Book Reviews

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BOOK REVIEW . . .

Nematode Parasites of Vertebrates, their Development and Transmission, Roy C. Anderson. CAB International, Wallingford, Oxon, OX10 8DE, 1992. United Kingdom. £75.00 (Available from The University of Arizona Press, 1230 North Park Avenue, #102, Tucson, Arizona 85719-4140 U.S.A. $142.00 U.S.) 578 pp., 33 figures.

Information on the life histories of the nematode parasites of domesticated vertebrates is conveniently summarized to a greater or lesser extent in most of the standard texts on veterinary helminthology such as those by Monnig, Soulsby, Urquhart and Reineke. Probably the best among them for the researcher as opposed to the undergraduate student has been Norman Levine's comprehensive, but now somewhat dated "The nematode parasites of domestic animals and of man" because of the fairly exhaustive summary of the literature. A major advantage of Levine's book for those with interests other than the domestic animals was that it crept somewhat beyond the bounds of parasites of these hosts to include a variety of nematodes of wild animals which could parasitize domestic species. Davis and Anderson's "Parasitic diseases of wild mammals" included excellent sections on diseases due to nematodes, but concentrated on the lungworms, *Trichinella, Dioctophyme,* and *Elaeophora*. Thus, there has been no available synopsis of the life histories of nematodes parasitic in non-domestic animals, that is until now, the very welcome advent of Roy C. Anderson's book "Nematode parasites of vertebrates, their development and transmission." This text is welcome because it includes virtually all nematode parasites of vertebrates, from mammals, birds, and reptiles, whether they be domestic or wild. Such a publication cannot fail to be an important addition to the literature on parasitic diseases of wildlife and of domestic animals.

The book commences with a very concise but informative overview of nematode systematics, and introduces concepts on the origins of nematode parasitism and the relationships between the complex types of life cycles which occur. It is perhaps a pity that this topic is dealt with so briefly, given Dr. Anderson's important contributions to the subject generally. The introduction also provides definitions of terms such as monoxenous, heteroxenous and paratenesis which are encountered subsequently in the text, and each is explained lucidly with examples. Hypobiosis and routes of infection also are discussed though, perhaps surprisingly, there appears to be no definition of definitive and intermediate hosts. A synopsis of the important primary literature is provided at the end of the introduction.

The subsequent treatment of parasitic nematode groups then follows, based principally on the taxonomic arrangement found in the Commonwealth Institute of Helminthology (CIH) "Keys to the nematode parasites of vertebrates," probably the most widely used taxonomic system for parasitic nematodes, and a work which was contributed to and edited in part by Dr. Anderson. Herein lies one of the major advantages of the present volume: it is based on a modern comprehensive system of nematode taxonomy which can be referred to by those in need of further information on the taxonomy of a particular nematode or needing to identify specimens. Dr. Anderson's text does however depart from the CIH keys in its treatment of *Capillaria* which he accepts as having seven valid genera; most of these are treated as synonyms of *Capillaria* in the CIH keys. This is a minor difference unless one is trying to find some of the species of *Capillaria* in the index of the new work.

Each chapter contains a particular order or superfamily of nematodes. Part I contains the Secernentea, commencing with the Rhabditida (17 pp.), then the Strongylida (173 pp.), the Oxyurida (13 pp.), the Ascaridida (88 pp.), the Spirurida-Camallanina (123 pp.), Spirurida-Spirurina (190 pp.), and Part II the Adenophorean nematodes with the one order Enoplida (33 pp.). Except in a few instances the text treats species individually. Where species are combined, the treatment works well, except in one instance identified, the case of the *Onchocerca* species of horses where the confusion in the literature between *O. cervicalis* and *O. reticulata* has not been entirely sorted out. Under each species heading, the definitive and intermediate hosts are given, details of life history are provided, often including a significant amount of experimental detail, and, where relevant, the pathological effects on the host are addressed. At the end of each section, there is a bibliography, with both the titles of articles and the journal names cited in full, a feature to be commended highly. Relatively common genera such as *Trichostrongylus* and *Haemonchus* in domestic animals are covered well, but, as the author clearly states, were not intended to be covered comprehensively. At the other extreme, nematode species also are included even when the available information on life history is scanty, such as on p. 90, where it is noted that the only observations

