and illustration of important features. The section on evolution is most interesting and includes much new information. This is the first attempt to reconstruct the history of the anatomical changes within some of the classes and to analyze the functional significance of these changes. This discussion is clearly written and well documented. The broad features of the evolution are illustrated with text figures of the important genera, arranged in the suggested phylogenetic order. These sections of the book are most stimulating, and it is hoped they will encourage workers to do more phylogenetic studies. Certainly, specialists in some groups will disagree with Nichols and will be stimulated to search for more evidence to support their own views.

Nichols devotes chapters to the significance and evolution of pentamerous symmetry, spines and pedicellariae, tube-feet, and larval forms. In a brief chapter he describes the phylogeny of the echinoderms and, in a final chapter, the relation of the Echinodermata to other phyla, particularly the chordates. The classification of the echinoderms provided in the appendix includes most of the orders and all of the genera referred to in the text. The extensive bibliography is divided into sections that correspond to the chapters. Although the author included most of the major works in each field, it is surprising that he omitted Jackson's great work, *Phylogeny of the Echini* (1912), one of the classics in echinoid literature.

Not only is this book an excellent compilation of existing knowledge, but it contains many new ideas. It is a valuable source book for the echinoderm worker and for other zoologists. It can be read and enjoyed by the layman, but it can also be used as a text for a graduate course. It is hoped that Nichols will revise and keep the book up to date. The trend in paleontology is toward more phylogenetic studies, and it is very useful to have these results synthesized and available to students and to those who write textbooks on invertebrate paleontology. In the short time since this book was written a significant breakthrough has occurred in knowledge of the carpoids, a peculiar group of primitive echinoderms: the discovery, by Ubaghs, that in some species the structure that had been previously considered to be a stem is in reality an arm used for feeding. Thus, much of the discussion on the orientation and the function of many of the structures of the carpoids is obsolete. Also, after publication of the echinoderm sections of the *Treatise on Invertebrate Paleontology*, there will be much new information that should be incorporated into this book.

This book, by its emphasis on the value of synthesis of paleontological and neontological information, should encourage workers in other animal groups to prepare similar syntheses. In this day of scattered literature and narrow specialization, the broad view is especially difficult to attain. Nichols has performed this task admirably for those interested in the Echinodermata.

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## Life Cycles of Parasites

**Animal Parasites: Their Biology and Life Cycles**. O. Wilford Olsen. Burgess, Minneapolis, Minn., 1962. vii + 346 pp. Illus. $6.95.

This book grew out of the teaching device of multicolored plates used by Wilford Olsen to aid students in understanding the complexities of parasitic life cycles. Here the plates, in black and white on mat surface paper, are clean-lined diagrams showing life history stages, gross and minute, of over 100 characteristic species of protozoa, flatworms, and nematodes.

Trailing the spoor of such details for so many species in and out of cells, tissues, and hollow organs of vertebrate and invertebrate hosts (and in the free-living environment, when that is involved) could easily have resulted in a confusing hodge-podge. Instead, through the author's gift for clarity, and his placement of well-labeled 8- by 11-inch plates opposite their explanatory keys, the net result is an impact from page after page of the wonder of life in a world of animal parasites.

The table of contents presents the taxonomic hierarchy from phylum down to the species illustrated, with an accessory listing of the 107 plates. Five of the latter summarize facts concerning particular groups.

Textual material is mostly limited to introducing characteristic subgroups. (The author has fortunately included a digest of his own extensive work on *Uncinaria lucasi*, the extraordinary hookworm of the northern fur seal).

For many species there is added an "Exercise on life cycle," which points to the utilization of certain forms that may be locally available. Further study is also invited by a few selected references. In the main these are well chosen for the worms, but for the parasitic protozoa they tend to rely heavily on textbooks. I found few errors, although two misspelled genera at the bottom of plate 106 are conspicuous. The index comprises seven pages, triple column.

Relying, as the author does, on an essentially biological approach, he accepts the limitation that his book gives little, except by inference, concerning the great fund of current knowledge on interaction between parasite and host: physiology, pathology, disease, and immunity. Likewise, this is no synopsis of veterinary or medical parasitology. Such deliberate omissions permit the unremitting emphasis on the phenomena of parasitism as seen in the life cycles themselves.

It needs hardly to be added that these numerous life histories, fair samples as they are of all that is known, represent no more than an informative cross-section of discoveries made over the last century of how Mother Nature has contrived to maintain her parasitic species. New and old alike in this beguiling field of interest, however, be they neophyte biologists or professional parasitologists, will be enlightened and enkindled by Olsen's presentation of the intrinsic variety and nuances of adjustment that occur in life cycles of animal parasites.

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## Plant Diseases

**Insects in Relation to Plant Disease.** Walter Carter. Interscience (Wiley), New York, 1962. xiv + 705 pp. Illus. $25.

Following the introduction (chapter 1), this book is divided into three parts. In part 1, which treats plant pathogens transmitted by insects, chapter 2 deals with bacterial pathogens and chapter 3 with the fungal pathogens. Part 2 deals with the toxicogenic insect and phytotoxemia and includes three chapters: "Localized toxic effects," "Primary malformations," and "The systemic phytotoxemias." Part 3, which deals with the plant viruses, is divided into eight chapters and takes up most of the book,