Book Reviews

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BOOK REVIEW . . .

Arthropod-Borne and Rodent-Borne Viral Diseases, WHO Technical Report Series No. 719. World Health Organization, 1211 Geneva 27, Switzerland. 1985. 116 pp. $4.50 U.S.

This pocket-sized book is the written report of the 1983 meeting of the World Health Organization Scientific Group on Arthropod-Borne and Rodent-Borne Viral Diseases. The last published report from this WHO Scientific Group was in 1967. An updated report was needed because the number of identified viruses has more than doubled, the knowledge about the diseases and the viruses has greatly expanded, and the techniques for diagnosing viral infections and identifying viruses have changed dramatically since 1967.

This report succinctly summarizes the pertinent information on the arthropod- and rodent-borne viruses, including geographic distribution, vectors and vertebrate hosts, clinical disease and pathogenesis in humans, laboratory diagnosis, biological hazards, surveillance and control, and preparedness and emergency operations. It is a very concise report that contains a textbook-amount of information in 116 pages. The report is written such that the reader needs to have a background in arbovirology to comprehend some sections. There are no descriptions or diagrams of the natural transmission cycles of the viruses, although there are tables listing the viruses, the types of vectors involved and the clinical symptoms of diseases these viruses cause. The report contains much useful information on the viral diseases that are of the most public health concern in the various regions of the world.

The report emphasizes the viruses, diagnoses, clinical disease in humans, and vectors and vector control. There is very little information on the involvement or role of vertebrates in these viral diseases, but information on rodent control is provided. There are good sections on emergency and long-term vector control and the research needs for vector control. The sections on pathogenesis and the diseases and their management are also quite informative. Although the list of references is short and seemingly incomplete for the broad range and depth of the subjects discussed, the members of the scientific group writing the report were able to provide information from their own fields of expertise.

It is an inexpensive book that contains valuable information on many important viral diseases in the world. It is a handy reference and an excellent summary of the current knowledge of and research needs for these viral diseases.

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Corporation, Painesville, Ohio for supplying tiamulin. Use of trade names does not imply U.S. Government endorsement of commercial products.

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BOOK REVIEW . . .

Primates: The Road to Self-Sustaining Populations, Kurt Benirschke (ed.). Springer-Verlag, 275 Fifth Ave., New York, New York 10010, USA. 1986. 1044 pp. $79.00 U.S.

This book represents the proceedings of the international conference on wildlife conservation held in June 1985 at San Diego, California. The quality and evenness of the chapters are generally excellent; they are well written and easy to read. Most are thoroughly referenced in addition to being supplemented with information tables and charts.

The purpose of the conference was not only to arouse more widespread concern about the situation of the world's primate populations but also to foster interdisciplinary communication among scientists and field researchers in order to stem the approaching tide of primate species extinction.

The book represents contributions from field scientists, primatologists, behavioralists, reproductive specialists, virologists, and others. The volume generally follows the theme of the meeting, beginning with a review by field scientists of the status of primates in their natural ecosystems, and problems they face in their natural contexts from conservation programs. This review is followed by extensive contributions from those specializing in the management and propagation of captive primate populations. Specific consideration is given to reproductive phenomena, infection, and other basic scientific contributions such as pathology and genetics.

This volume will serve as a uniquely useful resource to students and professional conservationists owing to the diversity of the chapters. Many topics that would ordinarily be difficult to locate in the general literature because of their special nature, such as the preparation of specimens for viral isolation or management strategy for captive chimpanzee populations, are described here. In addition, because of the multidisciplinary nature of the book, it is interesting reading for the wildlife scientist. The emphasis of the text is primarily on technological intervention; however, as several contributors point out, the ultimate solution for the long-term conservation of primate species lies in the emphasis on the preservation of species in their natural ecosystems. In spite of the unresolved issues, this book is a valuable contribution to the literature of wildlife conservation.

The dialogue generated by this conference is exciting and thought provoking. Although there is no simple way to "build a road to self-sustaining populations," the conference and this book represent a positive contribution to worldwide primate conservation.

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BOOK REVIEW . . .

