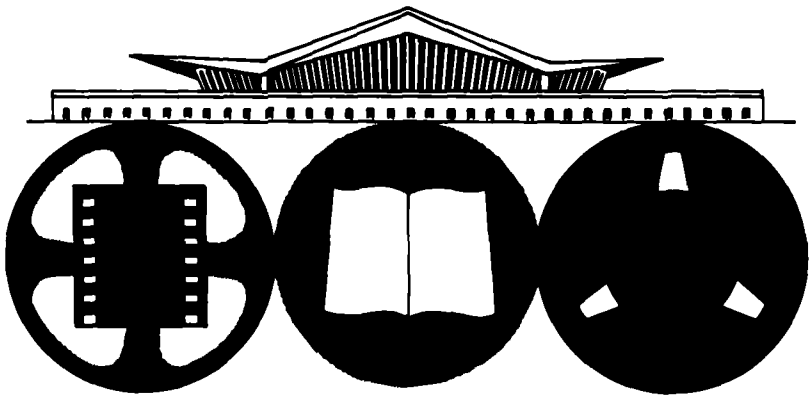
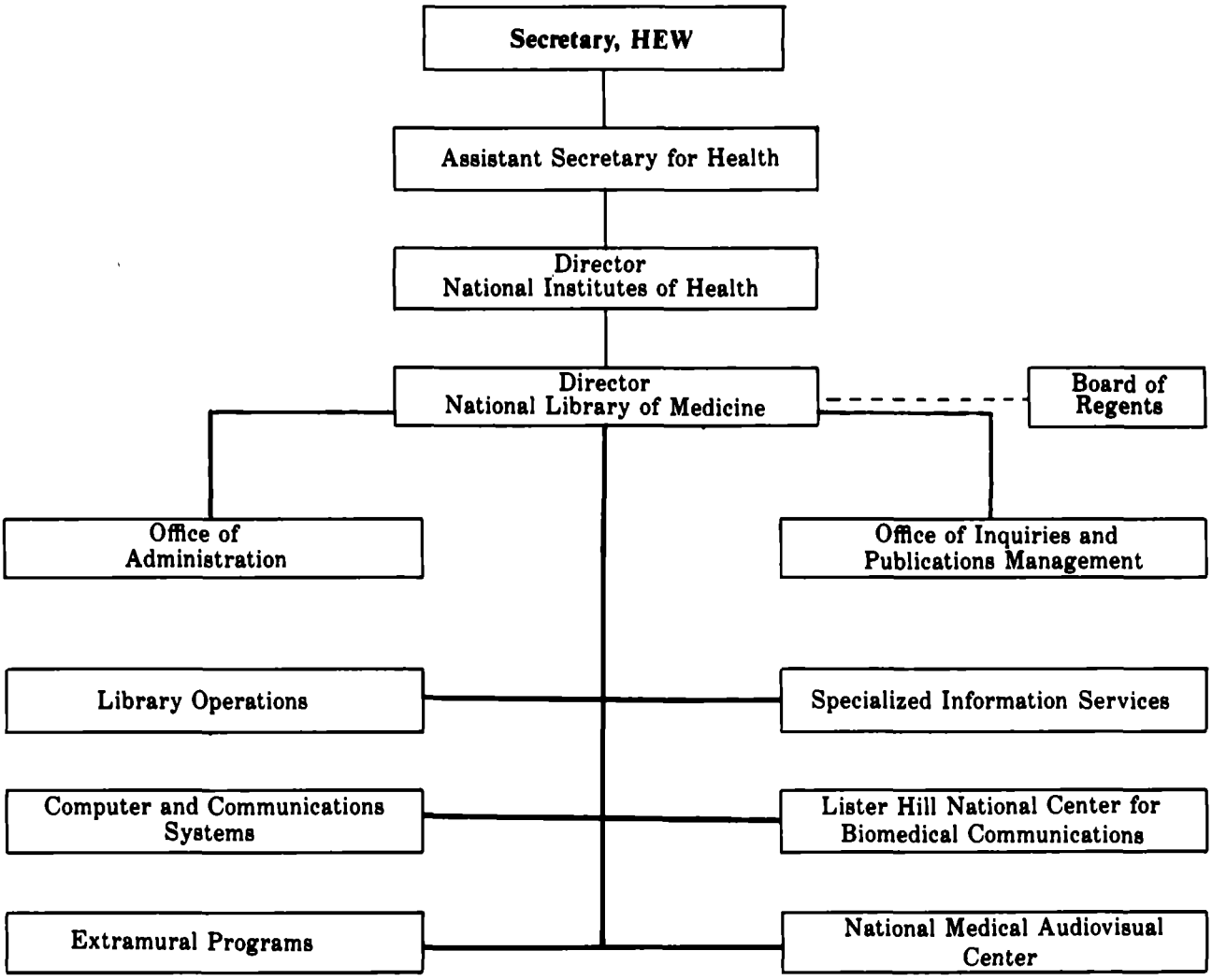
National Library of Medicine

Programs and Services



Fiscal Year 1976

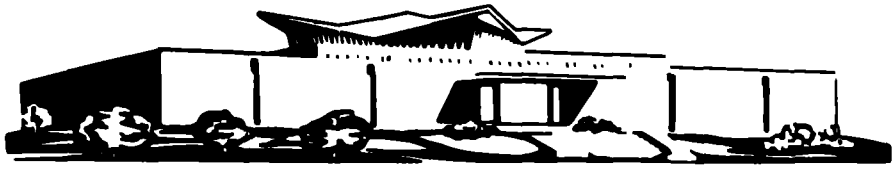
U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
Public Health Service
National Institutes of Health


Secretary, HEW
Assistant Secretary for Health
Director
National Institutes of Health
Director
National Library of Medicine
Board of Regents
Office of
Administration
Office of Inquiries and
Publications Management
Library Operations
Specialized Information Services
Computer and Communications
Systems
Lister Hill National Center for
Biomedical Communications
Extramural Programs
National Medical Audiovisual
Center

ISSN 0093-0393

National Library of Medicine

Programs and Services



Fiscal Year 1976

U.S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE

Public Health Service
National Institutes of Health
Bethesda, Maryland

DHEW Publication No. (NIH) 77-256

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National Library of Medicine.
Programs and services.
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Continues the Library's Annual report.
Report for 1974/75 called Communication in the service of American health; a bicentennial report from the National Library of Medicine.

I. National Library of Medicine. Communication in the service of American health. II. Title III. Title: Communication in the service of American health; a bicentennial report from the National Library of Medicine IV. Series

The Federal Government has changed its fiscal year to begin on October 1 and run through September 30. As a result, Fiscal Year 1976 includes, in addition to the period July 1, 1975 to June 30, 1976, a "transitional" period from July 1 to September 30, 1976. The entire 15-month period is covered in this report.

Preface

The year 1976 had special meaning for all Americans. In addition to its general historical significance it also marked the 20th anniversary of the Act which established the National Library of Medicine. It was the year when we received funding for the construction of the new Lister Hill Center building. The appropriation of $26 million this year has made certain that the specifications carefully drawn up by the staff and the design prepared by the architect will be translated into a modern communications facility.

The construction of the Lister Hill Center building will be an important landmark in the Library's history. Indeed, its significance extends to all those concerned with health sciences communication. For the first time we will have under one roof the combined resources and talents of a wide range of health professionals, information scientists, librarians, computer experts, educators, and specialists in modern audiovisual techniques. The new facility will be splendidly equipped to meet their specialized needs. We are hopeful that even the most intractable communications problems will give way to solution as the result of this concentration of skills and resources.

We are grateful to all those who have made it possible for the Library to be on this threshold of further great accomplishment. With continued strong support from the health professions and the medical library community, I am convinced we shall succeed.

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

Contents

List of Tables

Chapter 1 Policy and Direction

Kent Smith, Assistant Director, Administration

Board of Regents

During the period covered by this report the Regents reviewed the Library's International Programs and recommended approval of changes in the *quid-pro-quo* bilateral MEDLARS arrangements. The Board recommended modifications of the statements of Objectives for the International Programs, adopted in 1966, to one primary objective: "To improve U.S. research, education, and services in health and health-related sciences by the mechanism of international cooperation and collaboration in biomedical communications." The Regents also recommended approval that NLM place in its publications a claim of copyright protection outside the U.S.

At the Board's June meeting, the Regents voted to approve a compendium of the various policies the Board has considered and approved over the years. The 25-page document includes some 15 policy statements touching all major areas of the Library's operation.

Lister Hill Center Building

On August 3, 1968, President Johnson signed a Joint Resolution of Congress (P.L. 90-456) to establish the Lister Hill National Center for Biomedical Communications within the National Library of Medicine. This resolution also called for the construction of a facility to house the Center on the NLM grounds. Construction funds were appropriated in FY 1976 and during this year the Lister Hill Center came several steps closer to becoming a reality. On May 20, 1976, the Montgomery County (Maryland) sewer moratorium waiver was received by NIH, and on July 8, the National Capital Planning Commission approved the plans for construction. The final remaining requirements of the National Environmental Protection Act were satisfied on August 9, 1976.

The schedule for the remaining steps prior to construction includes:

November 1, 1976 - Open advertisement for construction bids
January 16, 1977 - Receipt and opening of bids
February 1, 1977 - Award of construction contract
March 1, 1977 - Notice to proceed with construction

The current schedule calls for construction of the Lister Hill Center building to be completed by November 1979.

Personnel

During FY 1976 the NLM embarked upon a formal program to hire the handicapped. Eight employees were hired on a trial basis and then extended to continuing positions. Deafness has proven to be virtually no handicap for those employed as library technicians, photoduplication aides, and computer personnel.

During FY 1976 the number of people hired under the provisions of the Intergovernmental Personnel Act has increased from 2 to 14. This program provides an excellent interchange that benefits both NLM and the national medical library community.

An NLM orientation program has been developed for new employees. It includes: (a) a slide/tape series on the Library, its history and operation; (b) a Library tour; (c) a Civil Service Commission film entitled "Working for the United States: Benefits You Earn"; (d) an Employee's Handbook; and (e) an oral presentation on work performance, evaluations, training, incentive awards, and merit promotion procedures.

Dr Cummings (left) presents the NLM Director's Honor Award to Albert M Berkowitz

John M. Olive (right) receives Outstanding Supervisor Award from NIH Director Donald S Fredrickson

Awards

Distinguished Achievement Award

Martin M. Cummings, M.D., NLM Director, received a Distinguished Achievement Award from the journal *Modern Medicine* for his leadership of the National Library of Medicine during the period when the computerized information retrieval services were developed.

PHS Superior Service Award

Melvin S. Day, NLM Deputy Director, was awarded the PHS Superior Service Award for leadership and dedication in applying technological advances to improved communication for public health and medical care.

Table 1. Personnel Ceilings

	FY 70	*FY 71*	*FY 72*	*FY 73*	*FY 74*	*FY 75*	*FY 76*
Office of the Director	12	13	12	12	11	9	10
Office of Inquiries and Publications Management	6	6	5	6	5	5	5
Office of Administration	32	34	37	36	36	34	35
Office of Computer and Communications Services	57	58	55	54	51	52	54
Extramural Programs	32	34	31	30	27	22	24
Lister Hill National Center for Biomedical Communications	11	13	15	17	20	22	24
Specialized Information Services	18	17	17	16	17	17	18
National Medical Audiovisual Center	109	104	105	103	100	101	101
Library Operations	198	188	192	192	199	196	201
Total	475	467	469	466	466	458	472

NIH Director's Award

Stanley Jablonski, Chief of the Index Section, Library Operations, received the NIH Director's Award for his outstanding achievement in maintaining a high level of quality of indexing for *Index Medicus*, and for developing authoritative and widely accepted aids to bibliographers and lexicographers in the medical field.

NLM Director's Award

Albert M. Berkowitz, Chief of Reference Services Division, Library Operations, received the NLM Director's Honor Award in recognition of his leadership and administrative skill in serving the diverse needs of the community of users of the Library.

Seventh Annual Regents Award

Myron J. Adams, Jr., M.D., Acting Chief of the Materials Development Branch, National Medical Audiovisual Center, received the Seventh Annual Regents Award in recognition of his originality and creativity in improving the learning process for health professionals.

Outstanding Summer Supervisor

John M. Olive of the Office of Administrative Management Services was honored as "The Outstanding Supervisor" of the entire NIH Summer Program for his dedication and concern for summer youth employees.

Equal Employment Opportunity

The Library's EEO Committee, under the Chairmanship of Alvin Barnes, completed another successful year in which communication between management and employees was improved, opportunities for minorities and women were advanced, and in which a major effort was made to revise the NLM Affirmative Action Plan. The EEO Committee of the National Medical Audiovisual Center remains active under the Chairmanship of Georgia Keener. Sylvia Stewart, Office of Computer and Communications Systems, and Jackie Danneman, NMAC, have effectively represented the Library during the past year on the National Institutes of Health EEO Council.

The NIH Women's Advisory Committee was established by the NIH Director early this year to advise the Federal Women's Program Coordinator on problems and issues that concern the women employees at NIH. Marie Pinho, OCCS, was elected to represent NLM on the Committee, and Alice Ladson, Library Operations, was selected as the alternate.

Financial Resources

The National Library of Medicine's FY 1977 appropriation request for $35,234,000 was enacted into law on September 30, 1976, by Congressional override of the President's veto of the Labor-HEW Appropriation Bill. This appropriation will provide for an increase of approximately $6,000,000 over the amount available to the Library in FY 1976.

The increase is to be used primarily to sustain and improve the effectiveness of the NLM Biomedical Communications Network and to expand the Library's efforts to disseminate research results to practicing physicians.

Security

During the year, NLM contracted with a consultant firm specializing in protection engineering to conduct a fire and life safety survey of the Library. The report was received on September 30, 1976, and contains several specific recommendations that could improve our ability to protect the collection and personnel from losses due to fire. These recommendations have been reviewed and will be implemented as funds become available.

Copyright

On September 30, 1976, Congress capped almost 15 years of legislative effort by clearing for the President's signature the general revisions to the Copyright Law. Since 1961, Congress has been laboring to update this law, which has gone relatively unchanged since its passage in 1909. The revisions were urgently

Table 2. Financial Resources and Allocations
(dollars in thousands)

	July 1975—June 1976	*Transitional Quarter* [1]
Amounts Available for Obligation		
Appropriation, NLM	29,065	6,572
Earned Reimbursements	1,560	272
Total	30,625	6,844
Amounts Obligated by Extramural Programs	6,343	1,315
Amounts Obligated for Direct Operations		
Lister Hill National Center for Biomedical Communications	1,475	872
National Medical Audiovisual Center	3,567	2,031
Office of Computer and Communications Services	4,023	1,172
Library Operations	6,152	1,692
Toxicology Information Program	1,726	214
Review and Approval of Grants	808	178
Program Direction	4,480	1,034
Subtotal, Direct Operations	22,231	7,193
Total Obligations, NLM	28,574	8,508

[1] *July-Sept. 1976*

needed to deal with current copyright issues resulting from photocopying, motion pictures, radio, television, and phonographic recording.

Of primary interest to libraries is the issue of photocopying. The courts have stated their conviction that this question would ultimately be resolved by the revisions to the Copyright Law on which the Congress was working.

The Senate passed its version of the Copyright Bill, S. 22, on February 19, 1976. The House Judiciary Subcommittee held hearings on the House bill for several months, and mark-up sessions extended over a six-month period. The House Committee Report was based on the Senate's S. 22. Both the Senate and House versions contained the controversial Section 108(g)(2) which would prohibit "systematic photocopying" by libraries, a term the Senate failed to define. The Senate Report which accompanied S. 22, however, provided illustrative examples of systematic photocopying by libraries which, while not naming NLM or the Regional Medical Library Network, clearly alluded to their activities.

The House bill in its final form addressed the systematic photocopying issue by stating that, with regard to interlibrary loans, photocopying would not be regarded as an infringement of copyright if it did not substitute for the purchase of a book or subscription to a periodical by the libraries involved.

Differences between the Senate and House versions of this bill were resolved by the Conference Committee on the final day of the 94th Congress, September 30, 1976. (The bill was sent to the President with the full expectation that it would be signed into law.) The Copyright Office of the Library of Congress is expected to write regulations which will implement the provisions of the Act. Most provisions of the Law will become effective on January 1, 1978.

Bicentennial Exhibit

In observance of the Nation's Bicentennial, NLM prepared a year-long lobby exhibit highlighting selected American achievements in medical science and practice over the past two centuries. "Two Hundred Years of American Medicine" featured books, manuscripts, and pictures from the Library's collections, including the original of a letter written by George Washington about the Medical Department of the Army. An illuminated panel displayed portraits of 29 American men and women who have made notable contributions to medicine through the years.

As an adjunct to the exhibit, there was a special display of 32 microscopes from the Billings Collection of the Armed Forces Institute of Pathology. Representative instruments illustrate the evolution of microscopy from the 17th to 20th centuries. Illustrated brochures were prepared for both the lobby exhibit and the display of microscopes.

It is appropriate that we conclude our involvement in the bicentennial year with an account of the NLM's role as a publisher. This account of more recent NLM history concludes the review undertaken by Scott Adams, the earlier chapter having been published in last year's annual report.

MEDLARS and the Library's Role as Publisher

by Scott Adams,
NLM Deputy Director, 1960-1970

The accomplishments of MEDLARS and MEDLINE in introducing and promoting computer-based searches of the biomedical literature have been well covered in the literature. A less well-known but equally important aspect of mechanization is the exploitation of MEDLARS as a system to augment the Library's traditional role as a publisher of medical indexes. The discharge of this responsibility had high priority among the objectives of the three-year development program that led to MEDLARS.

In 1960 the Library wrote specifications for the guidance of contractors' proposals. These defined the following purposes for the proposed system:

1. To improve and enlarge the *Index Medicus;*
2. To make possible publications comparable to *Index Medicus;*
3. To permit citations from other sources to be included in the data base; and
4. To provide for the preparation of special bibliographies, on demand and on a recurring basis.

