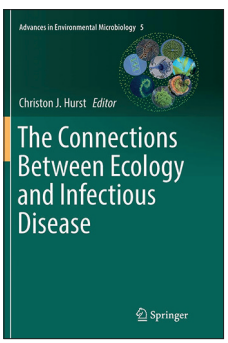
Books

The nature of ecology of infectious disease



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The Connections Between Ecology and Infectious Disease
Christon Hurst
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Many infectious organisms that threaten humans and animals, notably those domesticated for food production, may in turn be affected by human actions that favour or slow down disease transmission. Even wild animals can be affected by human action on the environment and other attributes of ecosystems, and can be exposed to detrimental pathogens associated with neighbouring livestock or human individuals coming in to watch them. Understanding the complex interactions between infectious diseases, their hosts, and the environment in time and space requires an ecological understanding of the numerous linkages that consolidate and structure all of the pillars in this triad. During the last two decades, the field of ecology of infectious diseases has been particularly relevant to: (1) the study of population dynamics of disease transmission and their interactions with human or animal vaccine strategies; (2) metapopulation theory and other spatial, large-scale models of transmission; (3) macroecological and biogeographical studies revealing important new pathogen-host-environment patterns; and (4) field and experimental investigations pinpointing the role of biodiversity in multihost disease life cycles and spread. More recent advances have also clearly shown that plants, animals, and humans host microrganisms that condition their own immunity, physiology, psychology, and many other traits and characteristics. Thus, ecology has now permeated a range of research disciplines, and current microbiome research in medical, plant, and environmental microbiology is producing scientific papers that are easily understood by disease ecologists trained in community ecology.

The Connections Between Ecology and Infectious Disease, edited by Christon J Hurst, addresses various scientific and sociocultural issues related to the strong interconnections that exist between the scientific field of ecology and human, animal, and plant pathogen transmission and spread. The book gives state-of-the-art summaries for a range of disciplines, posing new problems and stimulating new research avenues. Chapter 1 deals remarkably with interkingdom community interactions in disease ecology, discussing how microscopic passengers govern the macro-world, and chapter 2 is a useful illustration of recent work on biodiversity-disease relationships, but it mixes reviewed published results and personal works by the chapter's author. This mixing prevents this early chapter from being an introductory contribution because it requires an advanced level in ecology to be understood.

The second part of the book concerns the ecology of human infectious diseases affecting humans. Chapter 3 was written by Hurst himself, and addresses risk understanding and estimation of drinking-water waterborne infections. This chapter benefits from a keen knowledge of basic epidemiology of waterborne diseases, but it does not belong to a category described as disease ecology. The summary tables giving minimal inoculum sizes for causing illness in the different enteric bacteria are helpful, since this information is rare and very important for disease modelling and health interventions. In chapter 4, on the ecology of bacterial agents transmitted by food consumption, the authors make an effort towards synthesis even though the chapter structure follows a series of food-borne pathogens. Chapter 5 concerns the impact of mycobacterial biofilms on public health, and is a nice and concise contribution.

Section three of this book, on the ecology of infectious diseases affecting livestock and wildlife, is comprised of four chapters. The overly long chapter 6, on opportunistic bacteria associated with livestock diseases, would be more suited as basic epidemiology and microbiology for first year medical or veterinary doctor trainees. In chapters 7 to 9, we are well positioned within the field of modern disease ecology, with chapter 7 on mathematical modelling of wildlife disease forming a nice, well written synthesis of this important field. Two important contributions are made by chapter 8, on the ecology of pathogen spillover and emergence at the human-wildlife-environment interfaces, and chapter 9, an essay on integrative landscape hierarchies and spatial scaling for zoonotic infections and their environmental drivers.

Internationally reputed research teams are using evolving ecological theory and principles to better understand important patterns of disease transmission in plants, animals, and humans, and to make inferences about the mechanisms and processes thereof. Most of them find their roots in departments of zoology and biological sciences, and not in medicine and public health schools. All these works are now informing national and international infectious disease control and public health authorities on what is happening in time and space, and on what are the best strategies to adopt to fight against disease.

Overall, *The Connections Between Ecology and Infectious Disease* mimics in the uneven quality of its content the fluctuations in infectious disease dynamics, and suffers from a suboptimal recognition of what disease ecology is. The book would have been made stronger by a solid general introduction to its scientific background, comprehensive synthesis reviews to lay the groundwork, and a concluding chapter. Still, readers will find several important contributions that deserve great attention and interest.

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