The Earliest American Books on General Bacteriology: 1880 to 1892

A growing interest in microbiology led to a distinctive surge in American books on general bacteriology published during the late 19th century.

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A Manual of Bacteriology (1892) by George M. Sternberg is considered the first book by an American to cover bacteriology comprehensively. Its size and scope certainly justify this distinction. The book “instantly became the standard reference in bacteriology,” wrote Patricia Peck Gossel, a former chairman of the division of Science, Medicine, and Society at the Smithsonian National Museum of American History in Washington, D.C.

However, several earlier American books addressed the science of bacteriology in a general but less-encyclopedic fashion. Although none of these other publications offers the scope and detail of the Sternberg Manual, they do reflect the already recognized need to document experimental, clinical, and teaching material reflecting then-current developments in the emerging field. Those efforts were not aimed at describing or defining a distinctive American brand of bacteriology in the sense of there being a particular school of thought that was scientifically distinct from developments in several countries of Western Europe, including France, Germany, and Great Britain. Nonetheless, several American publications from that period reflect the activities of the first generation of American bacteriologists, those called the “pioneer microbiologists of America” by author Paul F. Clark, Emeritus Professor of Medical Microbiology at the University of Wisconsin.

American Educators in Bacteriology

Required Access to Books for Teaching

In the 1880s, bacteriologists then teaching courses offered by newly formed departments of bacteriology at American institutions soon began to demand access to English language books for them and their students. As University of Wisconsin bacteriologist Harry L. Russell said of bacteriology in 1903, “The science in this country is not much more than a decade and a half old.”

Little more than a decade earlier, during 1891-92, the earliest American textbooks on bacteriology were being published. In addition to the manual by Sternberg, there were Essentials of Bacteriology by Michael Ball and Principles of Bacteriology by Alexander Abbott. Our brief survey of these and other books published from 1880-1891 reflects developing American interest in this subject. Moreover, our focus is on books that treat bacteriology in a general way. We exclude other published works that deal with a single infectious disease, hygiene, microscopy, or a specialty area of bacteriology, or contain only a chapter on bacteriology within a medical or pathology volume.

The American Society for Microbiology Bibliography of Microbiology-related Publications in America: 1721 To 1915 proves a rich resource for this purpose. That bibliography, which was up-

SUMMARY

- George Sternberg published A Manual of Bacteriology in 1892, an early but comprehensive volume on this subject, that set the stage for further growth through formal course work.
- Entries in the ASM Microbiology Bibliography reflect efforts by early American bacteriologists to gain access to books and other publications on this subject.
- Interest in reading about bacteriology in English spurred efforts to translate major works on this subject from Germany and France.
- Lecture series were published in book form, helping to spread information about bacteriology to students and the general public.
- Although the Sternberg Manual was dominant, other more concise textbooks of the day had followings and broadened the teaching base for this new field.
dated in 2012, derives from several sources but traces its roots to the 1944 review paper by Leland McClung, “Early American Publications Relating to Bacteriology” (Bacteriological Reviews 8:2, 119–160). In recent years, his bibliography has been rearranged, expanded, and then made available on the Center for the History of Microbiology/ASM Archives (CHOMA) website. This updated version of the ASM Microbiology Bibliography is proving to be a valuable resource, and we hope that this brief account will encourage other investigators to explore this archive.

The criteria for including works in this bibliography are that the publication be in book form with the primary subject matter relating to microbiology, including all subdivisions; that it was published before 1916; and that at least one of the following conditions was met: the work had to be authored or translated by an American (or someone residing in America) or published in America or as a special American edition. The bibliography does not address the literature that appears in American and European journals.