The concept of using a comprehensive data base to generate more than one published product can be traced to the interrelationship which existed between the *Index Catalogue* and the *Index Medicus* from 1879 to 1927. During this period the Library's indexing records were used first to produce the monthly publication, and then stored for a second use in the *Index Catalogue.* A dual use of index records was at the root of the 1927-1935 cooperative effort with the American Medical Association to produce the *Quarterly Cumulative Index Medicus* as a current bibliography and the *Index Catalogue* as a retrospective bibliography. This practice was reincarnated with the appearance of the *Bibliography of Medical Reviews* (1955), which selected references from the 100,000-article data base then generated annually for the *Current List of Medical Literature* to produce the derivative publication. And, of course, the continuing effort to produce semiannual and an-

nual cumulative indexes throughout the life of the *Current List* and into the first index mechanization project of 1960-63 was in this tradition.

Accordingly, in planning the use of MEDLARS, the Library gave high priority to the production of "comparable publications" derived from the common indexing data base, pointing out that they represented the repackaging of the scientific record in answer to the needs of new interdisciplinary fields.

Recurring Bibliographies

With MEDLARS about to become operational, the Library drafted a statement of policy guiding its uses for consideration by the Board of Regents, meeting on December 13, 1963. In this policy statement the Library declared its intention to enter into active partnership with a number of organizations and institutions which had assumed national responsibility for the advancement of knowledge in a particular field. In these partnerships, the Library would use MEDLARS to produce listings of citations responsive to needs in the field, while the cooperating organization would assist the Library to improve the quality of the product and to disseminate the resulting publication to a national audience.

In proposing the cooperative publication of these specialized indexes, or "recurring bibliographies" as they were named, the Library cited the statutory authority of Section 372(c) of the National Library of Medicine Act, which authorized it to "make available its facilities for research or its bibliographic, reference, or other services, to public and private agencies and organizations, institutions, and individuals ... in appropriate circumstances, under contract arrangements made with a public or other nonprofit agency, organization, or institution."

The Library proposed that the Board of Regents endorse a set of criteria for the selection of the fields and agencies for which recurring bibliographies would be produced by the MEDLARS system under cooperative agreements.

These criteria included:

1. The magnitude of the health problem involved;
2. The dissemination plan and capabilities of the requestor;
3. The adequacy of existing information services in specific subject areas; and
4. The capabilities and national standing of the user organization.

The Board of Regents approved both the program and the criteria, and the Library proceeded to make a series of agreements. A total of fifty such recurring bibliographies was foreseen.

Early among these agreements was one with the American Rheumatism Association which, under grant from the National Institute of Arthritis and Metabolic Diseases, had been planning a periodic index since 1961. The first issue of a monthly *Index of Rheumatology*, resulting from this cooperative enterprise, appeared in January 1965.

Under the sponsorship of the Joint Council Subcommittee on Cerebrovascular Disease of the National Institute of Neurological Diseases and Blindness and the National Heart Institute, the MEDLARS system was used to produce a quarterly recurring bibliography, *Index to Cerebrovascular Literature*, starting in 1964. Following negotiations initiated several years earlier, the first MEDLARS-produced issue of the *Index to Dental Literature*, prepared in cooperation with the American Dental Association, was issued in June 1965.

In these early agreements, the Library stressed the contributions that the cooperating organization might make to improve the coverage and quality of the products. For example, under a Memorandum of Understanding with the American Dental Association, the Association provided two indexers to complement the Library staff, and agreed to index dental journals of its choice to supplement the indexing for the *Index Medicus*.

The early *quid-pro-quo* agreements provided for cooperative activity to strengthen the MeSH subject headings to be used to cover the literature of the specialized field, to augment the Library's indexing staff, and to involve the membership of the cooperating organization in evaluating the published products. The last feature was particularly helpful in acquiring feedback to redesign and improve the recurring bibliographies.

At the present time the Library produces copy for 28 recurring bibliographies on behalf of cooperating organizations.* These are of varying periodicity—monthly, quarterly, and annual—and are distributed by the cooperating organizations. All are printed from camera-ready copy composed by the Library's high-speed photocomposing equipment, and while both the selection of bibliographic elements and their formatting may vary according to the wishes of the cooperating organization, the subject heading apparatus, Medical Subject Headings (MeSH), is common to all.

The design of a recurring bibliography involves the closest of technical cooperation between representatives of the sponsoring organization and experts on the Library staff. First the format, in the sense of the selection and ordering of the bibliographic elements to be included, and the frequency, are to be jointly agreed on. Next, a definition of the subject field must be established using the terminology of the MeSH vocabulary. Customarily, this involves a long series of work sessions for the MEDLARS analysts and the subject experts who represent the sponsoring organization. At these work sessions the search strategy is repeatedly modified and refined until both the experts and the searchers are satisfied with the results.

Sample issues are then duplicated and distributed to a select group of knowledgeable experts for review and criticism. Further modifications are made based on their criticism, and finally a first issue is photocomposed and delivered to the sponsoring organization for printing and distribution.

The entire process of developing the specifications for a recurring bibliography takes at least a year. And, of course, since changes are made in MeSH and in indexing procedures, annual revisions of the search strategy are obligatory.

The recurring bibliography represents one NLM approach to the Selective Dissemination of Information (SDI) service popular in information retrieval systems in other areas of science. The principal difference is, of course, that the products are made for groups of researchers rather than for individuals, and that, being planned for a group utility, they result in publications.

*A full list of the 28 bibliographies is published in each issue of *Index Medicus*.

Abridged Index Medicus

Although not included in the list of the 28 recurring bibliographies, one of the Library's serial publications—*Abridged Index Medicus*—has many features in common with them. Its origins may be of interest.

The Library's long history of cooperation with the American Medical Association, dating to 1917, has been described earlier.* With the advent of the new *Index Medicus* (1960), the AMA had assumed responsibility for publishing its annual version, *Cumulated Index Medicus*. When, in 1968, the AMA decided to withdraw its support for the publication of the *Cumulated Index Medicus*, the Library agreed to assume this responsibility and asked the AMA if it were interested in publishing an abridgment of the *Index Medicus* intended to serve the needs of individual medical practitioners. The proposed abridgment would be limited arbitrarily to 100 English language journals selected by an advisory committee of physicians, medical editors, and medical librarians, with the special purpose of covering fields of clinical medicine for the general practitioner. After consideration, however, the AMA declined the Library's offer.

The National Library of Medicine then queried the Medical Library Association and the American Hospital Association about their interest in sponsoring an *Abridged Index Medicus*. Since neither organization was interested, the Library undertook its publication as of January 1970.

The *Abridged Index Medicus* had the following feature in common with the specialized recurring bibliographies: it was intended as a search tool for individuals . In the case of the recurring bibliographies, the individuals were members of societies or organizations sponsoring research and development in specialized fields. In the case of the *Abridged Index Medicus*, the general practitioner was the intended audience.

*The Library's Bicentennial Report, *Communication in the Service of American Health*, Chapter II.

Literature Searches

MEDLARS was also used to produce published "Literature Searches." These consisted of edited versions of demand searches, photocomposed and distributed on request.

In common with other medical libraries, the Library in pre-MEDLARS days had responded, when able, to requests for specialized bibliographies. In some instances the bibliographies had been mimeographed, announced, and distributed by the Library's Reference Services Division. With the coming of MEDLARS, it soon became apparent that demand searches on certain subjects were of potential interest to a much wider audience than to just the individuals who had requested them. It was possible, therefore, to get added value from the work performed by duplicating the search and advertising its availability.

Accordingly, starting in 1965, the Library undertook a program to reproduce and distribute copies of bibliographies prepared by MEDLARS. For the first five years, these Literature Searches were prepared and distributed by the Bibliographic Services Division, which was responsible for MEDLARS search operations. Beginning in 1970, however, distribution has been the responsibility of the Reference Services Division. The publication record is as follows:

Table 3. Published Literature Searches

1965 — 30	1971 — 25
1966 — 18	1972 — 37
1967 — 21	1973 — 36
1968 — 39	1974 — 22
1969 — 11	1975 — 30
1970 — 50	1976 — 37
	Total: 356

Data on the number of copies of the 356 Literature Searches distributed are lacking. However, certain titles have become best sellers over the years. These include Literature Searches on *Health Care for the Poor, Acupuncture, Medical Care in Developing Countries, Audiovisual Aids in Medicine,* and *Toxicology of Cannabis.**

*A list of the Literature Searches available is published in each issue of *Index Medicus.*

Unrealized Potentials

In the preoperative phase of MEDLARS, other types of specialized products were proposed that have yet to be realized. These include a scheme for supplying the annual indexes to the publishers of the individual journals included in the system, and the production of national medical indexes. For example, the Danish Medical Association had published an *Index Medicus Danicus.* It was proposed that the Danes index that part of their national literature not covered by MEDLARS, in accordance with MEDLARS standards, and that in exchange for this contribution to an enlarged indexing base, the Library provide merged tapes that could be used to publish an *Index Medicus Danicus.*

While either scheme is well within the limits of technical feasibility, neither achieved priority in competition with the other claims on systems time and staff attention.

Bibliography of Medical Reviews

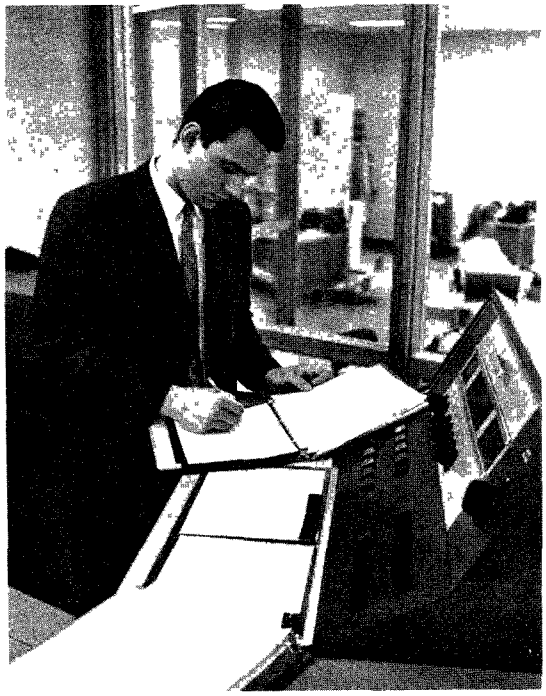
With the coming of MEDLARS, the annual *Bibliography of Medical Reviews* began to be photocomposed for the first time with Volume 10, 1965. Volume 12 was the last annual volume to be published, although *Cumulated Index Medicus* continued to include a separate review section. In January 1968, the *Monthly Bibliography of Medical Reviews* began as a separate serial, continuing also as a section within *Index Medicus.* Casebound multi-year cumulations covering 1966-1970 and 1971-1975 have also been published.

Photocomposition

According to tradition in the Government Printing Office, the composition of the successive volumes of the *Index Catalogue* constituted the most formidable and taxing job assigned by any Federal Executive agency. Indeed, the proofreading of these volumes was a horrendous burden on the editors and their staffs. Typographic volume and the burden it entailed were old acquaintances to the Library's staff.

When the Index Mechanization Project was undertaken, this acquaintance was renewed. The million-plus IBM cards generated annually for the *Index Medicus* from 1960 to 1963 necessitated much systems calculation. There was the need to sort by machine the author and subject files, to provide for stepwise month-by-month cumulation of both, and above all the need to calculate the time to run the monthly and the annual cumulations through the step-and-repeat camera used for this early form of photocomposition. It may be noted, however, that even in this prototype system, the Library achieved one major printing breakthrough. Composition subject to verification occurred only at the initial key punching; the enormous labor of visual proofreading had been bypassed.

A first consideration in quantifying the requirements of the new computer-based system was an ability to compose massive volumes of bibliographic text so that the 200,000 citations specified might be set into type not only for the monthly issues of the *Index Medicus,* and the *Cumulated Index Medicus,* but also the recurring bibliographies and the other specialized bibliographic products envisaged. This obviously required an ability to create, store, and recall a bibliographic record complete with relevant typographic instructions in a computer file. And this meant extending the state of the art in computer-based photocomposition beyond the limits of the "off-the-shelf" hardware of 1960.



Donald Dodson operates the prototype GRACE (Photon 900) in this 1967 photograph

At the time there were several competitive high-speed devices on the drawing board, and a more limited number of slow-speed devices in operation. The Library's requirements dictated a magnetic-tape-driven high-speed device. The MEDLARS prime contractor, the General Electric Company, together with the Library, reviewed the field and entered into a subcontract with Photon, Inc. to develop a drawing-board model, the Photon 900, which had a theoretical capability of composing at a rate of 300 characters per second.

The Library's humanistic tradition not only included an appreciation of the typographic quality of medical incunabula, but a grounding in the physiology of reading and a compassion for fellow sufferers exposed to an extended dose of solid-capital letter computer print-out. With a view to creating an acceptable enduring printed product in the tradition of the *Index Catalogue* and the *Index Medicus,* the Library stipulated that the product of the photocomposing device be of high typographic quality. The device was given the code name GRAC (for Graphic Arts Composer), later changed to the more felicitous GRACE (Graphic Arts Composing Equipment).

As senior advisors to the Library observed during the period, development is a risky business. By mid-1963, it became evident that the project was in trouble. Microsecond timing variations and positioning created wavy lines and irregularly spaced lettering. It took heroic efforts on the part of the incoming director and outside engineers to bring GRACE to a productive reality. The first issue of the *Index Medicus* to be produced by GRACE was scheduled for January 1, 1964.

Slippage in the development forced the Library to seek an alternative. Through the cooperation of Dr. Mortimer Taube of Documentation Incorporated, a line printer was made available; a crash reprogramming effort

enabled the January through July 1964 issues to be produced on schedule. Finally, the efforts to perfect GRACE succeeded and the first product to employ the highspeed Photon 900 photocomposer was the August 1964 issue of the *Index Medicus*.

GRACE composed at a rate of 300 characters per second, five times faster than any previous system. It used three fonts of type in 6, 10, and 14 point sizes in both upper and lower case, a total of 226 characters. It was estimated to have the typesetting power of 55 linotype operators.

The August 1964 issue of the *Index Medicus* contained 13,733 citations, totaling an estimated 9,000,000 characters or 1,800,000 five-letter words. It took 18 hours of computer time to compose it.

GRACE served the Library well from August 1964 until March 1969, when it was replaced by a production model Photon 901 and the prototype GRACE was donated to the Smithsonian Institution. During this period GRACE composed successfully an estimated 165,000 pages of bibliographic copy for the *Index Medicus*, *Cumulated Index Medicus*, recurring bibliographies, and Literature Searches. Together with its Photon 901 successor, the Library's photocomposing devices have composed (exclusive of catalog cards and annual cumulations to the recurring bibliographies) over 500,000 pages of copy from August 1964 to December 1975. In addition, an estimated 200,000 catalog cards were photocomposed.

The Library's century-old tradition of producing bibliographic publications for the health professions has been continued and augmented with the coming of MEDLARS and GRACE. Computer and photocomposing technologies, and the systems know-how to apply them productively to a massive publishing enterprise, have enabled the Library to meet both the challenge of growth in the literature and the bibliographic needs of a highly complex community.

As the *Index Medicus* approaches its one-hundredth birthday, it may be of interest to read again the expectations that Billings and Fletcher, its editors, and its original publisher, F. Leypoldt of New York, had for the projected publication:

> In its pages the practitioner will find the titles of parallels for his anomalous cases, accounts of new remedies, and the latest methods in therapeutics. The teacher will observe what is being written or taught by the masters of his art in all countries. The author will be enabled to add the latest views and cases to his forthcoming work, or to discover where he has been anticipated by other writers. And the publishers of medical books and periodicals must necessarily profit by the publicity given their productions.

However much more the Library's index publications may have accomplished through the years, or may be accomplishing today, there can be no doubt that for the first century of their existence these utilitarian objectives have served American and world medicine faithfully and well.

Table 4. Growth of Cumulated Index Medicus, 1960-1976

	Articles*	Pages
1960**	125,000	3,786
1961	140,000	4,318
1962	146,000	4,854
1963	130,000	4,824
1964	145,000	5,696
1965	171,000	6,327
1966	165,000	5,768
1967***	165,000	7,229
1968	207,000	8,925
1969	224,000	10,269
1970	210,000	9,054
1971	206,000	9,010
1972	221,000	9,866
1973	208,000	9,151
1974	220,000	9,723
1975	225,000	10,710
1976	267,000	12,439

* Since this total is administratively controlled, no effort should be made to equate it with the growth of the literature.

** Published by the American Medical Association, 1960-1964.

*** Beginning in 1967 includes the cumulated *Bibliography of Medical Reviews*.

Chapter 2 Library Services and Operations

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

Library Operations has continued to concentrate on expanding and strengthening technical services in order to provide a sound basis for improved and increased library services to the health sciences community.

A distributed processing system designed to provide data input and file maintenance capabilities at individual terminals connected to a minicomputer will provide the potential to reduce manual processing, particularly cataloging, by as much as 85%.

The steadily increasing flow of materials into the Library makes necessary an expansion of shelving capacity of the general collection. Installation of compact shelving on the lowest level of the stack area has added over 5,000 feet of shelf space to alleviate an immediate crisis.

A major move to re-establish a high level of integrity in the Library's general collection involved a complete inventory of all monographs and a shelf reading of the older periodical collection. Attendant measures to increase security for the collection by restricting stack access to authorized staff and a new charging system will assure continued close control. The document collection, although not included in the inventory, is undergoing a thorough review, including a study of content, scope, and services.

The Staff Library, a project of the NLM Library Associates, was moved to newly decorated and permanent quarters. This collection emphasizes publications in library and information science as well as supporting disciplines like administration and education.

Training activities in Library Operations also had a high priority. There was special emphasis in three areas: interdivisional training, on-line training, and work experience under the Intergovernmental Personnel Act (IPA). Through IPA, the Library concluded agreements with a dozen academic institutions, affording qualified librarians and information specialists an opportunity for work and study at NLM.