on *Strongylacanthus glycirrhiza* from rhinolophid bats are on the free-living stages and were made by Seurat in 1920, or (p. 563) on *Lappnema auras*, found on the ears of reindeer, in which males are unknown and the mode of transmission also is unknown. Obviously not all nematodes whose life cycles are only partially known are included; for example the development of the larval stages of the elasmobranch nematode *Echinocephalus overstreeti* in the egg and in molluscs has not been included, nor has the life cycle of *Cercopithifilaria johnstoni*, but the book certainly covers the vast majority of nematodes. This comprehensive approach is a major attribute of the volume and serves not only to summarize what is known, but also to indicate the enormous scope for research in the future.

The author makes the point in the preface that the literature on well studied species is immense and that he has therefore been selective with respect to the bibliographies, recognizing that "a book is a poor substitute for the original literature" (p. xii). It strikes me that the author's claims are far too modest. The literature on well studied species is indeed immense, but most of it is also fairly readily available and relevant reviews frequently exist. What we are presented with in this volume, and what will be of immense value to parasitologists interested in non-domesticated animals or to veterinarians, pathologists, and wildlife biologists interested in nematode parasites generally, is the enormous body of literature brought together for the lesser known nematode taxa in wild animals. The overall impression given is that the world literature, at least up to 1988, has been scoured extremely thoroughly for this book, extending to New Zealand Ministry of Agriculture Media Services reports, annual progress reports of the South-East Asian Treaty Organisation Medical Research Laboratory, and unpublished Ph.D. theses. Non-English references are well represented, including unpublished Ph.D. theses from Swiss universities, and, for the pedants, foreign language titles and publications in European languages are invariably cited correctly in the original language, while Slavic language publication titles have been carefully transliterated. The coverage of the Russian literature is very good. Asian language titles are given in English. The literature after 1988 is less prominent with 36 references each from 1989 to 1990, then 9 in 1991 and 5 in 1992, but the cut-off date is not stated. It would be of considerable use to specialists to have the date beyond which the literature was excluded clearly stated, particularly in the case of the Enoplida, where recent work on the life cycle of *Capillaria hepatica* and *Trichinella pseudospiralis* would have been a useful addition, and in the case of the ascaridoids where the inclusion of recent definitive studies on the life cycle of *Toxocara vitulorum* in cattle would also have been helpful.

Given the immense body of literature available, it is difficult for any individual reviewer to accurately assess the coverage in this book. All one can do is to ask how much of the obscure as well as the obvious literature on nematode life cycles known to oneself has been included. The answer for me is that overall the literature coverage is very good; indeed I was amazed to find several of my own very obscure publications cited. One can obviously find omissions, particularly when the date beyond which publication citation ceases is not stated, and there are obvious differences in coverage between taxa, with the lungworms and filarioids being extremely well covered, but these omissions should not detract from the enormous effort which has been put into providing as comprehensive a series of bibliographies as is practically possible. A book may in Dr. Anderson's words be a poor substitute for the original literature, but it can more importantly be an invaluable guide to it, and there can be no doubt that this book fulfils the latter criterion admirably.

There are 33 figures in the text, all line drawings, many of them original, and all of excellent quality. The only complaint which one might offer, given their quality, is that there are not more of them. One can find minor omissions, such as the lack of keys to abbreviations for some figures (e.g., Figs. 2 and 3); for Fig. 22, showing the life cycle of *Toxocara canis*, transmammary transmission is not shown in the figure, even though it is mentioned in the text. One also might quibble, given the work of Araujo (1971, 1972), with showing a second stage larva as the infective stage, rather than the third stage, which is now generally presumed to be the infective form in most ascaridoids; but this at least conforms to the information cited in the text, and is an area in which one can expect to find divergent opinions. Perhaps surprisingly, this matter is not discussed in the chapter on ascaridoid life cycles.

The index is brief, and, as one might expect, consists primarily of parasite names and taxonomic categories. Synonyms are included in the index, though there obviously is a minor problem with some of the species of *Capillaria*, given the sub-division of this genus into seven taxa.

