Book Review

Parasitology by J. Chernin. Taylor & Francis, London, UK, 2000, pp. 139. ISBN 0 7484 0817 7. Price £13.99

Parasitology is part of the *Lifelines* series, a series of textbooks tailored for undergraduate students. The information on the book's back cover states that this textbook ''assumes no prior knowledge [of parasitology] – [it's] ideal for those new to the subject,'' and the ''didactic approach strips away unnecessary detail leaving concise principles and examples.'' As a faculty member who taught parasitology to undergraduate students for 27 years and used a number of textbooks of varying (and sometimes dubious) quality, I was excited to read these statements. They suggested to me that this new book would present to students the science of parasitology in an understandable, concise manner. As a textbook designed for the novice, I also assumed that it would: (1) be written at a level appropriate for undergraduate students who know nothing about parasitology and may not have had a course in invertebrate zoology; (2) present the basic principles of parasitology in a logical, easy-to-follow order; (3) be factually correct; (4) be well illustrated; and (5) set an example for students by being well written. Unfortunately, none of my assumptions was valid.

Parasitology is structured somewhat differently from most traditional parasitology textbooks. Chapter 1 is an ''Introduction to Parasitology,'' and Chapters 2 and 3 cover the ''Protozoa'' and ''Platyhelminthes,'' respectively. Chapter 4 discusses parasites ''grouped according to life-cycle,'' (e.g., direct versus indirect life-cycles). The next five chapters cover the topics of the host response, nutrition and biochemistry, pathology, epidemiology, and vaccines, while the final chapter of the book is on ''aspects of malaria.'' At the end of each chapter is a set of study questions designed to reinforce the material, and the final few pages contain supplementary readings, references, and an index. I applaud the author's efforts in organizing *Parasitology* along the lines of some important parasitological principles rather than the more traditional ''tiptoe through the phyla.'' However, the titles of some of the chapters do not reflect accurately the chapter's contents, and some of the chapters do not include important principles or the principles are not explained clearly and concisely. The author's efforts in presenting important parasitological principles in a logical, easy-to-follow order were not successful.

Chapter 1 introduces students to some basic parasitological principles and terms. The chapter begins by defining parasites as ''living organisms that are associated with food for all or part of their life-cycle,'' a definition that would fit many free-living organisms. The chapter then discusses briefly such topics as ''the nature of parasitism,'' life cycles, and pathology. These concepts are discussed using many technical terms with which students may not be familiar (and there is no glossary), and there are few illustrations to demonstrate or otherwise reinforce these concepts. The chapter includes the scientific (or generic) names of many parasitic species. It is very likely that students will not have heard of many of these parasites, so they will probably find all of these names confusing.

Chapter 2 (8 pages) covers the parasitic protozoans. The coverage of this important group of parasites is superficial and confusing. One entire page of text of this chapter is devoted to the different ''forms'' of the Kinetoplastida, but the only illustration is of a trypomastigote. Moreover, the text infers that these ''forms'' are found in all flagellates. Chapter 3 (15 pages) is titled ''Platyhelminthes.'' At the beginning of the chapter the author lists the various ''groups'' of organisms that are included in the chapter. The list includes the Nematomorpha, Nematoda, and Acanthocephala, none of which is considered to be a group of acoelomate flatworms. The order in which the groups of organisms are listed bears no resemblance to the taxonomic or phylogenetic relationships among these groups, and no information is provided on the taxonomic status of the groups. Upon reading this chapter, undergraduate students might believe that nematodes, horsehair worms, and acanthocephalans are platyhelminths (acoelomate flatworms) and that the Eucestoda is a group within the Acanthocephala. The remainder of this chapter discusses some aspects of the biology of cestodes, trematodes, and nematodes (there is no discussion of the Nematomorpha and Acanthocephala). The coverage of each group is superficial, and students are introduced to many terms that are not defined or illustrated.

Chapter 4 provides students with examples of parasites ''grouped according to life-cycle.'' This chapter (20 pages) provides written descriptions of the life cycles of approximately 25 species of parasites; some of the parasites discussed in this chapter are not mentioned or discussed in previous chapters. These written descriptions of the life cycles tend to be very brief, and the few illustrations that are included are of very poor quality. The students are also introduced to many new terms that are not defined or the significance of which is not discussed.

Parasitology (2001), **122**, 121–123. Printed in the United Kingdom
https://doi.org/10.1017/S0031182000007289 Published online by Cambridge University Press

Rhabditiform and filariform nematode larvae are mentioned, but there is no explanation of the significance of these forms in the life cycles of parasitic nematodes and that these terms refer to the shape of the oesophagus. Examples of other terms that students will find confusing (i.e., they are not discussed satisfactorily or illustrated) include haptor, oncomiricidium, parasitophorous vacuole, bradyzoites, tachyzoites, gynocophoric (sic) groove, and microfilaria.

Chapter 5 introduces the concept of host response. For an introductory parasitology textbook, the chapter is too long (17 pages), and for the typical undergraduate student it is too detailed and technical. Chapter 7 (15 pages) is titled ''Pathological effect of the parasite upon the host.'' The chapter begins with descriptions of how the host can respond to the presence of a parasite (e.g., inflammation, organ and systemic pathology, etc.) and then proceeds to describe the pathology associated with specific parasites. In some cases the descriptions of the host response and pathology are inadequate (e.g., *Paragonimus westermani*, *Opisthorchis viverrini*, and hydatid disease), while in other cases (fascioliasis and schistosomiasis) the descriptions are, at best, mediocre.

