

## Scientists as Librarians: A Historical Review

### 図書館人としての科学者：歴史的展望

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#### 要 旨

図書館の仕事が特別の教育と経験を必要とする専門職として確立されたのは19世紀のことで、それ以前は普通、専門の教育をなにも受けていない人達に図書館の運営がまかされていた。学者の中から館長を任命し、実際の仕事は教育もより低く、安く雇える人達にまかすことが行なわれた。結果として、欧米では何人もの有名な科学者が図書館長の職につき、その人達の知的能力が図書館活動の質の向上に役立った。

例えばライプニッツは微分積分学の原理を発見した人として名高いが、同時に彼は、従来蔵書についての情報は人の記憶のみに頼っていたハノーバーのブルンスヴィック公の図書館に、目録を作る必要を認め、更にその作業の過程で主題分類というものを考えた。その他、現在の電子計算機のもととなった原理を使った計算機を作ったりした。

また、ゲーテは、ワイマールの図書館の改善に努力し、幾つかの図書館が共通で使用できる分類法を考察し、著者名及び主題による目録を作り、貸出のシステムを考え、更に相互貸借の組織をつくって、これを実行に移した。

この他にも何世紀もの間に、何人もの科学者が情報源の探索の必要性に気付いて、書誌や索引の編纂者となっている。

しかし、図書館そのものの性格まで変えさせるような影響を与えた科学者としては、ジョン・ショー・ビリングス、ジョセフ・ヘンリー、アサートン・セイデル、フランク・B・ロジャース、サンフォード・V・ラーキーなどの人達をあげることができる。

今日の米国国立医学図書館(NLM)の基礎をきずいたビリングスは、医学分野の書誌作成及び図書館活動に分業という新しい方法を持ち込み、給料が安い女子を記録やファイリングなどの簡単な作業に使用する先鞭をつけた。また、網羅的な医学文献や探索の道具として名高い *Index-Catalogue* の出版をはじめた。同様にヘンリーは、*Royal Society Catalogue of Scientific Papers* の出版を実現させ、化学者のセイデルは *Current List of Medical Literature* を生み出したばかりでなく、マイクロ・フィルムの図書館活動への導入に多大の貢献をなした。また、彼は American Documentation Institute の創設者の一人でもあった。

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エステル・ブロードマン： ミズリー州セントルイス、ワシントン大学医学部教授・図書館長；1962年度図書館学科訪問教授

第2次大戦直後の陸軍医学図書館 (NLM の前身) の館長のマックニッチ大佐は、*Index-Catalogue* の出版が困難になった情況に直面し、図書館活動が盛んにならなければ、その図書館の書誌作成活動も盛んにならないことに気付き、館員数を増して、専門の図書館員を雇い入れた。また、図書館や書誌活動にオートメーションを取り入れることについての調査をジョンズ・ホプキンス大学の医学図書館を使って始めた。ラーキーはこの大学の医史学の準教授であると共に、医学図書館長であった。彼の機械化への努力が後の NLM の書誌のオートメ化にも貢献している。

MEDLARS 出現に段取りの役をしたのが、NLM の前館長のロジャーズ大佐である。彼は医者であるばかりでなく、館長の職につくために図書館学校も卒業している。図書館の専門家でもあるため、他の人達と同じグループに入れることはできないが、彼なしでは今日の NLM が存在したかどうか疑問なほど図書館界に大きな貢献をした。(Y. T.)

### Introduction

It is only in the past century that librarianship has been a settled profession, requiring special training and experience. Previous to that time it was customary in every country with libraries throughout the world, to place in charge of them schoolteachers, retired clergymen, worthy widows, part-time practitioners of some other profession, or others without specific training in what was, after all, a new field. In some cases it was the usual habit to name a member of the group who used the library as titular head, while appointing some less well-educated or cheaper worker as the actual doer of the many tasks required. This latter system was particularly used in the East and in continental Europe, while the first plan was more common in the British Isles and the United States.