The Biology of *Echinococcus* and Hydatid Disease, R. C. A. Thompson (ed.). Allen and Unwin, Inc., 8 Winchester Place, Winchester, Massachusetts 01890, USA. 1986. 290 pp. $60.00 U.S.

The book is dedicated to Professor J. D. Smyth at the time of his retirement in appreciation of his major contributions to parasitology. It is directed towards a wide audience including researchers in classical parasitology and human and veterinary medicine in addition to those working on the surveillance, treatment and control of hydatid disease. The book effectively summarizes much of the current knowledge of the genus *Echinococcus* and hydatid disease including sections on the basic life history and geographical distribution of the parasite and disease. There is an extensive review of hosts including a thorough review of the eastern European and Asian literature. There are chapters on biochemistry and physiology, cultivation, and immunobiology of the parasites. Also included are three chapters on epidemiology and control, immunodiagnosis, and on treatment of hydatid disease. The editor indicated that the area of surgical treatment of hydatid disease in humans was "consciously avoided" and "probably warrants a volume in itself."

The only other area noticeable by its absence or incomplete coverage is an accurate description of the clinical pathology of hydatid disease. Some clinical features of central nervous system unilocular hydatid infections are mentioned but the same is not true of the more common unilocular lung and liver infections. Clinical effects of these infections in humans are summarized as "simply reflect[ing] the results of pressure and other space-occupying effects of an isolated and well delineated, but growing, mass." While complications associated with multiple cysts or ruptured cysts are acknowledged, their effects also are not summarized in any detail.

Such characteristics of lung hydatid disease as chest pain, nonresolving pneumonia, chronic cough, and allergic reactions also are not described. Similarly, the abdominal pain, jaundice, nausea, vomition, and allergic reactions associated with unilocular hydatid disease of the liver in humans are not reported. The result is a book about a disease without a thorough description of the disease. Thus, when the reader finds that infection with *E. granulosus* of sylvatic origin (wolves, moose and caribou) in North America is "virtually asymptomatic in man," he/she is left wondering how the pathogenicity of this strain varies from that of other strains of *E. granulosus*.

It is easy to overlook this one shortcoming because of the high quality of the book. There are few typographical errors. The only error of note regards the effects of temperature on survival of eggs in temperate zones. However, the resulting confusion in the text is clarified by an accompanying figure. Figures are few in number, are clear, and are very useful. Each chapter contains a list of references cited in the text.

The writing is remarkably consistent between chapters written by different experts. The smoothly flowing text makes for relaxed reading and ready assimilation of the facts regarding the efforts and triumphs of research on *Echinococcus* spp. and hydatid disease. In spots the text reads like a spy thriller; what was to be the next major discovery?

Equally as important as descriptions of what is known, the authors have left the reader with a clear understanding of the major areas which must be investigated further if this important zoonosis is to be effectively controlled. The list of areas requiring future research is too extensive to include in a book review (I tried) and might tend to daunt the weak of heart. However, the excitement generated by descriptions of what has been discovered to date leaves the reader undaunted and wanting to enter into research on the genus *Echinococcus*.

This book is a valuable summary for experts working with *Echinococcus* spp., hydatid disease, and other tapeworms. However, it achieves more generic goals. It describes in a clean and exciting manner examples of steps in the process of speciation of parasites and also of the complexities of host-parasite relationships. In addition it demonstrates very well that major advances in our understanding often arise from complimentary work in such fields of science as basic biology, biochemistry, epidemiology, in vitro cultivation and immunology. The important achievements of this book make it recommended reading for students and researchers alike and also make it a fitting tribute to the contributions of Dr. Smyth to parasitology.

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BOOK REVIEW . . .

Conservation Biology. The Science of Scarcity and Diversity, Michael E. Soule (ed.). Sinauer Associates, Inc., Sunderland, Massachusetts, USA. 1986. 584 pp. $28.50 U.S.

