

Such analyses should be in compact and understandable form and free from extravagant subjective opinion and emotional appeal.

I propose this in the interest of creating an informed opinion, though I do not concede the irrele-

vance or unimportance of certain far-reaching generalities that must form a background of any opinion that is reached.

LELAND H. TAYLOR

WEST VIRGINIA UNIVERSITY

SCIENTIFIC BOOKS

THE HISTORY OF BOTANY

A Short History of the Plant Sciences. By HOWARD S. REED. 323 pp. 37 figs. Volume VII of A New Series of Plant Science Books, edited by Frans Verdoorn. Waltham, Mass.: The Chronica Botanica Company. 1942. \$5.00.

REED's "Short History" is more than a dry record of progress. Through the kind and appreciative eyes of one of America's best-liked botanists the kaleidoscopic change in scenes and actors on the stage of botanical progress becomes a vivid adventure. This book will be enjoyed not only by professional botanists but also by students and others.

The first half of the book will appeal especially to those already versed in the history of botany, since it discusses many salient but generally neglected aspects of botany. Among these should be mentioned the chapters entitled "The Gardeners and Herbalists of Antiquity" and "Gardens and Other Things." In both of these the role of primitive agriculturists and horticulturists in the development of our knowledge of plants is stressed. Even though no written records of their activities are preserved, thus making the task of the historian difficult, their actual contributions, in the form of domesticated plants and cultural practices, are of such magnitude that our own work—although properly recorded and published—is dwarfed by them.

The middle portion of the book is most detailed, and the botanists of the seventeenth and eighteenth centuries receive considerable attention. This part conforms most closely to existing texts, but the evaluation of the work of these scientists is based on original research and is not a mere restating of current opinions. One might expect such conformity, since after more than 200 years the historian can estimate the influence of his predecessors with far greater certainty than that of more recent investigators in fields which are at present in a state of flux. In the latter case only a person actively engaged in research in such fields is in position to give a proper historical account, in which more than mere facts are recorded.

In the third part of the book a limited number of fields of research have been selected, and the development of each is traced to the present time. The choice of these fields was mainly determined by Dr. Reed's own interests and research activities, which are of a remarkably wide scope. In this manner plant geogra-

phy, morphology, cytology, mycology, plant pathology and various plant physiological topics are dealt with in eleven chapters. Although some readers might wish the inclusion of certain other subjects, such as taxonomy, agriculture or growth and plant movements, the reviewer, for one, is glad that the author has chosen the adequate treatment of a selected number of subjects rather than an abbreviated encyclopedic treatment of all phases of botany. As it stands, the book is very readable and should be required reading for all more advanced students in biology. It gives a welcome addition to the diet of currently accepted facts on which most students are reared, and it will help in giving them a proper perspective, which becomes harder to attain as specialization progresses.

This book is thoroughly original, in scope and treatment as well as in illustrations. We do not find the traditional portraits of the paragons of science, which often are of questionable authenticity and usually are entirely non-committal as to the character of the subject. Instead, original illustrations of significant experiments, laboratories or publications are depicted, with delightful originality. One of the special values of the book is the adequate, though not undue, stress laid on the contributions of American scientists. The reviewer was surprised to find how seldom he disagreed with the author, which can only be attributed to the care with which Dr. Reed has considered each contribution and the sympathy with which he has treated each contributor. It is easier to criticize mistakes than to appreciate positive advances, which become incorporated in our general body of knowledge and which can be recognized as advances only after careful consideration.

The Chronica Botanica Company and its active editor should be commended for their initiative in bringing this book, for which a definite need existed, before the public.

F. W. WENT

CALIFORNIA INSTITUTE OF TECHNOLOGY

THE THEORY OF RINGS

The Theory of Rings: Mathematical Surveys, No. 2.

By NATHAN JACOBSON. vi+150 pp. New York: The American Mathematical Society. \$2.25. 1943.

THIS is the second book in a new series of expository books entitled "Mathematical Surveys" which is edited and published by the American Mathematical

Society. The books of this series are expected to be authoritative and comprehensive within the field covered up to the time of publication. They will be of incalculable value to research mathematicians, who until the war were largely indebted to foreign publishers for such treatises. The present book by Jacobson is a worthy member of this series. It is not, however, recommended to the beginner.