NLM Library Associates for 1976-1977, left to right Lou Snyder, Judith Bube, Patricia Bosma, Rebecca Davidson

An emphasis on interdivisional training has been particularly valuable in developing broader skills for technical and professional staff. Another benefit has been an increased opportunity for promoting employees and for their transfer to more challenging positions.

Major changes and developments were implemented in the On-Line Services Training Program in three areas: improved curriculum design, initiation of training in the field, and effective criteria for trainee enrollment.

The expansion of the on-line user network necessitated not only an increase in training, but greatly accelerated activities in the MEDLARS Management Section to cope with growing service demands.

BIBLIOGRAPHIC AND VOCABULARY (MeSH) SERVICES

The Bibliographic Services Division continued to perform its mission as the publisher of *Index Medicus* and other NLM publications, and as the coordinator of the Library's computerized on-line retrieval network. Much of this service-oriented Division's resources were devoted to improving internal operating procedures. Despite the time and energy expended to these ends, the processing improvements still enabled the staff to meet or exceed productivity goals in all areas.

During FY 1976, the Division began to exploit some of the new capabilities offered by the MEDLARS II system. Prominent among these is the ability to cite monographic literature in *Index Medicus*. More than 5,300 individual contributions from 186 such works, including published proceedings of selected congresses and symposia, were indexed and input by the end of the fiscal year. The first of these was cited in the May 1976 issue of *Index Medicus*.

Another improvement provides the capability for computerized on-line editing and error correction. This improved method for quality control of indexed materials has speeded up the flow of indexing into the computer system, and has made for much easier and faster correction of data base errors.

A record high of 255,031 journal articles was indexed during the year (Table 5). Of these, 103,249 articles included English language author abstracts which were added to the MEDLARS data base.

Network Services

The MEDLARS Management Section is responsible for the day-to-day operation of the network service functions. The network of libraries accessing the NLM's on-line data bases continued to grow, and by year-end numbered 500. As can be seen from table 6, the MEDLINE data base was the most frequently searched file. Approximately 200,000 off-line printouts, resulting from on-line searches of all

Reference librarian Howertine Farrell-Duncan operates one of the on-line terminals in the Reading Room.

files, were processed and mailed to users (Table 7). The capability of storing search formulations in the computer's memory for subsequent, recurrent processing was expanded, and by September 30 more than one-third of all participating libraries were utilizing this new feature of the MEDLARS II system. By year-end, this option was being extended to all network users. The Section handled 2,249 inquiries from users on such topics as search strategies, system use and performance, and communications problems.

The publication efforts of the Division resulted in a major updating of the *On-Line Services Reference Manual*, several sections of the second edition of the comprehensive *Indexing Manual*, and numerous shorter technical publications relating to special topics in indexing and retrieval. The *Network/MEDLARS Technical Bulletin*, in its seventh year of publication, was produced each month and distributed to all libraries participating in the network.

One hundred and eighty-four issues of the 28 Recurring Bibliographies were published during the 15-month fiscal year, as well as 58 new Literature Searches.

Training

The staff of the Bibliographic Services Division continued to lead or participate in in-service workshops for the continuing education of medical librarians in the Regional Medical Library Network. Classes were conducted for new indexers who will index for MEDLARS under contract to the NLM, as well as for those who joined the indexing staff during the year.

Because of wide differences in the background of training applicants, and because of the varying information needs of the MEDLINE Centers served by these analysts, NLM has begun a "modularized" training program. In addition to the regular three-week On-Line Services class, two new one-week courses were introduced. The first, an introductory MEDLINE training course, was designed for institutions anticipating only limited use of NLM's on-line services, or for trainees who would receive further on-the-job supervision by fully qualified analysts after the introductory course. The second, an advanced MEDLINE training course, was offered for candidates who had acquired significant MEDLINE search experience on the job and who required training to review and consolidate the basic principles.

The development of one-week courses has made it possible to decentralize the training. In cooperation with the Regional Medical Libraries, NLM began in FY 1976 to conduct classes in locations outside of Washington. The Library is also developing a small cadre of qualified teachers from the Regional Libraries to participate in this field training program. Enrollment in the various training programs reached an all-time high in FY 1976 of 160 students in 15 classes.

Vocabulary and Medical Subject Headings (MeSH) Activities

The 15-month fiscal year saw the publication of two annual issues of *Annotated MeSH*, 1976 and 1977. These incorporate extensive changes in the nomenclature of bacteriology and infectious disease. Terminology in the field of preventive medicine and public health was reorganized. As in other recent years, numerous significant drug and chemical terms were added. Headings were added or modified in response to user needs and indexer-identified trends in the literature. Thus all subject areas covered by MeSH were affected.

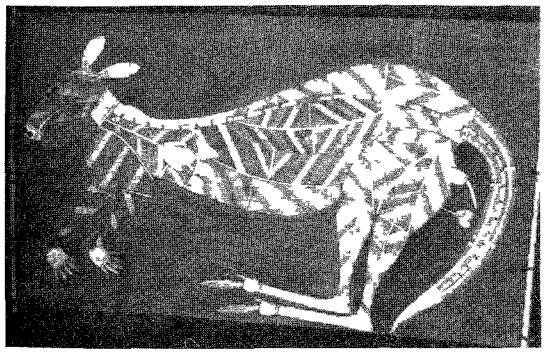
At the end of the period, work was underway to expand the vocabulary of bioethics and health care, including health care financing, health care organization, and health care manpower. This effort is expected to result in the addition of further minor descriptors to the 1977 MeSH and major descriptors to the 1978 MeSH.

The period was marked by closer communication and coordination of MeSH Section activities with those of the Index Section and the Office of Computer and Communications Systems (OCCS). In the case of the Index Section, this resulted in the receipt of many more useful MeSH suggestions, and in smoother handling of the preparation of annotations for the 1977 MeSH. OCCS has improved the programs

for updating the MeSH, and most of the earlier confusion concerning the MEDLARS II MeSH data base was eliminated. Consequently, it was possible to clean up the MeSH file, removing some of the errors that had been carried over from the MEDLARS I file or introduced during the transition to MEDLARS II.

HISTORY OF MEDICINE

During the 15-month period covered by this report, the major single accomplishment of the History of Medicine Division (HMD) was the conversion of the annual *Bibliography of the History of Medicine* from a manual to a computerized publication, made possible by the development of MEDLARS II. In general, other activities continued as in recent years (Table 8). Added to the historical collection were some 1,100 books, serial volumes, and theses; approximately 90,000 manuscript items; and over 900 prints and photographs. About 4,400 titles were cataloged and nearly 45,000 manuscripts processed. Nearly 7,000 volumes were served to readers and another 2,700 made available through interlibrary loan or photocopy. Approximately 2,500 prints, slides, or other photographic copies of pictorial material were provided to requesters.



Dr Cummings brought back from Australia several examples of aboriginal bark painting for the History of Medicine picture collection The "x-ray" style shows spine and internal organs.

Acquisitions

During the past 15 months, the History of Medicine Division has continued to acquire a wide range of printed, manuscript, and pictorial materials intended to enlarge the Library's resources for research in the history of medicine.

Within the area of rare-book acquisition, the Library added two incunabula during the period under review. The first was *De salute corporis* by the 13th century author Guglielmo da Saliceto, printed in Antwerp by Govaert Bac in 1495 (Klebs 484.2). Although Saliceto is better known for his work on surgery, this work was printed five times in the 15th century. All editions are rare, and three out of the five, including this one, are not listed in Goff's *Census* of incunabula in the United States. The second incunabulum acquired was the *Liber pandectarum medicinae* of Matteo Silvatico, printed in Venice in 1498 (Goff S-517). This popular digest of medicine, prepared in the 14th century, was printed ten times between 1474 and 1499. NLM now holds six of these incunable editions, as well as others printed later.

NLM has long held a substantial body of older materials, many of them "popular," written in the vernacular as well as in Latin. Such works often reveal more of the character of treatment actually received by much of the population in centuries past than do the noteworthy contributions to medical advance. Two early and particularly rare editions of vernacular works added to the collection were the first edition of *Le tresor des povres* attributed to Arnaldus de Villanova, printed in Caen in 1507 for Jean and Richard Mace, and the frequently printed *Treasure of Poore Men* (London, Rychard Lant, 1547). Both are collections of recipes, not otherwise related to each other despite the similarities of title. The first is not listed in the National Union Catalog; the second is not in Pollard and Redgrave's *Short-Title Catalogue* (first edition).

In recent years, HMD has been placing increasing emphasis on the preservation of modern manuscripts for the future use of historical scholars. Among the important collections acquired this year were the personal papers of Dr. John B. Youmans, former Dean and Professor of Medicine at the University of Illinois College of Medicine (1946-1950) and Vanderbilt University School of Medicine (1950-1958). Dr. Youmans is best known for his work in clinical nutrition, but he was also active in the Associa-

tion of American Medical Colleges and the AMA. Another valuable collection was that of George M. Kober (1850-1931) of Washington, D.C. After serving on the frontier as contract surgeon, Dr. Kober settled in Washington where he took an active interest in public health programs. He was a strong supporter of the Surgeon General's Library; among his correspondents were Billings, Osler, Welch, and Sternberg.

Other important collections acquired were the papers of Louis I. Dublin (1882-1969), the noted statistician of the Metropolitan Life Insurance Company, and those of Dr. Thomas B. Marquis (1869-1935) which relate primarily to the practice of medicine on the western frontier.

Publications and Cataloging

During 1976, one annual issue (Number 9) of the *Bibliography of the History of Medicine* was published, citing and indexing works printed in 1973, and preparations were completed for publication of Number 10, the five-year cumulative volume for 1970-1974.

These two volumes continue a series begun in 1964, and in outward form they differ little from their predecessors. The event of their appearance, however, is noteworthy. Number 9 was the last of the series to have been prepared manually, a process that involved laborious hand-sorting and arrangement of subject matter and equally cumbersome, time-consuming conventional typesetting. Number 10, by contrast, is the first to be published mainly by computer.

HMD anticipates a number of benefits from this conversion to computerized methods. Not least of these will be a considerable reduction in the Bibliography's publication costs. Equally important will be the saving of as much as a year in the time required for the publication to reach its readers. Finally, the establishment of this discrete data base (HISTLINE), though primarily aimed to assist publication, will also broaden access to the NLM collections.

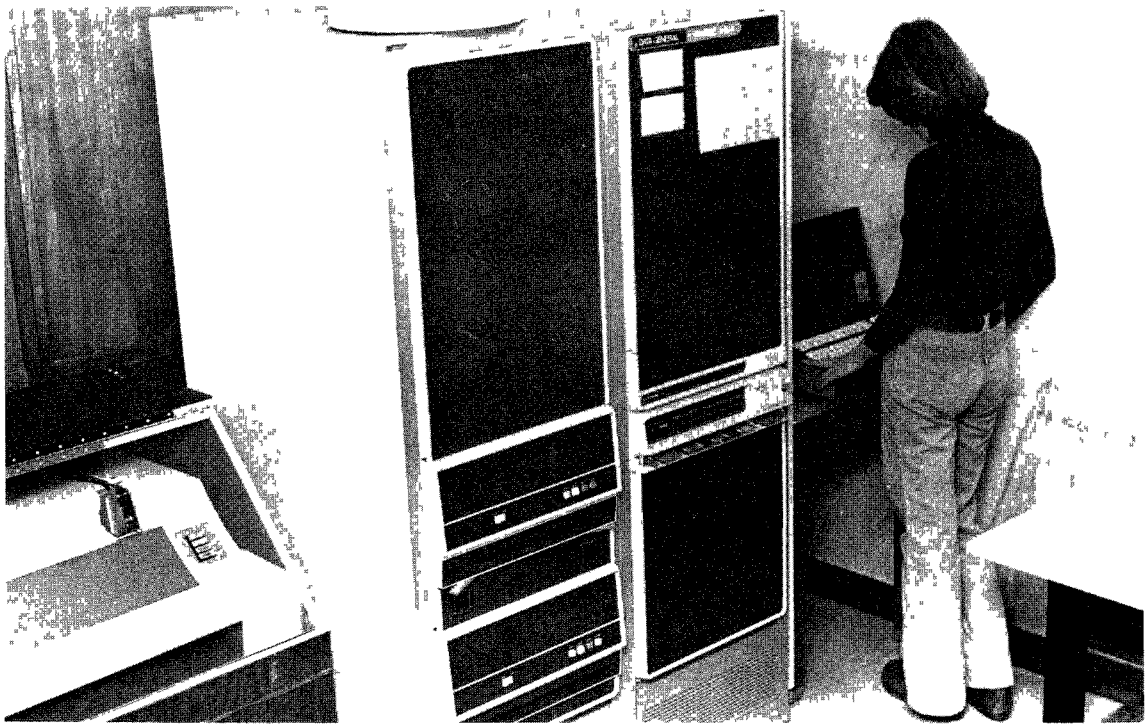
Continued progress was also made in the provision of more adequate guides to the use of the collection through the cataloging of early books. Initial cataloging of 17th century imprints in the collection, the first step in preparing a printed catalog, is nearing completion and substantial progress was made in preparing a short-title catalog of 18th century printed books in the Library.

Members of the staff have also contributed to the advancement of studies in the history of medicine through active participation in and cooperation with related professional organizations and through the publication of papers reporting the results of their research. In addition, the Division prepared a special year-long exhibit for the lobby of the Library in honor of the nation's Bicentennial. Two members of the staff participated in the special Colloquium on the Bicentennial of Medicine in the U.S., held in May, 1976: Dr. Peter D. Olch presented the formal commentary on the paper on pathology and Dr. John B. Blake provided a general historical overview.

TECHNICAL SERVICES

Through publications and on-line data bases, the Technical Services Division (TSD) supports such activities as acquisitions, cataloging, reference, and interlibrary lending both at NLM and in other libraries. During FY 1976 the Technical Services Division began to develop several new programs to improve its internal operations and its services to the Library and to the biomedical community. During this year of development and change, the Division's workloads and production remained consistent in some areas with those for Fiscal Years 1974 and 1975 and showed increases in others. Services provided for the NLM and network libraries were continued without interruption and in some cases improved.

A number of new programs were initiated during FY 1976 in the Technical Services Division. A distributed (decentralized) processing system is being developed and implemented in cooperation with NLM's Lister Hill Center and the Office of Computer and Communications Systems. This system provides for data input and file maintenance at individual terminals connected to a front-end processor (minicomputer). The system eventually will automate cataloging processes (reducing manual catalog-



Linda Baum enters data into the new minicomputer, part of TSD's distributed processing system now under development

ing by as much as 85%), transfer machine readable data from the minicomputer to NLM's on-line data bases, and provide better management control of cataloging. The first phase, the acquisitions module of the system, based on the On-Line In-Process (INPROC) files, is scheduled for October 1976. Phase II, which includes the cataloging module, card production programs, and new capabilities for the system's interface with other machine readable data bases (MARC, OCLC), is in the planning stage.

The Division, through the development of an On-Line In-Process file in FY 1974, has achieved control of bibliographic records until cataloging is completed. During the past year, a backlog of almost 6,000 low priority cataloging items was listed in abbreviated form and entered into INPROC. At present, the INPROC data base provides on-line access to approximately 40,000 records.

The Technical Services Division has continued to expand CATLINE, the on-line catalog for serials and monographs that provides support for acquisitions, cataloging, reference, and interlibrary loan activities throughout the health science library community. CATLINE contains approximately 150,000 citations and is updated weekly. Concurrent with the conversion to MEDLARS II in 1975, an On-Line Name Authority File containing some 75,000 entries was generated, which automatically validates cataloging data before they are put into CATLINE. The Name Authority File may be consulted by all U.S MEDLINE Centers that use NLM cataloging data.

Since many libraries in academic institutions that use Library of Congress cataloging data in MARC format also want to use NLM cataloging data, a machine conversion program was developed that will convert NLM cataloging data (in the MEDLARS format) to the MARC format.

Another service to the health sciences library community is the Cataloging in Publication (CIP) program, begun in 1974 in cooperation with the Library of Congress and U.S. publishers. During FY 1976, NLM provided cataloging data for approximately 2,000 new titles. The Library recently made arrangements with S. Karger, publisher, in Basel, Switzerland, to include foreign titles in the CIP program on an experimental basis. NLM continues

to participate in two other cooperative programs: the National Serials Data Program and the Council on Library Resources' CONSER (Conversion of Serial Records Project).

The *NLM Classification* is being revised and expanded to encompass changes which have occurred in the schedules as a result of developments in the health and related sciences. The revised edition will feature a detailed index to increase its usefulness.

An experiment to have dealers provide serial check-in services for approximately 1,400 foreign journal titles indexed in *Index Medicus* was begun in 1974. The experiment was expanded this past fiscal year to include an additional 500 non-*Index Medicus* titles from western and eastern Europe, Russia, and the Middle East. The program will be further expanded in 1977 to include U.S. titles checked in by selected U.S. dealers.

A master serial system was implemented during FY 1976, replacing a large number of redundant manual and machine files and providing automated control over NLM's serial processing operations. This system includes a bibliographic file (of which SERLINE is a subset); a GAP file that lists missing issues and is used to generate back issue orders; a subscription file that generates new orders and controls all subscriptions; a MEDLARS file that contains indexing authority information and of which the Journal Authority File is a subset and, finally, an ARCHIVE file that will be used to control procedures and information for serial binding at NLM. All subsets of the system have been constructed.

The master serial system now contains data for approximately 20,000 serials. Immediate plans for the system include the processing of dealer invoices on computer tape against the subscription file and the addition of micropreservation information to the ARCHIVE module.

AVLINE, the on-line data base listing reviewed nonprint media, became operational during this reporting period. At present, AVLINE contains bibliographic data for approximately 2,200 items. Beginning in January 1977, the development and bibliographic and operational control of AVLINE will be located at NLM in Bethesda as a function of the Technical Services Division. Processing and control will be improved by a redesigned Audiovisual In-Process file (AVPROC) and a new acquisition procedure for nonprint material. In addition, a new pre-evaluation system and a cooperative acquisition and cataloging program with selected academic institutions will be implemented.

