



Book Reviews

Mother Nature: A History of Mothers, Infants, and Natural Selection. By S. B. HRDY. New York: Pantheon (1999). Pp. xix+723. Price \$35.00.

Only a few scientists among us have the eloquence and the breadth of interdisciplinary knowledge to make our research intelligible and interesting to laypeople. Sarah Hrdy is one of them, and her talents are expressed at their best in her latest book, *Mother Nature*. This is much more than a popular science book. Hrdy draws from evolutionary biology, animal behaviour, anthropology, psychology and history to paint a rich and fascinating picture of what it is like to be a parent in animal and human societies. The book consists of three parts. Part 1 ('Look to the animals') has five chapters on how views of motherhood and parenting have changed over the years, thanks to the input of evolutionary theory. Part 2 ('Mothers and allomothers') has nine chapters focusing on parental care and mating systems in human and nonhuman primates and is rich with information drawn from history, literature, art and mythology. Part 3 ('An infant's-eye view') has 10 chapters discussing human development from an evolutionary perspective.

Although primates and other animals are often mentioned, animal behaviour occupies a relatively small part of the book. It is apparent that Hrdy's interests have shifted over the years from primate behaviour to anthropology and history. In fact, some of the most enjoyable chapters are those reconstructing the history of infant abandonment and wet-nursing in human societies across the centuries. I also enjoyed the continuous references to literature, art and mythology as a way of exemplifying our views of parents and children. At times, however, the information is not presented in a logical sequence. For example, in the third section of the book, two initial chapters on attachment theory are followed by a discussion of topics such as embryo mortality, parent-offspring conflict, the adipose tissue of human newborns and mother-infant bonding. And when the author expresses her own opinions and recommendations about parenting, the tone of the narrative comes close to that of the self-help literature (e.g. the last two chapters of the book).

As is often the case when authors attempt to cover so much ground, the depth of discussion is sacrificed for some topics. For example, *Mother Nature* does not provide a comprehensive review of recent research on primate parenting. Most of Hrdy's references to primate behaviour are based either on her own observations of langurs made in the early 1970s or on outdated sources (e.g. in a note on page 560, she advises readers to consult articles published in 1980 and 1987 for up-to-date reviews of the literature). Her bias towards langurs is also apparent when she discusses the evolution of flamboyant coat coloration in monkey infants. Based on her work with langurs, Hrdy confidently claims that 'flamboyant natal coats in primates no longer seem such a mystery' (page 448): they evolved to make infants attractive to other group

members and promote allomothering. Enter the stump-tail macaque. In this species, infants have a flamboyant coat but are avoided by other group members when they are off their mothers. As recent studies of this phenomenon have shown, flamboyant natal coats in primates still remain a mystery (e.g. Treves 1997).

Infanticide, and the ongoing debate over the interpretation of this phenomenon, occupy a prominent part of the book. Since Hrdy first described infanticide in langurs in the 1970s, some langur researchers have claimed that they have never observed infanticide at their field sites, that it is unthinkable that primate adults would kill infants, and that the phenomenon observed by Hrdy must be a by-product of overcrowding or other artificial conditions. I happen to side with Hrdy on this issue, but I was surprised that she dismissed observations of maternal abuse of offspring in captive macaques by saying that abuse has never been observed in the wild (it has been; Hiraiwa 1981; S. Perloe & K. Rasmussen, personal communications), that it is unthinkable that monkey mothers would abuse their own infants, and that this phenomenon must be a by-product of an artificial environment. Sound familiar?

Hrdy deserves credit for debunking some gender-related myths still pervasive in the animal behaviour and anthropological literature. With *Mother Nature*, however, we also owe to her the creation of a new myth, that of the unconditionally nurturing primate mother. Consistent with evolutionary theory, much evidence shows that parental care varies predictably in the relation to offspring quality. Hrdy herself devotes a whole chapter ('Unnatural mothers') to showing that ambivalence is an intrinsic characteristic of human parenting, and that much anthropological, psychological and historical evidence suggests that humans often discriminate against their offspring in relation to their perceived poor quality. Throughout the book, however, Hrdy claims that monkey and ape mothers are different from all other mammalian mothers, including human ones, for their unconditional commitment to their infants, irrespective of sex or other physical attributes. She maintains that no data show maternal discrimination of offspring quality in primates, and that all the available evidence suggests that primate mothers will always take care of their infants to the best of their abilities, regardless of variation in offspring quality. It may be true that there is little evidence of maternal discrimination against poor offspring quality in primates. It is also true, however, that very little research has been done in this area. Infant mortality in primate populations can be very high, and I would not be surprised if maternal neglect in relation to poor offspring quality accounted for a significant portion of such mortality.

