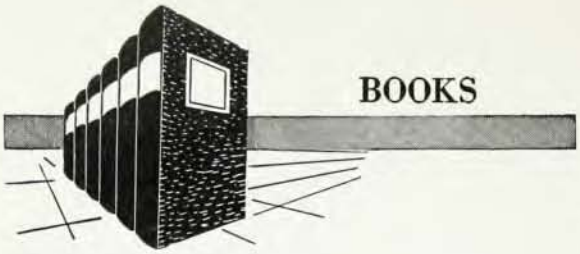

BOOKS

Two Struiks

YANKEE SCIENCE IN THE MAKING. By Dirk J. Struik. 430 pp. Little, Brown and Company, Boston, 1948. $5.00.

This is a leisurely and rambling history of New England's early inventions, its budding industry, its educational beginnings, and its efforts at scientific research from the time when the Pilgrims fought the Indians until that later period when their descendants put on uniforms against the Confederates. Some readers may find it too slow and discursive to suit the twentieth century tempo of communication. Others, and particularly those who have lived in New England, may find a special kind of charm in the highly detailed narrative.

Struik is the MIT mathematician, but here he pays his respects to shipbuilders, gunmakers, geologists, naturalists, botanists, and educators. Today physics is getting to be a fairly important industry along the banks of the Charles River, but that is a phenomenon of this electronic and atomic age. Struik reconstructs the very different scene of a century and more ago, when not only Yankee science but American technology as a whole was in the making in New England.

Harry M. Davis
Newsweek

A CONCISE HISTORY OF MATHEMATICS. Two Volumes. By Dirk J. Struik. 299 pp. Dover Publications, Inc., New York City, 1948. $3.00.

These two little volumes are properly named. They are a history of mathematics rather than a history of mathematicians. One won't find the anecdotes of the precocity of Gauss as a child or the usual estimates which leave only Archimedes and Newton to compare with him, although the author does say, "It is perhaps not entirely fair to compare Gauss with any mathematician except the very greatest." Histories not infrequently reveal more about the author than about the historical subject. That is not true in this case. However, on page 222 we find the following interesting sentences. "Cauchy, like his contemporary Balzac with whom he shared a capacity for an infinite amount of work, was a legitimist and a royalist. Both men had such a deep understanding of values that despite their reactionary ideals much of their work has retained its fundamental place." Political views and scholarly facility have never seemed to this reviewer to be closely related, so that it comes as no great shock to find that these gentlemen compared favorably in achievement with the more politically supple Laplace.

The book contains thirty-three illustrations, including an attractive picture of Euler which replaces in the reviewer's mind a somber picture of the aging genius. There are also interesting reproductions of pages from famous first editions and from manuscripts. Theoretical physics is barely touched; so that people such as Helmholtz, Gibbs, and Maxwell are only names.

The book is written with a real feeling for mathematics. Such things as Felix Klein's "Erlangen program" and the later statement of problems by Hilbert are presented in an interesting if incomplete way. Finally one must say the books were read with pleasure and they provide a valuable beginning to a study of the history of mathematics, with abundant references for continuing the study.

Henry Eyring
University of Utah

Tracers

RADIOACTIVE INDICATORS. By George Hevesy. 556 pp. Interscience Publishers, Inc., New York City, 1948. $10.00.

Thirty-five years ago the first paper on the use of radioactive indicators was published by Paneth and Hevesy and for several years they were the only research workers applying this new tool. Ten years later, in 1923, Hevesy reported the first biological application of radioactive indicators: a study of the absorption and translocation of lead in plants. The present book is the most recent of a long series of distinguished publications by this pioneer in applied radioactivity.

Physicists, chemists, metallurgists, and others not primarily concerned with life science research will find little of direct interest in "Radioactive Indicators," since the true scope of the book is revealed in the subtitle "Their Application in Biochemistry, Animal Physiology, and Pathology." However, within this framework a thorough and well-documented presentation is made.

The first three chapters cover the production, availability, and measurement of radioactive tracers. The next two chapters on atomic interchange and indicators in chemical analysis are very sketchy but are pointed toward the problem involved in biological applications. The remaining eighty percent of the book is a substantial contribution to the literature of radioactive indicators, representing as it does a summary of thirteen years of intensive work by many investigators in a very active field of research.

This section follows a logical pattern, starting with the general considerations of absorption, distribution, and excretion of more than twenty-five elements, as simple inorganic species, in the whole animal organism. This is followed by a discussion of the problems associated with the transport of ions and compounds across the many types of membranes in living systems. Metabolic studies, including intermediary metabolism, are treated next. This section closes with a survey of the new information obtained from radioactive indicator studies of the special organs, skeleton, and red cells. The shortcomings of radioactive indicators in biology provides a timely warning for overenthusiastic readers. The book has an excellent author and subject index.

