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Illustrated Dictionary of Parasitology in the Post-Genomic Era

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Book Review

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Book reviews express the opinions of the individual authors regarding the value of the book's content for Journal of Wildlife Diseases *readers. The reviews are subjective assessments and do not necessarily reflect the opinions of the editors, nor do they establish any official policy of the Wildlife Disease Association.*

Illustrated Dictionary of Parasitology in the Post-Genomic Era. By Henry M. Elsheikha and Edward L. Jarroll. Caister Academic Press, Norfolk, UK. 2017. 582 pp. ISBN: 978-1910190678. US $319 hardback or eBook.

Review by Daniel Fitzgerald

The stated goal of this dictionary is to provide "up-to-date resources for the many terms encountered in contemporary parasitological literature." The book consists of definitions and descriptions relating to a multitude of research fields that intersect in some way with the study of parasites. In-depth detail of a subject sufficient to instruct a newcomer on a new laboratory method or biological process is beyond the scope of any dictionary. What is provided offers a high-level reminder of what a word or phrase means sufficient to jog one's memory or at least convey enough meaning to allow for informed discussion.

Published in 2017, this dictionary is focused on current methods and knowledge relating to parasitology including, as the title suggests, many sequencing terms and phrases. The text consists of 306 pages of more than 4,500 definitions organized alphabetically. There are more than 170 images spread throughout these 306 pages, comprising photographs, microscopic images, and illustrations. Seven appendices are spread over an additional 24 pages. The book is well laid out, with two columns of text per page. Entries are well spaced and easy to read.

Currently all textbooks and dictionaries face a simple question: Why buy this book when an internet search can find almost anything? Everything in this book can be found on the internet. No new research or study findings are presented. At most, the definitions are a short paragraph. Much more detail can be found elsewhere in subject-specific textbooks or review papers. Instead, this book offers many terms from disparate fields. And, most importantly, the defined terms are in context. Although an internet search can define anything, it also has the drawback of defining everything. Context matters, and a passing reference to a term is often not enough to allow for a quick database or internet search. The definitions in this book are from a viewpoint of someone thinking about parasitology and its many intersecting disciplines. The third definition in the book, "ABC" (antibiotic-based combination therapy), illustrates this well. Those with medical backgrounds may be familiar with that acronym. Others may be more familiar with the ATP-binding cassette. Others will be left trying to search for ABC on the internet. Having this book on hand makes finding the proper definition easier to obtain and could save time.

One great advantage of this book is being able to follow definitions through to other definitions. Quite often, the definition of a term will contain other terms that the reader may wish to look up. This book proves quite thorough in that regard. Frequently, a single definition leads to a chain of several subsequent definitions. Following such a chain of definitions can provide sufficient background terminology so that the reader is not lost in a conversation about an unfamiliar subject. For instance, definitions around sequencing and genomics are plentiful and provide useful

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basic concepts to those endeavors. Terms such as "library" and "cluster" and the chain of terms they lead to can help a reader with a general understanding as they look into high-throughput whole-genome sequencing.

The title tells us that this book at the very least deals with parasitology and genomics. Many other fields are touched upon, including immunology, cell biology, physiology, statistics, parasite morphological terms, ecology, and epidemiology. The authors state that the focus is on terms of "relevance to parasite biotechnology and molecular biology," and the book does achieve that goal. Obviously, no dictionary can include everything related to those two interrelated disciplines, so the challenge is then to consider which terms to exclude. For example, "*Escherichia coli*" is present but *Caenorhabiditis elegans* is not. Both are model organisms and neither are parasites. The choice to include one versus the other reflects the goal of focusing on biotechnology and molecular biology rather than just including everything. Work in those two fields is more likely to involve using *E. coli*, so it is more relevant than *C. elegans*, even though as a nematode, the former may seem an obvious choice. Such decisions are found throughout the dictionary.

With such a broad assortment of terms, is this book more suited to inform parasitologists about other fields or to bring parasitology to external audiences? The former seems most appropriate. There are still many parasite definitions. The definitions tend to be brief and provide a general idea of what the organism is and why it is of concern or note. Some are defined in much more detail than others. For example, "*Trichinella spiralis*" is given a brief description, while "*Thelazia callipaeda*" is given a full paragraph, "echinococcosis" is even larger, and "midges" get nearly a half page. But overall, the parasite descriptions seem intended to provide a quick summary of the individual species or a group. This dictionary is also not meant to be a comprehensive list, so some of the most common parasites are not included. For instance, while four types of mange (chorioptic, demodectic, psorioptic, and scabies) are described, there is only one flea species and no louse species. So for those unfamiliar with parasitology and who are looking for an exhaustive list of parasites of note to veterinary or human health, this is not the book for them. Similarly, there are a substantial number of definitions relating to parasite morphology. Some definitions are brief, and others are more descriptive. But, again, no reasonable dictionary could be expected to contain a full list and description for every morphological term of every parasite. Based on the approach to what is included in this book, knowing the proper name of every body part is not essential.

