

scheme, or to parts of it, but the many gaps in the archaeological and ethnological record give one pause and prevent enthusiastic acceptance of the idea.

However there is a danger that persons interested in primitive art, but without anthropological sophistication, especially the history of anthropological theory as it bears upon diffusionism, will uncritically accept the historical scheme put forth in this book, and will regard as proven the idea that there are unbroken lines of historical relationship between paleolithic art and recent primitive art.

But, with this caution, it must be said that this is a serious attempt to deal with world primitive art, certainly more than is usually tried in many of the picture books, and a refreshingly different view of an often mistreated subject is presented.

The book is beautifully illustrated with a profusion of photographs, many in color. This volume is one of a series of ten books in the Landmarks of the World's Art, dealing with different aspects of world art history.

Phillip H. Lewis
Field Museum of Natural History
Chicago, Illinois

THE MANY WORLDS OF MAN, Jack Conrad, 305 pp., \$6.95, Thomas Y. Crowell, Co., New York, 1964.

A simple account of elementary anthropology, both physical and cultural, as given by a professor teaching in the South. This turns out to be a significant point, as the author uses analogies and illustrations from his cultural context in Memphis, Tennessee. The book reads as a set of very excellent lectures in elementary anthropology as taught to the beginning undergraduate. This is not a derogation of the quality of content, but it does give the potential reader a flavor of the approach to the subject.

It is fully illustrated with many beautiful photographs of cultural artifacts as well as soft crayon drawings of some of the points which the author desires to make.

The author's main thesis is that there are racial differences, but that it is entirely wrong to give them qualitative grades. He is an exponent of the idea that racial differences extend in many physical ways, and he makes quite a point of this. However, he is very careful throughout to point out that no qualitative measurement can be made about these differences.

All in all, this is a fine elementary book in anthropology that would be interesting for the beginning student and for the uninitiated.

Microbiology

PARAMEDICAL MICROBIOLOGY, Stanley Wedberg, 462 pp., \$8.50, Reinhold Publishing Company, New York, 1966.

The paramedical sciences are considered to be pharmacy, nursing, physical and occupational therapy, and medical technology. As might be expected, students in these specialty areas are duty bound to have a moderate amount of fundamental knowledge and a considerable amount of practical knowledge in many non-specialty fields. One of these fields is microbiology, which of necessity encompasses the areas of immunology and virology. Here then is the problem "How can one text be both fundamental and practical in all three areas of microbiology without becoming confusing, boring, or too verbose?" (not necessarily in that order) The answer has apparently been found by Prof. Wedberg in this text.

There are 19 chapters in this book beginning with basic considerations of the bacterial cell. The first four chapters are devoted to bacterial metabolism, cultivation and identification. Chapters 5, 6, and 7 are concerned with sterilization and the control of bacteria by chemical and physical means. The next five chapters consider various aspects of the microbiology of water, sewage, soil, air, and food followed by a chapter on chemotherapy and the transmission of disease. The final six chapters deal with pathogenic bacteria, fungi, rickettsiae, and viruses, concluding with resistance to disease. Each chapter is followed by a series of review questions. At the end of the text there is a twelve page glossary. In Chapter 5 the author states that "the principles and applications of asepsis, disinfection and sterilization have more practical bearing on nursing and medical practice than any other aspect of microbiology," to this I would like to add "and are the most difficult for the student to comprehend." It is therefore very pleasing to see that the text dwells at some length on principles and techniques of sterilization as well as the control of microorganisms by chemical and physical forces. To paramedical groups this type of basic principle is much more important than an extensive background in diagnostic bacteriology, which in any event, is best handled in the laboratory.

As regards the microbiology of food, soil, water, sewage, and atmosphere, the author is adequately thorough yet concise.

In the chapter on viruses it is somewhat surprising to find that no electron photomicrographs of animal viruses are included. Admittedly they may not aid the student in his

understanding, but they exist as evidence that some indication of the structure and morphology of these organisms can be obtained. The same holds true concerning the chapter on fungi where no photomicrographs are used.

This book is well written in a coherent style and is a welcome addition to the texts which already exist in this area. In addition, it can profitably be used as a review book on basic microbiology by graduate and medical students. The Reinhold Company has done an excellent job on printing and binding this book and it is heartily recommended for both the paramedical eye and mind.

Dr. Robert W. Pumper
Department of Microbiology
University of Illinois
Medical Center
Chicago, Illinois

ENDOSYMBIOSIS OF ANIMALS WITH PLANT MICROORGANISMS, Paul Buchner, 909 pp., Interscience Publishers, New York, 1965.

Dr. Paul Buchner is undoubtedly the leading authority in the field of experimental endosymbiosis. This text of 909 pages is devoted primarily to endosymbionts of invertebrates, especially insects. It is an excellent reference.

The first several chapters treat the history of algal, fungal, and bacterial endosymbiosis and tell of the rapid progress from 1910 to the present. Symbionts were often mistaken as host tissue or as parasites.

The main portion of the text is specialized and detailed. Specific topics in this section include:

1. Algal symbiosis in a number of invertebrate phyla. The uses of these symbionts and the significance of their oxygen production is explained.
2. The historical background of the fungi and bacteria associated with cephalopods, fish, and especially many insect orders is elaborated.
3. This section which specialized in very specific cases of symbiosis included insects which feed upon vascular plant tissues and fluids.
4. Also considered are animals which suck vertebrate blood, insects that feed on mixed diets, luminous cephalopods, tunicates, and fish, and cases of symbiosis that are situated in the excretory organs of segmented worms, cyclostomatids, annulariids, and molgulids.

The text contains well over 370 figures and plates of symbionts shown in relation to the host tissue. Well over 1300 references are given. An author index and index of animal

and plant names is also provided. Specificity is the rule as a detailed explanation of the endosymbiont-host association is discussed.

The general section of the text treats methods of transmission, symbiont establishment in the host tissue, and the embryonic and post-embryonic phenomena.

The specific nature of this book will provide an excellent reference for certain areas of research with symbiotic microorganisms and their invertebrate hosts. In addition, there is ample opportunity to apply the basic information contained in this book to a greater appreciation of the concepts involved in the areas of parasitology, ecology (adaptation), nutrition, mycology, bacteriology and protozoology, as well as immunology and invertebrate morphology and physiology. Continued research in the area of symbiotic organisms will undoubtedly contribute greater knowledge to many scientific research areas. This book represents one of the most thorough presentations of the complex interrelations between symbionts and their hosts. Dr. Buchner does more than describe symbiosis—he explains it.

H. L. Zimmack
Biology Department
Ball State University

LIFE IN THE SOIL, A Laboratory Block, David Pramer, 62 pp., Teachers Supplement, 38 pp., D. C. Heath and Company, New York, 1965.

In this Laboratory Block the author, with the excellent staff work of the BSCS group under Addison Lee, has made an excellent summary of some of the biological aspects of soil. The student is led very carefully to analyze the soil, then to analyze the living material in the soil in relationship to CO₂, oxygen, and dehydrogenase activity. Finally, the author explains methods of ascertaining the relationships among soil organisms and some of their activity within the soil.

As usual, the Block gives complete and detailed instructions with very excellent illustrations of equipment for the student to perform the experiments to determine just what the relationships of soil and living organisms happens to be. The entire Block is full of project ideas which may be used individually by students, but taken as a whole, the Block offers an excellent unit for study by students of an aspect of biology which is truly applied. This application is meaningful for man, but the application is more than that, in the sense that the student takes off from a well-known feature of his environment and studies it for its biological activity.

The Teachers Supplement gives full bibliographies, formulae, and very pertinent information for the operation of this particular Block. Of