experimental models for a range of theoretical and applied population ecology and evolutionary studies.

The book is well written with a pleasant and relaxed, easy-to-read style, through which the authors' obvious enthusiasm for the subject is clearly seen, highlighted by the fact that they have funded several of their studies 'out-of-pocket', as mentioned in the preface. The text is enhanced by some wonderful illustrations and well-chosen electron micrographs, which show the intricate details of some of the more complex aspects of mite morphology.

This book will appeal to anyone with an interest in the ecology and evolution of invertebrates. It will make an excellent introductory text to the world of acarology, especially as it includes a comprehensive list of references plus a list of other useful sources of information, such as journals, organizations and web sites. There is however, a small bias in the examples to mites from Australian ecosystems, but given that the diversity of mites is highest in the rainforest, this does not detract from the excellence of the book. I am sure that it will achieve its aim of 'attracting new students into ecology by showing them that mites do interesting and exciting things' – as they most certainly do!

D.J. Skirvin

Geologische und biologische Entomoökologie der rezenten Seidenbiene Colletes. By Detlef Mader (Logabook, Koln, 1999). 807 pp. Hard cover DM98.00. ISBN 3 87361 263 1.

This is the first volume of two dealing with the nest ecology of solitary bees of the genus *Colletes*. The German vernacular name for *Colletes* (Seidenbiene) translates as 'silk-bee', referring to the silk-like, membranous lining of the nest cells made by the female. This silk, made by polymerization of an ester secreted by the Dufour's gland is waterproof, thus protecting the developing young from inclement weather.

During the course of research for this book, 2000 nest sites of selected solitary bees and wasps were 'evaluated and interpreted'. Information on species is supplemented by lavish illustrations with superb photographic plates, tables, line drawings and diagrams on nearly every second page, showing the insects themselves and their nest sites. Although most species maps are of parts of Germany, two cover much of Europe.

A major part of the book lists the flowers visited for nectar and/or pollen for virtually every known species of *Colletes* (157 spp.) from the palaearctic, nearctic, neotropical, afrotropical and oriental regions. This information is summarized in several tables. It is apparent from this that several *Colletes* spp., despite having short proboscises, are important pollinators of crop plants particularly legumes and members of the Asteraceae.

The book concludes with a very long literature list of 63 pages, suitably cross-referenced, covering the biology and taxonomy of solitary bees and wasps. The book is aimed at entomologists interested in the ecology of this group of insects rather than applied entomologists. It is written in technical German, and it is recommended that when volume 2 appears an English translation would ensure the book reaches a wider readership

Geoff Allen

Insecticide resistance: From mechanisms to management. Edited by I. Denholm, J.A. Pickett and A.L. Devonshire. (Wallingford: CABI Publishing, 1999). 144 pp. Hard cover £35.00 (US$65.00). ISBN 085199 367 2.

Resistance to insecticides constitutes a major threat to the control of arthropod disease vectors and of those pests affecting primary production. It represents a growing threat to our ability to control disease and to feed the world population in the future. The volume under review is concerned with the nature of resistance to insecticides; with the factors that lead to its establishment in pest populations and with possible avenues of approach to the management of this threat. Avenues discussed include the biochemical, molecular genetic, ecological and industrial and impinge on the legislative and political.

The volume contains papers presented at a Royal Society Discussion meeting held in London in 1998. As might be expected from this fact alone, these papers constitute a thoroughly up-to-date, authoritative account of the subject presented by leading researchers from around the world. A strength of the publication is that it does not consist of a miscellany of research papers but is rather a selection of well-informed review papers documenting the status of resistance to different classes of insecticide in different arthropod pests. Different groups adopt different approaches. There are detailed reviews on mechanisms of resistance, and their evolution, in important pest species, notably in *Myzus persicae, Bemisia tabaci, Lucilia cuprina,* heliothine moths, and in *Culex pipiens* and other species of mosquito. There are accounts of the mechanism of selection and evolution of specific resistance mechanisms including microsomal oxidases, esterases, glutathione S-transferases and target modifications. In other papers, the development of resistance to particular classes of insecticide is reviewed. The synthetic pyrethroids and the *Bacillus thuringiensis* toxins receive particular attention.

Whatever the approach taken and whatever the experimental approach described, the majority of the authors do not have a particularly optimistic view of the future. A common theme is that resistance to insecticides is an unavoidable evolutionary response to the pressures placed on insect populations by the application of chemical control agents. Resistance cannot be avoided or circumvented but may, by careful, knowledgeable management, be mitigated in severity or delayed in onset. What is quite clearly demonstrated is that successful management strategies require detailed knowledge, not only of the biochemical, toxicological and molecular biological processes underlying the development of resistance and its fixation in populations, but also of the genetic constitution of the organism and its status in the regional ecology.

Taking these papers in sum, the conclusion that one is led to, inescapably, is that to mitigate the development of resistance all relevant factors must be taken into account and integrated into management programmes. Such programmes may require the informed cooperation, not only of the users of the insecticides but also of manufacturers and perhaps of regulatory bodies as well. Vigilance is required if relevant factors are not to be overlooked in implementing management programmes. The need for this is illustrated in reports by Huang *et al*. (1999) and Liu *et al*. (1999) that have appeared in the literature since the publication of this book which support the view that the