

SCIENCE

VOL. 85

FRIDAY, FEBRUARY 26, 1937

No. 2200

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SCIENCE: A Weekly Journal devoted to the Advance-
ment of Science, edited by J. McKEEN CATTELL and pub-
lished every Friday by

THE SCIENCE PRESS

New York City: Grand Central Terminal
Lancaster, Pa. Garrison, N. Y.
Annual Subscription, \$6.00 Single Copies, 15 Cts.

SCIENCE is the official organ of the American Associa-
tion for the Advancement of Science. Information regard-
ing membership in the Association may be secured from
the office of the permanent secretary, in the Smithsonian
Institution Building, Washington, D. C.

THE HISTORY AND WORK OF THE ARMY MEDICAL LIBRARY¹

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THE celebration on November 16, 1936, of the cen-
tenary of the foundation of the Army Medical Library
served to bring home to a large number of persons not
engaged in work in the medical sciences the importance
of this great collection of books. This celebration was
attended by six or seven hundred representatives of
universities, libraries and learned societies of the world,
and cablegrams, letters and diplomas of honor were
received from nearly 200 foreign institutions alone.
These bodies joined in commemorating the establish-
ment of what is now the largest collection of medical
literature that the world has ever seen. The develop-
ment of this mighty library in so short a time is a
phenomenon in which American science and letters
may take pride.

Established in 1836 by Surgeon General Lovell as a

¹ Read on December 30, 1936, at Brown University,
Providence, R. I., before the joint session of the History
of Science Society and the American Historical Associa-
tion.

small number of reference medical texts for the use of
his staff, it was in fact as well as in name "The Surgeon
General's Library." The collection, hardly more ex-
tensive for some years than President Eliot's five-foot
shelf of books, grew but slowly until, at the close of
the Civil War, one of the greatest men of science our
land has produced was placed in charge and given the
congenial task of building up a great national medical
library.

This man was Surgeon John Shaw Billings (1838-
1913). When he took up his new work the library
consisted only of 2,253 volumes (602 titles under 11
topical subdivisions). A catalogue of the collection
was printed in 1865. Billings was given the sum of
\$80,000 left over from the hospital fund of the war,
and wise Surgeon General Barnes likewise gave him a
free hand. Billings had realized the need for such a
library ever since he was a medical student at what
is now the University of Cincinnati. Writing many
years later he said:

I became convinced of three things. The first was, that it involves a vast amount of time and labor to search through a thousand volumes of medical books and journals for items on a particular subject, and that the indexes of such books and journals can not always be relied on as a guide of their contents. The second is that there are in existence, somewhere, over 100,000 volumes of such medical books and journals, not counting pamphlets and reprints. And the third was, that while there was nowhere in the world a library which contained all medical literature, there was not in the United States any fairly good medical library, one in which a student might hope to find a large part of the literature relating to any medical subject, and that if one wished to do good bibliographical work to verify references given by European medical writers, or to make reasonably sure that one had before him all that had been seen or done by previous observers or experimenters on a given subject he must go to Europe and visit, not merely one, but several of the great capital cities in order to accomplish his desire.

With a gift for judging the value of books, an almost uncanny sense of where to find them and an orderly mind that enabled him properly to classify them, Billings was equipped by nature to be America's greatest bibliographer. He worked with extraordinary energy. In 1871 he produced his first catalogue, a three-volume work, each volume of the approximate size of the present Index Catalogue. But it was a catalogue only, and not comparable with the Index Catalogue soon to follow.

"Books," said Billings, "are properly compared to tools, of which the index is the handle." He had to have such a handle for his collection, already becoming unwieldy. So, in 1876, he published a "Specimen Fasciculus of a Catalogue of the National Medical Library, under the Direction of the Surgeon General, United States Army." This he submitted to the medical profession for criticisms and suggestions. Its style and arrangement were practically that of the Index Catalogue itself, another evidence of Billings's skill. Finally Congress was induced to appropriate funds for the publication of the work, and the first volume appeared in 1880.

Since such matters as typography and general arrangement of the contents had been settled in the "Specimen Fasciculus," there remained only the question of classification to be decided. "Following the general idea of a subject and author catalogue arranged in dictionary order in a single alphabet, the special subjects were featured by means of key titles or rubrics. After settling upon the main grand divisions, such as *Aneurism*, *Cancer*, *Tumors*, etc., and subdividing these, the subjects of lesser weight easily fell into their places by the simple device of finding the centers of gravity of the title in each case."²

² Garrison.

Dr. Billings saw clearly that he could not prepare a complete bibliography of his subject, but rather a bibliographical conspectus of the contents of a great library. Happily this proved so complete that it became, for practical use, a working bibliography of medicine. Modern medical science was even then beginning to advance by leaps and bounds, its surface aspect constantly changing as it advanced, so that he saw at once that it would be impossible to adopt any arbitrary and fixed classification based on a definite scheme of nosology. Any such scheme would have been, like the average medical text-book of to-day, obsolete within a few years.

