and that the committee's work will be extended to deal with the needs of peace as well as with those of war. So far as the Governments are concerned the interchange of information has been as complete as the cooperation in the field. Even at a time when it seemed unlikely that the United States would participate in the actual fighting, the information acquired by the British forces and tested by experience in war was freely communicated to the American authorities and proved invaluable when the United States became an active ally. As the event showed, British science, in aviation, in the use of radio, in the manufacture of explosives and in many other matters, was well ahead of German, although for long years all the efforts of German scientists, like those of every other profession in Germany, had been concentrated on preparation for war.

This mutual Anglo-American aid has not been confined to Government agencies. In 1940, at the invitation of President Roosevelt, a British scientific mission under Sir Henry Tizard visited the United States and discussed ways and means of sharing scientific and technical information, and active cooperation was established with American men of science. Canada also took a hand, and Professor R. H. Fowler, then working with the National Research Council of Canada, helped to bring Canadian science into the tripartite arrangement. In the spring of 1941 Dr. Conant, the eminent chemist who is president of Harvard University, visited this country to promote the closest possible collaboration between the National Defense Research Association of the United States and the corresponding organizations in Great Britain. Since America came into the war, this intercourse and interchange has become even more intimate. By an agreement of January 1, 1942, each Government undertook at its own cost to obtain from its nationals such information and manufacturing rights as the other Government may require. These arrangements will be facilitated if, as the result of Sir John Anderson's mission, a regular clearing house is established to enable scientists in each country to keep in close touch with what is being done in the others. Such a clearing house, especially when it is extended to embrace the other countries which play a leading part in discovery and invention, will obviously be no less useful in peace than in war.—*The Times*, London, August 11.

SCIENTIFIC BOOKS

GASES AND VAPORS

The Adsorption of Gases and Vapors. Volume I. *Physical Adsorption.* By STEPHEN BRUNAUER. 511 pp. Princeton, N. J.: Princeton University Press. $7.50.

IN the preface to this volume the author states that he had considered two methods of treating his subject. By the first method he would marshall the observations and data gathered by the hundreds of investigators who have studied the adsorptive properties of charcoal, silica gel, metals, oxides and the many other important adsorbents. By the second method he would survey and discuss the attempts that had been made to analyze these observations and data in order to elucidate the nature of the adsorption process. He finally chose the second method, but he adds:

> Had I started the writing of this book a year later, I would doubtless have adopted the more practical approach because of its more direct relation to the needs of the war industry, but on the day of Pearl Harbor the greater part of this book was already written. As it is, it may prove to be useful in the training of scientists and technicians in colleges. Besides, a good practical chemist knows how to put science to use, and so perhaps this book will also find its way eventually into the stream of the industrial production of our nation.

The reader, in spite of Pearl Harbor, will, I think, be glad that the author chose the second alternative. In McBain's "The Sorption of Gases and Vapours by Solids" we already have a lively and stimulating treatment of adsorption from the phenomenological point of view; although a second edition of this eleven-year-old book is now long overdue and much to be desired. On the other hand, there is no up-to-date, thoroughgoing treatise on the theories of adsorption, and this Dr. Brunauer has now provided.

The author has further delimited his field by discussing only *physical* adsorption in this volume, except for the introductory chapters; he expresses the hope that some day he may write a second volume on chemical adsorption, but remarks that this

> . . . must wait until the end of the war. *Inter arma silent musae.* The writing of such a book is a long and time consuming process incompatible with present urgent work connected with the war. There is not much point in writing science, unless we make the world first safe for science.

A brief outline of the contents is as follows:

The introductory chapters present a selection of the important data on adsorption and a discussion of the experimental methods by which these data have been obtained. There follow three scholarly chapters on the various theories of adsorption, the derivation from them of equations for the adsorption isotherm, and the success of these equations in the representation of the observed data. Then come two chapters on the heat of adsorption and two on the surface of the

adsorbent. Finally, there is a chapter each on the pore structure of the adsorbent, on the kinetics of adsorption and on mixed adsorption.