The ring is the present evolutionary form to which linear algebras and hypercomplex systems are ancestral and of which they are special instances. The modern structure theory of linear algebras dates from the publication in 1907 of Wedderburn's thesis, and the structure of rings dates from Artin's paper of 1927. The representation theory of rings and their ideal theory is due to Emmy Noether and many other workers.

The author divides his subject into three parts: structure theory, representation theory and arithmetic ideal theory. In Chapter 1 he lays the foundations of the theory of endomorphisms of a group and throughout the book makes extensive use of the theory of rings of endomorphisms. By using the regular representations, the theory of abstract rings is obtained as a special case of the more concrete theory

of endomorphisms. Moreover, the theory of modules, and hence representation theory, may be regarded as the study of a set of rings of endomorphisms all of which are homomorphic images of a fixed ring.

Chapter 2 deals with vector spaces and Chapter 3 with the arithmetic of non-commutative principal ideal domains. Chapter 4 is devoted to the development of these theories and to some applications to the problem of the representation of groups by projective transformations and to the Galois theory of division rings. The first part of Chapter 5 treats the theory of simple algebras over a general field; the second part is concerned with the theory of the characteristic and minimum polynomials of an algebra and the trace criterion for separability of an algebra.

The book is practically self-contained and embraces in its 150 pages a large amount of factual material. Such conciseness is obtained at the expense of elegance of typography, for many equations which would have looked better in displayed form have been run into the text. But this is a minor criticism of a book which is well planned and executed in a masterly manner.

C. C. MACDUFFEE

UNIVERSITY OF WISCONSIN

SPECIAL ARTICLES

THE ISOLATION OF PITUITARY GROWTH HORMONE¹

In this paper a method is described for the isolation of a protein from the anterior lobes of ox pituitaries which electively causes the resumption of body growth in hypophysectomized rats and which behaves as a single substance in electrophoresis.

The 2.0 *m* (NH₄)₂SO₄ precipitate of the Ca(OH)₂ extract² from the acetone dried powder of freshly dissected anterior lobes of ox pituitaries was made by a method previously described.³ The precipitate was suspended in water and dialysed until free from electrolytes. The insoluble material after dialysis was dissolved in water and brought to pH 4.0 with 1.0 *m* HCl; a saturated NaCl solution was then added until the concentration was 0.1 *m*. A precipitate formed. The 0.1 *m* NaCl precipitate, found to be devoid of growth activity, was removed by centrifugation. The supernatant was brought to 5.0 *m* with solid NaCl,

¹ From the Institute of Experimental Biology, University of California, Berkeley. Aided by grants from the Rockefeller Foundation, New York City; the Josiah Macy Jr. Foundation, New York City; and the National Research Council Committee on Research in Endocrinology.

² All procedures were performed at 2 to 3° C.

³ W. Marx, M. E. Simpson and H. M. Evans, *Jour. Biol. Chem.*, 147: 77, 1943.

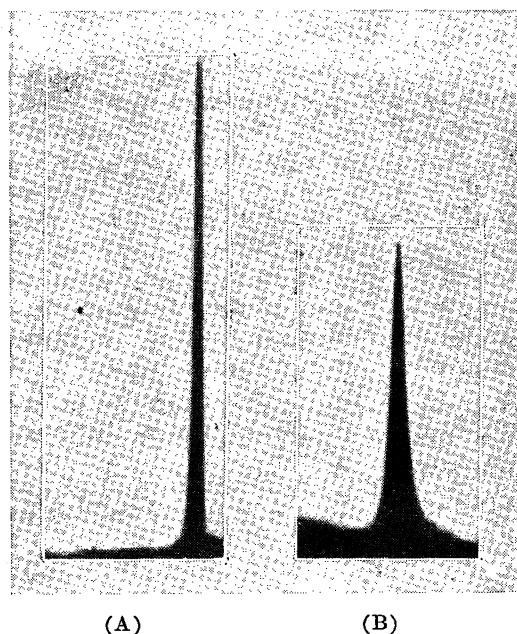


FIG. 1. Electrophoretic patterns of ascending boundaries of pituitary growth hormone preparations. (A) in pH 4.00 acetate buffer and (B) in pH 9.80 borate buffer after the current has been put on for 135 and 140 minutes respectively with a potential gradient of about 6 volts per cm.