Translations of Key Books and Treatises about Early Microbiology

Prior to 1880, Americans interested in bacteriology were limited to journal articles published in English, French, or German. As Joseph McFarland observed in 1937, “Before 1884, when Klein’s little book Microorganisms and Disease appeared, there was no book in the English language that treated of the subject.” However, he failed to note that, in addition to the Klein book, An Introduction to Practical Bacteriology by Edgar Crookshank was published in the United Kingdom in 1886 with an American edition simultaneously available. Although both books had non-American authors, they both gained avid U.S. readerships, reflecting growing American interest in books covering bacteriology.

Books on bacteriology translated by Americans from the French and German literature started to appear in 1880. From that year through 1914, 519 citations appear in the updated ASM bibliography. If the entries are broken into 5-year periods, the percentage of books in the form of translations went from 18% during 1880–84, to 13% in 1890–94, and dropped to 3% by 1910–14, reflecting a trend to publish more and more American books on bacteriology after 1892.

Some of the early translated works were on very specialized subjects in bacteriology, while a few continued to deal with more general subjects in this field between 1880 and 1892. In 1880, George Sternberg translated Les Bactéries by Antoine Magnin, a book that focused on the place microbes held in the natural world. In the following year, Charles S. Dolley translated Bacterium: The Smallest Living Organisms by Ferdinand Cohn. In 1885, Stephen Yates Howell translated the second edition of Carl Friedlaender’s A Manual of Microscopical Technology for use in the Investigations of Medicine and Pathological Anatomy.

The following year Hermann M. Biggs translated Ferdinand Theophil Heuppe’s The Methods of Bacteriological Investigation into English. In 1890, William Trelease published his translation of Carl Salomonson’s Bacteriological Technology for Physicians. In 1891, J. H. Linsley published his translation of the third edition of Carl Fraenkel’s

Lecture Series and Laboratory Manuals

In 1882, American lecture series relating to bacteriology began to be published in book form, occasionally after their appearances in serial format. These publications served a variety of audiences and generally covered the science without referring to technical details. Prominent among these are Henry Gradle's Bacteria and the Germ Theory of Disease (1883), a series of eight lectures delivered at the Chicago Medical College, and On the Relations of Micro-Organisms to Disease by William Belfield, presented originally as the Cartwright Lectures before the Alumni Association of the College of Physicians and Surgeons. The latter book is reprinted from The Medical Record for February and March 1883. Later in 1892, E. A. Birge published Synopsis of a Course of University Extension Lectures on Bacteriology, a collection in which appear summaries of extension course lectures that were not intended for medical or full-time undergraduate students.

These lectures (and others that are not included in the ASM bibliography) reflect a growing interest in bacteriology among the nonscientific public. Books aimed at this audience began to appear during this period, beginning with The Story of the Bacteria and their Relations to Health and Disease, which Theophil Mitchell Prudden published in 1889.

A number of books published during the 1880s offered instruction in the techniques of studying bacteria, but did not address matters such as their classification, natural history, metabolism, or pathogenicity. Included here are Photomicrographs and How to Make Them (1883) by George Sternberg, The Technology of Bacteria Investigation: Explicit Directions for the Study of Bacteria: Their Culture, Staining, Mounting, etc (1885) and Notes on the Methods Employed in Biological Studies Compiled Solely for the Use of Students in the Laboratories of the School of Biology (1889), both by Charles Dolley, and An Introduction to Practical Bacteriology (1887) by Thomas Satterthwaite.

Special Note on the Sternberg 1884 Publication

Although 1891–92 marked the first American publication of comprehensive general works on bacteriology, one earlier work in this field merits special mention. Four years after his translation of Antoine Magnin’s Les Bactéries in 1884, Sternberg published Bacteria, which retained most of the earlier work as an introduction. However, he also added 300 pages of his own original work, including sections on experimental techniques, germicides and antiseptics, and the making of photomicrographs, including 10 multi-image plates of his own photomicrographs. Further, he discarded Magnin's tentative examination of the role of bacteria in disease, providing instead an expanded review of the then-recent literature on that subject. It reflected substantial progress since Magnin published his thesis in 1878.

