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The Encyclopedia of Land Invertebrate Behaviour. by Rod Preston-Mafham; Ken Preston-Mafham

Review by: William G. Eberhard

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The book itself is largely a collation of his numerous papers, but it is held together, to some extent, by four introductory chapters and three concluding chapters. The remaining six chapters deal with specific issues such as dominance relations and multiple queens or with specific species such as *Ropalidia fasciata* and *Polistes canadensis*. Itô's main conclusion is that, although "Kin-selection/inclusive fitness theory has created a new era in understanding the evolution of insect sociality . . . the one sided view of kin-selection has also set a constraint on further studies. We can generate many new study projects by liberating ourselves from this view."

The main argument of the so-called kin-selection/inclusive fitness theory is that an altruistic trait could spread by natural selection if the benefit of the altruism (measured as the number of relatives reared) multiplied by the genetic relatedness between the altruist and the relatives reared, is greater than the cost of altruism (measured by the number of offspring given up by the altruist) multiplied by the altruist's genetic relatedness to his or her offspring. What Itô means by a one-sided view of kin selection is the excessive concentration on above inequality being brought about by the inequalities in the genetic relatedness terms and relatively less attention to the possible role of inequalities in the cost and benefit terms.

To a large extent Itô's critical conclusion is justified, but things are changing rapidly and far more attention is being paid in recent times to measuring costs and benefits of altruism, thanks to the repeated warnings by Itô and a large number of other social insect researchers.

The book under review, however, is not without its faults. It is too much of a collection of papers; there has not been sufficient attempt to make it read like a book. Even though the publication date is 1993, the book does not pay sufficient attention to a number of recent theoretical developments in the field. There are also several problems with terminology and interpretations of the literature. The most serious problem with terminology is the inconsistent way in which the terms haplometrosis and pleometrosis are used, sometimes to refer to single and multiple egg layers, respectively, and sometimes to refer to single and multiple foundress associations, respectively. An example of inaccurate interpretation of the literature is seen when Itô uses a 1988 paper by Frumhoff and Baker to support his contention that kin-recognition abilities are well developed, but ignores a series of criticisms of that conclusion that appeared in the same journal in 1990.

In my opinion, a serious shortcoming of this book is the lack of careful copy editing, which could have greatly improved the text in many places.

Much more serious is the fact that some of the figures and tables are almost completely unintelligible. Figures 7.2 to 7.5 and 13.1 to 13.2 are glaring examples of what should not get past any copy editor. Given that the author is not a native English speaker and that this book is the result of his own efforts to translate a previous version published in Japanese, the blame falls more heavily on the copy editor and publisher.

RAGHAVENDRA GADAGKAR, *Ecological Sciences, Jawaharlal Nehru Centre for Advanced Scientific Research, Indian Institute of Science, Bangalore, India*

#### THE ENCYCLOPEDIA OF LAND INVERTEBRATE BEHAVIOUR.

By Rod Preston-Mafham and Ken Preston-Mafham. The MIT Press, Cambridge (Massachusetts). \$45.00. 320 p.; ill.; indexes of scientific names and common names, and general index. ISBN: 0-262-16137-0. 1993.

Most professional biologists find both visual and intellectual beauty in the study of nature, and I think many of us would admit that this beauty is a substantial part of our motivation. We seldom succeed in simultaneously communicating, however, the excitement of visual and intellectual beauty to nonspecialists. I think this book is as successful an attempt to do this as I have seen.

The book combines coffee-table-quality color photographs, often of exotic (and identified!) tropical species, with an easy-to-read text that quickly plunges into such esoteric topics as sperm precedence, operational sex ratios, and resource defense polygyny. Many of the photos are not just portraits of animals at rest, but illustrate unexpected, refined ways of making a living (e.g., a view of ants tending homopterans is enlivened by a mosquito robbing honeydew from the mouth of a worker). The beautiful photographs, and the easy access to the text, which includes long figure captions and boxes describing particular stories, are in the style of a coffee-table nature book. But the text is not. The authors have perused a lot of recent literature, and in general they describe correctly the stories familiar to a specialist, plus some that were new and interesting to me. In places they also present original interpretations of their own (e.g., to explain the elaborate courtship rituals in spiders), marshalling data and arguments to support their views. The intellectual as well as the visual excitement of studying arthropod behavior comes through.