How does one then assess the overall importance of such a book? Given its immense scope, one can obviously find details here and there which are not correct or which are open to alternative interpretations, as well as omissions. On the whole, however, this text is a delight both as a scholarly work and as a book in which

to dabble much as one would in an anthology. It fills a substantial hole in the parasitological literature and Dr. Anderson is to be commended highly for it. It should be an essential possession for anybody interested in nematode parasites and their role in wildlife disease. If one has to make comparisons with other texts, then perhaps those considered at the beginning of this review are really not apposite. It is probably best thought of as a worthy companion to Yamaguti's "Synopsis of the life histories of the digenetic trematodes," and like Yamaguti's text will be a standard source for research workers for many years to come. If one were to have to suggest possible improvements, it could only be in making the literature cited for every group of nematodes comprehensive rather than selective, and this clearly is more than one could ask of any single author.

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BOOK REVIEW . . .

Transmissible Spongiform Encephalopathies of Animals, Office International des Epizooties, Scientific and Technical Review, Volume 11, Number 2. 12 Rue de Prony, 75017 Paris, France. 1992. 634 pp., 185 French francs.

Ever since bovine spongiform encephalopathy (BSE) was first recognized in cattle in Great Britain in 1986, there has been renewed interest in the transmissible spongiform encephalopathies (TSE), resulting in "cutting edge" research and an explosion of new information on the molecular biology of the disease agent(s). Transmissible spongiform encephalopathies, of which scrapie is the archetype, comprise a group of progressive and fatal diseases of the central nervous system characterized by a prolonged incubation period of months to years; neuronal vacuolation, astrocytosis, and amyloid plaques in the absence of significant inflammation; and the presence of scrapie-associated fibrils in affected brain tissue. This volume is comprised of six review articles. Each article is written by one to three separate authors, most of whom are internationally recognized experts in the field of transmissible spongiform encephalopathies. In the first paper, bovine spongiform encephalopathy is reviewed and background information is provided on the related diseases (i.e., TSE) in other animal species, including humans. The authors of the next three papers review the spongiform encephalopathies in sheep and goats (scrapie), mink (transmissible mink encephalopathy), mule deer (*Odocoileus hemionus hemionus*), and Rocky Mountain elk (*Cervus elaphus nelsoni*). In Cervidae, the disease is called chronic wasting disease. Each of the first four papers is preceded by a comprehensive table of contents. The order of information presented in each paper is fairly uniform. For each host species, there are sections on geographical distribution, economic implications, etiology, epidemiology, transmission, clinical features, pathology, pathogenesis, diagnosis, prevention, and control. In the fifth paper, the authors describe the rodent model of transmissible encephalopathy, characterize the PrP protein (the major component of infectious fractions from infected tissue), describe the PrP gene, and review the molecular biology and the nature of the etiologic agent. The authors of the last paper summarize data presented in the first five papers, provide data on the geographic distribution of animals affected with TSE, and briefly discuss government regulations established for the control of BSE and scrapie.

The bibliography is amply extensive and was up-to-date at the time of publication. Although there is no index, the table of contents is adequate, albeit a bit cumbersome to use as a substitute for an index. The quality of photographs is fair, and while there are relatively few photomicrographs, the photographs adequately help convey information on the clinical signs, pathology, and etiology of TSE. The glossary in the beginning of the volume and the appendix on protocols for the diagnosis of BSE are beneficial features. The first article is written in English, French and Spanish. The rest of the articles are in English, with summaries in French and Spanish.

While none of the individual articles is written in comprehensive detail, there is enough information to give the reader an ample understanding and, in some cases, a working knowledge of the subject. For instance, although there are several papers in the current literature that provide more detail on the pathology of TSE in different host species, enough of the salient pathologic features are mentioned in this book to enable a pathologist to easily derive a diagnosis of any of the spongiform encephalopathies. Overall, the authors of this book provide an excellent review of transmissible spongiform encephalopathies and the book is comprehensive enough to appeal to a broad audience including microbiologists, clinical veterinarians, pathologists, animal scientists, molecular biologists, and any individuals interested in the comparative aspects of spongiform encephalopathies. The articles on TSE in mink and in Cervidae would especially appeal to wildlife scientists and wildlife veterinarians. The article on BSE and the last article also have useful information on spongiform encephalopathies in other wildlife species.

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