highlight the idiosyncrasies of insect conservation. In some ways, this is a function of the relatively new task of conserving insect species, and in others, is related to their sheer diversity of forms and habits. The idiosyncrasies of insect conservation are made plain by a recent paper by Thomas and colleagues (2009), who show how difficult, detailed, and time-consuming a program for the conservation of a single butterfly species can be. Insect Species Conservation does a great service by describing a growing literature, and providing a broad structure for insect-conservation programs. Yet, at the same time, understanding the diversity of insects under threat leads to the conclusion that we will never be able to conserve each insect species one at a time. This book makes it more likely that in the future, with more and better planned studies and management efforts directed at rare insects, we will be able to synthesize general approaches to insect conservation.

References


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Advance Access publication October 21, 2009
doi:10.1093/icb/icp108

Sperm Biology – An Evolutionary Perspective. Tim R. Birkhead, Dave J. Hosken, and Scott Pitnick, editors.


Quite often I find edited volumes to be a bit like the curate’s egg—good in parts. It is sperm (and not eggs) that are the subject of this particular book and having an interest in this field myself, I hoped for something good throughout. “Sperm Biology – An Evolutionary Perspective” is a volume of 12 chapters edited by Tim Birkhead, Dave Hosken, and Scott Pitnick who have gathered together a range of expert contributors working both in pure research and in practical applications of spermatology. The preface provides an insight into the book’s origins; a plan was hatched (or rather seeded) in 2003 at the biennial “Biology of Spermatozoa” meeting held in deepest Derbyshire (UK). The aim of these meetings coincides to a large extent with that of the book: to bring together a diverse range of scientists to discuss the state-of-the-art in all things related to sperm, thereby stimulating a conversation over disciplinary boundaries.

The book begins with a thoroughly enjoyable historical account of the field going back to the 17th century and the first direct observations of spermatoza by Antonie van Leeuwenhoek in 1678. The discovery of spermatozoa clarified a great deal about how reproduction worked. In one stroke, Leeuwenhoek’s observations established that the semen of males was not simply nourishment for the embryo, as Aristotle apparently suggested. The ability to observe sperm was of course dependent upon having a microscope of sufficient quality and power—something Leeuwenhoek was skillful enough to produce himself. Indeed, it is claimed in this chapter that advances in technology have to a large extent dictated the pace of progress in the field (a microscopes-through-the-ages figure maps out some of the major milestones in technology and knowledge). In many respects this is of course correct, but after reading the book it seems to me that many of the gaps in our knowledge could be filled with the tools we have available now—if only people bothered to look.

Quantitative genetics, for example, is a tool that is almost as old as evolutionary biology itself, but as a later chapter shows, it has rarely been employed, with only one quantitative trait loci (QTL) study having been conducted. The history of spermatology is brought to life with some fantastic portraits of the main historical characters. Gustav Retzius, for
example, seems to have been a one-man whirlwind when it came to cataloging the diversity of sperm in the animal kingdom. His passion for sperm was ignited late (he began in his 60s), but by the time he died he had published work on sperm from over 400 species. In a breathtaking display of scientific ego, he started a journal with the sole aim of publishing his own work—surely the ultimate solution to avoiding the tedious process of peer review.

As one would expect from the title, the majority of the chapters have a definite evolutionary angle, including those on the origins and maintenance of gamete dimorphism, sperm morphological diversity, spermatogenesis, motility, and how sperm competition has shaped sperm phenotype. For those with a keen interest in the wacky world of sperm, the chapter on sperm morphology by the editors is a treat, as it recounts familiar and less familiar examples of variation in sperm form. The numerous plates throughout the book help to comprehend the bewildering range of phenotypes that evolutionary biologists are trying to understand. Although sperm are the focal point, I found a great deal in the book that would interest students of sexual selection, coevolution and evolutionary conflicts. For example, the two chapters on sperm-egg and ejaculate-female interactions make it abundantly clear that in order to understand the evolution of male traits we must understand the selective forces generated by the environment in which they must function. Which of the various models of evolutionary change that have shaped sperm, and the female counterparts they interact with, is already the focus of much research. Two other chapters on meiotic drive and some unusual gametic/genetic systems of reproduction also widen the range of issues covered with some brain-aching examples of evolutionary conflicts and genetic networks that may have contributed to the massive variation in sperm form.

The book ends with two chapters that have a less direct link with evolutionary biology, but were fascinating just the same. The first deals with the role sperm plays in conservation biology. Evolutionary biologists could make important contributions here, such as providing a better understanding of how the inbreeding that small populations may experience influences reproductive traits. Roldan and Gomendio also flag an exciting new opportunity that seems to be opening up with the advances made in stem cell research and in cloning techniques; it may be possible in the future to generate “synthetic” gametes, perhaps one day rescuing the fertility of any endangered species using only somatic tissue as the starting material.

Finally, Allan Pacey’s chapter on sperm, human fertility, and society offers an illuminating introduction to the world of human infertility. There are surprising nuggets in almost all chapters, but this last chapter contains some of the most shocking facts, such as the fact that ICSI (intracytoplasmic sperm injection) resulted from an accidental slip of the needle during an in vitro fertilization (IVF) procedure (it was not supposed to be an intracytoplasmic injection). Or that, although this method now accounts for ~50% of all IVFs, the risks involved are only now coming to light. For example, Y-linked disorders may be passed directly from father to son by the use of ICSI, condemning subsequent generations of men to a reproductive life dependent upon the same technology.

The aim of the book outlined in the preface was to provide a “broad synthesis” of the field of sperm biology. Did they succeed? With such a diverse range of chapters the book is of course a broad treatment of numerous facets of the life of sperm. I am not so sure they can claim to have provided much in the way of a synthesis, since although the individual chapters stand as important contributions, they seem to lack much in the way of cross talk between them. Nonetheless, the book does provide a strong point of reference for the future and I will unquestionably be referring to it and benefiting from it for many years to come.

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Advance Access publication October 13, 2009
doi:10.1093/icb/icp109