REFERENCE AND DOCUMENT DELIVERY SERVICES

The year was marked by another increase in service demands by the Library's public, with on-site requests and requests for interlibrary loans both up sharply. In FY 1976 there was a concentration of effort on care and security of the collection, including: an inventory of the monograph collection; the installation of compact shelving to provide additional space for journals; limiting personal on-site access to the collection; and continuing the conversion of deteriorating material onto microfilm. Expanding the audiovisual area in the Reading Room by constructing six new carrels, installing modern hardware, and acquiring additional media are intended to improve access to the most modern nonprint learning resources available. Interdivisional cooperation by librarians and skilled library technicians who helped in bibliographic searching resulted in more efficient and rapid fulfillment of interlibrary loan requests.

For the first time since the National Library of Medicine moved to its present location in 1962, a complete inventory of the Library's monograph collection was undertaken. In addition, bibliographic data were collected on older journal materials, which had never been cataloged, for future use in making them available to the Library's clientele.

Measures have been taken to increase the security of the collection. Access doors to the stack areas were locked and alarms installed, a revised system of charging materials to NLM staff members implemented, and direct access to the stacks limited to those working there.

To increase the shelving capacity of the general collection, 30 ten-section ranges of

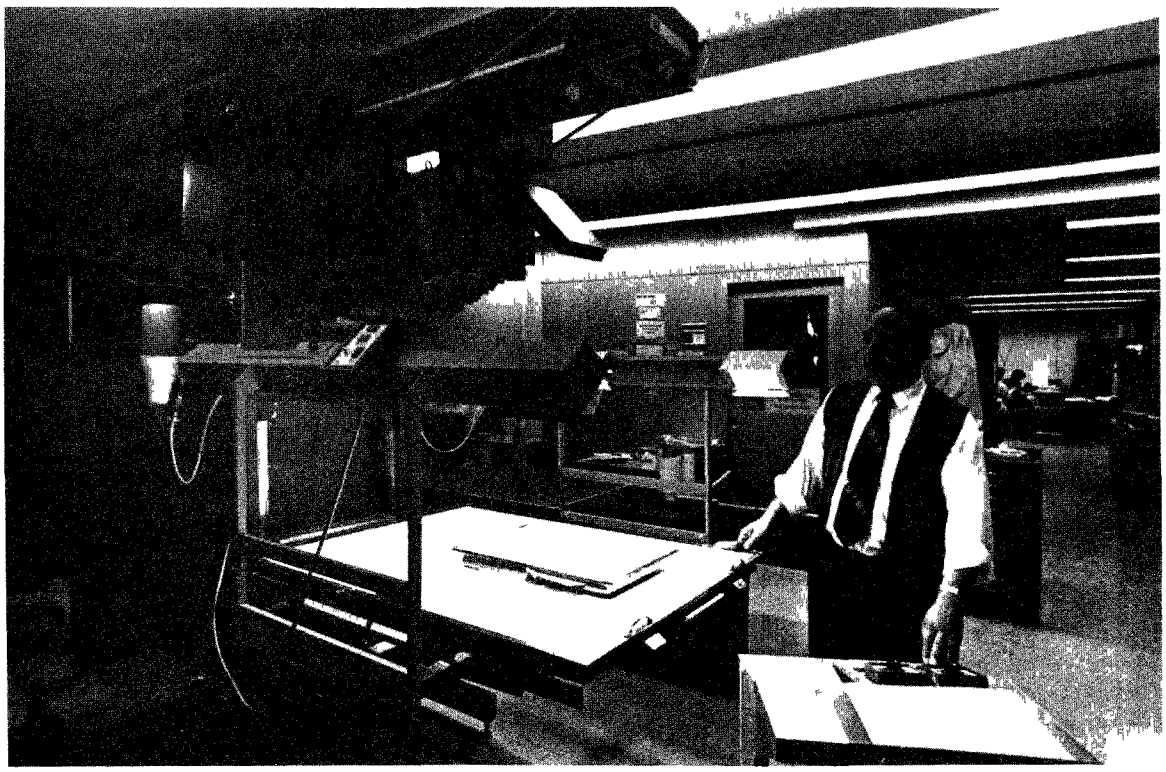
Fred Buschmeyer, RSD, checks out equipment in one of the new audiovisual carrels in the Reading Room

electrically controlled compact shelving were installed. This installation has added over 5,000 feet of shelf space. Plans are being developed for broadening the acquisitions program and for expanding reference and loan services from the Library's collection of government document serials. The facilities for using nonprint media have been considerably improved by the addition of six new audiovisual carrels in the Library's Reading Room fully equipped with slide/tape and videotape hardware and software. A new 14-page brochure provides Reading Room patrons with information regarding the services and facilities available at the Library.

Requests received for access to the collection by both on-site readers and through interlibrary loans reached 380,000, a new high. On-site reader requests increased by 29%, interlibrary loans by 15%, and reference inquiries increased by 10% (Tables 13, 14). Over 50,000 Literature Searches (printed bibliographies) on a wide variety of subjects were distributed in response to requests from around the world, up 73% over last year. This is partially the result of a marked increase in the number of new Searches produced by the Bibliographic Services Division.

As part of NLM's continuing micropreservation program, an additional half million pages of deteriorating material were filmed by a contractor, and over 900,000 pages of materials, now in condition too poor to be sent out, were filmed in the Library.

Training activities were concentrated in the Loan and Stack Section and featured a new



George Queen, RSD, operates the Itek copying camera in the Photoduplication Section

interlibrary loan procedure manual and a programmed text and slide/tape presentation for new employees. Special workshops were held for health science librarians in the greater Washington metropolitan area to familiarize them with NLM's reference and interlibrary loan programs.

Supplement Three, 1973-1974, to *Medical Reference Works, 1679-1966*, was completed and published in collaboration with the Medical Library Association. Work on a revised and greatly expanded edition of *Highlights in Medicolegal Relations* was completed, and publication is planned for early 1977.

Table 5. Bibliographic Services

	FY 1974	*FY 1975*	*July 1975-June 1976*	*Transitional Quarter* [1]
Articles Indexed				
NLM	44,100	49,500	38,400	8,600
Other U.S.	74,000	98,700	100,000	24,500
Foreign	106,200	72,600	116,600	32,600
Total	224,300	220,800	255,000	65,700
Recurring bibliographies	24	28	28	28
Journals indexed	2,275	2,353	2,408	2,410
Monographs indexed*	—	—	186	159
Abstracts entered	—	10,000**	103,200	29,100

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

Table 6. On-Line Searches

Searches	*FY 1974*	*FY 1975*	*June 1975-July 1976*	*Transitional Quarter* [1]
MEDLINE	179,000	232,600	300,400	83,300
SDILINE	27,600	45,300	48,100	11,600
CATLINE	45,800	86,900	103,400	22,100
SERLINE	2,900	2,100	—	—
TOXLINE	13,000	14,700	19,700	6,500
CHEMLINE	—	8,600	9,400	2,800
CANCERLINE	—	1,900	5,100	1,700
CANCERPROJ	—	—	900	400
AVLINE	—	300	2,100	900
EPILEPSYLINE	—	—	400	300
BACKFILES*	10,100	9,600	89,100	31,000
Total	278,400	402,000	578,600	160,600

*Includes BACK66, BACK69, BACK72, and TOXBACK.

[1] *July-Sept. 1976*

Table 7. Off-Line Prints

Off-Line Prints	*FY 1974*	*FY 1975*	*June 1975-July 1976*	*Transitional Quarter*[1]
MEDLINE	40,900	52,900	65,700	18,600
SDILINE	13,900	15,500	30,500	9,100
CATLINE	400	500	700	300
SERLINE	100	100	—	—
TOXLINE	1,000	6,500	8,300	3,200
CHEMLINE	—	100	200	100
CANCERLINE	—	400	2,100	900
CANCERPROJ	—	—	2,700	1,300
AVLINE	—	(15)	200	200
EPILEPSYLINE	—	—	100	100
BACKFILES*	11,100	21,400	89,100	31,000
Total	67,400	97,400	199,600	64,800

*Includes BACK66, BACK69, BACK72, and TOXBACK.

Table 8. History of Medicine Activities

	FY 1974	*FY 1975*	*June 1975-July 1976*	*Transitional Quarter*[1]
Acquisitions				
Books	1,142	863	904	182
Modern manuscripts	42,970	89,563	82,452	13,544
Oral history hours	40	98	1	10
Prints and photographs	565	762	815	119
Processing				
Titles cataloged	2,473	2,866	3,721	695
Modern manuscripts cataloged	20,000	59,355	44,201	16
Pictures indexed	355	404	577	136
Articles indexed	5,354	4,236	3,950	519
Pages microfilmed	148,952	151,130	160,583	59,423
Public service				
Reference questions answered	1,865	1,880	1,782	408
ILL and pay orders filled	2,233	2,214	2,162	578
Reader requests filled	4,085	8,962	5,760	1,322
Pictures supplied	1,877	1,797	1,995	430

[1] *July-Sept. 1976*

Table 9. Growth of Collections

	Previous Total FY 1975	*July 1975-June 1976*	*Transitional Quarter* [1]	*New Total Sep. 30, 1976*
A. Book Materials				
Monographs:				
Before 1500	560	2	0	562
1501-1600	5,404	34	10	5,448
1601-1700	9,445	76	24	9,545
1701-1800	22,408	198	96	22,702
1801-1870	38,980	90	26	39,096
Americana	2,253	16	3	2,272
1871-present	329,000	11,956	3,644	344,600
Brief listed-INPROC	2,261	3,267	3,070	8,598
*Theses HMD	280,878	395	22	281,295
**Pamphlets	172,021	0	0	172,021
Bound serial volumes	475,457	28,811	6,517	510,785
Total Volumes	1,338,667	44,845	13,412	1,396,924
B. Nonbook Materials				
Microforms	26,514	2,925	719	30,158
Audiovisuals***	2,339	746	206	3,291
Pictures	70,750	800	50	71,600
Manuscripts	647,100	82,500	13,500	743,100

*Printed before 1951. Additions are in the History of Medicine Collection.
**In the collection before July 1, 1975. Additions are included with monographs.
***Does not include material at the National Medical Audiovisual Center.

Table 10. Acquisition Statistics

	FY 1974	*FY 1975*	*July 1975-June 1976*	*Transitional Quarter* [1]
Serial Record				
New titles added	960	990	722	288
Discontinued titles	105	404	289	48
Current titles received	24,642	25,228	18,086*	18,326
Publications Processed				
Serial pieces	93,371	137,180	169,726	41,656
Other	16,148	21,553	19,582	5,225
Total	109,519	158,733	189,308	46,881
Obligations for Publications	$689,740	$723,571	$859,572**	$275,997
Included for rare books	$101,769	$82,136	$76,008	$26,061

*Based on inventories completed during the year; represents open entries for serials included in NLM's machine readable data base—Master Serials System.
**Includes $107,578 in quid pro quo arrangements for services abroad.

[1] *July-Sept. 1976*

Table 11. Cataloging Activities

	FY 1974	*FY 1975*	*July 1975-June 1976*	*Transitional Quarter* [1]
Completed cataloging	11,382	12,844	15,044	3,051
Catalog cards filed	134,190	118,463	118,628	24,992
Volumes shelf-listed	9,900	11,843	13,326	3,310

Table 12. Binding Statistics

	FY 1974	*FY 1975*	*July 1975-June 1976*	*Transitional Quarter* [1]
Number of Volumes				
Send to binder	31,900	38,178	24,997	6,274
Obligations for binding	$110,595	$136,409	$95,508	$25,000

Table 13. Circulation Activities

	FY 1974	*FY 1975*	*July 1975-June 1976*	*Transitional Quarter* [1]
Number of requests received	262,733	320,079	380,475	90,900
For interlibrary loan	179,747	228,755	263,072	64,716
For readers	82,986	91,324	117,403	26,184
Number of requests filled	205,894	247,614	301,965	74,785
For interlibrary loan	138,999	173,642	205,695	51,743
Photocopy	126,689	158,493	184,704	47,153
Original	12,310	15,149	20,991	4,590
For readers	66,895	73,972	96,270	23,042
Number of requests unfilled	56,839	72,465	78,510	16,115
Interlibrary loan	40,748	55,113	57,377	12,973
Rejected	7,521	15,446	18,127	4,585
Referred	6,561	6,645	8,684	2,099
Returned as unavailable	26,666	33,022	30,566	6,289
Reader service returned as unavailable	16,091	17,352	21,133	3,142

[1] *July-Sept. 1976*

Table 14. Reference Services

	FY 1974	*FY 1975*	*July 1975-June 1976*	*Transitional Quarter*[1]
Requests by telephone	13,316	11,509	13,275	4,015
Government	5,397	4,028	3,562	1,201
Nongovernment	7,919	7,481	9,713	2,814
Requests by mail	1,398	1,488	1,446	342
Government	200	385	189	43
Nongovernment	1,198	1,103	1,257	299
Readers assisted	12,594	16,409	17,613	5,819
Government	4,307	4,718	3,793	1,098
Nongovernment	8,827	11,691	13,820	4,721
Total	27,308	29,406	32,334	10,176
Government	9,904	9,131	7,544	2,342
Nongovernment	17,404	20,275	24,790	7,834
Reading room users registered	15,209	22,426	28,384	5,725

[1] *July-Sept. 1976*

Chapter 3 Computer and Communications Systems

Davis B. McCarn, Associate Director for Computer and Communications Systems

During FY 1976 the Office of Computer and Communications Systems completed the transition of the MEDLARS II system from acceptance test status to full operation. The AVLINE, CANCERPROJ, and EPILEPSYLINE data bases were added during the year. A new capability was added to the on-line services that allows storing profiles of user interests and providing automatic monthly searches against these profiles.

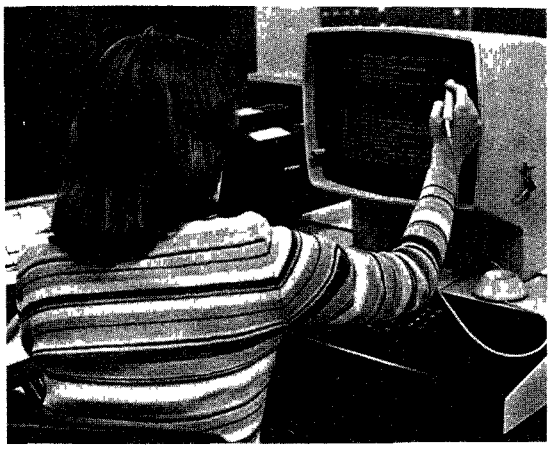
As of the end of FY 1976, NLM was providing on-line services to 500 institutions in 49 states. The following table shows the distribution of these institutions:

Table 15. On-Line Institutions

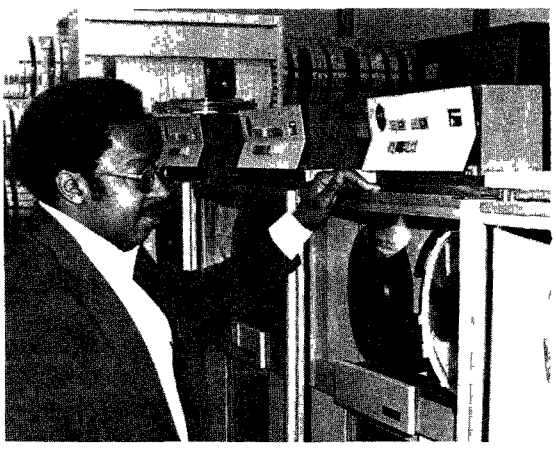
Hospitals and clinics	149
Medical schools	114
Other schools	34
Research organizations	58
Industry and other	145
Total	500

Another major activity has been the development of supporting software to extend MEDLARS II capabilities, primarily in new file management techniques for large data bases. Further accomplishments include a new citation input module (MEDCIM) and the ability to provide photocomposition via the Government Printing Office's new VideoComp 500 equipment. Further programming support has made it possible to publish quinquennial cumulated issues of the *Bibliography of the History of Medicine* and the *NLM Current Catalog.* Other publications developed are MeSH scope notes, an audiovisual catalog, and a kidney and nephrology index.

The Library continues to lead in network development to provide efficient access to and exchange of health information for all health professionals. NLM became the first government agency to install the common carrier public package switching network (TELENET). TELENET offers packet-switching ser-



A computer operator uses a "light pen" attached to a cathode ray tube to interact with the computer system



James Goldsmith, Head of the Computer Operations Section, and the IBM 3420 tape drive used for MEDLARS off-line data storage

vice through centers linked by high-speed transmission channels. The rate structure is not based on distance, but on the number of data packets sent and on measured access port usage. NLM is also providing network services to two grant-supported computers and one system in another agency and, in addition, MEDLARS services have been extended to Iran, South Africa, and Mexico. (See International Activities.)

Considerable emphasis has been placed on tuning the computers and the operating system for maximum performance and balanced utilization of resources. This has been accomplished mainly by developing systems support programs to analyze utilization data and by installing monitors of utilization. In order to provide the capacity necessary to meet the growing breadth and increasing use of the NLM services, NLM is working with the General Services Administration on the competitive replacement of its computer system. The replacement system will provide the capacity required to meet an anticipated growth rate of 20-25% per year until 1985. In addition, it will provide a more efficient system, each hour of service costing much less than at present.

Chapter 4 Specialized Information Services

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

The Toxicology Information Program is the major activity of the Library's Specialized Information Services component. In FY 1976 the importance of an efficient system for handling toxicological information was underscored by the impending enactment of the Toxic Substances Control Act. This need was also highlighted at the Symposium on the Handling of Toxicological Information, held at the National Institutes of Health on May 27-28, 1976. The Symposium was sponsored by the Toxicology Information Subcommittee of the DHEW Committee to Coordinate Toxicology and Related Programs. The Subcommittee is under the leadership and operational control of the Library's Toxicology Information Program.

The Symposium commemorated the tenth anniversary of the President's Science Advisory Committee Report on the "Handling of Toxicological Information." This Report led to the establishment in 1967 of the Toxicology Information Program within the National Library of Medicine.