As a result of this system, a number of famous scientists in Europe and the United States have served as librarians for a time, and many of them brought to the practice of librarianship the same intellectual abilities that led them into science in general. We are still heirs to the efforts of such people as Goethe and Leibnitz in Germany, Pettigrew and Richardson in Great Britain, Billings, Greene, and Rogers in the United States; as well as such early librarian-indexers in medicine as a Beughem in the Netherlands and Ploucquet in Germany. At this point in time, when so much emphasis is laid on the necessity for

specialized training in librarianship, it is, perhaps, desirable to recall the gifted amateurs who helped make our scientific libraries what they are today.

Of the people just mentioned, undoubtedly Leibnitz and Goethe are the most famous, and it is therefore appropriate to discuss their contributions first.

### Gottfried Leibnitz, 1646-1716

Although Gottfried Wilhelm Leibnitz is most famous for his discovery of the principles of the calculus, he was also pre-eminent in the fields of natural philosophy, logic, and even politics and diplomacy. Every country seems to have one period when it blooms in many fields, and for the German states this seems to have been in the late 17th and early 18th centuries, when polymaths can be found in numbers. This late German Renaissance saw, also, the development of ducal libraries (such as those in Hanover and Gottingen and Weimar) which became the ideals for all the other European countries. Thus, Carlyle, testifying before a Royal Commission on the British Museum library, pointed to the library at the University of Gottingen as the one on which the British library should be based.

This was also the time, throughout Europe, when science and belles lettres were changing from the occupation of the rich amateur to that of the individual who spent his whole life in it and earned his living from his work.

It was, therefore, not unusual for many of these positions to be the gift of some patron of the scientist or literateur, and to this group belongs Leibnitz' work with the library of the Duke of Brunswick in Hanover.

Leibnitz was the son of a Leipzig Professor of Philosophy and early showed his unusual gifts. At the age of eight he had studied the classics and was so proficient in these languages that by the time he was twelve, he was writing verse in Latin, as well as translating Greek plays. At fifteen he entered the university as a law student, but he also became interested there in differing philosophies on nature, in psychology, and in mathematics; and by the age of twenty-one he had been offered and accepted the position of revisor of the legal system of Mainz. He also decided at that time that an understanding of any human system required a study of its history, and from that point on, all of Leibnitz' works contain historical explanations.

After ten years in Mainz, during which period he acted as Ambassador to France for the Elector, Leibnitz accepted a position with the Duke of Brunswick, and spent the remaining forty years of his life in diplomacy, historical research, and in running the ducal library in Hanover. It is to the last that we will now turn our attention.

Although the Hanoverian library was large and impressive, it had not been cataloged or arranged for the ease of the user. This had been less of a problem when the collections were small and it was possible for the librarian to keep in mind the contents and positions of each of the items in the library than it was when it grew larger. It was Leibnitz, however, who first clearly saw that the library should not be dependent upon the memory of any one individual, who was likely to die or be sick or go away, and he began an investigation of the best ways of providing the reader with objective information. One of the things which he did was to devise a classification system, both to show where the physical books were to be placed in logical order, and provide the basis through its hierarchical ar-

range for a subject conspectus of the contents.

Still another piece of work which Leibnitz started was taken over by librarians several centuries later; that is the "calculating engine" which is the basis of today's adding machines and computer. Because of the technology of the time, Leibnitz had to use mechanical gears to move the elements of the calculator, and since these gears could not then be fabricated with the fine tolerances required, the machine did not work accurately, as Babbage in England also found almost a century later; but the theoretical bases of Leibnitz were the same ones later used for successful machines of this type.

#### **Johann Wolfgang Goethe, 1749-1832**

Goethe, like Shakespeare in England, Tolstoy and Dostoevsky in Russia, Dante in Italy, and Voltaire in France, is part of that international group of towering geniuses in literature which have become the birthright of readers throughout the world. But unlike these others, Goethe can also claim fame as an embryologist and zoologist par excellence, a painter of no mean stature, a philosopher, a theatre manager, and a librarian.

Although Goethe took on public duties in Weimar in 1775, he only began to give a great deal of his attention to libraries from 1788; but from that date until the end of his life in 1832, Goethe was concerned almost daily in planning or overseeing the work of great libraries. (How many present-day catalogers will agree with his letter to Schiller in 1802, when he had just brought out a catalog of the Büttner Library, "It's been with me as I suspect it always is with one's work, just when one is congratulating oneself on having finished a good piece of work, all hell breaks loose.")

