occurred to the writer that it would be of interest to know whether the glutamic acid of an antitoxin is also partially racemized. If this were the case it would help to explain the great resistance of certain antitoxins toward cleavage by proteolytic enzymes.

Accordingly, a sample of refined and concentrated scarlet fever antitoxin[2] containing three grams of protein was hydrolyzed by hydrochloric acid and the glutamic acid isolated by Foreman's barium salt method. After four recrystallizations the glutamic acid hydrochloride melted at 203° C. and gave the following analysis:

Found:	C, 32.82%; H, 5.48%; N, 7.66%
Calculated for $C_5H_{10}O_4NCl$:	C, 32.69%; H, 5.49%; N, 7.63%

The specific rotation in 9 per cent. hydrochloric acid was $[\alpha]_D^{27°} = +32.2°$ when calculated as the free acid (49.5 mg in 3.06 cc gave a rotation of +0.42° in a one dm. tube). This value is in good agreement with that of d-glutamic acid, +31.5°.

It is therefore apparent that at least the glutamic acid of scarlet fever antitoxin is of the normal configuration. Whether this situation extends to other amino acids and other antitoxins remains to be seen.

ROBERT D. COGHILL
YALE UNIVERSITY

LUCITE

IN my recent paper, " 'Lucite' for microscopic Transillumination," published in SCIENCE, Volume 89, No. 2312, April 21, 1939, I made the following statement: "This is presumably the first report of the use of Lucite for this purpose and as a substitute for the Abbe Condenser."

Dr. Elbert C. Cole, of Williams College, has kindly called my attention to the fact that a paper written by him in SCIENCE in April, 1938, entitled "Methyl Methocrylate as a Laboratory Tool," suggested the use of this substance for illuminating living tissue for observation with the microscope. I gladly give Dr. Cole priority as to the use of this substance for illumination.

LEE S. FENT

SCIENTIFIC BOOKS

A HISTORY OF SCIENCE

A History of Science, Technology and Philosophy in the 18th Century. By A. WOLF, professor of the history of science in the University of London. 814 pp., with 345 illustrations. The Macmillan Company, New York, 1939. $8.00.

IT is probably universally true that every reviewer wishes to criticize a book within his own field of interest, and particularly from his own point of view. But, in the case of the volume before us, Wolf's "History of Science, Technology and Philosophy," a reviewer must necessarily take a four-dimensional point of view in order to encompass all that is printed within its 814 pages. The thirty-two chapter headings, beginning with eighteenth century mathematics and ending with philosophy, have called forth all that is implied in pure science and technology, including agriculture, scientific instruments, building, transportation, metallurgy, telegraphy, psychology, medicine, economics, social science, geography and philosophy. This wide range of subject-matter is new from the standpoint of the purely academic treatment of the history of science; it should require, therefore, a group of reviewers or encyclopedists to evaluate properly the true merit of this book.

This volume is the second of a series planned by Professor Wolf, and is of the same general character and scholarship as the first book, which was critically reviewed in SCIENCE.[1] The main points of criticism which Dr. Sigerist brought out in this review concerning the treatment of the history of science in the sixteenth and seventeenth centuries are still valid in the volume for the eighteenth century. There is the same lack of coordination and continuity of subject-matter, and there is no critical analysis of the theory, work and philosophy of each scholar, inventor and philosopher. According to Professor Wolf's treatment in the historical method, each field of activity has gone its own appointed way without apparent reference to the basic sciences.

Modern science has its heritage, and a rich one, from the past. Each succeeding age or century shows something of a mathematical progression in its accomplishments. Accordingly the sixteenth and seventeenth centuries were treated in one volume, while the eighteenth century alone required one volume with one hundred pages more for its treatment. The eighteenth century was a critical one in that scientific discoveries, based upon fundamental principles and natural laws, were asserting themselves in the form of practical application to the needs of society and the betterment of man. Professor Wolf has shown that advances were made in almost every field of intellectual enterprise and that there was an unprecedented spread of knowledge beyond the circle of the specialists. He has by comparison shown that the age of enlightenment was a worthy heir to the age of genius. But he has treated upon this only in the form of chapters on independent subjects, and not as a continuous history

[2] Kindly furnished by Parke, Davis and Company.
[1] SCIENCE, 83: 2150, 262–264, March 13, 1936.

of ideas, movements or results. The task of bringing order into the apparent tangle of luxuriant growth of scientific and technological advances is almost an impossible one, but Professor Wolf has succeeded to a large degree in setting forth what is known. There is nothing particularly new in what the author has written; he has gathered his material from a rich source of original work of the great pioneers in each field.

