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REVIEW

Odd Couples: Extraordinary Differences between the Sexes in the Animal Kingdom

by Daphne J Fairbairn
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reviewed by Robert M Cox

Males and females are different. In fact, these differences encompass nearly every aspect of their biology, from morphology and coloration to behavior, physiology, and life history. What we often fail to appreciate is just how profound these differences can be, especially once we move beyond the familiar zoological territory of mammals and birds. This is the primary theme in *Odd Couples: Extraordinary Differences between the Sexes in the Animal Kingdom*, in which evolutionary biologist Daphne Fairbairn uses some of the most striking and unusual sex differences in the animal kingdom to explore how and why males and females of the same species differ so dramatically. To do this, Fairbairn augments her own expertise on insects and spiders with a fantastically bizarre cast that ranges from the familiar elephant seals of the California coast, in which massive, brutish males aggressively monopolize harems of much smaller females, to recently discovered marine tubeworms (also of the California coast, albeit from the ocean floor), in which colonies of females use symbiotic bacteria to digest the bones of whale carcasses while maintaining their own individual harems of miniscule male sperm donors. In the intervening taxonomic space, we are introduced to flamboyant lekking birds, diminutive male spiders, ghastly deep-sea anglerfish, and a variety of other creatures, each with its own unique features that lend flavor to the narrative and allow Fairbairn to bring generalities (and exceptions) into sharper focus.

The study of sex differences is hallowed ground in evolutionary biology. Charles Darwin amassed an expansive catalogue of such differences in organisms ranging from mollusk to man and, unable to account for many of these differences with his famous theory of natural selection, was prompted to develop his complementary theory of sexual selection. One might think that, in the subsequent century and a half, evolutionary biologists would have arrived at a clear understanding of the precise circumstances that lead males and females down their separate evolutionary paths. In a sense, we have. For example, we know that natural selection for high fecundity typically favors large body size in females of a variety of species, whereas sexual selection typically favors large size in males when competition for mating opportunities is intense and mediated by aggressive combat. Yet, despite clear empirical support for natural and sexual selection as important causes of sex differences in many animals, it has proven difficult to move toward a more general, predictive framework for how these evolutionary forces should equilibrate to produce a particular pattern of sexual dimorphism under given ecological or demographic circumstances. One of the nicest features of *Odd Couples* is the broad view that Fairbairn takes when synthesizing her own expertise with lessons from the diverse animals she highlights to distill general principles

regarding the circumstances that lead to the evolution of sex differences. This synthesis is as much a service to the scientific community as it is to the book's broad target audience, providing an insightful state-of-the-field summary that leads to thought-provoking generalizations about how and why males and females differ so dramatically.

To arrive at this generality, Fairbairn begins with an introductory discussion of the divergent reproductive roles of males and females and concludes with an authoritative cataloging of the myriad sex differences in morphology observed across all major lineages of animals. While the former is necessary background for any reader, the latter will perhaps be of greatest interest to scientists and specialists in the field. Indeed, the figures, tables, and statistics that populate the penultimate chapter of the book represent an impressive amount of scholarship and synthesis. However, it is the chapters sandwiched between these general discussions that make *Odd Couples* such a unique and enjoyable book, for scientists and casual readers alike. Here, Fairbairn presents eight fascinating natural history vignettes involving some of the most extreme and improbable sex differences in the animal kingdom. Many will be familiar to students of behavioral ecology, though some, such as the pelagic blanket octopuses, bone-eating worms, and shell-dwelling barnacles that variously illustrate the recurrent evolutionary phenomenon of dwarf males, are more obscure. However, my guess is that even the most seasoned researcher will gain new insight (and new lecture material) from the way that Fairbairn expertly weaves the accumulated scientific literature into a complete picture of the unique biology of each sex and species. By tracking males and females from cradle to grave, through breeding and nonbreeding seasons, Fairbairn underscores not only the obvious differences in appearance and behavior of the sexes, but also the more surprising fact that males and females often lead entirely different lives.

Throughout her narrative, Fairbairn confronts the daunting challenge of balancing detail and scientific rigor with engaging prose and popular appeal. It's a difficult task, but she is mostly successful. The writing is accessible and the scientific jargon is usually kept to a minimum. Nonetheless, the style is very much in the tradition of scientific writing, and academics will find the comforting familiarity of tables, figures, and citations from the primary literature. But at its core, *Odd Couples* is an unapologetic celebration of the diversity of life, the intriguing scientific questions it raises, and the surprising answers that evolutionary biology provides. If there is a lesson to be learned about the place of humans in the tapestry of life, it is simply that we "show a fairly typical pattern of sexual dimorphism for a large, terrestrial mammal."

This is not to say that the topic of the book is without relevance to larger issues in science and education. Although Fairbairn does not make the case herself, the study of sex differences is one important facet of a much larger issue at the core of modern biology: understanding how the genetic information encoded by DNA is translated into the myriad forms, physiologies, behaviors, and life histories that we refer to as phenotypes. The extreme sex differences that come to light in Fairbairn's narrative become even more extraordinary when we consider that they are produced from essentially the same set of underlying genes. *Odd Couples* does not attempt to address this genes-to-phenotype issue (perhaps fertile ground for a sequel?), but it does present a fun and enlightening plunge into the natural history of some very exceptional animals, along with an authoritative and accessible summary of current evolutionary theory on sex differences.

About the author

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