Goethe's interest in libraries occurred just at the time that he was turning more and more to the study of objective nature, and side by side he studied the world about him and the world of librarianship. When he arrived as

the Chairman of the ducal library commission, he found several libraries, none of them cataloged, many of them in unsuitable, damp quarters, none of them well-arranged, and all with individual rules and supervisors. By the time he died, he had seen the books well-housed, the various libraries using the same systems (some of them physically united), he had started both a name and a classified subject catalog, the books in the pure and applied sciences had been classified by his own scheme, and a circulation system, complete with a loan book record, in operation. In addition, he had laid philosophical bases for the things he did, so that after him librarianship at its best could never again be the idiosyncracies of one powerful individual.

It must not be thought, however, that Goethe was above placing his own ideas and powers above those of any other person or group, such as the time he calmly broke through a wall to the medical school's conference room, because the faculty of that school did not wish to give up the room to the university library and Goethe thought it was the only logical extension of library space. But fact is that his overbearing sweeping away of those in opposition was accompanied by ideas that were not only right but ahead of his time; and his ruthlessness thus became a necessity, without which his ideas would never have been tried. Even so, in some matters he lost—as in his desire to make a union catalog of the three libraries in Weimar and Jena, or in his feeling that the accessions register of a library would “wither away” when a good catalog came into being. What we remember him for, however, even more than for his catalogs, his liberal loan policies, his establishment of the first system of interlibrary loans, his production of copies of catalogs for schools at a distance, and his insistence that even famous professors must bring back library books on time and in good condition, was his ability to place the problems of librarianship on a systematic basis, so that their laws could be investigated scientifically.

### Karl Ernst von Baer, 1792-1876

Like Goethe, Karl Ernst von Baer is remembered in science mostly for his work in embryology. His examination of the mammalian egg and the changes it undergoes laid the foundations of all future work in this field, and his beautifully written and wonderfully illustrated monograph on this subject (published in 1827) is a treasure in any library which possesses a copy. Like Goethe, and Virchow, also, von Baer pursued a great many other scientific and political interests. A German born in Lithuania who left Prussia to live in St. Petersburg in Russia, because of a fancied lack of German interest in his work, von Baer spent a number of his years in Russia in natural history expeditions in various unmapped portions of northern Russia, and his reports on these expeditions, describing the flora and fauna and the human inhabitants of the region, are classics in the field.

Von Baer came to St. Petersburg (now Leningrad) in 1834, although he had visited the city as early as 1828. He found it difficult, however, to have his personal library transferred from Königsberg in Prussia to St. Petersburg and he felt very hindered in his work by the lack of his books. He therefore frequented the Library of the Petersburg Academy of Sciences. Here he found (at least in the foreign section) that all was chaos. His biographer, Raikov<sup>1)</sup> reports that the 70,000 volumes in the foreign section were in no order and there was no catalog to direct users either to the contents of the collection or the physical whereabouts of the individual volumes. Rarities were intermingled with routine publications, and superannuated librarians moved back and forward trying to find where any item might be, by imagining where they would put it if it came into their hands. Physically, also, the library was difficult to work in because it could not be heated, and in the long Russian winters the ink froze in the inkwells and staff and readers alike worked in fur coats and with fur mittens.

Immediately von Baer took on the job of

bringing order out of chaos. The first thing he undertook (in 1836) was the production of a subject catalog, which he finished in two years. He then set about to arrange the books in a classified order, to provide services to readers, and finally to open the library precincts to users other than members of the Academy. Like Leibnitz, von Baer gave careful attention to a classification scheme which would be appropriate for scholars working in a scientific collection, and his scheme and the form of his catalog became the basis for all further catalogs of the Academy. Moreover, this catalog was one of the ones which John Shaw Billings examined before producing his *Index-Catalogue of the Library of the Surgeon General's Office*, so that von Baer's work as a librarian in Russia had repercussions in the United States and through the pre-eminence of Billings, throughout the world.

