

mechanisms through integrated organisms, all the way to macroevolutionary considerations. An attempt at that scale runs the risk of becoming a volume that strikes a glancing blow at too many topics, without real depth. And in fact there are a few sections of this book that do seem to provide little new for professional animal behaviorists, but might still provide a useful entry point for graduate students. Nonetheless, overall Rosenthal does an admirable job refocusing decades of work mostly concerned with the effects of (primarily female) mate choice on (primarily male) behavior, physiology, and morphology. This is all recast to focus most strongly on the mechanisms, description, and process of mate choice per se. The volume is at its best when considering the integration of mechanistic sensory systems, neural physiology and information processing, and the quantitative and molecular genetic underpinnings of behavior. A central tenet of the book is that far too much effort has been expended in assessing how mate preferences affect the evolution of courter traits and the adaptive versus arbitrary nature of mate preferences (Rosenthal is solidly, but not dogmatically, on the arbitrary side of this historical divide). With a few decades hindsight, this may well be true: mate choice as a process is much richer than these narrow concerns. Rosenthal does a solid job of covering a great deal of territory, some of which will represent novel interpretations even for those well acquainted with the literature. I would recommend this book highly, especially for graduate students, but suggest they read the concluding chapter (18) first, rather than last.

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SOCIAL INEQUALITIES IN HEALTH IN NONHUMAN PRIMATES: THE BIOLOGY OF THE GRADIENT. *Developments in Primatology: Progress and Prospects.*

Edited by Carol A. Shively and Mark E. Wilson. Cham (Switzerland): Springer. \$159.00 (hardcover); \$119.00 (ebook). v + 178 p.; ill.; no index. ISBN: 978-3-319-30870-8 (hc); 978-3-319-30872-2 (eb). 2016.

THE SOCIAL ORIGINS OF LANGUAGE.

By Robert M. Seyfarth and Dorothy L. Cheney; edited and introduced by Michael L. Platt. Princeton (New Jersey): Princeton University Press. \$32.95. ix + 167 p.; ill.; index. ISBN: 978-0-691-17723-6. 2018.

This volume explores theoretical issues related to the possible social origins of human language capacities. It centers on a target article by leading primatologists Robert Seyfarth and Dorothy Cheney with five responses by six scholars (John McWhorter, Ljiljana Progovac, Jennifer Arnold, Benjamin Wilson, Christopher Petkov, and Peter Godfrey-Smith) from

four distinct subfields (linguistics, neurobiology, psychology, and philosophy). The result provides an illuminating discussion on a dauntingly large set of issues in an admirably small number of 129 proper pages—indeed, if anything, the book could have benefited from either having more responses or more extended discussions. The target article builds on Cheney and Seyfarth's previous work, particularly the pathbreaking books, *How Monkeys See the World: Inside the Mind of Another Species* (1990. Chicago (IL): University of Chicago Press) and *Baboon Metaphysics: The Evolution of a Social Mind* (2007. Chicago (IL): University of Chicago Press). In keeping with their previous discussions, Seyfarth and Cheney approach both social organization and language from a broadly neurocognitivist perspective. This is to say, they are not just interested in social structure but in individual animals' psychological representations of social structure and not just interested in patterns of language use but also the psychological mechanisms that language users employ to generate those patterns. The primary thesis of this article is that our knowledge of the sociocognitive capacities of living primates gives us compelling reasons to think that our own nonlinguistic primate ancestors possessed many of the distinctive capacities supporting the acquisition and use of natural language (p. 11). In other terms: that human-typical abilities for language arose as modified descendants of primate-typical abilities for social interaction in general and interpersonal communication in particular.

All five of the commentaries offer generally positive assessments of Seyfarth and Cheney's discussion. None of the commentators challenge the fruitfulness and feasibility of its attempt to provide what has been called a lineage explanation (B. Calcott. 2009. *British Journal for the Philosophy of Science* 60:51–78) of the origins of human language: a specification of a sequence of mechanisms for engaging in social behavior that differ from one another in marginal respects, and which terminate in the mechanisms supporting language use. Still, a number of commentators—most explicitly, Peter Godfrey-Smith—do question whether the underlying continuities are best described in terms of communication. For communication is naturally seen to require coadapted policies of both sending and receiving; slightly more carefully, for there to be actions or structures on the part of senders that have been selected because of their effects on receivers and for there to be specific responses on the part of receivers to those acts or structures that have also been selected because of their effects (compare J. Maynard Smith and D. Harper. 2003. *Animal Signals*. New York: Oxford University Press; p. 3).

