

## Advances in insect chemical ecology

Editors: Ring T. Cardé, Jocelyn G. Millar  
 Publisher: Cambridge University Press,  
 Cambridge; 2004  
 ISBN: 0521792754; 352 pages;  
 price: £60.00 (hardback)

Why would a book containing chapters on why flowers smell and the sex lives of cockroaches be of interest to the readers of the *Bulletin of the World Health Organization*? A good guess would be the roles played by insects in human disease and in food sufficiency and insufficiency. However, very little to address overtly these issues will be found in *Advances in insect chemical ecology*. I have long been interested in chemical ecology, particularly from the perspectives of traditional herbal medicines and natural toxins. Therefore, I found the examples of mechanisms of synergy given in this book fascinating. At the great risk of over-interpreting, I shall attempt to put this collection of expert reviews into the broader perspective of its potential importance to human health.

On planet Earth all living things have evolved with the same basic biochemical mechanisms. While we humans primarily use vision, sound, and touch to sense the environment, organisms were communicating with chemical signals long before we appeared. Chemical ecology is the science of identifying these chemical signals (semiochemicals) and determining how they affect an organism and its interactions with other organisms. Semiochemicals play an important role in almost all aspects of the lives of insects. Plants also use chemical signals to defend themselves from pathogens, herbivores, and sometimes from competition from other plants. Many of these chemicals act through signal transduction mechanisms to induce resistance against insects and pathogens. And many of these same phytochemicals, such as salicylic acid and resveratrol, have been found to influence signal transduction pathways in humans.

*Advances in insect chemical ecology* consists of eight in-depth reviews of defined areas in the chemical ecology of insects and closely related arthropods.

The editors and authors, from seven different countries, are all internationally recognized experts. Individual chapters cover plant–insect herbivore interactions, including an incredibly interesting relationship between tiger moths and plants containing pyrrolizidine alkaloids; plant–herbivore–parasitoid interactions; mediation of insect pollination by floral odours; and pheromone communication in moths, spiders and cockroaches. The central focus is on the chemical and evolutionary perspectives. The chapters are generally very well written, although several may contain too many structural formulae for non-chemists. Overall, the individual chapters, although disparate, are complementary and taken together result in a well-balanced treatment of the subject area.

A key take-home message is that plants use multiple chemicals, often with different mechanisms of action, and not silver-bullets, in their defensive strategies. Insects usually employ complex mixture of chemicals in their communications. Such multiple approaches are less susceptible to the development of resistance. Plants and insects have been

practising and perfecting combinatorial chemistry on an evolutionary timescale; in contrast, this approach has only recently been introduced into pharmaceutical discovery programmes. Basic research in insect semiochemicals has resulted in advances in other fields; for example, in understanding human olfaction and taste. Also, studies of plants' defences against insects can result in safer and more effective pesticides and repellents for disease vector control and plant protection. There is mounting evidence that many of the secondary metabolites used by plants for their defence also have beneficial effects in humans. The complexity of plant protection mechanisms, particularly the evolution of multiple pathways involving many chemicals, should not be lost in investigations of the roles of these chemicals in relationships between human diet and disease.

Much remains to be learned about and from insect chemical ecology. This volume presents an excellent collection of reviews that should be useful to those working within and outside this study area. ■

Samuel W. Page<sup>1</sup>

### Bulletin board: have your say.

Readers now have the opportunity to comment on recently published articles that have appeared in the *Bulletin*, in the form of an informal letter to the editor. These comments will then be published on the *Bulletin's* web site, after quick editorial review, under our new "Bulletin board" section and a selection will be chosen to appear in the print version of the journal. Please visit our web site at <http://www.who.int/bulletin/en/> to access the latest articles and email your contributions to: [bulletin@who.int](mailto:bulletin@who.int).

<sup>1</sup> International Programme on Chemical Safety, World Health Organization, 1211 Geneva 27, Switzerland (email: [pages@who.int](mailto:pages@who.int)).