A large number of scientists over the centuries have been aware of the problems of locating information, and have become bibliographers and indexers of the world's literature. Conrad Gesner, the "father of bibliography"; Albrecht von Haller, the indefatigable abstractor of scientific literature; Ploucquet, the medico-legal expert who first noted that expansion of the lungs occurs at birth and therefore proof of whether a child was stillborn could be obtained by examining the lungs—all these published extensive bibliographies in scientific fields. But for librarian-scientists who changed the character of libraries in general, we must look to such people as John Shaw Billings, Joseph Henry, Atherton Seidell, Frank B. Rogers, and Sanford V. Larkey, who directed librarianship into new ways of thinking and acting.

### John Shaw Billings, 1838-1913

The National Library of Medicine, now in Bethesda, Maryland, stands pre-eminent in medical librarianship throughout the world and an exemplar of national libraries in a subject field. When it was first taken over by John Shaw Billings, a Civil War (1861-65)

physician and surgeon, at the end of that conflict, however, it was little but a handful of books in a dusty ex-theatre. Moreover, there was serious opposition to its becoming anything else, with both the American Medical Association and the Smithsonian Institution making overtures for becoming a national medical library. What changed the situation was the ability of Billings to use the newly-emerging factory system to produce and distribute its publications and services to a wider group than any previous library had felt it was its duty to serve. In doing so, Billings changed the concept of medical bibliography, the role of a medical library, and the responsibility of a national government to serve all its citizens and many foreigners also through its libraries.

As Billings began to add substantial numbers of books and journals to the Library of the Surgeon-General's Office (as it was then called), he realized that some quick conspectus of the contents of the collection had to be presented to users, many of whom were not physically in the same city as the Library. He also realized that to do it by the old, scholarly methods used in libraries traditionally would make the keys to the literature much too expensive to produce. He, therefore, devised a system where mere clerks were given tasks which required very little training, but which were so standardized that each output could be added to every other output interchangeably. In this way, scholars were only required and used at certain stages of the work. In order to make the cost even lower, Billings devised systems for using women, always less-well paid than men, in a kind of "cottage industry" for copying and filing.

In the publication of the *Index Medicus*, which came out monthly or later quarterly, therefore, Billings presented to physicians everywhere the latest information from the books and journals he was acquiring regularly and in large amounts. On the other hand, he realized that for retrospective searching such a publication was tedious and time-consuming, and so he devised the *Index-Catalogue*, which

presented under subject headings a conspectus of the literature on that subject for about twenty years. He thus accepted another of the precepts of factory work—and one taken over by computer users too—that a single piece work should be used in as many ways as possible, rather than doing the same work over and over again.

John Shaw Billings, of course, was not the only one who had seen these problems and tried to solve them. The British Association for the Advancement of Science, prodded by the American, Joseph Henry, then Secretary of the Smithsonian Institution, and one of the foremost physicists of his time, (for whom the electrical quantity, the Henry, is named), had gone along somewhat this same track with its plans for the Royal Society Catalogue of Scientific Papers. In the Smithsonian Institution's own Library, also, the then librarian, Henry Jewett, had proposed the printing of catalogs and indexes through stereotype plates, on which bibliographical citations could be stored, and which could be combined and recombined in various ways as need arose. All of these methods foreshadowed the successful one by Billings, a system which worked from the mid-19th to the early part of the 20th century, and which only fell down when there was a quantum jump in the amount of literature which had to be handled.

When that time came, fortunately, new technologies were arising which gave promise of solving the problem for the time being, and it was the ability of such people as Atherton Seidell, a chemist; Joseph McNinch and Frank B. Rogers, Army surgeons, and Sanford V. Larkey, physician, medical historian, and librarian of the Johns Hopkins Medical School, that brought about the new forms of librarianship we now see.

#### Atherton Seidell, 1878-1961

Atherton Seidell, a chemist with a private fortune augmented returns from the sale of *the* standard handbook on chemical solubilities, was one of those charming, persistent, tedious,

beloved, frustrating, and inspired prophets who has a message for mankind and will not be stopped. Like Martin Luther King, he had a dream, and the realization of that dream was the work of the latter part of his life.

To Atherton Seidell, microfilm was the answer to the larger question of providing service to all those who need scientific data, whether they were close to a library or not. His aim was always to see that scientific advances were brought to the attention of those who might add further to knowledge or who would use knowledge gained for the betterment of mankind. Like many another enthusiast, however, he found as time went on that the media became the message to many people, who failed to see, as he did, that microfilm was merely a means to an end; and in the end he was sometimes shunned by people who were tired of hearing about microfilm as the savior of science—a topic about which he would discourse at length and in great detail.

