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Bringing the National Library of Medicine into the Computer Age: A Tribute to Frank Bradway Rogers

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In May 1983, the Medical Library Association (MLA) selected Frank Bradway Rogers to be the first recipient of the Information Advancement Award, which is sponsored by ISI®. The award recognizes the work of a "librarian who has made an outstanding contribution to the application of technology in delivering health sciences information."¹ Although many others have applied technology to advance medical librarianship, Rogers played a unique role in the application of mechanization and computers to medical information retrieval. In recognition of this, the MLA, with our blessing, decided that the award will henceforth be called the Frank Bradway Rogers Information Advancement Award.

Rogers was director of the National Library of Medicine (NLM) from 1949 to 1963, a crucial period in the life of that institution. The proliferation of medical literature in the postwar years posed a real challenge for the NLM. Rogers more than met that challenge, converting an old-fashioned institution into a modern organization, ready to enter the computer age.² During his splendid tenure, Rogers helped develop the Medical Literature Analysis and Retrieval System (MEDLARS), worked for passage of the National Library of Medicine Act, and spearheaded the successful drive to construct a new building for the NLM. Rogers was an energetic director, and personally tackled all the major problems that confronted the library.

Rogers was born in Norwood, Ohio, on December 31, 1914. After attending

Walnut Hills High School, Cincinnati, he went on to Yale University, from which he received an AB degree in pre-medicine in 1936. During the next two years, Rogers worked at several different jobs,³ first as a copyboy in New York for *Newsweek*, then as a bartender and bouncer back in Cincinnati. He later moved to Chicago, where he found employment as a claims adjuster for an insurance company. Finally, he was hired by Procter and Gamble, employed first to pass out coupons for products door-to-door, then as a field advertising crew manager. The fact that Rogers was able to obtain work time and again during the latter years of the Great Depression is evidence of one of his main virtues—perseverance.

In 1938, Rogers entered Ohio State University, where he received his MD in 1942. After working for a year as an intern at Letterman General Hospital, San Francisco, he took a commission in the US Army. Rogers served as a surgeon in the Philippines, for which he received the Bronze Star Medal. At the close of the war he spent two years in Japan as surgeon for the 25th Infantry Division. After returning to the US in 1947, he was assigned to Walter Reed Army Hospital, Washington, DC, as a resident in surgery. It was while he was at Walter Reed, in 1948, that Rogers noticed a job announcement that intrigued him. A new director was being sought for the Army Medical Library (AML), the predecessor of the NLM. Along with several other officers, he applied for the job. Rogers was subsequently interviewed by a commit-



Frank Bradway Rogers

tee consisting in part of Col. Joseph H. McNinch, the director of the library, Col. Harold Wellington Jones, director of the library from 1936 to 1945, and Luther Evans, the Librarian of Congress.^{2,3} Although Rogers was concerned that he would be considered too young to assume such a responsible position, he was given the job. From then on, he could pursue the two things that he loved most: medicine and books.

The library at that time was changing rapidly. Accordingly, McNinch wanted Rogers to have an in-depth knowledge of librarianship, and to have the credentials needed to command respect among the medical library community.² McNinch subsequently sent Rogers to the Columbia University School of Library Service to pursue an MS in library service. Meanwhile, McNinch remained as director. In 1949, after receiving his degree, Rogers became the seventeenth director of the library.

Several problems required Rogers's immediate attention. A survey of the AML conducted for the American Library Association (ALA) between 1943

and 1944 had found almost every aspect of the century-old institution—from the services it provided to the building it was housed in—deficient.⁴ Rogers's predecessors had begun to implement the recommended changes, but the modifications needed were far too radical and far-reaching to be accomplished quickly.

The library's funding was not always in line with its needs. The library was short on professional staff, and its post-1920 holdings were sparse.⁵ Moreover, its card catalog was so deficient that the reference staff had to spend an inordinate amount of time just hunting for books.

By 1954, Rogers had successfully implemented many of the recommendations of the ALA committee. He hired additional staff, worked to have the library's budget increased, updated the reference services, and instituted in-service training.⁴ Also, the AML was renamed the Armed Forces Medical Library.

