Eur. J. Entomol. **104**: 186, 2007
http://www.eje.cz/scripts/viewabstract.php?abstract=1236
ISSN 1210-5759

BOOK REVIEW

COSTA J.T.: THE OTHER INSECT SOCIETIES. The Belknap Press of Harvard University Press, Cambridge, MA, and London, UK, 2006, 767 pp. ISBN-13-978-0-674-02163-1 (hard cover). Price GBP 38.95, USD 59.95, EUR 51.00.

In zoological terms a *social animal* is one living, or disposed to live in company with others or in communities. Nobody would deny that wolves or impalas are social animals and regularly live in groups, but calling bugs, moths or aphids social is surprising, and yet they can form packs, or herds, or family groups. If one is asked to name an insect society, bees, ants, wasps or termites quickly come to mind, since their marvellous or awe-inspiring colonies have for centuries fascinated scientists, philosophers and novelists. Thousands of scholars have satisfied their curiosity by studying the organisation and complexity of such colonies, or just contemplated the purpose of their existence. All of these sociable insect species are given an epithet *eusocial* – meaning truly social – and since Michener's (1969) and Wilson's (1971) monographs the degree of their sociality is firmly defined and recognized: group members use the same nest, exhibit cooperative brood care, form reproductive casts and their generations overlap. However, there are many other insect species in which the individuals live in more or less close social associations with conspecifics, but lack one or more of the eusocial features. This "declassifies" them as communal, presocial, subsocial, semisocial, parasocial or quasisocial, and, inevitably makes them less interesting to students of insect social behaviour. Members of these less sophisticated insect species have gone largely unstudied and ignored. These *non-eusocial* societal species, often neglected and forgotten in the context of social insects, are the major players in Jim Costa's book. It was an enormous task (as well as requiring a great courage) for a single author to write a monograph on all the 'presocial' insect (and some arthropod) communities. It necessitated collecting an enormous body of literature scattered in time over more than a century, and critically evaluating and reviewing it. There are only a few brief *synthetic* treatments of the non-eusocial arthropod societies – those *other* insect societies – and thus this monograph is timely as it fills a major gap in the literature on insect social behaviour.

The introductory chapter is mainly on the controversies over the definition and classification of social behaviour. The reader is persuaded to agree with Costa's disentangling sociality and eusociality and accept his broader and simpler definition of sociality. As Bert Hölldobler puts it in his foreword to the book, this chapter "is a wonderful introduction to some of the central issues of insect socio-biology." The second chapter is devoted to the ecology of social evolution. Using selected examples the author analyses the roles of extrinsic ecological factors that selectively promote evolutionary pathways of four basic categories of group living, in which the remarkable diversity of social forms covered in the book can be placed. These social interactions include *maternal* and *biparental care* (selected mainly by risk of predation), *paternal care* (arises through a sexual selection pathway), *fortress defenders* (this sociality centres around protection of valuable, often ephemeral feeding grounds) and *herds* of two forms – *larval* or *mixed-family*. The role of genetic factors postulated by Hamilton's kin selection theory is also critically re-evaluated on the background of the challenges posed by ecological forces.

The remaining 18 chapters are organized taxonomically. Section Orthopteroidea deals with maternal care in earwigs, hopper herd and cricket families, family lives of webspinners, rare maternal care in some phasmids, social defences of mantids, various degrees of parental care in cockroaches and the little known social relations of tiny Psocoptera and Zoraptera. Five chapters are devoted to Hemipteroidea, namely samurai aphids (non-reproducing aphid soldiers), treehopper herds, social interactions of terrestrial and aquatic bugs, and thysanopteran communes and family fortresses. Three chapters deal with beetle societies – one with dung, rove and carrion beetles, and the other two with bark and ambrosia beetles, weevils and chrysomelids, and several families with only a few social representatives (Erotylidae, Silvanidae, Tenebrionidae and Gyrinidae). Two chapters focus on social caterpillars, one on sawfly societies and the final chapter on other social arthropods: Arachnids, Centipedes and Millipedes. Each chapter is followed by an exhaustive list of references. The book is also provided with taxonomic, author and subject indexes. Black and white drawings aptly highlight the case examples and 28 colour plates of gorgeous photographs grace this voluminous book.

I was very impressed by the depth of knowledge of the author of each taxonomic group and of the contextual information needed to understand the social behaviour of its members. The reader is provided with the relevant references from taxonomy to anatomy or from physiology to ecology, and yet the text has a vivid narrative, the flow of which relies on description and explanation. The reader is presented with modern science, from theory to data analysis. In the introduction the author sets a goal of being comprehensive but not encyclopaedic, and to highlight important outstanding questions that will entice a new generation of eager young naturalists to take a closer look. This goal is, in my opinion, fully accomplished. The book will become a standard reference work on the subject for many years to come and boost research on insects that would otherwise be neglected or poorly studied. This unique source of information should not be missing from the bookshelf of any student of insect ecology or socio-biology. Nevertheless, broadly interested zoologists and ecologists as well as laymen naturalists will undoubtedly find it both instructive and entertaining.

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