The treatment is thorough, up-to-date and discriminating. It is neither tiresome nor encyclopedic, as is so often the case in general treatises of this kind. Only such mathematics is included as is necessary to understand the course of the argument. Best of all, the author does not hesitate to point out the merits or demerits of the theoretical conclusions which he develops, but his comments are restrained and judicial. His style is clear, simple and direct.

The book can be recommended to any one who wishes a broad and thorough survey of our present understanding of the nature of physical adsorption; he will find it both competent and stimulating.

ARTHUR B. LAMB

TISSUE CULTURE

A Handbook of Plant Tissue Culture. By PHILIP R. WHITE. Pp. xiv + 277. Lancaster: The Jaques Cattell Press. 71 figs. 1943. $3.75.

INTEREST in plant tissue culture has been increasing rapidly in recent years. It is significant that we have now advanced to the point where a good handbook on the subject is a necessity. Fortunately a skilled technician in this field has provided an excellent book covering the tissue culture technique briefly but thoroughly. Seldom does one find a complicated subject handled so fully and so succinctly.

Dr. White presents the subject in ten chapters, the first of which by way of introduction stresses the importance of morphogenesis, out of the study of which tissue culture has arisen. He points out clearly the advantages of the tissue culture approach to the problems of the origin of form and function in organized beings.

The second chapter sketches the history of plant tissue culture, in four periods of development. The entire history covers a little more than a century, but most of the progress has been made since 1930. This progress hinged upon the successful development of culture media suitable for the unlimited growth of excised root tips. A fine feature of the historical account is the inclusion of portraits of the major investigators in this field.

The third chapter discusses the material which may be used successfully in tissue cultures, mainly those which are meristematic in character, such as apical meristems, cambial tissues and embryos.

Recognizing the importance of facilities for work, the author devotes the fourth chapter to a detailed description of the kind of laboratory which should be available for such investigations. A detailed floor-plan is given, showing a convenient arrangement for laboratory room, transfer room, media room, culture room and office. Even the equipment most useful to the work is detailed, with suggestions and directions for successful manipulation of all equipment.

Several succeeding chapters describe the methods and materials for making synthetic nutrient media—the methods by which cultures may be started; the culture techniques; and the methods of making measurements and recording them for later interpretation. These chapters are all written with the utmost clarity.

The last two chapters turn to the significance of plant tissue culture in the solution of biological problems. These are very stimulative, and will no doubt encourage much more work to be undertaken. Chapter nine, for instance, discusses the relation of tissue culture to the problems of pathology and general physiology; and chapter ten returns to the primary issue, morphogenesis. A bibliography of 457 citations covers collateral fields, as well as plant tissue culture. The work closes with an adequate index.

The book has been admirably planned, and the subject has been handled very skilfully. It is fortunate indeed that the first handbook in this field has been so well done. It should serve for many years as a sufficient guide to students and older investigators interested in tissue cultures. Because of its broad point of view it should find a place in every physiologist's private library.

CHARLES A. SHULL

THE UNIVERSITY OF CHICAGO

ESSAYS IN BIOLOGY

Essays in Biology. In Honor of Herbert M. Evans. Written by his friends. 687 pp. Berkeley and Los Angeles: University of California Press. 1943. $10.

FORTY-EIGHT papers on apparatus, endocrinology, the history of biology, nutrition, physiology, cytology, medicine, growth and experimental biology, together with a complete biography of Evans, are found in this memorial volume. It is issued in commemoration of his sixtieth birthday. Ten of the titles are upon the history of biology, including one by George W. Bartelmez, a translation, with notes, of Purkinje's paper on the "History of the Bird's Egg Previous to Incubation," another by George W. Corner of de Graff's article "On the Female Testes or Ovaries." In addition there are the following titles: "Kidney—Explantation in Relation to Arterial Tension" (8 pp.), Frederick M. Allen; "The Influence of the Endocrine Organs on Intestinal Absorption" (11 pp.), T. L. Althausen; "The Impact of the Introduction of Iron on Medical and Religious Thought" (6 pp.), Walter C. Alvarez; "The Physiology of the Salt-treated Adrenalectomized Animal" (15 pp.), Evelyn Ander-