

BOOK NOTICES

Fearfully and Wonderfully Made

Knowledge of the human organism grows apace, and it is fitting that from time to time attempts should be made to synthesize and correlate the available knowledge. The author of this volume, born and educated in Vienna, and with much chemical and medical research to her credit in the United States, has succeeded in bringing together in clear simple terms an astonishingly large number of facts about the anatomy, the physiology and the chemistry of man. Early in the book the author digresses to the philosophical consideration of asymmetric molecules and their bearing on living substance, and from time to time the phenomena of stereochemistry are reintroduced, until they become the dominant theme of the presentation. The author feels that stereochemistry reaches the very roots of biological principles, giving the unique specificity to the bio-molecule, and deplors the neglect of this science by biological workers. A most interesting philosophy of the living world is built around these considerations.

The hope is expressed that the interested layman will profit by the book, but it is the opinion of the reviewer that it would have to be an extremely inquiring and eager layman to wend his way through the tremendous mass of facts and emerge with much inkling of the author's philosophy. There is some tendency to redundancy in the volume, and a few grammatical errors, which detract from the pleasure of reading. However, the book should be stimulating to the philosophically minded biologist, bio-chemist and bio-physicist.—*L. H. S.*

Fearfully and Wonderfully Made, by Renee von Eulenburg-Wiener. xii+472 pp. New York, the Macmillan Co., 1938. \$3.50.

Heredity Up-to-Date

Shull's "Heredity," for twelve years a standard and popular text in genetics, has been newly revised and issued in its third edition. The author has long been noted for his facile writing and clarity of presentation, and the new edition, extensively rewritten and reorganized, is a model of text-book preparation. Human material has been widely introduced throughout the book, without, however, replacing the chapters formerly given over to human heredity, which have themselves been considerably extended. The new knowledge of giant chromosomes has been made use of early in the book, the concept of genes and chromosomes being introduced in advance of examples of the inheritance of specific factors. Nearly 700 questions and problems of the objective type have been incorporated in the new edition, and a bibliography has been added. Practical applications of genetics, particularly to human beings, are thoroughly discussed. The book should appeal strongly to teachers and students alike.—*L. H. S.*

Heredity, by A. Franklin Shull. Third edition, xvii+442 pp. New York, the McGraw-Hill Book Co., 1938.

Cancer

Noting the success of the symposium type of program presented at the A.A.A.S. meetings, particularly as exemplified in the annual symposium of the American Society of Naturalists, the Medical Sciences Section determined to present at its 1936-37 meetings an extension of the plan. Accordingly there was prepared and offered a symposium on cancer, covering on a large scale a many-sided survey of this problem. Workers in various phases of cancer research presented papers at a series of sessions on seven successive days. As a result of the growing subsequent interest in the papers and the ensuing discussions, the symposium was printed in book form, and the present volume is the result. The thirty-one papers are clearly presented, well illustrated, and are by recognized authorities in the various fields. They are

grouped into the following general categories: heredity and constitutional factors; induction, stimulation and inhibition of tumorous growths; metabolism of cancerous tissue; radiation; general discussion of the cancer problem. While many of the papers are technical, others are more general and should be read by social workers and educators. Particularly Little's discussion of the social significance of cancer should have widespread publicity.—*L. H. S.*

Some Fundamental Aspects of the Cancer Problem. A Symposium. 248 pp. New York, the Science Press, 1937. \$2.50.

Political Genetics Again

The controversy started by Graubard and by Muller against the more orthodox eugenists receives new fuel from this book by the distinguished geneticist of the University of London. While the book can not be said to be non-partisan, it is nevertheless a very fair presentation of the genetic implications involved in problems of racial inequalities, political discrimination and eugenical possibilities. The book is based on the Muirhead Lectures delivered at Birmingham University in 1937. In reading them one can only wish that it had been his privilege to hear them actually delivered, and perhaps to take part in the debate which must surely have followed their utterance.—*L. H. S.*

Heredity and Politics, by J. B. S. Haldane. 202 pp. New York, W. W. Norton and Co., 1938.

Scientific Orientation

Ten members of the faculty of the University of Rochester have conspired to produce this introduction to the sciences. In keeping with the trend of the times, it surveys the broad field of science, integrating the various specialties into a unified whole. The integration is well thought out. For example, geology is introduced twice, once in more general aspect preceding the study of chemistry, and again in its mineralogical aspects following the chemical discussions. Chemistry itself is presented in two parts, separated by a discussion of physics. Other subjects portrayed are astronomy, biology, paleontology, physiology, bacteriology, psychology and mathematics. As is almost inevitable when ten authors write individual chapters of a text, some subjects are better presented than others, but on the whole the book seems a remarkably successful attempt to introduce the beginning student to science, its implications and its applications.—*L. H. S.*

An Orientation in Science, by Watkeys and Associates. x+560 pp. New York, the McGraw-Hill Book Co., 1938. \$3.50.

Making Biology an Exact Science

It has been said that the task of the biologist of today is to raise biology to the rank of an exact science. Most people using the phrase "exact science" probably have in mind a science which adapts itself to mathematical treatment. But mathematics, or at least conventional mathematics, is not to be regarded as the only method for systematizing scientific knowledge, as is convincingly shown in the recent study by Dr. J. H. Woodger entitled "The Axiomatic Method in Biology." This book is very unique, since it represents the first attempt to apply to biology the *axiomatic* or *logistic* method, using the symbolic logic of Whitehead and Russell's celebrated work, the *Principia Mathematica*. This type of mathematics, though non-numerical, is perfectly controllable, perfectly rigorous, and enables one to decide quickly and decisively whether or not any possible statement concerning certain biological variables and their possible relationships is true. The purpose of the book is therefore to furnish the foundations for a new concise language for systematizing biological theory. It is the opinion of the author that the axiomatic method may thus serve to eliminate from biological literature disputes which arise solely from the faults of its language. It may also serve in discovering new unsuspected truths or even entire new analytical methods. Particularly convincing of this viewpoint are the words of Whitehead: "It follows that there are an indefinite

number of purely abstract sciences, with their laws, their regularities, and their complexes of theorems—all as yet undeveloped. We can hardly avoid the conclusion that Nature in her processes illustrates many such sciences. We are blind to such illustrations because we are ignorant of the type of regularities to look for."

The first two chapters describe the construction of axiom systems, the choice of various classes of arbitrarily defined variables, the properties of certain relationships which these may bear to each other, and rules concerning the manipulation of the logical symbols in the deduction of theorems. Chapter III then develops an axiom system for biology and explores its applications in Genetics, Embryology, and Taxonomy. The author warns the reader that no startling revelations are to be expected among the theorems which are presented, since only the framework of a vast project has been undertaken. As a result of the logical inspection of Mendelism, however, some practical goals have already been attained, a system for grading the different types of inheritance, and formulae for computing the numbers of genotypes and genotypic matings under all conditions.

Anyone interested in theoretical biology will probably find much of interest in Professor Woodger's study, especially in the introductory chapters. To follow the outline of the biological calculus will, however, consume a great deal of time and study, and this will be necessary if the reader wishes to evaluate the book thoroughly and check for himself the author's claims for its usefulness.—*C. W. Cotterman.*

The Axiomatic Method in Biology, by J. H. Woodger, with Appendices by Alfred Tarski and W. F. Floyd. x+174 pp. Cambridge University Press, 1937.