Aside from an outdated view of primate parenting and a few other inaccuracies (e.g. prolactin and oxytocin are not natural opiates, p. 154; we certainly know more about nursing and reproduction than that 'high prolactin levels are correlated with some as yet unknown function that suppresses ovulation', p. 195), *Mother Nature* provides an excellent integration of information on parental care

and infant development from different scientific and humanistic disciplines.

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doi:10.1006/anbe.2000.1391,

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Information Processing in Social Insects. Edited by C. DETRAIN, J. L. DENEUBOURG & J. M. PASTEELS. Basel: Birkhäuser Verlag (1999). Pp. xiv+415. Price sFr 168.

How does an animal decide what to do? What information and rules might an animal use to produce its behavioural response in a specific situation? These fundamental questions underlie our attempts to understand animal behaviour. As humans, we are used to thinking of information and decisions in a hierarchical sense. That is, information is gathered and then processed by some central organization, for example the brain in an individual or the general in an army. Decisions made at this central point determine the behavioural response to the information. Social insect colonies provide a, by now, well-known challenge to this view of decision making. *Information Processing in Social Insects* provides a state-of-the-art review of our current knowledge of decision making in these taxa.

The editors of this volume had two aims: first, to produce a review of current research, and second, to advocate social insects as a model system for the elucidation of information processing in social groups. How do they succeed in these aims?

The volume is divided into four sections, each of which contains several stand-alone contributions followed by an overview chapter. The first section, 'Group size and information flow inside the colony', contains chapters on wasps, ants and bees. The chapters by Jeanne (on colony size, productivity and information flow), Gordon (on interactions and task allocation) and Cassill & Tschinkel (on information flow during feeding) give a fascinating glimpse into how research is done, and act as both reviews and works of advocacy for their particular research programmes. While these chapters combine both empirical and theoretical work, the contributions of Anderson & Ratnieks and Stickland et al. focus on the theory of information flow within colonies. All of these contributions, and the overview chapter by Franks (which presents an insightful synthesis of the preceding chapters), share the strength that they suggest new questions and areas of research.

The second section, 'Role and control of behavioral thresholds', is dominated by contributions from the world of honeybee research. This section is much more tightly knit than the first, for example the contribution by Bonabeau & Theraulaz to the theory of response

thresholds follows on directly from Beshers et al.'s clear review of the same subject. Huang & Robinson review their activator-inhibitor model for division of labour. Dreller & Page show that our knowledge of honeybee foraging is leaps and bounds ahead of any other social insect species. Finally, Moritz & Page assess the potential costs and benefits of variation in behavioural thresholds. All of the chapters in this section provide excellent reviews of current work, and stimulating ideas for future research. However, this section lacks an overview chapter, which is a shame as such overviews add so much to the other sections.

The third section, 'The individual at the core of information management', is the most diffuse in this volume. Lenoir et al. provide a review of nestmate recognition in ants, Robson & Traniello advocate the concept of key individuals and Fourcassié et al. discuss the use of phase temporal information in ants and bees. While each of these contributions is interesting, and despite the efforts of Ronacher & Wehner (who provide a critically challenging overview of these chapters and the dominance of research based on self-organization), this section feels neither complete nor well rounded. A chapter about the perceptual and computational ability of individuals would have added to both the impact of this section, and the book in general.

Finally, 'Amplification of information and emergence of collective patterns' reviews our knowledge of group-level behaviours. Cole & Trampus provide a summary of activity cycles in ant colonies, and make the valuable and oft-forgotten point that while group-level behaviours can be measured and modelled, they are not necessarily adaptive. Rather, it is incumbent on the researcher to show that such behaviours are not simply the 'incidental consequence of selection' on the behaviour of individuals. Theraulaz et al. and Detrain et al. contrast this with excellent reviews of the empirical and theoretical evidence for self-organized building and foraging, respectively. The contribution of Visscher & Camazine summarizes what is known about individuals and collective decision making in swarming bees. There is clearly a lot of work to be done before we can understand how colonies make such important decisions. The next contribution, by Fitzgerald & Costa, reviews collective behaviour in social caterpillars. While this may seem an odd addition to those whose view of social insects usually comprises only hymenoptera and isoptera, this chapter provides an excellent counterpoint to the rest of the book. Caterpillars are, to a naïve reader, surprisingly social, and this review should serve both to draw the attention of classical social insect researchers out to other animals, and to attract researchers of other social systems to the pioneering work reviewed in this volume. Deneubourg et al. then revisit many of the contributions in the volume and end with an impassioned plea for more empirical tests of self-organization.

Overall, the production of this volume is good, and it abounds with clear figures and tables. Towards the last section a number of typographical mistakes start to creep into the text, but they are not so numerous as to detract from the message. Reference lists are placed at the end of each chapter, and while this may have increased the length of the volume, it makes each contribution much more accessible.

In general, the editors have succeeded in both their aims. This volume is both a valuable source of literature reviews and packed full of new ideas, both conceptual