eggs develop. A fruitful field for investigation is open in this direction.

A. G. HUNTSMAN

CONSTANTS AND VARIABLES IN BIOLOGY

TO THE EDITOR OF SCIENCE: I have read Mr. Frank J. Kelly's letter on the substitutes for the words "homozygous and heterozygous." His argument appeals to me very particularly because we are constantly confronted with variously constructed new terms to express scientific theories. It seems to me it is by far best to give a special and restricted meaning to the ordinary words of the English language as is done in mathematics.

In this science the word "constant" is used to express a stable quantity and "variable" one that is subject to change. Why could not these two terms be bodily lifted from mathematical language into biological? The second term would quite adequately cover what Mr. Kelly calls "inconstant form."

J. R. DE LA JORRE BUENO

SCIENTIFIC BOOKS

Animal Parasites and Human Disease. By ASA C. CHANDLER, M.S., Ph.D., Instructor in Zoology, Oregon Agricultural College, Corvallis, Oregon. xiii + 570 pages. 6×9. 254 figures. Cloth, $4.50 net.

The work aims to present the subject of parasitology and especially its relations to the problems of human disease in such form as to make it attractive to the generally educated reader, and also useful to those less technically trained persons who have reason to utilize information in this field. The author's efforts have certainly achieved a good measure of success. His style is attractive and his presentation clear and reasonably complete. The work will be used by many who would not be inclined to refer to a more extended and more critical presentation of the subject.

After an introduction, outlining the significance of the subject and a discussion of parasitism in general, the first part of the work is devoted to a consideration of protozoa. These organisms have been grouped according to their systematic relationships. Under each heading, however, the particular organism is treated with reference to its significance in producing disease. The chapters included in this part are entitled: Introduction to Protozoa, Spirochætes, Leishman Bodies and Leishmaniasis, Trypanosomes and Sleeping Sickness, Intestinal Flagellates and Ciliates, Amebæ, Malaria, Other Sporozoa, and Obscure or Invisible Parasites.

This is the largest and certainly the most valuable part of the work, for it brings together a mass of material not readily available in this form in any other work. It points out in striking fashion the significance of recent discoveries concerning protozoa and disease. On the whole the treatment is well balanced and there are no important omissions. The author has included studies of recent date and perhaps has gone to the extreme in giving a place to discoveries so recent that their significance might well be considered doubtful, even if the observed facts are conceded to be correct. As an example of this may be cited the entry, in a note at the end of the chapter on spirochætes, of a discovery of one of these organisms in the kidney in cases of typhus and the comment that certain other bodies possibly are stages in the life history of the organism. One may reasonably doubt whether such conjectures regarding a complex and difficult field are really in place in a brief discussion intended to give the general reader clear and correct views of the present status of knowledge on these questions. It is only necessary to recall the number of organisms that have been at times supposed to be "causes" of certain diseases to see the questionable advisability of listing such suggestions before they have been thoroughly tested by other investigators.

Part II. on the Worms can not be regarded as equally successful. The chapters included in this part are entitled: Introduction to the "Worms," The Flukes, The Tapeworms, Hookworms, Other Intestinal Roundworms, Trichina Worms, Filiariæ and Their Allies, Leeches.

The material called for here is really better

worked up and better known and yet its presentation in this work leaves much to be desired. The author's discussion of the zoological significance of the term "Worms" is hardly on a level scientifically speaking with the work in other sections of the book. Furthermore it has no particular place in a treatise of this character where the parasitic organisms related to human diseases are the only ones under consideration. These are easily classified in certain generally recognized branches or subdivisions of other rank; they can be reasonably clearly defined without a discussion or even mention of those groups of uncertain relationships that make the subdivision of "worms" so difficult to handle. The introduction of this material serves also to confuse the student of health problems for it can hardly be intelligently handled by any one without considerable technical training in zoology. The general discussion of the significance of the parasites in this group is clearly inferior to that which has been printed in recent works like Braun or Fantham, Stephens and Theobald. The treatment of the separate subdivisions of this topic, while interesting and fairly complete, has not reached the standard set by the author in the first section of the work.

Part III. of the book is devoted to the Arthropods. After an introduction covering general features chapters are devoted to mites, ticks, bedbugs and their allies, lice, fleas, mosquitos and other blood-sucking flies, fly maggots and myiasis. The importance of these forms as agents in the transmission of diseases and their relations to specific maladies are clearly presented. The work will be a most convenient compendium despite the appearance of several recent more comprehensive works on medical entomology that cover in fact the same field as this section of Dr. Chandler's book.

It is difficult to agree with the author in his total elimination of references to those investigators who are responsible for the work outlined in the various parts of his book. While it may be true that extended references to original sources are out of place in so brief a presentation as his, yet it does injustice to the student if to no one else, that the author should present even a brief statement of the problem without any indication of the place in which the student interested can follow up the subject. I should not neglect to state that the author has included at the close of his book six pages of general references under the heading "Sources of Information." The list is very short and by virtue of the contractions employed might be difficult for some persons to use, while at the same time it is certainly unattractive in appearance on that account. Furthermore, there is no indication whatever of the significance of individual items beyond that contained in a very general subheading. In the opinion of the reviewer such a list is of very little use to the general student, and the same amount of space devoted to a citation of the major sources of information would have been of real value if the items had in one way or another been brought into definite connection with the specific discussions of the text.

The author's figures are not always particularly happy and some of them, such as Figs. 13 and 109, are little more than caricatures. It is difficult to believe that as good a scientific investigator as Dr. Chandler should have prepared a drawing like that represented in Fig. 120, where the size of the young trichinæ in the muscle fibers is apparently radically unlike the conditions as reported by many competent observers. Some of these little defects may be due to the rapidity with which the work was prepared. It is to be hoped that they can be corrected in a later edition. Many persons will find the book both interesting and useful, for it covers the field in a way not otherwise available.

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THE TENNESSEE ACADEMY OF SCIENCE

The eighth annual meeting of the Tennessee Academy of Science was held on November 28, 1919, at George Peabody College for Teachers,