For some years to come this book will provide a ready reference for anyone desiring information on the use of

radioactive indicators in biochemistry, animal physiology, and pathology.

John W. Irvine, Jr.
Massachusetts Institute of Technology

Silent Sound

SUPERSONICS: THE SCIENCE OF INAUDIBLE SOUNDS (The Charles K. Colver Lectures 1937). By Robert Williams Wood. Reprint with supplementary bibliography. 164 pp. Brown University, Providence, Rhode Island, 1948. $2.00.

Nowadays, supersonics pertains to speed above the normal sound velocity in air, while ultrasonics deals with high frequency inaudible sound waves. Therefore, the title of this book may be somewhat confusing, but its contents reveal clearly the early developments of ultrasound. In 1926, R. W. Wood and A. L. Loomis pioneered in the studies of intense ultrasonic waves. With striking experiments they demonstrated the physical and biological effects of these waves. Subsequently a number of scientific papers reported further investigations by Professor Wood and his collaborators in high frequency acoustics. This work attracted widespread attention. The Colver Lecture Foundation of Brown University recognized these achievements as "valuable contributions to human knowledge" and sponsored, in 1937, a series of lectures by Professor Wood on the subject of inaudible sound. These were published in 1939. The same little volume is now reprinted with a supplementary bibliography, which is not too complete.

For essential background material in ultrasonics, this book remains an excellent primer, in spite of the outstanding technological advances which have been made in this field during the past ten years. Today, we have a larger variety and a better understanding of synthetic piezoelectric crystals to supplement the existing natural crystals applicable to acoustic devices. The utilization of magnetostrictive materials has been extended. Great strides have been made in the techniques of quantitative measurements in different acoustic media at wide ranges of frequencies. The possibilities of these and other ultrasonic developments are mentioned in this series of lectures. Professor Wood gives a very lucid explanation of the supersonic phenomena associated with the Hartmann acoustic whistle. By characteristic versatility and resourcefulness, Professor Wood has here not only played a prominent part in the evolution of this new technology but also has stimulated other workers with compelling interest to explore the possibilities of an untried tool. This little volume should be appreciated by ultrasonic research workers as well as nonspecialists who are interested in experimental adventures in the new field of silent sound.

Elias Klein
Naval Research Laboratory

Wartime Science in Britain

SCIENCE AT WAR. By J. G. Crowther and R. Whiddington. 185 pp. The Philosophical Library, New York City, 1948. $6.00.

This is a thrilling account of the triumphs of scientific development in the recent war, as interpreted by our British Allies. In a relatively few pages, the authors have succeeded in giving many of the more significant details about radar, operational research, the atomic bomb, and science in the service of sea warfare. This is not a colorless digest of endless reports, as it well might be if they had exercised less skill in selecting and treating their material; but, rather, it is a vibrant story of a people with their backs to the wall, fighting with every resource at their disposal, including their scientifically trained manpower. To an unusual degree, one catches the feeling that radar unquestionably turned the tide in the Battle of Britain, and that, in the hands of those who developed it between 1935 and 1945, it played a major role in both defense and offense.

"Science at War" not only treats of the basic physics behind many of the developments—enough for the interested layman and not too much for the specialist—but it deals also in fine style with the intimate relationship between science and the military. In telling about the "Sunday Soviets" which brought all ranks of military, scientific, and field personnel together to discuss their common problems, where rank and prestige were laid aside in the search for that wisdom that arises from the experience of many people, the authors have contrasted their British methods with those of the Nazis, and have expressed the conviction that their success and the Nazi failure lay, not in superior intelligence, but in the democratic application of their science as a *civilian* undertaking.

Operational research is interestingly described and gives one a glimpse of how wars may be "improved" by the application of mathematical analysis: How many bombers should be in a raid to bring the biggest results with the least loss? How large should a convoy be? Answers to these and other equally urgent questions paid big dividends as a result of treating warfare quantitatively and analytically. It makes one hope that international agreement will succeed in removing the threat of another major war, almost certain to be "the mathematician's war," whose waging may depend upon the great calculating machines!

The section on the atomic bomb is devoted largely to pointing up the history of early developments in atomic energy control. It frankly acknowledges the inability of the British to put the necessary manpower and resources on this problem which was so successfully pursued by joint effort in Canada and the U.S.A. Over and over again, one catches the impression that much was accomplished in the British scientific effort with few men. For example, in the early development of the proximity fuse, the British never had more than fifty men on the problem, whereas we devoted fifteen hundred to it.

It would require a better historian than your reviewer, and one with full access to the records, to evaluate the comparative contributions to the common effort made by scientists working on opposite sides of the Atlantic Ocean. This book, on the face of it, is based upon documented facts and is not overreaching in its claims. The spirit of close cooperation that existed between American and

Continued on page 37