parto Normal Atendido Por La Partera Empirica"

"La Lactancia Materna"

"Captura Y Preparacion De Artropodos Para El Aislamiento de Virus"

"Auga Potable Para La Comunidad Rural"

"Captura Y Preparacion De Especimenes Vertebrados Para Estudios De Arbovirus"

"Filing Medical Records"

Print

Health Sciences Consortium
"Structure of the U S. Health Care System"
"Human Population Genetics"

Dental Consortium—Curriculum Forum II
"The NUVA System for Restoring Fractured Permanent Anterior Teeth"

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