In many areas throughout the world, animal and plant populations face extinction. In addition to the direct benefits to society, it is in our best interests to devote energy to saving endangered species and their habitats because habitat destruction and associated species extinctions affect the quality of our research and the scope of questions we can ask about natural populations. This volume effectively focuses ideas from various fields which are relevant to conservation of natural populations. There are 25 chapters which are grouped by common themes into six sections. In general, the chapters are well written and clearly explain concepts from population genetics and field and theoretical ecology that are important to effective conservation policy and management.

The chapters in section one describe the effects of changes in genetic heterozygosity on the fitness and viability of populations. This theme is relevant to those interested in disease because of the direct and indirect effects of heterozygosity on disease resistance and spread. Allendorf and Leary (Chapter 4) provide an excellent summary of data on the relationship of heterozygosity and fitness in animals which is complemented by an equally good chapter on heterozygosity and fitness in plants by Ledig (Chapter 5). Templeton's results (Chapter 6) suggest that in addition to avoidance of inbreeding, breeding schemes should be concerned also with outbreeding depression. However, unlike the well established link between inbreeding and fitness (Ralls et al., Chapter 3), the degree to which outbreeding depression occurs in vertebrates or plants is poorly known.

The diversity of species as measured over large and small geographic scales clearly has implications for the design and placement of biologic reserves. This is a topic that is dealt with by the four chapters in section two. Broad geographic surveys of diversity are provided by Cody (Chapter 7) for birds from the Mediterranean climate regions and by Gentry (Chapter 8) for plants from the New World tropics. The results of Hubbell and Foster (Chapter 10) are an interesting contrast to these broad based surveys; their study covers a small geographic area on Barro Colorado Island, Panama and consists of a tabulation of every plant species over 1 cm stem diameter. Their results emphasize the importance of large reserves for preservation of diversity.

The effects of habitat fragmentation on the abundance and distribution of species is discussed in the three chapters of section three. Wilcove et al. (Chapter 11) provides a good review, along with examples, of the consequences of fragmentation, such as area and perimeter effects and edge effects. Lovejoy et al. (Chapter 12) present experimental data on the effect of reserve size on diversity from work in Brazil sponsored in part by the World Wildlife Fund. In this unique study, the flux of species in and out of reserves of various sizes has been precisely monitored over a period of several years. Their results demonstrate the importance of edge effects on species diversity. The final chapter in this section by Jansen discusses external threats to the integrity of reserves.

The fourth section includes chapters that describe processes that occur on the community level. These are among the best chapters in the volume and include a very accessible discussion of community structure and stability by Pimm (Chapter 14). His balanced review exposes both the strengths and weaknesses of theoretical models of community structure. The need for better models and field data to test these models is implicit in his discussion. The insightful chapter by Terborgh (Chapter 15), emphasizes the effect keystone species have on community structure and stability. An understanding of the role of such species within a community is a necessary prerequisite to effective reserve policy and management. The final chapter in this section by Dobson and May (Chapter 16) highlights relevant concepts and conclusions of theoretical models of macro- and microparasitic epidemics. This is not a detailed account of their theoretical models but rather an introductory overview aimed at a broad audience.

The final two sections include chapters that discuss specific endangered habitats (section 5) and interactions with the real world (section 6). The endangered habitats discussed in separate chapters include shallow tropical marine environments, tropical continental aquatic habitats, tropical forests, cave faunas and African arid lands. This is a very informative group of chapters.

In the last section, Diamond (Chapter 24) presents an excellent case study involving the design and implication of a reserve system in New Guinea. This carefully conceived project points to an important weakness in the book. There is a strong consensus among most of the contrib-

utors to this volume that reserves should be large, not fragmented, and include a diversity of habitats and species. This academic consensus is not followed by any discussion of how specific governments can be convinced to create and maintain such reserves in their natural state. This is the most serious unresolved problem facing endangered habitats and species in the Third World. A single rhino horn is worth more than most Africans will make in their lifetime. Hungry people cannot be convinced to protect wild game when they occupy pastureland suitable for cattle or cultivation. We must confront such political and economic realities. There must be specific incentives to individuals and governments to protect endangered species and habitats. Hopefully, this will be the subject of future collaborative efforts.

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BOOK REVIEW . . .