The appearance of the Index Catalogue marked an epoch in the development and improvement of medical literature, particularly in the United States. For the first time the literature was at hand in the most convenient and accessible form, that is, strictly alphabetically catalogued. The Index Catalogue has no equal. "Its preparation," said Osler, "is Gargantuan." In no other field of knowledge is there a work comparable to this, the world's standard of medical bibliography. No matter where medical research is undertaken, there must one have the Index Catalogue. It is as much used in Europe, Asia and South America as in our own continent. "Among catalogues," says Professor William Bulloch, F.R.S., "it is regarded by the authorities of the British Museum as the greatest ever achieved."

The First Series of the Index Catalogue, 16 volumes, was completed in 1895 with the end of the alphabet, and Billings retired to accept the chair of hygiene at the University of Pennsylvania. Subsequently he was given charge of the consolidation of the three public libraries of New York City and the cataloguing of each, becoming, when the present building was completed, its librarian. A Second Series of the catalogue was begun in 1896 under the careful redaction of Billings's assistant, Dr. Robert Fletcher (1823-1912). This (26 volumes) was finished in 1916 and the Third Series of 10 volumes appeared between 1918 and 1932. The first volume of the Fourth Series was issued last spring and the second volume is now in press.

In 1879 Billings established another monumental work, the Index Medicus, a monthly classified record of the current medical literature of the world. The editorial management of the Index Medicus was principally in the hands of Dr. Fletcher, likewise a noted bibliographer. The Index Medicus consisted, from the start, of a printed monthly fasciculus, giving the medical literature of the preceding month carefully arranged as to subject-rubrics. The classification, as covering a smaller body of material, was more general than that of the Index Catalogue.

Never a government publication, the Index Medicus

always had great difficulty in paying for itself. It was expensive to publish and, though of the greatest use, the number of subscribers was necessarily limited, being chiefly medical libraries. From 1879 to 1899 it was published successively in New York, Detroit, Boston and Washington. Finally its founders could no longer afford to continue it. In vain did such men as Osler and Weir Mitchell plead with physicians to subscribe. In Paris Professors Charles Richet and Marcel Baudoin issued *Bibliographia Medica* (3 volumes) from 1900 to 1902 as a replacement, but they too had to give up. In 1903 the Carnegie Institution of Washington took over the *Index Medicus* and carried its financial losses until 1927, when the *Index Medicus* was merged with the *Quarterly Cumulative Index* (founded 1916) of the American Medical Association. The combined periodical, the *Quarterly Cumulative Index Medicus*, was published under the joint direction of the Army Medical Library and the American Medical Association until the end of 1931, when its connection with the library ceased, and it became solely a journal of the association. Except for two years spent in Manila, Dr. Fielding Hudson Garrison (1870-1935) was the editor of the *Index Medicus* after it was taken over by the Carnegie Institution.

With two such working tools as the *Index Catalogue* and the *Index Medicus* the student of medical science can in a very few moments assemble the bibliography of a subject or an author. Each series of the *Catalogue* includes the complete alphabet from A to Z. Thus he merely looks in each for the subject or author of his choice and notes what the library has about or by each man. From the date of the volume of the last series to the present, the annual volume of the *Index Medicus* are consulted and so it is a simple matter to complete the bibliography. Each day the cards of the Army Medical Library are brought up to date so that the cataloguing of journal articles is done within a short time of their receipt. The library is glad to quote the cards that have accumulated since the last issue of the *Index Medicus* thus rendering a bibliography as complete as can be.

This is not the place to recount the struggles that the library has had to obtain suitable quarters. The building now in use was erected in 1887 and was then adequate, but rapidly growing institutions, particularly libraries, have a way of outgrowing their garments, so that now the building is so overcrowded that the stacks will bear no more weight. The engineers require that when books are added others be withdrawn, so that the overflow fills the cellar and garret, and every other nook and corner. A new building must soon be provided, and this, we hope, will be of such size and construction as to provide for expansion. Tentative plans have been drawn, and the century-old institution now

but awaits Congressional consideration to provide the necessary funds—so small in these days of great financial figures.

A word as to the manner in which the Army Medical Library functions. It seeks, and its efforts have been crowned with no small success, to obtain everything worth while that is published anywhere in medical science. It receives an appropriation for purchases amounting to \$20,000 per year, more or less, for Congress is at times more liberal than at others. All this goes into the acquisition of books and journals. Many authors and many institutions have long made it a practice to present a copy of each of their publications to the Army Medical Library, thus insuring their inclusion in the *Index Catalogue*. American law requires that two copies of each book copyrighted be sent to the Copyright Office, and one of these is preserved in the Library of Congress, while the other is, usually, turned over to some other governmental library. Most of these second copies of medical works are given to the Army Medical Library, though of late there has been a tendency for the Library of Congress to retain both copies of many purely medical works. Many institutions, receiving the *Index Catalogue* as a gift, reciprocate with gifts of their publications. So the \$20,000 goes much further than would otherwise be possible. Moreover this sum does not have to cover such necessary expenses as salaries of personnel, postage, transportation costs, binding, etc. Thus it is possible for the library to receive upwards of 2,000 medical journals, the largest number of any medical library in the world.

