

range of positions on the meaning and utility of ancestry testing using contemporary molecular genetics. Geneticists Mark Shriver and Rick Kittles demonstrate the effective uses of Y-chromosome and mitochondrial DNA analyses for sex-linked ancestry evaluations. Because of the limits of these two tests, they also argue for the utility of the more-contested technology of ancestry informative markers (“genetic markers that show substantial differences in allele frequency across population groups”). Shriver and Kittles’s position is far from polemical in that they readily acknowledge that the meaning of these markers will vary based on the choice, size, and sampling procedure that determine the reference population. Henry Greely provides an overview of the dramatic surge in commercial, direct-to-consumer ancestry testing, and he calls for more transparency in the methods used to determine ancestral origins. This development is of vital interest in certain communities: Kimberly Tallbear documents how

Native Americans are dealing (or refusing to deal) with the use of genetics to authenticate tribal membership. Alondra Nelson portrays how African Americans are using these tests to try to find links to specific branches of an African heritage.

There are vigorous proponents for the continued use of race as a proxy for ancestry, some represented in this collection. Yet the full value of *Revisiting Race in a Genomic Age*—and the editors’ trenchant analytic summaries—is that the volume substantially raises the level and the terms of the debate. That deserves applause from all sides.

References

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BEHAVIOR

Under the Influence of Hormones

Elizabeth Adkins-Regan

Throughout much of human history, people with no social relationships would not have survived childhood, much less reproduced successfully. It is difficult even to imagine human life completely devoid of family, friends, or romantic interests.

Social relationships are an adaptive characteristic of our and many other animal species. These relationships can be cooperative, competitive, or a mixture of both. Humans can even sustain close relationships over long distances, through letters, phone calls, and e-mails.

Understanding the biology of these relationships requires research into both their ultimate causes (evolution and ecology) and their proximate causes (physiology and development). *Endocrinology of Social Relationships* focuses on exciting recent work on endocrine physiology as both a cause and consequence of social interactions. Editors Peter Ellison and Peter Gray (anthropologists at, respectively, Harvard and the University of Nevada, Las Vegas) success-

Endocrinology of Social Relationships

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fully aim at providing an overview and synthesis of the current state of the field, with an emphasis on—but not restricted to—humans.

Three developments in particular have catalyzed

the field. First, more researchers interested in hormones now study systems of social interactions and not just particular acts of social behavior. The difference between a monogamous and a promiscuous mating system lies in how many partners an individual has sex with, not the mechanics of the mating act itself. The relevant research on animals has produced important discoveries about the role of the brain neuropeptides oxytocin and vasopressin in monogamous relationships, discoveries that have captured the interest of human-focused researchers as well. Studies have found that men with one sexual partner have lower testosterone levels than those with multiple or no partners. Second, noninvasive methods for measuring steroid hormones in saliva have made it much easier to collect data through time while subjects are in social contexts such as being defeated in a competitive game, hearing a baby’s cry, or entering into a committed romantic relationship. Third, the

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research on humans is no longer being driven primarily by a search for causes of behavioral pathology. Instead, it is inspired by a foundation of concepts and theories of normal behavior taken from evolutionary biology (such as adaptive trade-offs between mating and parental effort), biological anthropology, biological psychology, and social psychology.

The volume is remarkably comprehensive, covering all these disciplinary perspectives and delivering the promised integration of endocrinology with evolution and ecology. It strikes excellent balances between theory and empirical results, nonhuman and human research, what is known and what is not known, and methodological advances and continuing challenges. For example, the chapter “Oxytocin, Vasopressin, and Human Social Behavior” describes findings from fascinating experiments on effects of intranasal administration of these hormones on interpersonal emotions. The authors then offer an illuminative discussion of the difficulties involved in knowing whether these effects are in fact due to actions of these neuropeptides in the brain, the hypothesized target organ.

