

*Ecology*, 96(10), 2015, pp. 2850–2851  
© 2015 by the Ecological Society of America

## Scaling up the understanding of animal movement

---

Hansson, Lars-Anders, and Susanne Åkesson, editors. 2014. **Animal movement across scales**. Oxford University Press, New York. xiii + 279 p. \$140.00 (cloth), ISBN: 978-0-19-967718-4; \$69.99 (paper), ISBN: 978-0-19-967719-1.

---

*Key words:* animal tracking; dispersal; environmental effects; migration; navigation.

The understanding of the causes, mechanisms, patterns, and consequences of animal movement has greatly improved during recent years due to technological, analytical, and conceptual advances. This book, comprised of a total of 14 chapters, has three different parts, addressing large-scale patterns of movement, movement strategies and adaptations, and the mechanisms and codes of navigation and movement. This contribution represents an important step forward in the progression of this field of study, allowing the reader to delve into a highly detailed selection of diverse research related to animal movement. Importantly, this work is a compilation of contributions from many scientists affiliated with Lund University in Sweden where the Centre for Animal Movement

Research (CANMove) was established in 2008, following a long tradition of movement-related studies at this institution, particularly of bird migration. Envisioning and producing this book that summarizes key aspects of animal movement by 37 researchers from a single academic institute, with such a wide breadth and thoroughness, is an extraordinary achievement. Although not intended to serve as a collection of reviews, almost all chapters discuss relevant literature and provide excellent introductory texts for each of the rather diverse fields covered in this book.

The book starts with a short introductory chapter describing the contents of the book, followed by a chapter consisting of a highly detailed account of animal migration, covering unique taxonomic characteristics of animal migration, as well temporal and spatial aspects of movement. As such, it is among a rather limited number of chapters in this book specifically describing scale-related patterns. Although discussed in the final chapter of the book, it is unfortunate that this chapter does not offer clear suggestions for future research in this field. In addition, neither this nor the following chapters describe how atmospheric dynamics may affect moving animals; such a discussion could have provided a firmer basis for understanding the implications

of climate change, which are discussed in the third chapter. The third chapter also discusses the consequences of changes in biotic interactions and habitat alterations on migrating animals and on animal movement in general, representing a highly relevant and well-written essay for anyone interested in the rather complicated and not-well-understood ways in which human activities may affect moving animals. The fourth chapter focuses on how modern agricultural landscapes influence animal movement, particularly dispersal. Community structure, resource utilization, biological control, and pollination are discussed in relation to habitat loss and fragmentation within relevant ecological settings. The chapter presents interesting ideas and theories and seems to pin-point relevant processes at different levels of organization, from the individual to the population, community, and ecosystem levels.

The fifth chapter, the first in the second section of the book, examines how new tracking technologies have advanced the understanding of migration and flight strategies. Despite its excellent and well-written coverage of the topic, it, regrettably, does not thoroughly explore the emerging methodology of accelerometry, which has already proven to be extremely useful for remotely deciphering animal behavior and energetics. Chapter 6 explores the interface between “animal personality” and animal movement, two developing scientific fields that until now were (surprisingly) treated separately, with few cross-links. This chapter thus fills a long-standing gap in the scientific literature and convincingly proposes that certain personalities (e.g., boldness and aggressiveness) may facilitate movement and other personalities (e.g., shyness, non-aggressiveness, and sociability) may promote a more sedentary lifestyle. The chapter, unfortunately, does not include possible underlying mechanisms connecting personality and movement (e.g., genetic and hormonal aspects) and seems to have a rather limited outlook on possible links between animal personality and several key features of animal movement, such as energetics and navigation. The next chapter offers some insights related to the genetic basis of phenotypic plasticity in the context of dispersal, highlighting the rather complicated relationship between dispersal and gene flow. It, however, largely lacks explicit treatment of spatial scales. Chapter 8, on pathogens and parasites, represents an important contribution to the understanding of drivers and implications of animal movement. The chapter thoroughly explores many aspects of different pathogens and parasites affecting and influenced by host animal movement across various spatial scales (but strangely no conventional classification of ecto- and endo-parasites is made). Most interestingly, it explores animal immune function in the context of movement (though it ignores the challenges associated with measuring immune function, a topic well suited for a dedicated textbox). How moving animals either avoid infection or increase their exposure to pathogens, how parasitized animals may suffer from reduced movement capacity, and how parasites may influence the movement of their host by “master minding” are among the fascinating topics described in this contribution.

The last section of the book, on mechanisms of movement, starts with a series of three chapters devoted to navigation. These chapters provide a comprehensive review of navigation in animals, though this account still has certain gaps. For example, except with regards to olfaction, the chapter largely ignores navigation within the aquatic medium. Also, empirical findings from the past 20 years regarding olfaction navigation

in pigeons are surprisingly not discussed here in depth. The following chapter, focusing on the genetics of migration, is an excellent review of this subject, interestingly introducing methodologies, case studies, and the “holy grail” of this field, namely the identification of specific migration genes. The following chapter, which discusses the physics of locomotion, is a complete summary of this subject, within which one may find good directions for future work, including a much-needed call for comparative studies. This chapter offers a general framework for studying the physics of locomotion in moving animals in the form of the cost of transport, and as such, it is a highly coherent contribution, incorporating recent empirical findings within old and deeply rooted theoretical frameworks. The last chapter of the book offers a synthesis among chapters and includes interesting suggestions for future work. Specifically, its proposition to continue incorporating new technologies that may facilitate important discoveries regarding animal movement without deserting the backbone of scientific theories is indeed much warranted. I believe that the chapter could have benefited from some conceptualization of animal movement, by either adopting existing, relevant paradigms, or by developing, at least schematically, a model linking the different topics covered in this book.

Some general caveats about this book include the scarcity of aquatic movement in many of the chapters, especially with regard to the rather large existing body of work on marine mammals. Also, foraging movements, likely the most frequent movement, are rarely mentioned throughout the book, whereas migration and dispersal, two less frequent (though longer range) movements, are each the focus of dedicated chapters. In addition, the book would have benefited from incorporating animal movement properties beyond the speed of movement (e.g., step length distribution, turning angles, and straightness index), shedding light on the strategic determination of the animal's movement track.

To conclude, this book covers diverse topics that are seldom covered or totally omitted in any other books on animal movement. It is clearly written, includes a good glossary, and contains many relevant textboxes (that nonetheless should have been indexed, as many of these are relevant to readers of different chapters). Undergraduate and graduate students, as well as more mature scientists, working on different aspects of animal movement, would benefit from the excellent introductory text, the presentation of important case studies, the coverage of advanced methodological developments, and the description of intricate processes and dynamics in this book. Overall, this contribution scales up our understanding of animal movement, paving the way for exciting new discoveries on the causes, mechanisms, patterns, and consequences of animal movement.

NIR SAPIR

*University of Haifa  
Animal Flight Laboratory  
Department of Evolutionary and Environmental Biology  
Mount Carmel, 3498838 Haifa  
Israel  
E-mail: nsapir1@univ.haifa.ac.il*