radioactive indicators in biochemistry, animal physiology, and pathology.

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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.

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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

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