Another strong point is the consideration several authors give to the psychological processes that mediate effects of hormones on fitness-promoting social relationships in both humans and nonhumans. A hormone like testosterone or oxytocin does not directly determine dominance, affiliation, or paternal behavior. Instead, hormones alter emotional



states (such as fear), bias attention (for example, toward sexual stimuli), or change the pleasantness or aversiveness of stimuli (such as infant odors) to alter behavioral probabilities in ways that depend on prior experience. There is an enormous difference between the sophisticated views represented in this book and the oversimplified, popularized human biology in which men are from Mars and driven by testosterone, women are

from Venus and driven by estrogen, and a spurt of oxytocin instantly makes new mothers love their babies. Nor is there a heavy emphasis on results of surveys of university undergraduates based on obsolete versions of sexual selection and mate-choice theories. Here, one instead finds the results of clever experiments (e.g., in which testosterone administration decreases tendencies to mimic other people's facial expressions) along with critical information about hunter-gatherer populations. For example, a discussion of lactation and conception in natural-fertility societies (those using no birth control technology) concludes that in the evolutionary past most human female mate choice may have taken place while the women were lactating, a study population largely missing from the human mate choice literature.

How do we know the animal research can shed light on humans? The basic endocrine mechanisms and brain structures have been remarkably conserved in the course of evolution—they are found in all mammals and most other vertebrates—making successful

generalization likely. Yet some of the social relationships (such as male-female pair bonds or paternal care of offspring) are not at all universal and instead have a spotty distribution on the evolutionary tree of animals. Even when the distribution is spotty, however, it is still possible that the same mechanisms have been independently co-opted multiple times to support the evolution of those social relationships. Whether they have is an empirical question. Are humans unique in their social relationships? The strongest hint at such a possibility comes in the chapter in which Jane Lancaster and Hillard Kaplan summarize the essential features of the “human adaptive complex,” a complex of traits that they see as describing “a very specialized niche.” That does not, however, automatically preclude generalization from animal research. The honey bee adaptive complex is very specialized too, yet few would claim that research on other insects is irrelevant to understanding honey bees.

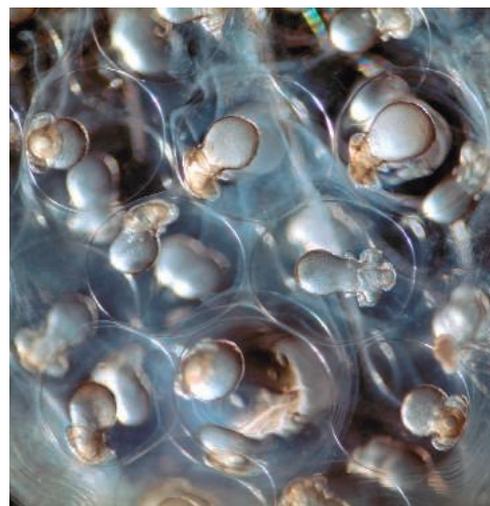
The editors and their authors have produced a definitive and scholarly, yet readable, state-of-the-art presentation of a fascinating and timely topic. This landmark volume is rich in ideas, conclusions, and questions for the future. As the editors point out, we are all being exposed, like it or not, to hormones in the environment and to ads full of claims about the benefits of administering hormones. We need to understand how such hormones might (or might not) be affecting social relationships. Will spraying on some oxytocin make your colleagues like you? Probably not, but reading *Endocrinology of Social Relationships* produced warm feelings about the ability of good science to illuminate the human condition.

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BROWSINGS

Third Art of Science Exhibition. Andrew Zwicker, Adam Finkelstein, Teresa Riordan, and Elle Starkman, organizers. Friend Center, Princeton University, Princeton, NJ, 2009. Through April 2010. www.princeton.edu/~artofsci/2009/.

Rather than seeking artistic works inspired by science, the organizers invited members of the Princeton University community to submit images captured during the course of their research projects. They received over 200 entries, from undergraduates, faculty, research staff, graduate students, and alumni. The judges selected 48 pieces for their aesthetic value; these are now on display online and in the atrium of the Friend Center. They awarded three cash prizes (apportioned according to the golden mean): third, to alumna Maria Ciocca for *Worm Love*, taken using immunofluorescence microscopy; second, to nanofabrication researchers Pat Watson, Mike Gaeviski, Joe Palmer, and Conrad Sylvestre for their scanning electron microscope image *Desert Butte*; and first, to assistant professor of chemical engineering Celeste Nelson for *Baby Squid*, a bright field microphotograph of squid embryos (right). If you visit the Web site by 1 July, your preferences can help determine a “People’s Choice” award.



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