Chapter 9 (5 pages) covers ''epidemiology.'' The chapter begins by defining epidemiology as ''the study of the distribution of diseases in a particular community or district.'' This definition is too narrow. It should have also included a statement that epidemiology includes the study (or determination) of causative (etiological) agents. Rather than introducing students to the basic principles of epidemiology of parasitic diseases, this chapter describes what types of data should be collected and then provides a few summaries of epidemiological studies. The most fundamental concepts of epidemiology, such as ''endemic disease'' and ''epidemic,'' are not defined in this chapter, and other important epidemiological concepts such as rate(s), virulence, pathogenicity, diagnosis (true and false positives and negatives), population size, and immune status, are not mentioned. This chapter will not provide students with much useful information regarding the principles of epidemiology or the paradigms for controlling and eradicating parasitic diseases.

Chapter 10 (4 pages) discusses vaccines, including such topics as ''the ideal vaccine'' and vaccine development, and it ends with a brief description of attempts to develop a vaccine against cutaneous leishmaniasis. This chapter does contain some information that students will find both interesting and useful. However, the section on cutaneous leishmaniasis might confuse and mislead some students. Earlier chapters in the textbook did not discuss the ''biology'' of cutaneous leishmaniasis, and students will not be aware that cutaneous leishmaniasis is perhaps the only parasitic disease to which naturally infected humans develop a permanent immunity.

The final chapter of the textbook (7 pages) deals with ''Aspects of Malaria.'' Prior to reading this chapter I thought that it might be a detailed discussion of the biology of *Plasmodium* spp. and/or malaria. The chapter is, however, a discussion of vaccine development. The coverage in previous chapters of *Plasmodium* spp. and malaria was so superficial that most undergraduate students will not understand this chapter.

In the section on ''supplementary readings,'' there are 4 ''general references'' (all textbooks), 4 references for ''host response'' (all textbooks), 8 references for ''physiology and nutrition,'' and 3 references for ''malaria and vaccines.'' Of these 19 references, the most recent is dated 1997 (an immunology textbook). The section of ''specific references'' contains 23 citations, the most recent of which is dated 1997.

Parasitology does not contain a single photograph of a parasite; there are no photographs of the important parasitic protozoa, and there is not a single photograph of an adult trematode, cestode, or nematode (or any of their life cycle stages). Rather, all of the illustrations (except one) have been prepared using a computer drawing program. While a few of the illustrations are well conceived and easy to understand, a vast majority of the illustrations are amateurish and crude, and all of the illustrations are black and white. A majority of the book's illustrations lack appropriate detail to illustrate important points. Some illustrations of specific parasites fail to show details that were discussed in the text, while others include terminology (e.g., the names of organelles or organs) that was not discussed in the text. Virtually all of the illustrations of parasites lack a scale, and in many instances the sizes of parasites are not given in the text, so the uninformed reader will have no idea of the actual sizes of these organisms. The illustrations for the life cycles of many of the parasites are particularly difficult to understand. Many of the life cycles are presented in an overly simplistic manner, and the ''details'' of the life cycles that make parasites so successful and interesting to parasitologists have not been included. The one photograph in the textbook is a transmission electron micrograph (TEM) of a tapeworm's tegument. The textbook is not printed on a journal-quality paper, so the TEM lacks detail. To someone with no experience in parasitology and no experience in interpreting electron micrographs (a typical undergraduate student), the TEM will be incomprehensible. Moreover, the legend for this photograph states, ''the [cestode] tegument is a syncitium [sic] i.e., a non-cellular layer … .''

Parasitology contains a number of misspelled words, factual errors, and poorly written statements that will mislead or otherwise confuse students. As

an academician, I find such errors particularly troublesome, for a textbook should set an example for students. Examples of a few of the many misspellings include *Sarcoystis* for *Sarcocystis*, prostrate for prostate [gland], *Eimeria tennela* for *E. tenella*, *Paragonimus westermania* for *P. westermani*, Cariophyllidea for Caryophyllidea, syncitium for syncytium, *Stichorcis* for *Stichorchis*, *Phlebotoma* for *Phlebotomus*, and *C. sinenis* for *C. sinensis*. As examples of factual errors, the textbook contains the following comments: the trypanosome's kinetoplast is a ''large mitochondrion-like structure;'' the infective stage of *Trypanosoma cruzi* in the arthropod vector is an epimastigote form; Anophelinae or Culicinae mosquitoes are vectors for human malaria, and ''oncospheres [of *Echinococcus granulosus*] develop into a coenurus cyst.'' Statements that will confuse or mislead students include: ''some [trophozoites of *Entamoeba histolytica*] enter the blood and then … invade the liver or the brain'', suggesting that extra-intestinal amoebiasis is the norm when it is not; in the description of the life cycle of *Toxoplasma gondii*, there is no mention of transmission between cats and between rodents, suggesting that this is an obligate two host life cycle; ''The larvae [microfilariae of *Wuchereria bancrofti*] … undergo three moults [in the vector] to form L_3 larvae;'' ''If the eggs of *Taenia solium* are accidentally swallowed by man (the wrong host) they develop into cysticerci and migrate round the body'' (if the eggs of this cestode are ingested by a human, the eggs may be distributed around the body and develop into cysticerci, but the resulting cysticerci do not migrate).

Despite the comments on its back cover, this textbook is not ''ideal'' for students who have no background in parasitology, and it does not include ''concise principles.'' This book would be a poor choice for an introductory level course in parasitology as well as any personal or academic library.

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https://doi.org/10.1017/S0031182000007289 Published online by Cambridge University Press

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