Throughout their work, Seyfarth and Cheney have shown a keen sensitivity to the complementary

roles of senders and receivers in episodes of communication; however, this fact is not always reflected in their claims about combinatorial communication. We might reasonably accept with Seyfarth and Cheney that baboons and other primates have a discrete, combinatorial system of individual cognition that they use to flexibly track their social words, while also rejecting the claim that baboons and other primates have a discrete, combinatorial, and flexible system of communication (or social coordination, more broadly). Indeed, as many linguists are quick to point out, human capacities for language may have as much to do with enriching the cognitive capacities of language users as they do with enhancing the possibilities for interpersonal communication. Still, this point should not detract from the myriad insights that Seyfarth and Cheney's work provides for our understanding of the evolutionary origins of human language.

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#### ANATOMY, PHYSIOLOGY, AND DEVELOPMENT

##### REPRODUCTION IN MAMMALS: THE FEMALE PERSPECTIVE.

By Virginia Hayssen and Teri Orr. Baltimore (Maryland): Johns Hopkins University Press. \$69.95. xv + 352 p.; ill.; common name, scientific name, and subject indexes. ISBN: 9781421423159 (hc); 9781421423166 (eb). 2017.

Broadly speaking, two kinds of "female perspective" are at work in this book. First, from a purely scientific standpoint, the authors focus on the reproductive biology of female mammals, rather than dealing with both sexes. Second, as they make clear in the opening sections of the text, there is also a feminist approach, which aims to counteract the degree of "androcentric bias" that has shaped the history of research on mammalian reproduction.

At its best, science strives to be objective, open-minded, and inclusive of everyone's efforts when it comes to exploring the workings of the natural world. Yet, as in many other aspects of human affairs, the reproductive sciences have, historically, been dominated by men. Such gender biases may encourage a culture of male chauvinism. The authors highlight problems of this kind in their introduction. For example, they are critical of "androcentric terminology" (p. 3) as applied to the anatomy of the reproductive organs, and to discussions of reproductive

physiology and behavior. Some of the examples they discuss are fully justified but others fall wide of the mark. For example, use of the terms "proceptivity," "receptivity," and "attractiveness" (p. 4) to define female sexuality are dismissed as androcentric and biased. Yet, Beach's original paper on this topic, titled "Sexual attractivity, proceptivity and receptivity in female mammals" (1976. *Hormones and Behavior* 7:105–138), has proven extremely useful to behavioral endocrinologists, and is not biased in my opinion.

The strongest sections of the book concern a number of important topics that can be addressed without considering males at all. Examples include female reproductive anatomy, oogenesis and folliculogenesis, ovarian cycles, pregnancy, parturition, lactation, and maternal-infant relationships, all of which are covered in Parts One and Two. Part Three considers environmental effects upon females; dietary and seasonal factors, and the impacts of predators, parasites, and diseases upon reproduction. Social factors are also considered here, including shared care of infants by females (alloparenting) and also intra-sexual competition and reproductive suppression. The final chapter, which is titled *Women as Mammals*, compares various aspects of human reproduction with the reproductive lives of female mammals in general.

In reality, of course, sexual reproduction requires that a series of complex interactions must occur, which involve *both sexes*. Unfortunately, the gynocentric approach adopted by the authors means that some of this complexity does not receive sufficient attention. The diversity of mammalian mating systems and patterns of copulatory behavior are not explored in any depth. The neuroendocrine control of sexual behavior is likewise passed over. Research on postcopulatory sexual selection, which comprises cryptic female choice, as well as sperm competition, has burgeoned during the last four decades, but these subjects merit only a limited appraisal here. This is regrettable, given the impact of postcopulatory sexual selection upon reproduction in many groups of animals, including the mammals.

Mammalogists and reproductive biologists will find this book interesting and useful given its comparative scope; wherever possible examples are drawn from across the mammalian spectrum, rather than being limited to domesticated species. Undergraduate students are likely to find it less useful, however, as it contains relatively few explanatory diagrams, figures, or tables.

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