Population Dynamics of Rabies in Wildlife, Philip J. Bacon (ed.). Academic Press, Inc., Orlando, Florida 32887, USA. 1985. 372 pp. $32.50 U.S.

This book is a compilation of 13 papers by 17 contributors from England, Canada, Barbados, and the United States on the mathematical approach to studying rabies in wildlife. Most of the chapters are concerned with rabies in red foxes in Europe, but information on wildlife rabies in Canada, Grenada, and the eastern United States is presented as well.

A general introduction to the virus, a description of rabies throughout the world, and the biological and ecological aspects of the disease in selected hosts are provided. Following this background is a chapter on the biological basis of rabies models that attempts to integrate what is known about the virus, the hosts, and the epizootiology of the disease into broad generalizations. The epizootiological features that seem most to influence the direction and intensity of rabies transmission are: (1) contact rate among rabies vectors; (2) population density of the vector which, of course, affects the contact rate, varies considerably, is difficult to measure accurately, and may be indirectly assessed through the habitat structure; and (3) the adaptable social behavior of the vector, particularly of red foxes.

The remainder of the book is a series of mathematical models that attempt to imitate the epizootiology of fox rabies and to conceptualize and test control strategies. Some of the models were designed to discover and interpret the environmental factors responsible for the spread of rabies, whereas others were used to predict the direction, pattern and velocity of the spread. Many of the models are explained thoroughly and, for some, flow diagrams or actual computer programs are provided. Other models require a strong mathematical background to understand them. The diversity of the models, however, provides a wide range of approaches to the mathematical study of rabies and rabies control in wildlife populations. A very realistic, easy-to-follow, spatial simulation model of rabies control is presented in the last chapter. The model used locally obtained field data on red fox biology and rabies epizootiology in Canada and tested the model outcomes against the field information to validate its accuracy.

Several assumptions used in designing most of the models may weaken their predictive capability and accuracy. I am not convinced that the assumption is valid that rabies virus is 100% fatal to red foxes and that natural immunity does not exist nor play any role in the epizootiology of the disease in red fox populations. Also, for most of the models, long and variable incubation periods of rabies in red foxes are not considered, i.e., generation time of the disease is based solely on short incubation periods with little variability in length. Most rabies virus transmissions in foxes result in fatal disease with short incubation periods, particularly during initial invasions into virgin populations. A small proportion of infections with longer incubation periods, however, instead of continuous replacement with susceptibles or regular reintroduction of rabies may be more important for the enzootic maintenance of the virus and will be the most challenging for control strategies. Another weakness of most of the models is the reliance on the inaccurate and inconsistent data acquired from the public reporting system.

As expressed by several authors, a crucial factor for rabies transmission and a particularly sensitive factor for the functioning of the models is the contact rate within the rabies vector population. These authors noted in particular that the contact rate is not necessarily density-dependent and that the flexible and variable social behavior of red foxes may greatly influence the temporal and spatial intensity of the contact rate in different habitats. These same authors emphasized the need for more information about these factors, and the models themselves have shown the need for more complete data. Whenever assumptions replace actual data, the reliability of the models is reduced, regardless of how well a model seems to function or how well it seems to mimic the outcome of the natural system. The models need to be validated with data from the field and continuously updated and modified.

Despite the few problems with the models, the methodology presented is creative, informative, and quite useful in understanding the dynamics of a contact-transmitted disease in a territorial wildlife species. The models provide techniques to evaluate options for and possible outcomes of disease control strategies for the wildlife manager faced with extensive and costly plans to manage diseases in wildlife species. These methods also provide insight into the impact a disease such as rabies can have on wildlife populations. This book is a must for the serious quantitative epidemiologist, a valuable refer-

ence for disease ecologists and rabies experts, and a good teaching aid for students and teachers of wild animal populations and the interaction of diseases in populations.

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BOOK REVIEW . . .

Handbook of Trout and Salmon Diseases, Second Edition, Ronald J. Roberts and C. Jonathan Shepherd. Fishing News Books Ltd., Farnham, Surrey, England. 1986. 222 pp. £19.50.

