Book Reviews

Nourishment and Evolution in Insect Societies.
Edited by J. H. Hunt & C. A. Nalepa.

For years Jim Hunt has been trying to awaken us to the importance of feeding and nourishment in the evolution of insect social behaviour (1982, 1991). Although others have shared his view that haplodiploidy and skewed genetic relatedness are neither necessary nor sufficient for the evolution of eusociality (Alexander 1974; Andersson 1984), they addressed a variety of extrinsic ecological factors without giving particular attention to the role of nourishment. Hunt & Nalepa have now provided us with a whole volume focused on the role of feeding and nourishment in the evolution of eusocial behaviour.

The editors realized that there are two ways to address such a broad topic: either research and write it themselves (analogous to cooking a nine-course meal for 100 friends) or pull together an edited volume (similar to 'pot luck'). The advantage of having chosen the latter is that we have Nourishment and Evolution in Insect Societies today. The disadvantage is some unevenness in the prose and internal structure of the chapters, as is often typical of edited volumes. It is possible, however, that much of the unevenness of content is due to the holes in our knowledge and points to areas ripe for further study. Fortunately, the 13 contributors did not all bring salads or desserts; there is a good mix of broad theoretical and taxon-specific contributions with plenty of examples and data.

The clustering of all but the first chapter is basically taxonomic (subsocial arthropods: chapter 2, termites: chapters 3–6, wasps: chapter 7, ants: chapters 8–10, and bees: chapters 11–13). Of these 12 chapters, three survey feeding in broad taxonomic groups (e.g. ants), five address much more specific groups such as fungus feeders, and four are more theoretical. The introductory chapter, by Hunt & Nalepa, sets the theoretical framework within which the other contributions should be viewed. They address feeding and nourishment as a major life-history component for insects and discuss the boundaries and options available. Variance in nourishment in societies and the modes of redistribution (i.e. cannibalism, oophagy, faecal pellet feeding and trophallaxis) have a major effect on social evolution. Trophallaxis, in particular, is key in the control of nourishment redistribution and endosymbiont transfer. Hunt & Nalepa argue that although these components are crucial in the evolution of sociality across taxa, the interaction between morphology, physiology and nourishment in different taxa has followed different evolutionary pathways. Similar arguments about the importance of any particular life-history characteristic often degenerate into adaptationist story telling, but Hunt & Nalepa stop short of that in this chapter and let the contributors get on with giving us actual data, examples and cases.

Most of the contributors give lots of details of the role of feeding and nutrition in the social evolution of small taxonomic groups. Among the taxa reviewed are the soil-feeding termites, fungus-growing termites, fungus-growing ants, primitively social bees and stingless bees. Bignell’s discussion of the soil-feeding termites and the constraints placed on them by their gut morphology anticipates Hunt’s arguments about nutritional constraints in wasps in chapter 7. To my surprise and disappointment, only one chapter deals with wasps, and it is from a theoretical perspective rather than a review of a particular taxon.

The broad taxonomic reviews of nourishment in termites and ants cover major trends in these taxa. Lenz reviews constraints on colony size and caste due to food type and distribution across termite species. Wheeler gives a broad review of how ants and ant colonies use food. In contrast, Tobin has a narrower scope and looks at the role of ants as primary consumers. Similar reviews of wasps and bees would have been welcome additions to the book.

The theoretical chapters are a mixed bag. Those by Hunt (chapter 7) and Nalepa (chapter 3) are well organized and convincingly argued. Hunt’s chapter 7 will probably be one of the most cited chapters in the volume and presents his argument that digestive tract morphology, maxillation, and sharing via trophallaxis are crucial characteristics leading to the evolution of social behaviour in Hymenoptera. On the other hand, Tallamy’s chapter 2 on subsocial arthropods and the role of male parental care attempts to take a sociobiological approach, but he makes no reference to basic behavioural ecology in developing his model. The other problematic contribution is chapter 12, in which Moritz argues that the ability to store food is central to the evolution of social behaviour in insects. He attempts to find a pattern
from a suite of characters where it is difficult to
determine which ones are just correlated and
which have causal relationships.

In the light of Sherman et al.'s (1995) recent
efforts to bridge the theoretical gap between the
study of eusocial behaviour in insects and coop-
erative breeding in vertebrates, perhaps a good
side dish to accompany this book would be
Rubenstein & Wrangham's (1986) anthology on
social evolution in vertebrates. Regardless of your
usual taxonomic menu, I highly recommend add-
ing Hunt & Nalepa's new book to the reading diet
for all interested in social behaviour.

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Ecological Aspects of Social Evolution: Birds and
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Sherman, P. W., Lacey, E. A., Reeve, H. K. & Keller, L.
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Unravelling Animal Behaviour, 2nd edn. By
MARIAN STAMP DAWKINS. Harlow, Essex:
paperback.

This second edition of Marian Dawkins' helpful
textbook differs materially from the first: it is a
genuine revision, not a repackaged updating. Two
chapters have been deleted from the first edition
and three new ones added, while the remainder of
the text has undergone changes ranging from
minor rewording of individual sentences to ad-
dition, deletion or substitution of whole sections.
In a couple of cases a single new chapter has been
formed by abbreviating and grafting together two
former ones.

Of the chapters that have been removed, one
dealt with a mixed bag of themes in classical
ethology, under the title of 'Some obstinate
remnants'. Few will mourn its passing. The
other deletion, 'Evolutionarily stable strategies', is
more regrettable since ESS modelling still plays
an important role in contemporary ethology,
especially in thinking about communication. ESSs
do not even appear in the index of the second
edition. Perhaps Dawkins feels that ESSs are no
longer sufficiently problematic to need explaining
to students, but if my experience is anything to go
by, undergraduates still have difficulty appreciating
what game theory models have to offer and
how payoff matrices are calculated. Recently,
after I had patiently devoted an entire lecture to
what I thought was a faultless step-by-step
account of the hawk–dove model, a student asked
me what was the point of the model since hawks
and doves, being different species which eat
different things, are not in competition with one
another in the first place. If a second chapter had
to be sacrificed to provide space for the new
additions, I would rather it had been the one on
optimality, which has undergone relatively little
revision since the first edition.

The three new chapters are titled 'Cognitive
ethology', 'Consciousness' and 'Animal behaviour
and human behaviour'. The first and third of these
are welcome additions, containing, amongst other
good things, clear-headed accounts of cognitive
maps, concept formation, and the problems
besetting attempts to apply evolutionary thinking
to human behaviour. I was less happy about the
chapter on consciousness, which fails adequately
to distinguish consciousness from intelligence and,
in particular, motivation. The confusion with
motivation comes in a section on animal suffering,
where Dawkins advocates using elasticity of
demand as a measure of an animal's motivation
to procure something that is missing from its
environment. Strength of motivation is irrelevant
to the issue of consciousness and in the end
Dawkins admits as much. However, this leaves
one wondering why she introduced the subject in
the first place.

Substantial revisions have been made to the
chapters now entitled 'Inclusive fitness', 'Com-
munication' and 'Sex and sexual selection',
including the addition of new sections covering
manipulation, handicaps, honesty of signals, and
female choice. The discussion of handicaps is
exceptionally clear and should be made comp-
lusory reading. One of the best features of the
first edition was its crystalline exposition of kin
selection, and this has been retained and even
improved in the second. It is a pity that the
'Inclusive fitness' chapter contains no mention of
reciprocal altruism since it is in other respects a