While the title page describes this work as a "second edition," the arrangement of the authors' names suggests a fundamentally different work from the 1880 publication. As Sternberg says in the preface:

It has been thought best in the present edition to remove the name of Dr. Magnin from the foremost place on the title page, inasmuch as the present writer has contributed more than two-thirds of the text, and as
illustrations from nature—photomicrographs—are all his work. The appreciation in which Dr. Magnin’s systematic account of the bacteria is held is shown, however, by the fact that we have not attempted to re-write this portion of the work, at the head of which a separate title page bearing Dr. Magnin’s name, will be found.

In any case, Sternberg’s contributions to this book certainly qualify as a publication covering the broad field of bacteriology in their own right. A complicating factor is assessing the role Magnin serves and whether one can accept that Bacteria qualifies as a publication by an American author.

Three Significant Books on Bacteriology 1891–2

Three books from 1891 and 1892 leave no doubt that American microbiologists were fully covering bacteriology. As mentioned earlier, A Manual of Bacteriology by Sternberg is widely considered the first comprehensive book on bacteriology by an American author. Its size and scope, 882 pages and 2,582 bibliography entries, merit praise for comprehensiveness. Between 1879 and 1892, Sternberg, a surgeon in the U.S. Army, traveled widely—ranging from Walla Walla, twice to Cuba, New Orleans, San Francisco, Baltimore, Mexico, Brazil, and back to San Francisco. During this period, he published the two Magnin books, a book on malaria and another on yellow fever, a photomicrograph manual, and several dozen papers for the American Public Health Association and other organizations. In 1893 he was appointed U.S. Surgeon General; it was he who commissioned the Reed-Vaughan-Shakespeare Typhoid Fever Board (1898) and the Havana Yellow Fever Board (1900), both of which were led by Walter Reed.

Also in 1892, Alexander Abbott published the first edition of his popular textbook, The Principles of Bacteriology: a Practical Manual for Students and Physicians. Although it was not so extensive as the Sternberg work, Abbott makes a virtue of that fact: “As the majority of those undertaking the study of bacteriology . . . can devote but a portion of their time, it is desirable that the subject-matter be presented in as direct a manner as possible,” he wrote. The text proved so popular that it was updated through multiple editions, with the ninth and final published in 1915. Abbott was closely intertwined in the network of late-19th century investigators in bacteriology. After completing his medical degree at the University of Maryland, he worked with William Henry Welch at Johns Hopkins University, where he also collaborated with Sternberg and William Osler, one of the founding physicians of that institution. Abbott studied in Berlin with Robert Koch and Max von Pettenkofer, and was first assistant to John Shaw Billings when the landmark Laboratory of Hygiene opened in Philadelphia in 1892.

The third of these books on general bacteriology, published in 1891, was Essentials of Bacteriology: Being a Concise and Systematic Introduction to the Study of Microorganisms by Michael Valentine Ball. It deserves special recognition for several reasons. Unlike Sternberg and Abbott, Ball was not a well-known bacteriologist. After graduating from Jefferson Medical College in Philadelphia in 1889, he visited several European
laboratories and took a course in Berlin given by Koch, who was assisted by Carl Fraenkel and Emil Behring in January 1890. He returned to Philadelphia in April 1890 to do an internship at a local hospital. While still an intern, he signed an agreement with W. B. Saunders Company early the next year to write a book on bacteriology for $100, to be completed six months later. The amazing part of this story is that he made the deadline and the book became very popular and went through many editions.

Although Sternberg often receives the bulk of the credit for early growth in bacteriological publications in America, the contributions of Ball and Abbott should also be recognized. Their books were not as comprehensive as Sternberg’s, but they were at least as popular, if not more so, because they provided concise information about disease-relevant microorganisms, as well as about bacteriological techniques, enhancing their practical value for teaching. In any case, all three publications are milestones in microbiology.

*SUGGESTED READING*