A new edition of the well known trout and salmon disease handbook is now available. The same 13 chapters cover (1) The Cultured Salmonids, (2) The Anatomy of Salmonid Fish, (3) Husbandry of Salmonid Fish, (4) Infectious Diseases, (5) Disease Diagnosis on the Farm, (6) Diseases of Eggs and Sac-Fry (Alevins), (7) Diseases of Early Feeding, (8) Diseases of Growers in Freshwater, (9) Diseases of Growers in Seawater, (10) Nutritional Diseases, (11) Fish Kills, (12) Diseases of Wild Fish and Broodstock, and (13) Prevention and Treatment of Disease. The handbook relies on a concise, down-to-earth text that abandons the traditional encyclopedic style in favour of a thematic approach. As reflected by the titles, the chapters are functional units addressing problems encountered during the various phases of production. The old text has been edited and reorganized in places, updated in others, and expanded to accommodate several new tables and photographs. In addition, there are three brief appendices outlining the methods of laboratory diagnosis of bacterial infections and laboratory techniques and chemicals for diagnosis. The new edition retains the convenient pocket-book size and sturdy binding.

The new edition incorporates changes in growing practices that have occurred during the past 10 yr. There is more emphasis placed on growing trout and salmon in the sea and on production maximization through use of data on growth and food conversion rates. Similarly, more importance is placed on immunization programs under development and on nutrition and the role diet plays in infectious disease epizootics. More space is given to fungal diseases. I was interested particularly in seeing that, due to microbial adaptations to sulphamerazine, oxytetracycline has moved to the top of the list of broad spectrum antibiotics. Throughout the text one senses extended encouragement for farmers to initiate routine diagnostics and water quality monitoring themselves.

The new edition is full of brief factual updates. Recent evidence revealing that oligochaetes (misleadingly referred to as "worms") serve as an alternate host for *Myxosoma cerebralis* is mentioned, but unfortunately the relationship of the group to a triactinomyxon is not mentioned. Similarly, new information is provided on proliferative kidney disease, but an amoeba is suggested as the causative agent instead of a myxozoan. Diphyllobothriasis and botulism disease are given in the emphasis they deserve. Several diseases that have been studied since the first edition are included such as hitra disease, enteric redmouth disease, viral erythrocytic necrosis virus disease, bloat disease and exocrine pancreas disease (cardiac myopathy disease). Taxonomic updates include *Aeromonas hydrophila* for *Aeromonas liquefaciens*, *Flexibacter* for *Chondrococcus*, *Renibacterium* for *Corynebacterium* and *Hexamita* for *Octomitis*. *Lactobacillus piscicola* is not mentioned.

The main shortcoming of the handbook is its failure to discuss life history strategies of microparasites and, as it stands, one receives the impression that viral and bacterial pathogens are unadapted and nicheless in the natural world. These microparasites collectively constitute a continuum from strict obligates, to gastrointestinal tract dwellers, to opportunistically parasitic free-living heterotrophs. Associated with any one of these life styles are specific adaptations for transmission. Not being informed of the limitations of these adaptations creates an epidemiological void. Admittedly, it would be ridiculously abstract to present somewhat theoretical ideas in such a handbook. Nevertheless, variation in the biology of microparasite transmission could have been presented in a simple manner such as: how piscivorous birds and mammals can serve as disseminators; how nonsymptomatic superspreaders represent important internal reservoirs of infection and how wild fish represent important external reservoirs; how certain obligate microparasites can transfer directly to sperms, enter eggs, and subsequently survive in the new generation of stocks; how nets, buckets, food, and certain macroparasites can act as mechanical vectors; and how cleanliness is of the greatest importance in the trout and salmon business. Such a fourteenth chapter would provide a much needed ecological overview of infectious diseases.

The presence of well-used copies of the first edition in manager's offices and hatchery lunchrooms almost everywhere is proof of its success. The new information and added emphasis for hands-on diagnosis by fish growers justifies replacing the old with the new.

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BOOK REVIEW . . .