The Symposium, with over 500 participants, considered the past, present, and future of toxicological information handling and advised user communities about existing information systems and services. Progress in implementing the recommendations of the PSAC Report reported by the NLM Toxicology Information Program has been encouraging. However, the burgeoning problems of ubiquitous chemicals in the environment of highly industrialized societies pointed up the need for even better methods of handling toxicological information.

Toxicology Information Program (TIP)

Query Response: The Toxicology Information Response Center, supported by the TIP at the Oak Ridge National Laboratory, provides query response and literature search services. During the period July 1, 1975 through September 30, 1976 the Center completed 792 bibliographic searches for industrial firms, academic institutions, and government agencies. These were comprehensive searches that may take up to 20 hours to complete. Another

Panel on Conclusions and Recommendations at the Symposium on the Handling of Toxicological Information From left to right Rosa Gryder, FDA, Warren Muir, Council on Environmental Quality, Perry J Gehring, Dow Chemical Co , Davis B McCarn, NLM, William T Knox, National Technical Information Service

925 information requests were handled over the phone or by return mail.

A number of interagency agreements have been negotiated with other Federal organizations for literature search services from the Toxicology Information Response Center on a direct cost recovery basis (estimated at $20/hour). For example, interagency agreements have been negotiated between NLM and several components of the Food and Drug Administration, as well as the Edgewood Arsenal, Department of Defense. The National Technical Information Service handles the billing and collecting for TIRC.

Publications: The staff of the Toxicology Information Response Center completed and published 7 annotated bibliographies in FY 1976; 17 more are almost ready for publication. In addition, the Toxicology Information Program, as a follow-up to its three-year project with Biological Abstracts to support *Abstracts on Health Effects of Environmental Pollutants*, has sponsored the publication of the *Chemical Index Guide* to Volumes 1, 2, and 3 of this journal. The guide correlates Chemical Abstracts Service (CAS) Registry Numbers cited in the journal's indexes with the names of the chemical substances they identify.

Publication of the quarterly *Toxicity Bibliography*, a secondary journal produced by MEDLARS and containing citations and MeSH terms for articles in the field of toxicology, was continued for the ninth consecutive year.

On-Line Retrieval Services

TOXLINE. This toxicology bibliographic retrieval service now provides subscribers with on-line access to over 360,000 bibliographic records covering the most current five years of reports gathered from the scientific literature. They deal primarily with the toxicology/pharmacology of drugs, pesticides, industrial chemicals, environmental pollutants, and hazardous household chemicals. Provisions have been made to update the TOXLINE data base monthly. In addition, this year a backfile to TOXLINE (TOXBACK) was constructed to provide batch-mode access to another 189,186 records prior to 1971. All records in TOXLINE and TOXBACK are enriched with index terms and/or full abstracts.

TOXLINE and TOXBACK have been enhanced by two new component bibliographic files produced at the Oak Ridge National Laboratory: the Environmental Mutagen Information Center (EMIC) file, and the Toxic Materials Information Center (TMIC) file. The EMIC file is a collection of more than 15,000 citations (1969-1976) to published articles on chemical mutagenesis. The TMIC file is a collection of approximately 4,500 citations (1969-1976) to published articles on the toxicology of heavy metals and other industrial chemicals.

In addition to these two new files, TOXLINE and TOXBACK still contain the following bibliographic files: *Toxicity Bibliography*, *Chemical-Biological Activities*, *Abstracts on Health Effects of Environmental Pollutants*, *Pesticides Abstracts*, *International Pharmaceutical Abstracts*, and the *Hayes File* (a precursor to *Pesticides Abstracts*).

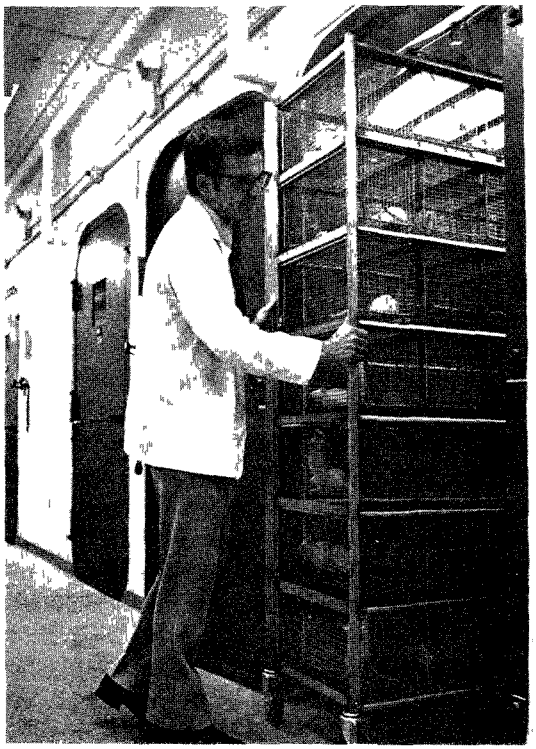
During the past year the TOXLINE user community grew to over 250 organizations: 90 academic institutions, 123 commercial organizations, 30 government organizations, and 7 miscellaneous groups. By the end of September 1976, nearly 60% of all TOXLINE users were also MEDLINE subscribers. The system reached a level of 600 connect hours per month, with approximately 27,000 searches conducted by TOXLINE users over the year. More than 353,000 pages of off-line prints were requested. A revised User Training Manual was developed and sent to all trainees in advance of scheduled training classes. The *TOXLINE Technical Bulletin* was prepared monthly and mailed to all TOXLINE/CHEMLINE subscribers.

CHEMLINE has evolved into more than just an on-line chemical dictionary to make more accessible information located in free-text searchable data bases such as TOXLINE. In addition to the original data elements in CHEMLINE (CAS Registry Numbers, molecular formulae, chemical names, synonyms, and corresponding name fragments), ring information, MeSH terms, and a new system to

aid in identifying other NLM files with information about a substance, have been added to this file. It has continued to grow over the past year to 87,366 CAS Registry Number records.

As new files such as the Toxicology Data Bank (see below) are linked via the CAS Registry Numbers, appropriate locator designations are added to CHEMLINE. In this manner, CHEMLINE will serve as a central node or directory for a network of bibliographic and data files. During the past fiscal year, the on-line use of CHEMLINE grew to 180 connect hours per month.

ON-LINE DATA RETRIEVAL. Success with bibliographic retrieval has led the TIP to apply this technology to data retrieval, using the same software system used for TOXLINE and CHEMLINE. Further, proposals have been made to link on-line, interactive data retrieval files so that multiple files can be easily searched. Examples of data files that could be linked in such a system are the Toxicology Data Bank and the Product Composition File, both currently under construction.



Special inhalation chambers at the Dow Chemical Company for exposing test animals to chemicals Dow reports its testing-in-progress in TOX-TIPS

The Toxicology Data Bank (TDB) will contain evaluated data from such sources as textbooks, handbooks, reviews, and criteria documents. This data bank will ultimately contain information on about 4,000 chemicals, potential or known biological hazards to which major population groups are exposed. A file of 300 records is now undergoing testing and a public file of about 1,000 records will be available early in 1977.

The Product Composition File will contain up-to-date information on manufacturers, usage, components, and CAS Registry Numbers for a large number of commercial products sold in the United States.

Collaborative Activities

The resources for toxicology information collaborative activities, usually money and rarely manpower, are provided by interagency sources. Most of the interagency projects for which TIP has been assigned operational responsibility are sponsored by the Toxicology Information Subcommittee of the DHEW Committee to Coordinate Toxicology and Related Programs. There are four continuing projects:

1. *Toxicology Research Projects Directory*, Volume I, was published in four issues in 1976. The Directory is a subset of toxicology project descriptions extracted from the Smithsonian Science Information Exchange (SSIE) data base. Each issue contained approximately 2,000 toxicology-related Notices of Research Projects (NRP) received by the SSIE. Editorial preparation of the Directory is managed through a contract with SSIE. Reproduction and sale are handled by the National Technical Information Service (NTIS) of the U.S. Department of Commerce. The Directory is now funded through the second volume on an experimental basis.

2. *Toxicology Document and Data Depository (TD3)*, established under an agreement with the NTIS, is being organized to make available, in microfiche, documents and useful data that do not find their way into journals (such as negative results, supplementary information, and data supporting published articles).

3. *Toxicology Testing-in-Progress* (TOX-TIPS) is a monthly current awareness service devoted to long-term toxicology testing of nonproprietary compounds. Industry has indicated a high level of interest in TOX-TIPS and is contributing information on its testing activities. During FY 1976, five monthly issues were published; the current distribution is 2500 copies. Although TOX-TIPS is distributed free of charge at this time, it will be sold on subscription in the future.

4. *Laboratory Animal Data Bank*, an on-line, interactive data retrieval service, will establish a set of baseline characteristics for selected strains of unmanipulated control animals. The data bank will aid in choosing species and strains for research and provide a basis for intercolony comparison of experimental studies. The Laboratory Animal Data Bank is being built under a contract with Battelle Columbus Laboratory. So far the file contains baseline data on 19 strains of laboratory animals. The data base, consisting of approximately 36,000 summarized baseline observations, is now in preliminary testing.

Chapter 5 Audiovisual Programs

George E. Mitchell, D.M.D., Director, National Medical Audiovisual Center

The National Medical Audiovisual Center (NMAC), a division of the National Library of Medicine since 1967, encourages the development and use of effective learning materials. Formerly the Center concentrated on undergraduate education of health professionals; recently, however, its programs have been extended to the improvement of continuing education. This shift in emphasis has brought NMAC in close partnership with the Library's Lister Hill National Center for Biomedical Communications.

To its long-established base of audiovisual professionalism, NMAC has added new competencies in educational theory and instructional development. Working cooperatively with the Bureau of Health Manpower and its Learning Resources Branch, which provides such resources as grant programs, demonstration projects, and student assistance, NMAC contributes its staff and facilities for research, audiovisual development and distribution, training, and consultation to the health educational community. As a result of this collaboration, a national program has been established to improve educational efficiency in schools of the health sciences.

Clearinghouse

In FY 1976, progress continued on the Library's data base known as AVLINE (Audiovisuals On-line). AVLINE provides information on audiovisual materials in a format similar to that of MEDLINE. This information is of value to the medical academician searching for validated audiovisual materials for student self-instruction or to support lectures and other learning experiences. After a six-month testing period, the AVLINE data base, containing over 2,000 records, was made available to the health community. It is now accessible by all MEDLINE subscribers.

Items being considered for entry into the AVLINE data base were evaluated by peer review panels. This process not only identifies audiovisual materials considered appropriate for national distribution, but it also helps to identify gaps for which additional educational materials are needed. In 1976, 1,988 instructional materials in medicine, dentistry, and nursing were reviewed. Of the titles screened, 165 were rated "highly recommended," 1,089 were rated "recommended," 486 were rated "not recommended," and 245 were referred to other screening procedures.

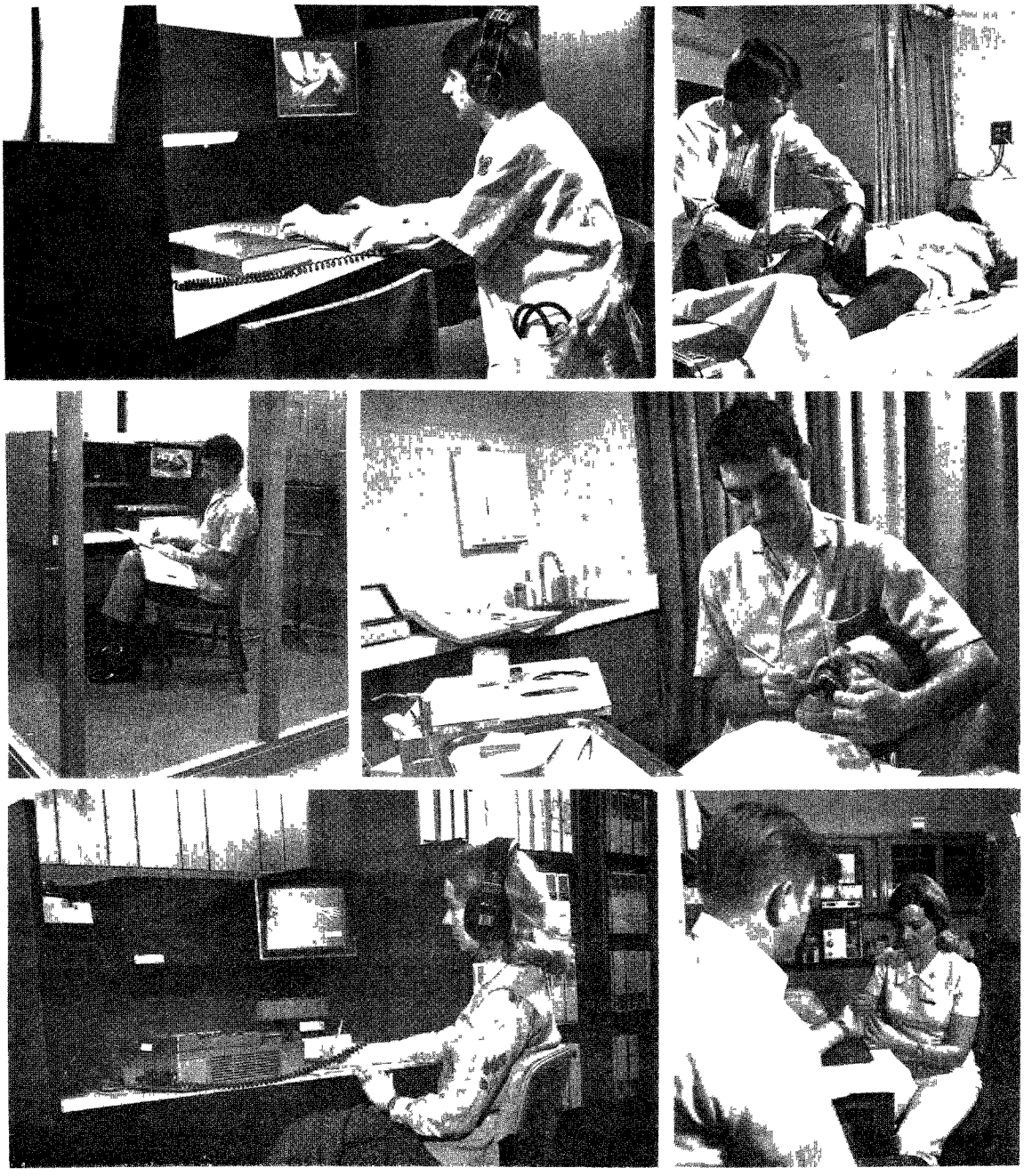
During FY 1976, a review of the procedures of operating AVLINE was undertaken. As a result, changes in the process were planned for early FY 1977, including transfer of operation to the Technical Services Division, Library Operations.

Education Research and Evaluation

The program of research and evaluation, begun in FY 1975, continued in 1976 with projects in many different areas of educational technology, theory, and application. Among projects either completed or in progress are those on the design of educational facilities, the development of prototype learning materials, the study of student learning styles and methods for testing and accommodating them, the development of problem-based learning packages, evaluation procedures for reviewing health science materials, the role of task analysis and curriculum definition, the study of instructional management procedures and associated cost factors, the improvement of equipment and techniques for audiovisual production and communications, and the study of current instructional development procedures used in the health science community. Research findings are integrated into the Center's development and training programs for testing and dissemination.

Materials Development

Audiovisual design and development activities again encompassed a wide variety of content, disciplines, objectives, and media in FY 1976. The support of major Center programs—training, applied research, distribution—and the monitoring of contractual projects accounted for the bulk of time and resources devoted to materials development. A modest program of in-house production was continued (see Appendix 4). Reimbursable work was limited to support requested by the Center for Disease Control, World Health Organization, and miscellaneous services for the Bureau of Health Manpower.



What students learn via audiovisual instruction finds application in practice

Projects completed or in progress are for students of medicine, nursing, dentistry, veterinary medicine, and certain associated health professionals. The current workload includes numerous projects in the basic sciences, notably anatomy and physiology. Other areas include pediatrics, nursing, anesthesiology, obstetrics/gynecology, and dentistry.

One project initiated in FY 1976—videotape excerpting—is unique and particularly interesting. Videotape excerpts are now being made from selected materials in the AVLINE inventory to supplement computer printouts. These excerpts—a sort of "visual abstract"—are to help potential users select audiovisual materials for loan or purchase.

Distribution

Associated with its programs to develop and acquire audiovisual materials, the Center operates a distribution program to lend certain of these materials to health professionals or offer them for sale through the General Services Administration. During FY 1976, the Direct Services Program processed approximately 72,500 requests for loans of audiovisuals and shipped over 60,000 films and videotapes in response to these requests.

During FY 1976, 133 new titles were acquired for the loan collection. For a number of reasons—including obsolescence—196 titles were withdrawn from the collection. Following a successful pilot program to distribute materials in the 3/4" videocassette format, a videocassette loan program of 142 titles was begun during the first quarter of FY 1976.

During FY 1976, 33 self-instructional teaching packages were completed and placed in the sales program. These new titles are in the areas of ophthalmology, physiology, tissue culture, anesthesiology, gastroenterology, pediatrics, cardiology, basic pathology, nursing, dentistry, and anatomy. The Center promotes these and previous titles as available through the General Services Administration. In FY 1976, 6,169 teaching packages were sold.

The Center's entire archival motion picture collection—some 1,000 titles, many of which are irreplaceable—is being transferred to videotape. This procedure will not only protect against loss or damage to the films, but it will also make possible their ultimate distribution as videocassettes for historical and classroom use.

Workshops and Conferences

Workshops and conferences presented by the Center continue to be an effective means for teaching health educators how to apply educational technology and systems approaches. NMAC's training program in FY 1976 reached over 500 participants in 23 workshop sessions. These activities were conducted by NMAC staff and visiting faculty. Workshop titles included Development and Evaluation of Audiovisual Instructional Materials, Designing and Utilizing Simulation and Gaming Activities in Health Science Education, Management of Learning Resources, Criterion Test Development, Learning Spaces, Evaluation of Health Science Educational Programs and Materials, Television Production Techniques, Enhancement of Instructional Materials, Audiovisual Cataloging and Indexing, Regional Approaches to Training and Utilization of Multimedia, and Field Testing for Instructional Effectiveness.