However, the library's publication problems still remained unresolved. The staff compiled two of the three indexes to the medical literature then in use—the *Index Catalogue of the Library of the Surgeon General's Office* and the *Current List of Medical Literature*.⁶ The coverage of these indexes overlapped with the American Medical Association's (AMA) *Quarterly Cumulative Index Medicus*. In addition, the *Index Catalogue* had been out of date for years. As far back as 1920 there was a backlog of one million references,² and by the early 1950s, the number was expected to reach two million. The indexing problems in particular had plagued all of the library's directors and eventually McNinch requested outside help.

This help came in the form of the *Committee of Consultants for the Study of the Indexes to Medical Literature* Published by the AML. Created in 1948, the committee was chaired by Lewis H. Weed, Johns Hopkins University and the National Research Council. Subsequently, the chairman was Chauncey D. Leake, then of the University of Texas.⁷

To undertake research for the committee, the so-called Welch Project was established at Johns Hopkins's Welch Medical Library, then directed by Sanford V. Larkey. The project, which I became a member of in 1951, concentrated on finding a solution to the AML's publication problems, and on evaluating machine methods for indexing.⁸ It was during the course of my work on the Welch Project that I first met not only Rogers, but such dedicated people as Estelle Brodman, AML's head of reference; Seymour I. Taine, editor of the *Current List of Medical Literature*; and Samuel Lazerow, director of the library's acquisitions division.⁹ The Lazerow Memorial Lectures, which are delivered annually at several universities, are named after Sam.¹

The pattern in which the volumes were published was the primary reason that the *Index Catalogue* was so out of date. Following the format created in 1880 by John Shaw Billings, the library's first director, the citations were arranged in "dictionary" format, that is, in alphabetical order.¹⁰ However, each volume of the *Index Catalogue* covered only a fraction of the alphabet. For example, the last volume, which was published in 1955, only included citations covering the letters Mh through Mn.² The volumes came out once a year at best and it usually took 20 years to cover the entire alphabet. Thus, at any one time, only five percent of the citations were current, while the rest were at least two to 20 years old.

The backlog of unindexed publications was increasing at a phenomenal rate. During the war years the library received few publications from war-torn nations.¹⁰ But thanks to the acquisitions efforts of Rogers and the late Scott Adams,¹¹ publications from these countries began pouring in. Adding further to the library's backlog was the dramatic proliferation of scientific papers after the war. Given the hopelessness of the situation, it's no wonder that the Weed committee recommended that publication of the *Index Catalogue* stop.

With the *Index Catalogue* winding down, other publications such as the *Current List* and *Index Medicus* were receiving greater attention. The Welch Project had also devised a system for categorizing the subject headings used when indexing the medical literature.⁸ By categorizing the subject headings and then sorting them by machine, we could more easily compare the AML's subject headings with those of other authorities, thus facilitating standardization. Larkey and I spent the days discussing these terms and sent recommendations to Taine. He and Rogers further refined the Subject Heading Authority List. In fact, the list was adopted by many other medical libraries and was the forerunner of the NLM's Medical Subject Headings (MeSH). Robert Hayne,¹² assistant editor of the *Current List*, was also heavily involved in this work as were Helen Field and Williamina Himwich, both members of the Welch Project.

Rogers has written that the study of subject headings and the elaboration of the concept of categorization was the Welch Project's "greatest achievement" and "their most important contribution to the development of medical bibliographic practice and the subsequent emergence of powerful new systems."¹³

If my days at the Welch Project were spent discussing medical history and subject headings, my nights were spent studying machine methods for indexing. To speed the compilation of the *Current List*, I developed a system employing IBM punched cards.¹⁴ Later, this was modified and combined with the use of special Listomatic cameras. This system was formally implemented later when I acted as a consultant. The Index Mechanization Project, as it was called, is thoroughly described in a supplement to the *Bulletin of the Medical Library Association*,¹⁵ prepared by Taine.