General Parasitology, 2nd Edition, Thomas C. Cheng. Academic Press, Inc., Harcourt Brace Jovanovich, Publishers, Orlando, Florida 32887, USA. 1986. 827 pp. $51.00 U.S.

Since its introduction in the early 1970's, this is only the second edition of an important reference and introductory text in parasitology. The first edition was a widely used volume not only by parasitologists but by biologists, veterinarians, medical practitioners, and other health professionals. Thus I, and undoubtedly many others, were looking forward to the second edition. I was disappointed. While the text represents a traditional coverage in a similar fashion as the first edition, it is noticeably deficient in most of the recent and dramatic developments in parasitology since the 1970's and fails to integrate into the text much of the newer information on molecular biology, immunogenetics, development of vaccines and new chemotherapeutic agents, parasite population dynamics and transmission, mechanisms of pathogenesis, etc. This is a major flaw in the volume and diminishes its usefulness as an up-to-date reference and introductory text.

Chapters 1, 2, and 3 provide the introductory basis for the text; the basis of parasitism, the inter-relationships of parasites with their environment (hosts) and the immune response. It was in these chapters that the author could have set the stage for the following 21 chapters that discussed individual taxonomic groups of parasites. However, the text in these chapters is unduly laborious in some areas and filled with meticulous detail on some subjects, yet fraught with inadequate or no discussion on some very important and recent developments in parasitology. I was particularly disappointed with the inadequate discussion of ecological parasitology and evolution of parasites in Chapter 1. Moreover, this chapter as well as the remainder of the text has numerous errors and/or misrepresentations. For example, from Chapter 1 there is misleading information on the following: that *Taenia pisiformis* larvae are in the liver of rabbits and that this species commonly infects wild cats, that "in time . . . (hosts) tend to lose most of their original parasites and pick up new ones that are endemic to new habitats," and that parasites evolve toward avirulence. Additionally, there was no mention of the important concepts of overdispersion of parasite frequency distributions, population regulation or the compensatory effects of parasites on their hosts, and the evolution of the host-parasite relationship.

In the introduction to the second edition, the author states that at the advice of colleagues, ". . . a concerted effort has been made to provide more information pertaining to species of medical importance." In most instances this appears to be "tacked on" or secondarily added to most chapters. More importantly, there are some points of misinformation related to medically important parasites. For example, from Chapter 12 dealing with Eucestoda the following were noted: (1) that cysticerci of *Taenia solium* develop in practically every organ of the body, when in fact they occur almost exclusively in skeletal musculature and the nervous tissue and its derivatives; (2) the inference that humans do not acquire cysticercosis from *Taenia saginatus* when it does occur as a rare infection in man; (3) the lack of a discussion of human sparganosis and (4) reference to natural immunity as a possible reason why some hosts do not develop a pernicious anemia due to *Diplyllobothrum latus* and no discussion of why humans may develop an anemia (only if located in the proximal portion of the jejunum where it can compete for Vitamin B_{12}). While these may not be of particular importance to wildlife parasitology researchers, there are other misrepresentations and incorrect statements related to this discipline. Examples include (1) reference to the walleye as walley pike, (2) reference to the lynx as a normal host for *Taenia taeniaeformis*, when in fact it is the closely related *Taenia rileyi* that usually occurs in this host, (3) reference to *Cloacataenia megalops* as *Hymenolepis megalops*, and (4) inference that the genus *Gastrotaenia* occurs in the intestine of anseriform birds when this is a well recognized and very unusual example of a true cestode occurring in a location other than the small intestine, under the lining of the gizzard.

While the presentation, quality of the paper, and printing are excellent, many of the figures are of poor quality. Many of the halftones are poorly reproduced and many of the photographs and photomicrographs are either severely over- or underexposed. Also, in several instances the same figures are used more than once in the volume.

All of the above considerably reduces the inherent value of this as an introductory text for parasitology and as a reference text for use by members of the Wildlife Disease Association. The number of errors, misinformation, quality

of the reproduction of the figures, absence of recent and exciting aspects of parasitological research, and the general content of the volume is particularly of concern since this could be the text used for the initial introduction of parasitology to our students and graduate students.

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