To cope with the ever-increasing problem of oversubscription to faculty development and training courses at the Center, and to use scarce NMAC staff time for the design of training courses rather than for instruction, a regional training center program was begun during this year. Areas of high- and low-density population were identified, and six field sites were selected. They are: Loma Linda University School of Dentistry, California; University of Nebraska Medical Center at Omaha; Ohio State University Medical Center; Delta College of Nursing in Michigan; University of North Carolina School of Dentistry, Chapel Hill; and the State University of New York School of Health Related Professions, Buffalo. An initial workshop entitled Development and Evaluation of Audiovisual Instructional Materials was held in FY 1976 at the Ohio State University, University of Nebraska, University of North Carolina,

and Delta College centers. A total of 107 faculty received training at the four regional center workshops.

The Center, in cooperation with the Midcontinental Regional Medical Library, conducted a 3 1/2-day advanced audiovisual seminar for those Regional Medical Library audiovisual consultants who had attended the 1975 audiovisual workshop at NMAC. Also attending the seminar were seven audiovisual consultants who have had previous experience with audiovisual media. Those conducting the seminar led lively interactive discussions with the participants—exchanging ideas, experiences, and problems. In addition, the group visited a small hospital learning resource center, a large academic learning resource center, and an academic biomedical communications program, to observe such operations so that they might apply what they learned to their own library and resource centers.

In addition to training activities at the Center, NMAC staff participated in workshops, seminars, and conferences held at the National Library of Medicine, Louisiana Hospital Library Association, University of Texas Medical School at Houston, the Chicago mid-winter meetings sponsored by the Chicago Dental Society, and the joint regional conference in Atlanta of the American Dental Hygienist Association and the American Dental Assistants Association.

Advisory Services

An on-site survey was conducted at the Southern California College of Optometry in Fullerton to assess existing communications resources and to recommend improvements in the College's biomedical communications program. NMAC staff conducted another on-site survey of the schools of medicine, dentistry, nursing, public health, and pharmacy at the University of North Carolina, Chapel Hill. The purpose of the survey was to provide the Vice Chancellor for Health Sciences with recommendations for a five-year plan for coordinating existing learning resources and services and for developing additional capabilities. Advice was also provided to the Georgia Mental Health Institute and the Meharry Medical College in Nashville on how to implement proposed audiovisual systems.

NMAC workshops instruct students on how to design audiovisual units

Over the year, consultation relating to education technology and instructional materials development was provided for representatives of 20 schools of medicine, two schools of dentistry, four schools of nursing, 30 schools of allied health, 22 national and international organizations, nine teaching hospitals and 174 other health science institutions. Included in these consultations were representatives from Egypt, New Guinea, Canada, Holland, Norway, Finland, Colombia, England, Thailand, Mexico, Saudi Arabia, Sweden, Iraq, New Zealand, Afghanistan, and Nepal.

As a part of the Center's cooperation with the Bureau of Health Manpower, NMAC staff review grant applications to the Bureau involving use of instructional technology (125 in FY 1976). In FY 1976, a two-day meeting on that subject was conducted for the Bureau's Regional Office staff.

In cooperation with the National Associations of Medical, Dental, Nursing, and Allied Health Schools, NMAC is conducting a survey to determine the state of the art of instructional technology in U.S. schools of the health professions. The resulting data will be of great interest and use to both the Center and health science schools.

Table 16. Selected Statistics, NMAC

	July 1975—June 1976	*Transitional Quarter* [1]
Audiovisuals requested	60,178	12,888
Audiovisuals shipped	53,227	7,000
Titles added (film and videotape)	97	36
Audiotape duplication	3,397	724
Titles to NAC for sale	23	10
Reviews conducted	22	2
Titles reviewed	1,807	176
Titles highly recommended	165	0
Titles recommended	986	103
Titles not recommended	413	73
Titles referred	243	2
Titles precataloged	1,758	279

[1] *July-Sept. 1976*

Chapter 6 Lister Hill National Center for Biomedical Communications

Robert M. Bird, M.D., Director, Lister Hill National Center for Biomedical Communications

Dr. Bird, former Dean of the University of Oklahoma College of Medicine and director of the Lister Hill National Center for Biomedical Communications since December 1974, died on December 31, 1976.

In 1968 the Ninetieth Congress passed a joint resolution to establish the Lister Hill National Center for Biomedical Communications as an organizational element of the National Library of Medicine. The Center has a broad mandate:

- to serve as focal point within the Department of Health, Education, and Welfare for developing and coordinating biomedical communications systems and networks; and
- to develop information systems and networks to improve education and research in the health sciences, and to facilitate the delivery of health services.

In carrying out this mandate, the Center recognizes the important role that improved information transfer mechanisms and technology can play in what it perceives as a resource sharing process. An assessment of community needs is coupled with an assessment of existing and emerging technology, to identify areas susceptible to the development of more effective and efficient information processing systems.

The programmatic activities of the Center can be categorized broadly as follows:

- focal point and coordination role, HEW
- communications engineering research and development
- computer technology research and development
- information transfer methodology research and development
- application, demonstration, experimentation, and evaluation in the above areas. For example, broadband biomedical communications, distributed information processing, computer-based education, and continuing medical education/dissemination of research information.

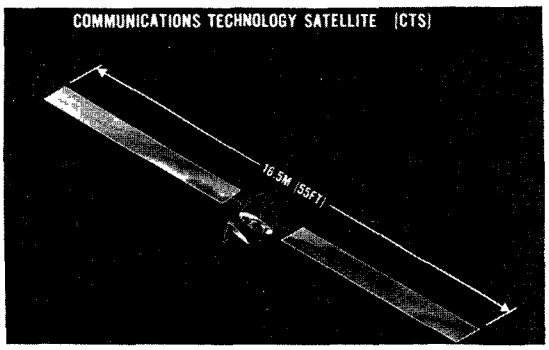
The discussion of specific application areas which follows illustrates not only research and development activities but also focal point activities for DHEW.

Broadband Biomedical Communications

Broadband communication refers to technology that utilizes large capacity channels such as can be provided by satellites, microwaves, coaxial cables, or optical paths (lasers and fiber optics). Such channels can support all modes of communication, such as high speed, high resolution transmission of video, facsimile and other forms of graphics, and digital and analog data such as from patient monitoring devices, laboratory instruments, and computer data banks. However, broadband channels are very costly, so it is important to share a given channel among many users and/or applications, each of which could require a different communications mode.

With the ever-increasing cost of health care, and a continuing maldistribution of primary care physicians, specialists, and facilities, the potential offered by broadband communications for sharing resources through information transfer of all kinds takes on considerable importance.

The Lister Hill Center has used several experimental communications satellites to test broadband applications. The fact that satellite communications can be provided at costs (presently high for commercial capabilities) which are essentially independent of distance makes satellite networks attractive for the future. The experiments and demonstrations already accomplished, and those planned during the past year, afford the health community an opportunity to develop models for cost-effective operational systems.



Launched on January 17, 1976, the Communications Technology Satellite will be used for a variety of experiments, including biomedical communications.

As a follow-up to its earlier successful satellite communications experiments (with the ATS-1 and ATS-6 satellites), the Center has been providing the technical planning and coordination for a new program involving the Canadian/American Communications Technology Satellite (CTS). On behalf of the Public Health Service agencies participating in the experiment, the Center, during the past year, has designed a satellite system using small terminals. The system will interconnect facilities in six cities distributed over a broad geographical area to form the nucleus of the first nationwide experimental broadband communications network. The cities are Bethesda (Maryland), Lexington, Denver, Seattle, Bozeman (Montana), and Fairbanks.

Terminals installed and operated by the Public Health Service will form the nucleus of the network. However, other United States CTS experimenters have been requested to share their facilities with the health community in their localities. With the extension made possible by these CTS users, the experimental network could be expanded to include over 50 communication facilities within the continental United States.

The Lister Hill Center (Bethesda) terminal will be the Network Coordinating Center for the system. From this location each of the Public Health Service facilities will receive the operational and maintenance coordination required to provide support for the programmatic experiments. The Network Coordinating Center will also function as the contact point with the NASA Satellite Control Center. Each outlying terminal in the network will be equipped to operate as an independent transmission center.

A variety of programs have been designed during the past year to explore interactive video transmission as a tool for future use in health systems. These have included the development of the content of the programs to be carried over the network, telecommunications design, program evaluation, and media development. An understanding of the best and most cost-effective mixture of these elements is important to the experiment. These demonstrations will permit NLM to identify the communications and information transfer modes needed in a nationwide broadband communications network for the health community.

In its focal point role within the Department of Health, Education, and Welfare, the Lister Hill Center has been coordinating satellite-oriented programs with three of the six Public Health Service agencies. The Health Resources Administration, presently the largest of the experimental groups, is supporting programs in four health disciplines:

- The Division of Nursing is developing a program with the University of Washington to disseminate research results in the field of predictive nursing involving infants and parents.
- The American Dietetic Association is developing a continuing education program

for professional dietitians in long term care.

- The Division of Dentistry will present a series of programs in continuing dental education and dental faculty development.
- The University of Washington's WAMI (Washington-Alaska-Montana-Idaho) program is expanding its activities under the Division of Medicine to include faculty sharing, independent student learning, admissions, conferences, minority recruitment, student consultation, and legislative processes.

A second PHS agency, the National Institutes of Health, plans to produce and distribute a series of continuing educational programs for health professionals.

The third agency, the Alcohol, Drug Abuse, and Mental Health Administration, is exploring the use of teleconferences to exchange therapeutic information among drug treatment centers.

These health experiments will avoid costly productions, yet include programming that will ensure effective communication. With experiments such as those being planned for the CTS program, it is expected that the health community will gain insight into the benefits of this interactive medium and incorporate its use as they have other communication modes of the past.

Distributed Information Processing

It is sometimes desirable to have the power of the computer available at locations and for specific applications where providing access to large computers is either not feasible or very costly. The Lister Hill Center has developed systems to test and evaluate relatively inexpensive combinations of small computers and sophisticated computer terminals for a wide variety of biomedical applications. The Center believes that by taking a leadership role in this area it can bring about more satisfactory solutions to information processing problems.

During the past year, three major objectives have been identified for the Center's computer-oriented research and development mission.

1. Demonstrate alternative technology applications. Here emphasis is on demonstration in the sense of education. It is extremely difficult to bridge the communication gap between the potential technology and the needs of the nontechnical user. A demonstration related directly to the user's needs is often a critical factor in communicating true technological potentials.
2. Improve the cost-effectiveness of systems. The continued appraisal of cost-effectiveness in light of dynamic technology changes is a function that has not been adequately emphasized. It is, however, a factor that is emphasized in activities of the Center's Learning Resource Laboratory.
3. Make the interface with technology "user-cordial." Great progress has been made in applying computer technology to a wide spectrum of information requirements. Often, however, the user is intimidated when he attempts to use this technology. The interface between man and machine has been a barrier to wider application since this interface is less than "cordial." Much work remains to be done in this area.

In seeking to meet its stated objectives, the Center is exploring unique applications of minicomputers, microprocessors and intelligent computer terminals.

Minicomputers represent a very important aspect of information processing today which has an impact on all of the above objectives. While not as powerful as large central computers, minicomputers do offer a more efficient, cost-effective alternative for many (not all) applications. In addition, the judicious use of minicomputers for distributed processing, in conjunction with large central computers, offers still another level of cost-savings and enhanced user cordiality.

A minicomputer has been procured for the Center's Learning Resource Laboratory. This system supports multiple on-line users and numerous computer languages, including the Massachusetts General Hospital MUMPS language. This language is widely used throughout the medical community for both computer-assisted instruction (CAI) and for

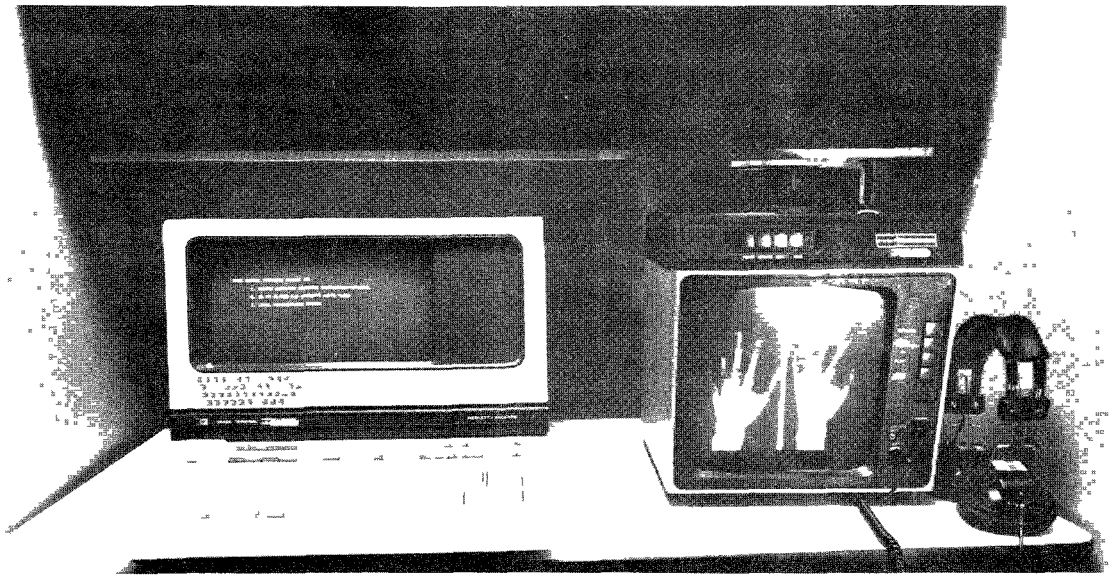
hospital information systems. Because of its importance, the Computer Technology Branch is looking into the efficiency, effective utilization, and desirable extensions of MUMPS.

Microprocessors are a new tool of computer technology resulting from highly sophisticated electronics fabricating techniques. While more limited than minicomputers, the cost and postage stamp size of components are creating a revolution in many areas of the electronics industry, e.g., in watches, instruments, and computer applications. Microprocessors may, today, be purchased for as little as $10. The central processing unit of a minicomputer may cost more than $10,000. In order to explore the uses and limitations of this exciting development, the Center has procured microprocessor equipment and is training staff in its use.

The primary interface between the user and the computer is via a computer terminal. The recent inclusion of "intelligence," i.e., logic capabilities in terminals in the form of microprocessors is providing many potential benefits in a large variety of applications, including computer-based education. The Computer Technology Branch has acquired the most modern terminals in order to explore and demonstrate their unique applicability to computer-based education, library use, and user-cordial interfaces.

In addition to the items discussed above, the Center also has made contributions during the past year in a number of related areas These include a satellite-footprint graphics application in support of satellite experiment planning; an automated Contracts Management System for NLM's Office of Contracts Management; a computer performance evaluation and measurement study incorporating a Performance Management System design; and a study for the Public Health Service on PHS data communications Associated with the graphics application has been the implementation of a generalized graphic capability for the NLM central computer facility which will also support other (e.g., management-type) graphics. The computer Performance Management System study developed in conjunction with the Federal Center for Simulation and Computer Performance Evaluation (FEDSIM) has received a great deal of national interest.

In 1972 the Lister Hill Center initiated the Lister Hill Experimental Computer-Assisted Instruction (CAI) network and established a tradition of leadership in the area of computer-based instruction in the health sciences. By fiscal year 1976, when the National Library of Medicine terminated support of what had become an operational enterprise, more than 100 medical institutions had utilized instructional material via the network.



A cubicle in the Center's new Learning Resource Laboratory A variety of modern equipment is available for testing and demonstration

In the past year the Lister Hill Center, in cooperation with the Association of American Medical Colleges (AAMC), sought guidance from the users and providers of computer-based educational materials in the health sciences community. Two recommendations resulted from these discussions. The first is that a national focal point should be established to serve both as a demonstration and a research and development center. The second recommendation is to initiate a systematic program to address a number of problem areas: appraisal (or peer review), author incentives, bibliographic control, economical delivery systems, evaluation, transferability, and technology development. It was the consensus of the community surveyed that the paramount problem was appraisal, and that the least serious and most tractable was technology development.

Experience with the Lister Hill Experimental CAI Network, and discussions with the health sciences community, dramatically brought to our attention the need for providing the academic and practitioner communities with a "window" to the world of computer-based educational materials (CBEM). This has taken the form of a Learning Resource Laboratory, completed during the past year in the National Library of Medicine.

The Laboratory affords the Lister Hill Center an environment in which to develop its programs and provide a demonstration/learning resource for the biomedical community. The Center has two goals in this area. The first is to provide technical consultation and research and development support to the internal elements of the Library. The second is to establish a research, development, and applications program that will be responsive to the information processing needs of the health community, with special emphasis on the health education community. The Center believes that these two goals are compatible, since most internal research and development needs are reflected, in different forms, in the biomedical community at large.

Continuing Medical Education/Dissemination of Research Information

The state-of-the-art in information processing technology is sufficiently advanced that it can support any mode that is perceived as desirable for continuing medical education/information dissemination. Indeed, the technological potential exceeds current demand generated by the information needs of the health professions. Recognizing that cost can be a significant constraint, the aforementioned activities in communications and in computer technology research and development are oriented toward providing more cost-effective capabilities.

The Lister Hill Center is embarking on a new program to make clinically relevant information that is derived from research available to health practitioners. To accomplish this the information must be examined for accuracy (*analysis*); it must be selected and condensed from the universe of biomedical data available (*synthesis*); and it must be validated for its clinical applicability and presented in a language that is understood by the practitioner (*translation*).

The processes of analysis and synthesis are the responsibility of subject matter experts. The responsibility for translation has been assumed variously by different organizations and accomplished with uneven effectiveness. Because this final step in the information transfer process is not being approached systematically, it is necessary to explore new ways to improve the organization and distribution of analyzed and synthesized biomedical information. Working with professional groups NLM will develop translation models that emphasize new knowledge applicable to the problems faced by the practitioner.