The punched-card system did not prove to be a practical method for retrieving bibliographic citations.¹⁶ Nor were punched-card methods totally reliable for compiling the *Current List* or *Index Medicus*. There was always the

chance that the huge stacks of sorted cards would be mixed-up.¹⁷ Also, the machines did not sort as fast as desired to compile bibliographies regularly. This was a serious drawback, since selective bibliographies were becoming more and more important.

In an effort to solve these problems, Rogers learned as much as possible about computers. At that time, business and government agencies were just starting to use them. He took courses in computer operations and symbolic logic, and consulted with computer experts. In 1959, Rogers and Taine, then chief of the library's index division, drew up specifications for a system that would allow the library both to keep up with its indexing chores and quickly retrieve bibliographic information.¹³ Thus, MEDLARS was born.

Taine and Rogers selected General Electric to design and implement MEDLARS. It required 30 man-years of programming effort to work out the best design for the system.¹³ But the effort certainly paid off. MEDLARS, which began operation in January 1964, enabled users to search the library's vast data base much more quickly and comprehensively than before. The MEDLARS data base also provided the source data for more than two dozen publications such as *Index to Dental Literature* and *International Nursing*. In addition, it improved the currency of *Index Medicus*, which was being published again after a hiatus of several years. In 1960, *Current List of Medical Literature* was changed to *Index Medicus*. This title switch was accomplished when the AMA discontinued the *Quarterly Cumulative Index Medicus*. GRACE, for Graphic Arts Composing Equipment, was a high-speed printer specifically designed for the MEDLARS system by Photon Incorporated. In its day, GRACE was the world's fastest photocomposer—operating at a speed of 3,600 words per minute. As I mentioned in a previous essay,⁶ GRACE laid the groundwork for much of the photocomposition in use today.

To permit greater access to its vast store of data, Adams recommended that MEDLARS be decentralized as soon as possible.² To accomplish this, the NLM created a network of MEDLARS centers throughout the US. Each center had its own copy of the MEDLARS tapes and could provide literature searches to local requesters. The NLM also helped establish MEDLARS centers in Canada, France, Federal Republic of Germany, Japan, Sweden, the UK, and at the World Health Organization in Geneva.¹⁸

By any reasonable measure, the MEDLARS project was successful. But in Rogers's view, MEDLARS was not his most significant accomplishment at the NLM.³ Rogers feels that passage of the National Library of Medicine Act in 1956 was even more important. As a result of this bill, sponsored by then Senators Lister Hill and John F. Kennedy, the Armed Forces Medical Library became the NLM. According to Naomi C. Broering, Georgetown University Medical Center, the library was then authorized to function as the nation's primary collector and distributor of medical information.¹⁹ The bill also bolstered the library's management by adding a knowledgeable and supportive board of regents.⁵ And finally, the passage of the bill paved the way for the construction of the new NLM building in Bethesda, Maryland.

It's hard to exaggerate the importance of the new building. The previous building was obsolete and crowded within 30 years after its construction in 1887. During rainy weather it leaked, when temperatures dropped it became uncomfortably cold, and it was infested with birds and rodents.⁵ Although as far back as 1920 the library had been promised a new building, construction was delayed time and again for lack of funds. But thanks to the National Library of Medicine Act, a new building was finally completed in 1962.

While at the NLM, Rogers also became an authority on Billings, who had been director of the AML's predecessor—the Library of the Surgeon Gener-

al's Office—from 1865 to 1895. Rogers greatly admired Billings, who is widely credited for his efforts in organizing and developing the library that Rogers came to direct. In what he described as a "labor of love," Rogers compiled Billings's works in his 1965 book, *Selected Papers of John Shaw Billings*.²⁰ Heretofore, the papers had been widely scattered and nearly inaccessible to researchers.