The cultural aspect of science upon society should have been continually emphasized. One of the best examples of the influence of an institution upon an epoch was that of the Royal Society of London upon the life and thought of the colonial period of American history and culture. We find a good account of the experiments of Franklin with electricity in 1746 and succeeding years. These were the great pioneer days of research in static electricity, and Wolf has treated carefully of Franklin's influence on the principal workers in this field. However, as well as commenting upon Franklin fully and deservedly, the author should have included a better treatment of the work of other Colonial scholars such as Cotton Mather, Paul Dudley, James Logan and John Bartram, who did pioneer experimentation on plant breeding, and Zabdiel Boylston, who was famous for being the first in the Colonies to inoculate for smallpox. The Royal Society recognized these men and approximately fifteen other colonial scholars during the eighteenth century of colonial America, by electing them as fellows.

A true history of science can be written by covering one field by epochs, but not by encompassing the whole range of human thought and invention. The history of art, science or philosophy should be treated in the form of a great symphony in which interrelations are shown in movements, where each great crescendo seems to be the result of a gradual upbuilding of ideas, feelings and moods, all influencing the human soul in its constant struggle for greater self-expression and life. A historian can be a Beethoven, a Mozart or a Wagner.

However, as stated in the beginning, the reviewer takes the liberty of judging this book from an unusual point of view, that of a librarian or bibliographer. The constant demand upon this profession for appraisal of the worth of a book and its service to readers encourages the bibliographer or reference librarian to become specialized in some field of research. The librarian of to-day, in this country, is becoming more and more conscious of scholarship. He is aware of his superior modern library technique and is now seeking the cultural aspects of his profession. Standard reference or source books are the essential tools of the reference librarian, and to this class Professor Wolf's book belongs in large measure. What has been set forth in each chapter and sub-chapter is clearly and concisely stated, sufficiently so that if further details are required the reader is referred to the original source. Also, for the bibliographer who wishes to prepare a select or critical bibliography of original source references and biographies of the great scientists of the past, the material is readily available. Professor Wolf has used good judgment in his selection.

The index, in its treatment by author and subject, leaves much to be desired. In cases of more than three references to a scholar it should have been more descriptive or analytical. The table of contents does not aid us here, in spite of the fact that it is well prepared from another point of view. This is a disconcerting phase for the reference librarian. In seeking to ascertain the work of any scholar, as for example, Newton, Euler, D'Alembert, etc., one does not find complete reference to his accomplishments. For example, in the chapter on light, which is comprehensive for general reference, mention is made of Euler and his work on light, leaving us not quite certain that this was all he did. The index does not show his profound discoveries in mathematics and physics, but gives only a large number of blank page references which makes it difficult to find record of his work in other fields.

The format is good, the book being well printed on durable light paper, which was necessary in order to handle a volume of 814 pages conveniently. The illustrations and line drawings are carefully selected and printed, and the numerous portraits lend dignity and beauty to the volume, since they were printed on paper especially adapted for such work. Professor Wolf has placed before the librarian and general scholar a decidedly useful compendium of scientific, technical and philosophical knowledge of the eighteenth century, which should be on every reference shelf, private or public.

FREDERICK E. BRASCH
LIBRARY OF CONGRESS

BIRDS AND THE SPECIES PROBLEM

A Systematic Review of the genus Phylloscopus (Willow-Warblers or Leaf-Warblers). By CLAUD B. TICEHURST. British Museum (Natural History), 1935. Pp. 193. Two colored plates.

At first sight it might well appear that a revision of a genus of Old World Warblers (*Sylviidae*) would be of little interest to American naturalists, but I should like to recommend Dr. Ticehurst's book for supplementary reading in all biological laboratories. The method of presentation is so interesting and so adequate, that we seem to have revealed to us the very course of events by which new races and species arise. The work is based on the examination of about nine thousand specimens, and much field work. Under each species we have details concerning the breeding range,