Chapter 7 Grants for Library Assistance

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

The Office of Extramural Programs administers a program of grants authorized by the Medical Library Assistance Act of 1965 and its amendments. The grants assist medical libraries to develop better health information services, particularly services that relate to a biomedical information network.

Extramural Programs has two major divisions. The Division of Biomedical Information Support is responsible for resource improvement grants, resource project grants, training grants, special scientific projects, and research grants. The International Programs Division administers a publication grant program, including Special Foreign Currency support for foreign publications. In addition, contracts support the maintenance and operation of ten Regional Medical Libraries.

This year saw a major change in the Resource Improvement Grant Program. The modified Program offers assistance to consortia of local health institutions to develop formal agreements for shared basic health information collections. These grants will extend library services locally and avoid unnecessary and costly duplication of resources.

Another major effort to improve resource sharing has resulted from interagency cooperation between the Bureau of Health Manpower (Health Resources Administration), and the Office of Extramural Programs. This Office, with support from the Lister Hill Center, collaborated in a contract to inventory Area Health Education Centers (AHECs) and their impact on library resources. As a result of the survey, the Office of Extramural Programs is cooperating with the Health Resources Administration and the Veterans Administration to foster better information resource sharing for AHEC projects.

Resource Grants

There are two types of resource grant. The Resource *Improvement* Grant assists a hospital to establish a basic collection. The collection not only provides information for the staff, but it allows the hospital to draw upon the larger resources of the network. The Resource *Project* Grant, considerably larger in scope, emphasizes new or improved library and information services. Support may range from one to three years depending on the activity proposed. Resource Project Grants promote better sharing of local resources and the projects relate either directly or indirectly to the development of the Regional Medical Library Network.

The goal of the Resource Improvement Grant Program is to strengthen the Regional Medical Library Network by improving health science libraries in local health facilities. This is accomplished through the development of basic information collections. There are two types of Resource Improvement Grant:

> Consortium—Membership in a consortium may include such institutions as hospitals, mental health facilities, medical societies, research institutions, public libraries, federal libraries, and community colleges. Priority is given to arrangements that involve institutions primarily related to health. One institution in the consortium, either public or private nonprofit, is designated as responsible for submitting the application and other required reports on behalf of the other consortium members.

Single Institution—These grants are intended for institutions whose participation in a consortium is neither feasible nor practicable.

The Resource Project Grant Program is designed to make existing health information resources available to users more expeditiously and economically or in a form better able to satisfy their information needs. These grants fall into four general areas:

- Medical Libraries and Librarianship—includes support not only for library technical services related to acquiring and organizing materials, but also for programs to use staff more creatively and effectively. The goal is to improve the effectiveness of the library as an information resource both for the parent institution and for the Regional Medical Library Network.
- Biomedical Information Services—includes support for traditional library reader-service activities such as circulation and reference. Also of interest is the introduction of technologies, new to an individual library, to provide readers with the most modern means of access to information.
- Education and Knowledge Transfer—includes support for projects that involve the library in education. Such projects may engage the library in programs of health care delivery, continuing medical education, or formal health education activities.
- History of Medicine—includes support for projects involving archival or historical collections. Preservation, organization, and utilization are in this category. The materials must be of major scholarly significance and the project should include plans to publicize the collection.

Regional Medical Libraries

The Regional Medical Library (RML) program provides a framework for support authorized under the Medical Library Assistance Act and for the many extramural functions of other NLM divisions as well. The RML program is a national network that has gained wide recognition as a model for cooperative information services to the health community.

In addition to the ten contract-funded Regional Medical Libraries (the NLM functions as the eleventh RML serving the Mid-Atlantic states) the network structure includes partnerships with most of the more than 100 medical school libraries in the country. In 1976, direct services in the regions have been provided to approximately 4,000 health science libraries at health care institutions and an equal number of academic and public libraries.

The keystone of the network is the sharing of resources, and its continued development depends directly on the extent to which the participating health institutions accept this concept. In the absence of massive outlays of Federal and private funds, it is only through the sharing of informational, technical, and human resources that the ultimate objectives of the program can be realized.

The most important form of resource sharing within the network is interlibrary lending (or "document delivery"). The rapid response time of document delivery service has been maintained since the first Regional Medical Library was established in 1967. Over 95% of the documents sent on interlibrary loan are mailed within four days of receipt of the request, despite the growing volume of requests which now approaches 600,000 units per year.

Research Grants

This program seeks to benefit biomedical communications by supporting projects that improve the processes: (1) of storing and retrieving biomedical information, and (2) communicating information resulting from biomedical research, in support of health care and health education. The following kinds of project are eligible for support.

- Research—to advance the state-of-the-art of information science as it relates to health.
- Development—to adapt theoretical and technological advances in communications to the health field. Such projects include the testing and evaluation of new systems,

information technologies, and media.
- Demonstration—under actual service conditions, of devices and techniques resulting from research and development.

The NLM Research Grants Program is multidisciplinary, not categorical. The program attempts to support projects that will improve the flow of information within the entire health community rather than for a particular discipline or specialty. Accordingly, the areas of interest are wide-ranging, and include:

Medical library science and information services—such as techniques for improving library operation, new mechanisms for administering libraries, manpower needs for medical libraries, and innovative library services.

Computer technology—applied to health information storage and retrieval, medical education, and continuing medical education (including computer assisted instruction).

Biomedical communications—studies concerning scientific communication, patterns of health information exchange, and information needs of health practitioners. Also encompassed are projects to study and develop medical vocabularies and classification systems.

Training Grants

The National Library of Medicine supports the training of health scientists in computer technology. The ultimate goal of this program is to promote the complete and effective integration of computer technology into all phases of clinical medicine, teaching, practice, and research. Except for a few unusual people, most do not find it possible to master two disciplines well enough to provide innovative leadership in either. Indeed, medicine itself is so much more than enough for a single individual that competent health care demands specialization and sub-specialization. Therefore, the most practical projects to be supported are those for teachers or potential faculty members in the health sciences. By incorporating new ideas into their teaching they will multiply the process of dissemination.

Depending on the academic background and experience of the faculty member being trained, one or two years of guided study should suffice to provide him with insight into the potential of computer techniques. The training should equip him to recognize where computers can be of assistance in the solution of medical problems, to communicate his needs effectively to computer consultants, and to understand and use the computer assistance provided. In FY 1976 there were grants at ten participating universities, supporting instruction for 62 trainees.

In May 1976, the directors of these training programs met in Bethesda. They discussed the problems of integrating the application of computer and information sciences with the health sciences to create a scholarly yet practicable discipline. Other topics discussed were: the need to expand the training programs to include other health personnel; the need to broaden training to incorporate related fields such as management science and health economics; and the need to examine the implications of computer technology for new health care delivery systems. The directors reported that they are able to attract qualified trainees and to place graduates of the programs into positions where their newly acquired skills can be used.

Special Scientific Projects

The objective of this program is to support health scientists and practitioners in preparing scholarly booklength works on subjects of broad professional interest.

During this fiscal year, six Special Scientific Projects were active. The work of one of these was published: John F. Murray, *The Normal Lung*, (Philadelphia: W. B. Saunders, 1976).

International Programs Division

Grants for nonprofit biomedical publications are administered in the International Programs

A few of the more than 30 grant-supported publications that appeared in Fiscal Year 1976

Division. There are two kinds of support: a domestic Publication Grant Program, and an international publication program funded with special foreign currencies. The international publication program, which is authorized under Public Law 480, is described in Chapter 8, International Activities.

The Publication Grant Program funds projects to condense, synthesize, repackage, and evaluate biomedical information for the U.S. health community. Among the publications supported are critical reviews and monographs; studies in medical librarianship, information science, and biomedical communications; secondary literature tools (bibliographies, atlases, guides, etc.); selected serial publications that develop innovative approaches to information packaging; research and translations in the history of medicine; translations of current foreign biomedical monographs; and proceedings of conferences dealing with U.S. health needs. Emphasis is placed on support for projects contributing to the improvement of health care, and studies providing perspectives on earlier medical advances and synthesizing new biomedical developments.

Forty Publication Grants were funded during FY 1976, 13 of which were new awards. Among the new awards were a review examining the efficacy of hyperbaric oxygen therapy in a range of medical conditions, a monograph on the medical physiology of temperature, and a history of medical care in the United States. Among studies published in FY 1976 was Paul Grun's *Cytoplasmic Genetics and Evolution* (New York: Columbia University Press, 1976), a major survey of a hitherto unexplored area of genetics and cytology—the genetics of the whole organism realistically seen as a combination of many different sorts of gene-bearing particles. (For a complete listing see Appendix 2.)

Table 17. Resource Grant Allocations by Objective* (in thousands)

	FY 1974	*FY 1975*	*July 1975-June 1976*	*Transitional Quarter* [1]
Medical libraries and librarianship	$1,041	$ 486	202	$37
Biomedical information services	712	497	292	-0-
Education and knowledge transfer	774	461	195	-0-
History of Medicine	105	25	-0-	-0-
Total	$2,632	$1,469	$689	$37

*Includes support for Regional Medical Libraries and Improvement Grants

[1] *July-Sept 1976*

Table 18. Extramural Grant and Contract Programs (in thousands)

	FY 1974		*FY 1975*		*July 1975-June 1976*		*Transitional Quarter* [1]	
Research	(22)*	$ 874	(20)	$1,292	(14)	$1,147	(3)	$ 206
Resource Projects	(77)	2,489	(47)	1,387	(27)	668	(2)	26
Resource Improvement	(50)	143	(28)	82	(10)	26	(4)	11
Training (including Fellowships)	(11)	902	(9)	891	(11)	1,056	(2)	333
Special Scientific Projects	(3)	95	(4)	153	(2)	59	(1)	13
Regional Medical Libraries**	(10)	2,658	(9)	2,194	(8)	2,721	(2)	630
Publications**	(25)	451	(36)	614	(40)	606	(4)	62
Total	(198)	$7,612	(153)	$6,618	(112)	$6,278	(18)	$1,281

*Figures in parentheses refer to number of projects.
**Includes contract funding.

[1] *July-Sept. 1976*

Chapter 8 International Activities

Mary E. Corning, Assistant Director, International Programs

Policy Review

During this past year the Board of Regents reviewed the principles and policies underlying the international programs of the National Library of Medicine. The Board reaffirmed that the primary objective of NLM international involvements is the improvement of U.S. research, education, and services in health and health-related sciences.

The conduct of NLM international programs is essentially a sharing of time, talent, and resources. The activities may vary in scope and mechanism but must have ultimate value to the U.S.

The Board of Regents also reaffirmed that international MEDLARS agreements should continue to be bilateral and *quid-pro-quo* in nature. Their unique value and effectiveness is directly related to the fact that they are developed and maintained at the scientific and substantive level.

International MEDLARS Policy Advisory Group Meeting

The third meeting of the International MEDLARS Policy Advisory Group was held at the National Library of Medicine November 5 and 6, 1975. It was agreed in 1972 that policy-level officials from the Library and each of the countries with which NLM has a bilateral MEDLARS arrangement should form an International MEDLARS Policy Advisory Group which would meet periodically. The members of the group and the Directors of the MEDLARS Centers who participated were: Miss Averill M. B. Edwards, Liaison Officer, representing Dr. George Chandler, Director, National Library of Australia; Dr. Jack E. Brown, Director, Canada Institute for Scientific and Technical Information and Mrs. Mary Lynne East, Tape Services, Canada Institute for Scientific and Technical Information; Dr. Philippe Laudat, Scientific Director, and Dr. J. Zeraffa, MEDLARS Project Officer of Institut National de la Sante et de la Recherche Medicale (INSERM), France; Dr. H. Thimm of the Federal Ministry for Youth, Family Affairs and Health, and Dr. Rolf Fritz, Director, MEDLARS Center of the Deutsches Institut für medizinische, Dokumentation und Information (DIMDI), Germany; Mr. Tojiro Oka, President, The Japan Information Center for Science and Technology (JICST); Dr. Sune Bergstrom, Rektor, and Dr. Goran Falkenberg, Medical Information Center of the Karolinska Institute, Sweden; Dr. Harry T. Hookway, Chief Executive of the British Library, Dr. Keith Barr, Executive Director, Lending Division, and Dr. Anthony J. Harley, Director, U.K. MEDLARS Service, the United Kingdom; and Mr. Seymour Taine, Chief, Office of Library and Health Literature Services of the World Health Organization.

The last meeting of this Group was in 1973, at which time NLM presented the basic elements for the new arrangements for MEDLARS II. As a result, all eight bilateral agreements were renegotiated to become effective in September 1974.

Donald S. Fredrickson, M.D., Director of the National Institutes of Health, welcomed the members of the International MEDLARS Policy Advisory Group to the NIH campus. Dr. Fredrickson observed that international cooperation in biomedical information serves as

a nerve center for biomedical research throughout the world. Scientific work can have no significance unless the information derived from it is made available to someone else. He considered two functions as vital: the gathering of information and its validation. The international network created by the countries represented by this Policy Group would appear to fulfill these two functions.

The objective of this policy meeting remained the same as that of the first meeting three and a half years ago: to provide an opportunity for all not only to share their current activities and future plans but to identify issues of a policy nature which should be discussed by all as a group, even though the mechanism for cooperation is bilateral between the National Library of Medicine and each participating country.

Among the issues examined at the meeting were:

1. The present policies and future plans of each country.
2. The availability of NLM data bases, with particular attention to TOXLINE/CHEMLINE.
3. Current issues based on the MEDLARS II/MEDLINE experience: information exchange at the policy level; national/regional services; networking; pricing policy; and technical cooperation.
4. Future sharing of resources and the provision of services.

The TOXLINE and CHEMLINE data bases, which are now included in the arrangements for MEDLINE (if the foreign centers so desire), contain proprietary information from Chemical Abstracts Service, Biosciences Information Service of Biological Abstracts, and the American Society of Hospital Pharmacists. Accordingly, representatives of these organizations attended the meeting to participate in the TOXLINE/CHEMLINE discussions. A mechanism was agreed upon whereby NLM would make TOXLINE/CHEMLINE available after negotiations between the non-U.S. Center and the organizational sources of the proprietary files had been completed.

The Policy Group agreed that Technical Workshops should be more oriented to technical problems, with a formal report made to all centers. The next Policy Group meeting will be in about two years. Three policy papers are to be prepared: the relation between a document delivery center and a bibliographic information center; building of data (not bibliographic) information bases; and networking. These papers are to be analytical, with specific issues identified. Although all Centers will contribute to the papers, primary responsibility has been assigned to one country (institution): document delivery to the British Library and the World Health Organization; data base building to NLM; and networking to Sweden.

New MEDLARS Partners

Three countries—Mexico, South Africa, and Iran—have met the technical requirements to enter into *quid-pro-quo* partnership arrangements with the National Library of Medicine for MEDLARS cooperation. These three countries join eight other NLM partners: Australia, Canada, France, Germany, Japan, Sweden, the United Kingdom, and the World Health Organization. The agreements, which continue to be truly cooperative in nature, are based on substantive scientific and technical considerations. The total impact of these bilateral arrangements is, in effect, an international network of biomedical information exchange.

Iran

The Iran MEDLARS arrangement is part of a broader cooperative effort. On May 12, 1975, a memorandum of understanding was signed by A. H. Samii, M.D., Minister of Science and Higher Education and Director of the Imperial Medical Complex of Iran, and Martin M. Cummings, M.D., Director of the National Library of Medicine, to further cooperative arrangements which will result in improved biomedical communications between both countries.

Since then, the Imperial Medical Complex of Iran has been developing the Pahlavi Li-

Amir H. Rezvani (left) of Iran received intensive MEDLINE training at the Library. Also receiving training were Mrs. Foroogh Koochek of Iran, Mr. Jorge Cervantes of Mexico (on her right), and Stefanus Rossouw of South Africa.

brary of Medicine as a national resource. Homayoun Amir-Ahmadi, M.D. was appointed Director and he has recruited key staff. Two of these, Mrs. Foroogh Koochek, Chief Librarian, and Mr. Amir H. Rezvani, MEDLARS Search Specialist, have been at the NLM for specialized training and a work/study program. The acquisition and organization of a core collection is well under way. The formal opening of the Library has not yet been announced.

On May 26, 1976, Dr. Cummings and Dr. Samii signed an amendment to this memorandum to initiate a *quid-pro-quo* arrangement whereby Iran will have access to the NLM computer on-line for MEDLINE search services. The MEDLINE operation was begun in September, 1976.

Mexico

For a number of years there have been discussions between the United States and Mexico on potential cooperation in biomedical information. The Minister of Health and Welfare of Mexico has recently created a Centro Nacional de Informacion y Documentacion en Salud (CENIDS), which will be responsible for providing biomedical information services to the health community of Mexico. A memorandum of understanding was signed on June 30, 1976 by the Secretary of Health, Dr. Gines Navarro Diaz de Leon, and Dr. Cummings for a MEDLARS arrangement with Mexico using the NLM computer on-line. Mr. Jorge Cervantes and Cesar Macias, M.D., of CENIDS have been trained at NLM as MEDLINE search analysts.

South Africa

On May 21, 1976, Professor A. J. Brink, President of the South African Medical Research Council and Dean of the Stellenbosch Medical School, signed a memorandum of understanding with Dr. Cummings for a bilateral *quid-pro-quo* arrangement on MEDLARS. The Medical Research Council of South Africa will have on-line access to the NLM computer to provide MEDLINE services within that country. Stefanus A. Rossouw, Director of the Council's Institute for Medical Literature, is responsible for biomedical information activities within South Africa. He has been at NLM for a specialized program in the organization, management, and implementation of biomedical information activities.

U.S. Delegation on Biomedical Communications to the Soviet Union

At the invitation of Dr. Dmitri D. Venediktov, Deputy Minister of Health of the USSR, a US Delegation on Biomedical Communications visited the Soviet Union from June 17 to July 1, 1976. The delegation was chaired by the NLM Director, Martin M. Cummings, M.D., and consisted of W. N. Hubbard, Jr., M.D., past Chairman of the NLM Board of Regents and Presi-

dent of The Upjohn Company; Miss Mary E. Corning, NLM Assistant Director for International Programs; and Dr. Vladimir Slamecka, Director of the School of Information and Computer Science, Georgia Institute of Technology. The Delegation's visit was under the aegis of the US/USSR Agreement for Cooperation in Medical Science and Public Health.