All the books and practically all the material in the journals are indexed by subjects (the books by authors as well) and these entries soon make their appearance in the *Index Catalogue*. The material is available not only to local readers, but through the inter-library loan system to every student, physician and other reader in the country. So great has this inter-library loan department grown that now the library maintains its own mail wagon. Canada, too, benefits from this arrangement, and McGill University is one of the library's largest borrowers.

Everything in the library is available on loan except the rare material or what is unbound. The library's collection of rare medical books is one of the best in the world, and by far the best in America. It has an unusually complete statistical collection, the growth of about thirteen years and supplementing the splendid collection presented by the Prudential Life Insurance Company in 1923. There are medical manuscripts of great worth from the earliest day to the present. The document collection is, probably, the most complete of its kind.

The growth of this great collection of medical literature well illustrates the advantage of allowing a specialized library to develop along its own lines, without being hampered as must otherwise be the case, if merely a department of a great general library. The contrast between the national medical and law libraries well illustrates this. The Law Library of Congress was established in 1832, Congress requiring that it be maintained as a separate unit in "an apartment near the Library of Congress." This collection has frequently been neglected and has received but little money. Several law libraries in the United States are superior to the Law Library of Congress in some fields, while the Harvard Law Library is far larger and superior in every way, containing (1933) 435,000 volumes to the 275,000 of the Law Library of Congress. Contrast this with the growth of the Army Medical Library, which in twenty years passed the medical collections of the two largest general libraries in Europe, as well as those of America. "Undoubtedly," wrote the Law Librarian of Congress in 1933, "had the Law Library been independent from its foundation in 1832, the government would have possessed the best law library in the world to-day, instead of lagging behind, with many serious gaps in the collection." He therefore urged the friends of the Law Library of Congress to crystalize sentiment through the country to aid the Law Library to become as eminent in law as the Surgeon General's Library is in medicine.

In Europe one sees the disadvantages of merging a specialized library in a general collection. Billings himself always stressed this and showed that neither the medical collections of the Bibliothèque Nationale de

France nor that of the British Museum has been able to develop as would otherwise have been possible. Medical writers make comparatively little use of these collections, preferring to use the special medical libraries of London and Paris, which are under the direction of medical bibliographers. I mention all this because from time to time one hears the suggestion that the Army Medical Library be added to the Library of Congress. The librarian of Congress, Dr. Putnam, recognizes the disadvantages of such a consolidation, adding that the Army Medical Library should "be administered by those familiar with that field."

I have sometimes thought that medical writers and students of the medical sciences in general are, bibliographically speaking, divided into two classes, those who know the Army Medical Library well, and those who do not know it at all. There are no half tones. Such folk are either in the high lights or the shadows, as it were. Those in other fields of learning may, perhaps far oftener than they may think, find material to their tastes and interests in this mighty collection of a million items. Its Index Catalogue is a tool that many other hands than those of physicians may use to good effect. It should be of interest to all men of letters, as well as of science, to know how to use a work which indexes practically everything of value in medical science, including every worthwhile article in every issue of every journal of every country in every language. Then, if not before, does one come to appreciate the soundness of dictum of the late Dr. William H. Welch, that the "Army Medical Library and its Index Catalogue are America's greatest gift to medicine."³

WAVES AND CORPUSCLES IN QUANTUM PHYSICS¹

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It is a well-known fact that macroscopic phenomena, like the reflection, refraction, diffraction and the propagation along curved paths of matter and light rays, can be described by means of the corpuscular theory as well as by means of the wave theory. As to microscopic phenomena of atomic dimensions, one can apply the two classical models only to a certain degree, the limits of the corpuscular description being drawn by the Heisenberg uncertainty principle. Nevertheless, many physicists seem to prefer the corpuscular picture when they are asked as to what is happening "in reality."

Take for instance the usual statistical *corpuscular interpretation of Schrödinger's wave function* ψ ; here $|\psi|^2 = \rho$ is said to mean in reality the probability

density of particles in space. To make this statistical distribution possible one has afterwards to resort to

³ The discussion of this paper was opened by Dr. Arnold C. Klebs, of Nyon, Switzerland, who said: "To us of the older generation who were privileged to visit under the inspiring guidance of Osler, when Billings, Fletcher and Garrison were still there, this great institution which later was so sympathetically and efficiently presided over by Colonel Hume, his report of past achievements and future problems makes a singular appeal. Does the present generation fully realize that we have there much more than a mere collection of books for use of the medical officers of the Army, much more even than a National Medical Library? In my wanderings abroad through numerous libraries I have always made it a point to ask the librarians how they advised those that were preparing medical monographs in the gathering of relevant material. The answer was invariably that the Index Catalogue was first consulted and often supplied all that was wanted. And when we consider that these rows of green books did not only grace the shelves by the side of the tomes of

¹ Address given at the Ohio Physics Club in Cincinnati, December, 1936.