Dr. Seidell realized that two things were necessary to bring about his goals: those who needed the information must be told what existed, and the technology of microfilm production and machines to read it must be improved and made very cheap. He set out to do both things; and almost single-handed and with his own funds produced the *Current List of Medical Literature* during World War II, when the regular indexes to medicine were unable to continue, as well as starting the distribution of free microfilms in lieu of inter-library loan of the original. (From these two things have come the present *Index Medicus* and the National Library of Medicine's inter-library loan copying service.) For these purposes, he modified a navy motion picture camera to film books and journals and he devised a hand-viewer to read the micro-films, which cost less than \$2.00 to produce and market.

Dr. Seidell's *Current List of Medical Literature* was put together at the then Army Medical Library (now the National Library of Medicine) by Dr. Seidell's niece, who copied the

title pages of the journals as soon as the Library had finished its own indexing and carding of the articles. These lists of titles were then pasted up onto sheets, photographed and printed into pamphlets so designed that they would fit into the pockets of the Army medical officers throughout the world, who could take them out and study them whenever they had a moment and wherever they were. The officers could then tear off a form in the back and request a microfilm copy from the Army Medical Library for anything that struck their fancy. And request them, they did—from all the places that American officers were stationed and for many years after the War also.

Even earlier than that, however, back in 1934, Dr. Seidell began the formation of a group which could carry out his aims long after he was gone, the American Documentation Institute, which he established with the hope that regional tables-of-contents bulletins would be issued throughout the world, tied in with a document delivery system on microfilm. During his annual sixmonths' stay at the Institut Pasteur in Paris, Dr. Seidell tried to persuade that institution to do for Europe what his Medicofilm Service at the Army Medical Library and the Biofilm Service at the Department of Agriculture Library in Washington were doing, but all that resulted from this attempt was development of microfiche as a substitute for the more difficult-to-handle roll microfilm. When the American Documentation Institute ceased to be interested primarily in microfilm and reorganized on a very different basis in the late 1950's, the ever-courteous Seidell was disappointed but never outspokenly critical.

What Dr. Seidell was trying to do was something that no library had ever considered doing before him: to accept the whole world as its responsibility. Even the then Army Medical Library, although it had been engaged in a brisk business of supplying needed information to medical officers throughout the vast reaches of the sparsely-settled United States for some 75 years before Atherton Seidell

came along, had never considered that it had a responsibility to serve civilians everywhere without charge. Even had the Directors and Commandants wished to do so, the government auditing system and the general climate of opinion on such social issues would not have allowed for it—as the Army Medical Library found out when it attempted to take over the microfilm loan service from Dr. Seidell. Moreover, the size of the literature pouring out once the dam of World War II was breached, made it not feasible to take on this large burden. But by that time, the need for such a system of notification and document procurement was obvious; two men, Colonel McNinch and Lt. Colonel Rogers, became Directors of the Library one after the other; and the appearance of the new technology of punched-cards and computers made possible the fulfillment of Atherton Seidell's dream to a greater extent than seemed possible during his lifetime. Together with a physician-librarian at Johns Hopkins Medical School, Sanford V. Larkey, it can be said these two brought forth the new era in librarianship.

#### Joseph McNinch, 1904

In a library, the relations of the bibliographic and the service functions are so inter-related that if either one of these things is badly handled, the other cannot function well as a result. The proof of this theorem had been demonstrated in the Army Medical Library between the first and second world wars, when the importance of the library's bibliographical work (production of the *Index-Catalogue* and *Index Medicus*) had been allowed to overshadow the work of the library as a service bureau for readers who wished to obtain information. This, in turn, had resulted in a slowing and finally a stopping of the ability of the library to produce its bibliographical tools, which had made it world-famous. Colonel Harold Jones, Director of the Library during World War II, realized this and proceeded to lay the first steps for the reorganization of the library proper. Unfor-

tunately, however, he retired before he could actually carry it out and it was Colonel McNinch who presided over the first part of the scheme and who helped choose his successor, Frank B. Rogers, to complete the revitalization of the institution.

