Book Review

ENDOCRINOLOGY OF SOCIAL RELATIONSHIPS. Edited by Peter T. Ellison and Peter B. Gray, Associate Professor, UNLV, Cambridge, MA: Harvard University Press. 2009, 509 pp. ISBN 978-0-674-03117-3. $49.95 (cloth).

Books rarely make it to bed with me, but *Endocrinology of Social Relationships* was an exception. The timing and topic were appropriate, because the bulk of my reading took place late at night while snuggled in bed with my newborn son, developing our core pair-bond and significantly altering my hormone levels, as my saliva confirms. Fatherhood is a state I share with this volume's editors. Peter Ellison is a National Academy of Sciences member and the John Cowles Professor of Anthropology at Harvard University. He has devoted the majority of his illustrious career to developing the discipline of human reproductive ecology. Peter Gray is Associate Professor of Anthropology and Ethnic Studies at the University of Nevada-Las Vegas. As one of Ellison's former graduate advisees, Gray's primary research interests involve endocrine correlates of paternal behaviors. Together, Ellison and Gray bring to the table extensive field and laboratory experience and unite an impressive array of experienced and promising contributors. Combined, these authors offer a voluminous exposition of historical and contemporary research on the endocrinological causes, correlates, and consequences of positive and negative social interactions. The purpose of this text is to review the potential proximate (biological and developmental) and ultimate (functional and phylogenetic) causes of social behaviors, focusing largely on affiliative and agonistic interactions among parents, offspring, potential mates, and rivals. The resulting discussion summarizes several key points, including (1) how hormones may facilitate survival and reproduction; (2) how hormones may influence, and be influenced by, social interactions; (3) how the flow of information between organisms during social interactions influences, and is influenced by, the endocrine status of participants; and (4) the conservative nature of hormone mechanisms underlying social relationships across different taxa.

The volume's 16 chapters are organized in three parts, beginning with general reviews of major theoretical and empirical concepts. Lee (Chapter 1) summarizes variation in animal reproductive behaviors, offering a sex-specific perspective on the costs and benefits of different reproductive strategies and, importantly, placing humans within the context of other animals studied to date. Wallen and Hassett (Chapter 2) describe basic endocrine physiology, including relationships between various steroid and peptide hormones, the potential organizational and activational effects of hormones, and the context-dependent nature of hormone-behavior relationships. Ellison (Chapter 3) demonstrates how behavioral endocrinology is a central component of the modern understanding of human reproductive ecology. Hormones regulate both reproductive physiologies and behaviors in response to different ecological signals, including social stimuli. This discussion is logically followed by Wingfield's (Chapter 4) analysis of the impact of predictable and unpredictable environmental changes (including social interactions) on reproductive behaviors and the roles of hormones in integrating environmental information and activating or inhibiting behaviors in response to environmental cues. Lancaster and Kaplan (Chapter 5) end this section by describing potential endocrine correlates of the "human adaptive complex," a series of coevolved traits including a specialized diet, reduced extrinsic mortality rates, cooperation between kin and nonkin, intergenerational transfer of information, sexual division of labor, and intensive investment in offspring.

The second part of this book focuses on the endocrinology of social relationships in nonhuman animals, particularly nonhuman primates. Carter et al. (Chapter 6) elucidate the biology of oxytocin and vasopressin and describe sex and species differences in parental behaviors, focusing largely on prairie voles. Ziegler and Snowdon (Chapter 7) illuminate the endocrinology of parental and alloparental behaviors in common marmosets and cotton-top tamarins, who exhibit biparental cooperative care of offspring. Historical and contemporary reviews of the relationships between testosterone, serotonin, dopamine, aggression, competition, and dominance in nonhuman primates (primarily macaques, baboons, squirrel monkeys, and lemurs) are offered by Fairbanks (Chapter 8). Emery Thompson (Chapter 9) ends this section with a discussion on the endocrinology of intra- and intersexual relationships in apes, including a particularly useful discussion on female sexual signals.

Human behavioral endocrinology is the focus of Part Three, which represents the bulk of the text. Drawing on a diverse literature base, McIntyre and Hooven (Chapter 10) describe the potential effects of androgens on differences in human reproductive behaviors. Roney (Chapter 11) interprets the potential roles of hormones in human mating psychology. Drawing largely on Gray's work in the United States, China, Kenya, and Jamaica, Gray and Campbell (Chapter 12) describe associations between testosterone, pair-bonding, and paternal behaviors. An important conclusion is that cultural differences can mediate potential relationships between hormones and partnering status. In a related contribution, van Anders (Chapter 15) characterizes potential causal and correlational relationships between testosterone and partnering behaviors in opposite- and same-sex pairings, including discussions of testosterone correlates with sexual orientation and multiple partnering. Fleming and Gonzalez (Chapter 13) summarize endocrine correlates (primarily cortisol) of human maternal behaviors, including self-reported maternal motivations and arousal and responsiveness to (or perceptions of) stimuli. Sanchez et al. (Chapter 14) explain the potential roles of oxytocin and vasopressin in facilitating human affiliative behaviors, particularly social support and paternal care. The book ends with Nepomnaschy and Flinn's (Chapter 16) description of the effects of early-life events, particularly social stressors, on psychological development via activation of the hypothalamic-pituitary-adrenal system.

The present text is similar to and different from others on behavioral endocrinology. The principal strength of the text is its significant focus on humans. A tradeoff is that better established, similarly sized texts can devote space to the histories of behavioral endocrinology and ethology as well as cover other topics such as

psychoneuroimmunology, field and laboratory methods, ingestive behaviors, communication, sensorimotor functions, the roles of hormone receptor sensitivity and distribution, learning, memory, and biological rhythms. Regardless, this text certainly fills a necessary niche, making it potentially useful as a text for graduate seminars in anthropology, psychology, and evolutionary biology.

It is obviously the case that other editors may have chosen to organize the volume a bit differently, either focusing exclusively on humans or including an increased taxonomic diversity (e.g., invertebrates, reptiles, birds, mammals, and fishes). Some readers, particularly students, might have benefited from bullet point summaries, discussion questions, and transition or concluding chapters. The book has some redundancy, with several chapters focusing on androgens, whereas some important discussions, such as those of the endocrinology of male-male coalitionary behaviors, female-female conflict/aggression, and alloparenting, were minimal. That said, the text is well integrated, with superb cross-referencing between contributions, and its accessible prose makes reading about this rather specialized topic enjoyable.

I anticipate that this text will function as an important springboard for this burgeoning field. As pointed out by many authors, there are interesting avenues for future research in human and nonhuman primate behavioral endocrinology. This includes both cross-cultural analyses under naturalistic conditions and experimental, prospective, interventional studies. Expanded studies using brain imaging and genetic analyses are warranted, and the ability to monitor oxytocin and vasopressin levels in saliva is much needed. Comparative studies of wild nonhuman primates, particularly bonobos and other apes, will be very informative, as will increased effort toward understanding androgen-mediated signals of attraction and female aggression and competition. The vision for this field is indeed exciting.

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