For parasitologists or those with a passing familiarity with parasitology, this book does offer much more detail on other fields than is found in standard parasitology textbooks. Immunology-related terms are a good example. The host immune system is essential to the life cycles of many parasites, and those who research parasites must eventually contend with immunological terms. There are a number of immune system-related terms in this book, which should provide enough detail for a parasitologist to approach immune-parasite research without becoming overwhelmed with Ts and Bs and ILs. Comparing the number of direct parasitology-related terms to those from other fields indicates this book is more for parasitology to look outward than the opposite.

Can this book lead me through the identification of a parasite? Identification via morphology is not a task for which this book was designed. There are no binary identification keys and no charts comparing key morphology among members of a genus. Nonparasitologists may find the morphological terms of more use than those in parasitology. For example, this book does not compare bursal rays for speciation, but it does remind the reader of what a bursa is. One area where the book is weak is histology—there just are not that many related terms or stains included. This is most likely because the focus is on molecular methods, and histology is at a more macrolevel. This dictionary would not be a primary reference for work on the bench to identify a parasite.

The appendices are one of the best features of this book, several of which are useful to assist with one of the great challenges of

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parasitology: nomenclature. There are two appendices dealing with word roots and the Greek alphabet. Simple perhaps, but such a resource is very handy and is something that should be standard in all parasitology textbooks. The appendix dealing with common names of parasites is great, as anyone who has mentioned a Latin genus and species name only to be confronted with a blank look will understand. The last three appendices deal with other resources that can be of use when researching parasites. Overall, the appendices are a great addition to the text and provide excellent support for the study of parasites, especially for those who are new to the field.

There are shortcomings in this book. Taking into account the previously mentioned focus on molecular methods, there remains some bias in which parasites are included and how they are defined. For example, ticks are mentioned, and a definition of "*Ixodes ricinus*" is given. However, there is no mention of *Borrelia burgdorferi* or its major vector, *Ixodes scapularis*. Human disease-related parasites are more heavily represented, while wildlife and veterinary parasites, such as *Eimeria* spp., *Giardia lamblia*, *Myxobolus cerebalis*, and meningeal worm, are absent. "Trichomoniasis" is defined, but not as a parasitic infection of veterinary concern, and none of the species are defined. These are all examples of omissions from the dictionary, which reinforce this book's being a text to help parasitologists understand terminology from other disciplines and not a comprehensive listing of the troublesome parasites of the world.

For a book about parasitology, too few parasite life cycles are depicted. This may be a trade-off to save space to focus on biotechnology. However, it is a drawback that nonparasitologists have to keep in mind when reading this text. Understanding the life cycle of a parasite is crucial, even in the postgenomic era. A single parasite species can interact with hosts (and their immune systems) from different phyla, different environmental conditions, intracellular and free-living stages, sexual and asexual forms, etc. The parasite will take completely distinct physical forms during its life cycle. The expression pattern of any genome has to shift over its lifespan to accommodate such vast changes. Understanding those changes in the context of a parasite's life cycle is, and will be, crucial to applying future postgenomic technologies and understanding to parasitology. This point is something the text fails to communicate to the reader.

As with any printed material, relevance decreases with time. The definitions in this book, especially those concerning current molecular techniques, are as up to date as possible for a publication released during 2017 (and therefore most likely first drafted in 2016). Although many methods in parasitology are older procedures using new equipment (e.g., isolation techniques, morphological identification, and histological preparation) and are generally long past standardization (i.e., will fecal flotations ever change?), the molecular techniques and genomic approaches are relatively new and still evolving. As such, this dictionary is a great resource now about those methods, but it will become outdated. This is the first edition, and hopefully the authors will put out subsequent editions that will move this text forward.

On another point, the illustrations are uneven. Some images are sharp and emphasize the correct structures, even some close-up microscopic images of whole mounted organisms. Most of the histological images, be they transmission electron microscopy or H&E stained, require the reader to know what to look for in the image. This presumes the reader can identify the tissue, the stain, or the method used to generate the slide and what life cycle stage to look for in the image. Others are too blurry to make a useful representation of the organism or structure. Many are wide-angle images shot with a handheld camera with no annotations to indicate what in that image exemplifies the preceding definition. None of the images are labeled. The arrangement puts the image directly after the related definition, and typically the relevant subject in the image can be deduced, but it may not be obvious to readers unfamiliar with parasitology.

Overall, I would recommend this book. In one resource there are many entries that can help a parasitologist approach other areas of

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research and quickly get up to speed with the basic terminology of those fields. Useful features make this book a worthwhile resource for nonparasitologists. The appendices are very well done. The definitions are clearly written and easy to comprehend. Having this book on hand will most likely save time spent searching for terms online.

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