Colonel McNinch represents a long line of very able military men who are assigned to varying duties from time to time and who seem to learn the intricacies to their new posts quickly, and with ease—then move on to still another assignment. A physician who had been in the Army Medical Corps since 1930, Colonel McNinch, rose to be Chief Surgeon in Europe before he was assigned to the Directorship of the Army Medical Library. He obtained the backing of the Surgeon-General to enlarge the staff, bring in trained librarians, revise the procedures for both library and its bibliographical tools, take over from Dr. Seidell the *Current List of Medical Literature* and the Medicofilm System; and he began the investigation of the use of automation for library and bibliographic uses. Under his aegis, a research contract was awarded to the Johns Hopkins University Medical School Library, to investigate the possibility of producing a weekly bibliographical index to medicine using unit record equipment, as well as for other studies which would yield basic data on the problems of medical literature. In 1950, he left the library to obtain a degree in public health administration and later to become Director of Research for the American Hospital Association, but his “float through history” as Sir William Osler put it, will undoubtedly be his recognition of the need for reorganizing the library and using the new technology for indexing the literature.

#### Sanford V. Larkey, 1898-1969

A more unlikely person to develop new automated schemes for literature control than Dr. Sanford V. Larkey would be difficult to imagine. A physician and a Rhodes Scholar, whose primary interest was Tudor medicine, Dr. Larkey was a lover of the old and conser-

vative in much of library administration. In his native California he had served both as Librarian of the University of California Medical School and Assistant Professor of Medical History, and after he retired from Johns Hopkins in 1963, he continued to teach the history of medicine there and to work on Tudor historical subjects at the Folger Library in Washington.

But with his great reverence for the past, Dr. Larkey had also an immense sense of civic duty, which brought him and his wife into contact with political leaders at a period in the United States when the exciting ideas of the New Deal were shaping the minds and lives of all about it. He was outraged at what the Germans were doing to helpless Jews and took up cudgels against them, returning to serve as a medical officer in the concentration camps of Europe when they were recaptured by the American troops.

But Sanford Larkey also had a scholar's curiosity, and the new methods and the new machines being developed around him in the 1950's intrigued him. He collected a research staff to help him on his research for the Army Medical Library, and at least some of the small group later went on to make important applications of the new techniques and tools in scientific communication. One even issued a proposal for producing the *Current List of Medical Literature* using punched cards and other automated schemes, which later became the basis of the first automation of that journal at the National Library of Medicine in 1960. His role, Dr. Larkey felt, was to nurture and further such research, even though he might not always have felt able to grasp its technical problems easily.

#### MEDLARS and Frank B. Rogers, 1914-

From the work done at the Research Project in Johns Hopkins, it was but a small step to the use of computers to produce bibliographic indexes, print satellite secondary tools, answer demand questions, and perform other library tasks. The story of MEDLARS (Medical



Literature Analysis and Retrieval System) has been told many places in the past few years. It was the first large-scale information storage and retrieval system which worked with some competence, and has become the prototype of many another system, which has taken off from where MEDLARS ended.

At the helm during its development was Lt. Colonel Frank B. Rogers, the last of the Directors of the Library when it was under the Army and the first when it was transferred to the U.S. Public Health Service. A physician who had seen service in the Pacific Theatre of Operations in World War II, Dr. Rogers was just completing his residency in surgery at the Walter Reed Army Hospital in Washington when he was chosen to be the Director of the Army Medical Library. A sign of the difference between his times and those of his predecessors, however, is that as soon as he was chosen for this post, the Army sent him to library school, so that he would not have to learn the technical details of librarianship on the job. As a trained librarian,

therefore, he does not fall into the area of gifted amateurs we have been describing in this paper. But without him probably the Army Medical Library would never have reached the high point in its career in which it now stands.

### Conclusions

Librarians rightly feel that today's large library is too complicated and too expensive an instrument to entrust to untrained people. Yet at the same time librarians ought to recognize the great good which a fine mind and a real interest in libraries can bestow on an institution to which an amateur without preconceived ideas comes. A study of the lives of some of these, which is presented here, may help to give us all a real sense of perspective.

- 1) Raikov, Boris Eugenevic. *Karl Ernst von Baer, 1792-1876. Sein Leben und Sein Werk.* Leipzig, Barth, 1968. p. 161.