This is not to say that I did not have reservations. The coverage of many groups other than insects and spiders (e.g., mites) is poor for a book that pretends to be "encyclopedic." The imbalance between the different topics (134 pages for sexual

behavior, 70 for parental care, 24 for egg laying, and 19 for defensive behavior) and the omission of others (e.g., foraging, feeding) also does not give a genuinely encyclopedic overview. Citations of published work are made only erratically (apparently the policy was to cite only those papers to which relatively large segments of text were dedicated). Thus one is often not sure whether a given statement should be credited to the authors' own observations. When the authors do report observations that are clearly their own, sample sizes and variations in behavior are almost never mentioned, so these observations can only be cited as tantalizing anecdotes. The informal, often anthropomorphic style, in combination with the enormous array of animals covered, also inevitably led to errors. For instance, the statement that nothing is known about sperm precedence in spiders is erroneous [e.g., Austad, "Evolution of sperm priority patterns in spiders," in R. L. Smith (ed.), *Sperm Competition and the Evolution of Animal Mating Systems*, Academic Press, New York, 1984]. The claim that the female *Agelena* spider is "unconscious" of what the male is doing with her is unsupported.

So in the end, I must recommend this book with a word of caution. But even for someone in the field, it succeeds in filling a very useful niche, illustrating both the beautiful, exotic forms and colors of terrestrial invertebrates, and their equally beautiful and unexpectedly elaborate ways of life.

WILLIAM G. EBERHARD, *Biology, Smithsonian Tropical Research Institute and Universidad de Costa Rica, Ciudad Universitaria, Costa Rica*

THE OSTRICH COMMUNAL NESTING SYSTEM. *Monographs in Behavior and Ecology*.

By Brian C. R. Bertram; Series Editors: John R. Krebs and Tim Clutton-Brock. Princeton University Press, Princeton (New Jersey). \$35.00. viii + 196 p.; ill.; subject index. ISBN: 0-691-08785-7. 1992.

A male ostrich and a female of his harem (named the major one) initiate a nest and both she and several other (minor) females lay communally at it. By the time she has laid about 11 eggs, the nest already contains over 20, and incubation by her and the male alone begins. Major females discriminate against eggs of minor females, reducing the total average number of eggs actually incubated to 19. Hence, major females care for others' eggs. Explaining how such apparently altruistic behavior may have evolved is the main goal of this three-year field study at Tsavo West National Park in Kenya.

The Bertrams's efforts to observe and recognize individually their elusive birds, monitoring nests

with time-lapse photography or placing dummy fiberglass eggs equipped with temperature-recording devices (Chapter 2, "Methods"), revealed an intricate nesting system influenced by many ecological and social factors, most of which still remain poorly understood. Data on population dynamics (Chapter 3), breeding biology (Chapter 4), and ecology (Chapter 5) build up a scenario for the complex strategies adopted by males and major and minor females (Chapters 6 to 8). In "Discussion: The Evolution and Maintenance of the Communal Nesting System" (Chapter 9), Bertram puts together physiological, ecological, and comparative evidence to provide a logical explanation for this unusual behavior.

Massive nest destruction (58%) by large predators, coupled with a sparse vegetarian food supply (a factor that would perhaps deserve more attention than that paid in the book), could have selected for extended and continuous biparental care. Male parental care is unusual among other polygynous birds and mammals, and female care is absent in other ratites. Both nutritional constraints on egg production and the increased risk of predation resulting from a prolonged laying period are invoked by Bertram as reasons why major females lay fewer eggs (11) than they can actually incubate (19), allowing minor hens (who might have lost their own nest while still laying at it as a major) to exploit their spare incubation capacity (p. 177).

The book is easy to read, and the author puts special care into outlining the objectives, methods and limitations, as well as into considering alternative hypotheses, for each and every finding. To criticize a bit, I found some meanness in the use of statistics (such as inferences made from raw data without any statistical test (see Chapter 8) or from too small sample sizes. For example, daily mortality risks for nests during laying are computed simply by dividing the total number of nest breakups by the total number of days (p. 83), which gives an estimate of 0.06 per day and predicts an optimal clutch size of eight eggs for a major female to start incubation (p. 122). However, fitting nest survival data (from Tables 5.2 and 5.5) to a negative exponential curve renders an estimate of 0.045 per day, which exactly predicts eleven eggs as the optimal clutch size. These minor flaws are not really important for the study as a whole.

I would recommend the book not only to specialists in ostrich behavior or cooperative breeding but especially to graduate students who may find an excellent, entertaining example of how to deal with a field project from the very beginning, showing how scientific rigor and elegant simplicity can make a splendid combination.

TOMÁS REDONDO, *Estación Biológica de Doñana, CSIC, Sevilla, Spain*