For a number of years biomedical communication has been identified within the Agreement as an area for exploration and possible cooperation. At the personal request of Minister of Health Petrovsky, the NLM had received Professor Yurii P. Lisitsyn, Director of the All-Union Research Institute for Medical and Medico-Technical Information (VNIIMI), in September 1973, for three weeks. The purpose of the U.S. Delegation's trip was to explore further whether substantive areas could in fact be identified and recommended for cooperation.

The Delegation began its sessions in Moscow by meeting with Dr. Venediktov and his staff at the Ministry of Public Health. Visits were subsequently made to a number of institutions in Moscow, Riga, Kiev, and Tashkent.

In Moscow these included VNIIMI, the Central State Medical Scientific Library, the Lenin Library, the All-Union Institute of Scientific and Technical Information (VINITI), the USSR Academy of Medical Sciences, the Moscow Scientific Research Institute of Pediatrics and Child Surgery and its Department of Scientific and Medical Information. In Latvia, the Delegation met with the Minister of Public Health, officials in the Institute of Organic Synthesis of the Academy of Sciences, and the Riga Medical Institute and its Department of Scientific and Medical Information. The staff of the Institute of Cybernetics of Kiev in the Ukraine and of the Republic Libraries in both the Ukraine and Uzbekistan also met with the U.S. Delegation.

Oral agreement was reached on several areas which could be considered for possible collaboration in the near future: (a) exchange of biomedical literature; (b) interlibrary loan (photocopy of research articles on a page for page basis) using the Telex linkage between the Soviet Ministry of Health and DHEW for requests; (c) exchange of personnel in the specialties of nomenclature or indexing. It was thought possible to consider the development of pilot projects in nomenclature in public health and exchange of bibliographic information in toxicology and pharmacology. Deferred was any consideration of projects involving computer software technology.

Copyright Protection Abroad

The Register of Copyrights and the Department of Health, Education, and Welfare General Counsel have officially stated that the publications of the National Library of Medicine and the machine-readable data bases from which they are produced have copyright protection outside of the U.S. and are covered under the National Treatment Clause of the Universal Copyright Convention. Thus, NLM claims copyright protection for its publications in those countries which copyright their government publications.

Beginning in 1976, therefore, the publications of the Library, including *Index Medicus*, *Abridged Index Medicus*, *Monthly Bibliography of Medical Reviews*, *Current Catalog*, recurring bibliographies, and all special serial or monographic publications carried the copyright symbol and the following statement: "All or portions of this publication are protected against copying or other reproduction outside of the United States in accordance with the provisions of Article II of the Universal Copyright Convention."

Public Law 480 Program

The Library's Special Foreign Currency Program, authorized by Public Law 83-480 made 16 new awards for a total of 113 scientific projects in 7 countries during FY 1976 (and the transition quarter). Under this program, appropriations of U.S.-owned local foreign currencies are available for scientific writing projects in cooperating countries, including Egypt, India, Israel, Pakistan, Poland, Tunisia and

Yugoslavia. This program enhances the Library's ability to procure and disseminate published information which is important to the progress of biomedical sciences and public health, using foreign scientific personnel and resources.

Included among the projects in the seven cooperating countries are the preparation of critical reviews of biomedical research and practice; the translation and publication of significant current and historical monographs in the biomedical sciences; publication of major international symposia and conference proceedings; and publication of authoritative bibliographies and other literature tools in special public health fields.

Examples of new projects activated in FY 1976 include a critical review of the transport of lipoproteins through the arterial wall, which will be part of a forthcoming book on atherosclerosis; a state-of-the-art review of muscular dystrophy and related diseases; and a study on chronic dialysis of the blood (circulation through an artificial kidney) as a way of life. Among some of the books published in FY 1976 under this program were Dr. Jerzy Lisiewicz' comprehensive review of *Hemorrhage in Leukemias* (Warsaw: PZWL, 1976), and the first English-language abridgment of a major, six-volume classic in the history of public health, *A System of Complete Medical Police, Selections from Johann Peter Frank* (Baltimore: The Johns Hopkins University Press, 1976). For a complete listing see Appendix 3.

International Services

NLM provides interlibrary loan services to institutions in non-AID countries throughout the world on a fee-for-service basis. The level of activity was about 6500 loans (FY 1976 and transition quarter) with Canada, Japan, and Mexico accounting for 62 percent. Under the auspices of the U.S. Agency for International Development, NLM annually provides over 21,000 services to 48 developing countries

Many individuals and groups from around the world visit NLM to tour the facility

where AID has health programs or interests. The services consist of interlibrary loans, reference, MEDLINE searches, and subscriptions to *Index Medicus* and *Abridged Index Medicus*.

Foreign Visitors

The NLM welcomes a number of professional visitors and delegations from abroad, totaling about 1,000 annually. During FY 1976 these individuals represented 49 countries and many areas of interest—physicians, researchers, information specialists, librarians, and officials charged with developing a national biomedical information system. Specialized programs were developed to enable NLM staff and these visitors to exchange views on problems of mutual interest.

Formal delegations included those from the USSR in the fields of cancer, cardiovascular disease, library, and intellectual property (patents); 18 architects from the People's Republic of China; and planning and study groups from Japan, the Netherlands, and Germany.

Professor Vulimiri Ramalingaswami, Director of the All India Institute of Medical Sciences, was a Fogarty International Center Scholar of the National Institutes of Health. He was in residence at the National Library of Medicine, using its resources for his writings. Dr. O. K. Harlem completed his NLM Visiting Scientist program and returned to his duties in Oslo, Norway.

Mr. Colin Freeman, Principal Librarian, Life Sciences, of the National Library of Australia, is responsible for implementing the biomedical bibliographic information services of the National Library of Australia and for developing a library network. He spent three weeks at NLM meeting with staff to explore these topics and discuss mutual problems.

International Meeting of ICSU AB

The Library hosted the 1976 meeting of the International Council of Scientific Unions Abstracting Board (ICSU AB) in Bethesda, Maryland. Representatives from 33 member bodies and scientific and technical information organizations attended from 12 countries. Topics discussed included a five-year plan, the development of an Aggregate List, bibliographic data, cooperation with the activities of the Commission of European Communities and EURONET, and on-line services. Special reports were given from working groups in publications, biology and chemistry.

NLM, Macy Foundation Sponsor Bicentennial Colloquium

On May 6 and 7 several hundred distinguished physicians, scientists and educators from this country and abroad gathered in the Masur Auditorium of the National Institutes of Health Clinical Center for a "Colloquium on the Bicentennial of Medicine in the United States." The Colloquium was hosted by the National Library of Medicine in cooperation with the Josiah Macy, Jr. Foundation.

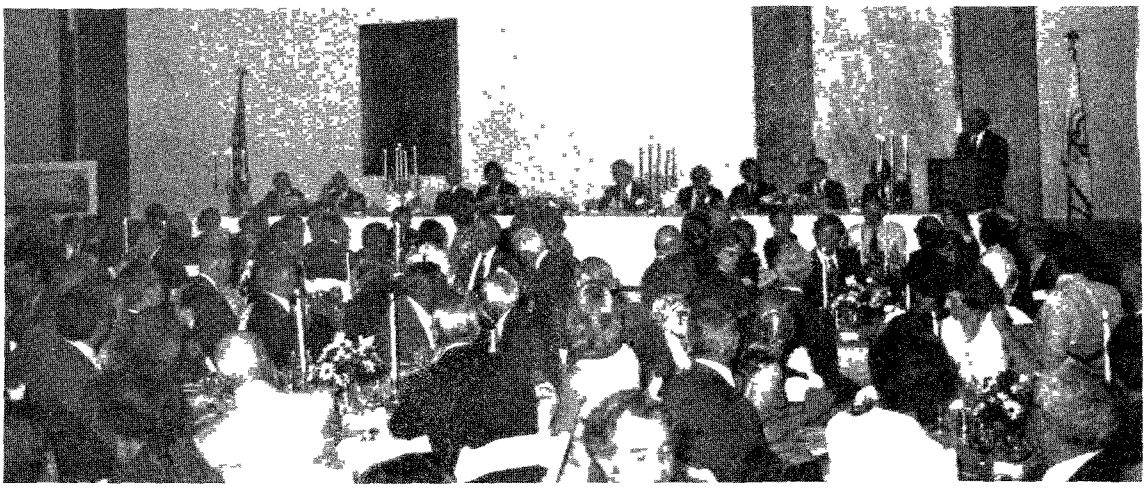
The essays presented were discussed first by a special discussant and then with full audience participation in the spirit of a true colloquy.

The essays are being published in a two-volume Festschrift by the Josiah Macy, Jr. Foundation.

On the evening of May 6, a special NLM Board of Regents dinner was held in the Library. Some 225 guests attended the function, the first of its kind ever held in the Library. The Main Reading Room was transformed into a banquet hall for the occasion. The guests of honor included notable figures who have played an important role in developing the Federal health effort and who have fostered NLM's programs: Health, Education, and Welfare Secretary David Mathews, Congressman Daniel Flood, former HEW Secretary Wilbur Cohen, former Senator Lister Hill, and former Surgeon General Luther L. Terry. The principal speaker was Chairman of the Board of Regents, W. N. Hubbard, Jr., M.D., who spoke on "The Utilization of Scientific Knowledge—The Role of a Medical Library."

In his comments, Congressman Flood said he was proud to follow in the footsteps of former Senator Lister Hill and the late Representative John Fogarty to champion "a vigorous national biomedical research effort and the effective dissemination of medical knowledge, as embodied in the programs of the research institutes and the National Library of Medicine here at NIH."

The closing lecture, "Quo Vadis, U.S. Medicine," was given by Dr. Philip Handler, President of the National Academy of Sciences, at the Smithsonian National Museum of History and Technology. This was followed by a reception-buffet.



The Library's main Reading Room on the night of the Board of Regents dinner

Miss Mary E. Corning, NLM Assistant Director for International Programs, whose recommendations to Dr. Cummings in 1973 led to this Colloquium and Festschrift, was the coordinator of the Colloquium.

THE WHITE HOUSE
WASHINGTON

May 4, 1976

Americans are proud that this nation's leadership in medicine has contributed so prominently to the relief of pain, the prevention of communicable diseases and the treatment of sick and disabled individuals in our own country and throughout the world.

It is most fitting that the National Library of Medicine is hosting a special Colloquium on the Bicentennial of U.S. medicine, and I am happy for this opportunity to welcome the distinguished foreign guests and U.S participants in this outstanding program.

Our great National Library of Medicine contains the world's published records of advances in medical science. But more than this, it uses this knowledge to provide information to all who need it for their research, education and health care services.

This Colloquium will serve both as a reflection on past accomplishments and as a bold acceptance of the challenges that lie ahead. I hope that it will be a rewarding and profitable experience for all who attend

Gerald R. Ford

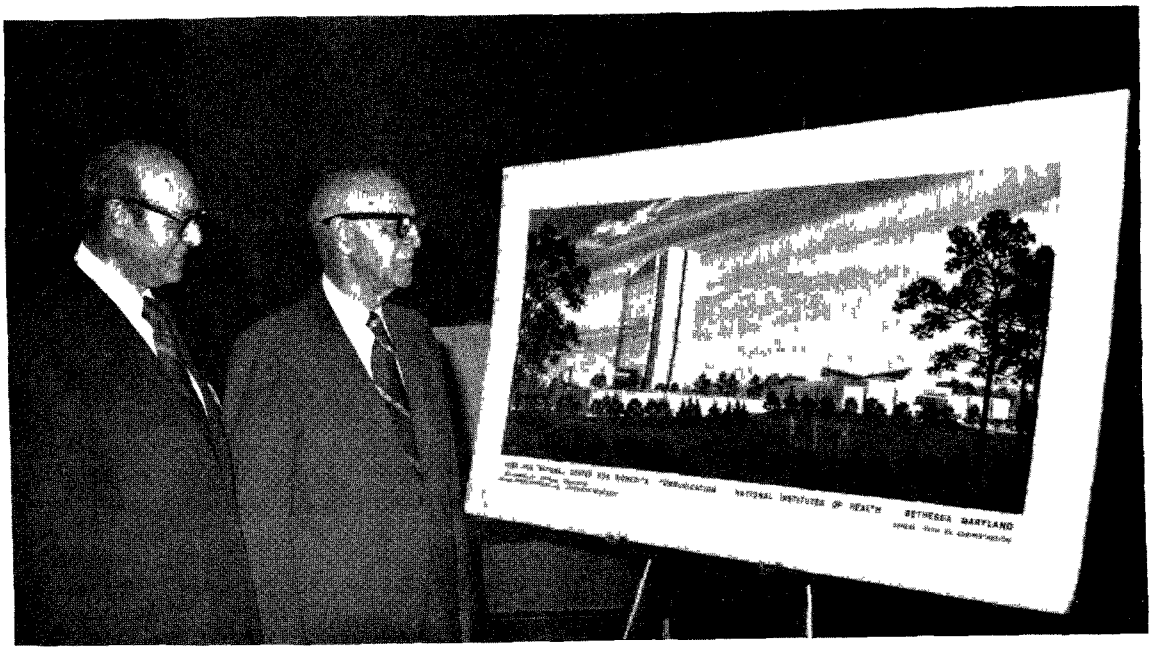
Colloquium Receives Messages from Senators Humphrey, Kennedy, and Magnuson

In addition to the letter from President Ford, messages to the Colloquium were received from three U.S. senators who have played important roles in the development of medical research programs in this country who were unable to attend. In his letter, Senator Hubert H. Humphrey of Minnesota recalled the many contributions of members of the health professions in our history. He noted the growth of the Library's collection and the importance of NLM's applying modern technology to the dissemination of biomedical information. "The quality of medical research and patient care depends on continued improvement and expansion of these activities."

Senator Edward M. Kennedy of Massachusetts sent a telegram to the Colloquium. He recalled the part played by his brother, then Senator John Kennedy, and Lister Hill in sponsoring the legislation that created a national resource—the National Library of Medicine—from the Armed Forces Medical Library. Senator Kennedy emphasized the importance of efficient and rapid dissemination of medical information. "Only when this information is utilized in the pursuit of research, education and patient care has society's patronage of science been fully repaid. Please accept my warm and high regards for this vitally important function."

Senator Warren Magnuson of Washington, in his message, said that Congress's high priority on health "has paid big dividends in terms of lives saved and an immeasurable amount of suffering prevented.... Our Federal investment in research has been most rewarding. Your host for this meeting, the National Library of Medicine, has been the world leader in providing medical library and information services."

At the Smithsonian Institution's reception, Dr. and Mrs. Philip Handler (center) chat with Miss Mary E. Corning and Dr. Cummings



Dr Cummings and former Senator Lister Hill view artist's rendition of the Lister Hill Center

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Appendix 4 NMAC Audiovisual Materials Produced—FY 1976

Motion Pictures—2
- "Management of Cleft Lip and Cleft Palate Deformities"
- "Clinical Rabies in Animals" (Revision)

Videotapes—47
- Project ACORDE Dental Videotapes (10)
- "Neuroanatomic Basis for Spinal Cord Disorders"
- Leaders in American Medicine (Series)
  - W. Montague Cobb, M.D.
  - Tinsley R. Harrison, M.D.
- "Medical Teaching Philosophies"
- Forensic Medicine Teaching Programs (Series) (11)
- Dental Consortium
  - "Head Posture and Its Role in Occlusion"
  - "The Removal of Simple Teeth"
- Scaling Techniques Series (10)
- "Examination for Venous Thrombosis or Pulmonary Embolism—Supplement Demonstrating Non-Invasive Diagnosis Instruments"
- "Basic Diagnostic and Treatment Procedures in Ophthalmology"
- "Controlling Infectious Aerosols: Precautions in Microbiology"
- "Controlling Infectious Aerosols: Minimizing Equipment-Related Hazards"
- "Use of Microtiter"
- "Inoculation of Fermentative Biochemical Set"
- "Understanding Immunofluorescence Tests"
- "Rubella: Clinical and Epidemiologic Aspects"
- "Auto-Immune Thyroiditis"

Slide Series (28)
- Pressure Ventilator Series
  - Part 1. Definition and Description
  - Part 2. Pressure Ventilator Control Unit
  - Part 3. Pressure Ventilator Breathing
  - Part 4. Preparation of the Pressure Ventilator for Use
  - Part 5. Use of the Pressure Ventilator with the Apneic Patient
  - Part 6. Use of the Pressure Ventilator with the Spontaneously Breathing Patient

- Basic Pathology Series
  - "Alcoholic Cirrhosis"
  - "Chronic Interstitial Pulmonary Fibrosis"
  - "Concepts in Basic Neuropathology"
  - "Infections of the Central Nervous System"
  - "Viral Hepatitis"
  - "Diseases of the Kidney: Glomerulonephritis"
  - "Inflammation"
  - "Acquired Valvular Heart Disease"
  - "Atherosclerosis and Coronary Heart Disease"
  - "Chronic Obstructive Pulmonary Disease"

Ophthalmology Series
"Ocular Emergencies Unit"
"General Ocular Examination"
"Red Eye and External Disease"
"Neuro-Ophthalmology"

"Examination for Venous Thrombosis or Pulmonary Embolism"

Human Physiology Series
"Introduction to Cellular Anatomy and Physiology"
"Physiological Control of Cardiac Output and Venous Return"
"Electrophysiology of the Heart"
"Regulation and Control of the Heart"
"Molecular Basis of Muscle Contraction"
"The Basic Structure and Function of Muscle"

Pediatric Ambulatory Series
"Child with Urinary Tract Infection"

NTIS (Print)
Clearance; the Glomerular Filtration Rate

Filmstrips (4)
"El Departamento de Registros Medicos"
"Audiovisuals un Medio de Comunicacion"
"El Archivo de Historias Clinicas"
"Fiebre amarilla y su Diagnostico Diferencial Histopatologico"

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