Rogers also began a long professional relationship with Adams, whose career I discussed in a recent essay.¹¹ He first met Adams in 1948. At the time, Adams was filling in for the civilian head of the AML, which gave him the awkward title, Acting the Librarian. Although Adams left the AML in 1950 to become librarian of the National Institutes of Health, he returned in 1960 to work as deputy director under Rogers. Rogers and Adams collaborated on a number of projects. Perhaps the most significant was the *Guide to Russian Medical Literature*.²¹ Rogers had great respect for Adams's talent as a librarian and writer. Recently, he wrote a moving obituary of Adams for the *Bulletin of the Medical Library Association*.²²

Rogers's next career move came in 1963. In need of a change after 14 years at the helm,²³ he left the NLM to become librarian of the Denison Memorial Library, University of Colorado Medical Center. He continued in that position through 1974. When Rogers became librarian, there was little organizational structure to the institution. No one knew to whom they reported, there were no reference services of any kind, and the collection was small. At the end of his tenure there was a full-fledged reference section, a clear hierarchical staff order, and a respectable collection. Moreover, in 1965, the NLM awarded a contract to the University of Colorado to operate a MEDLARS search center.²⁴ This was the first operational peripheral MEDLARS center.

Never afraid to "get his hands dirty," Rogers was also heavily involved in the day-to-day operations of the library. For

example, he revised the library's subject catalog to conform to the annual revisions in MeSH. In a 1968 paper, Rogers described the amount of work involved in making the changes. "[The project] required 240 man-hours, or six weeks," he wrote. "While I happen to find this kind of task congenial, I do begrudge the long hours involved."²⁵

On occasion, Rogers also performed searches for MEDLARS users. In his 1974 paper, "Computerized bibliographic retrieval services,"²⁶ Rogers offers illuminating insights into "a day in the life of a search analyst." His clients that day included medical students, local physicians, and a graduate nursing student. While some of the search requests were specific, others were so broadly defined that much of his time had to be spent in question negotiation and in developing search strategies. During that typical day, he spent "only" 142 minutes actually at the terminal.

Throughout the years many organizations, apart from his employers, have tapped Rogers's expertise. From 1958 to 1961, he served as chairman of the Joint Committee on the Union List of Serials. In 1962, he was elected president of the MLA. Rogers has also served as chairman of the Library Technology Project Advisory Committee and as president of the American Association for the History of Medicine.

Rogers's many achievements have not gone unheralded. Besides the Information Advancement Award mentioned earlier, in 1961 he received the Marcia C. Noyes award from the MLA "for outstanding achievement in medical librarianship." In 1963, he received the Melvil Dewey Award of the ALA "for creative professional achievement." In 1964, he received the UK's Barnard Memorial Prize "for distinguished services to medical librarianship."

Although formally retired, Rogers is still an active contributor to his field. He is a member of the mid-continental chapter of the MLA and the Colorado Council of Medical Librarians. He has been working on some biographical

sketches for the new edition of the *American Medical Biography*, and is preparing a short biography of Adams to be published in the *Encyclopedia of Library and Information Science*. But he spends most of his time these days repairing damaged medical books. This is a complex procedure that basically involves taking the book apart by separating it into its component sections, mending the torn pages, resewing, and then rebinding. Rogers has also attended many seminars on the craft of conservation bookbinding, and was taught by a professional bookbinder. He has repaired books for the Denver Botanical Garden, Denver Medical Society, Albany Medical College, and many other organizations. He has also restored at least one cookbook for his wife, Barbara.

It is characteristic of his unabated curiosity that Rogers has joined the personal computer generation and is now quite *au courant* with the abilities of the microcomputer. When I first demonstrated the *ISI/BIOMED*[®] system to him I felt as though we were transported back to those days 30 years ago in Baltimore when I first showed him what we had done with our primitive punched-card system. A lot has changed since those days but we still have a long way to

go. As another one of my heroes, Vannevar Bush, once said, "Research is an endless frontier."

Recently, when discussing his admiration for Billings, Rogers noted that medical librarianship, like any field, needs heroes.³ Unless one recounts the incredible accomplishments of a figure like Billings,²⁰ it is impossible to appreciate the implications of the assertion that Rogers more than amply lived up to the precedent established by Billings, a giant in the history of medicine and medical bibliography.²⁷ In addition to bringing the NLM into the computer age, Rogers authored numerous papers on various topics in medical librarianship, a selection of which appears in the references to this essay.²⁸⁻⁴⁶

Brad Rogers has remained one of my heroes. In spite of many differences of opinion, I was delighted that the MLA chose to honor him in a unique and permanent fashion.

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