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BOOK REVIEW

HAYNES K.F. & MILLAR J.G. (eds): METHODS IN CHEMICAL ECOLOGY. VOL. 2. BIOASSAY METHODS. Chapman & Hall, Kluwer Academic Publishers, Norwell, USA, 1998, xx + 406 pp, ISBN 0-412-08041-9, Price USD 115.00.

This book is the second volume of Methods in Chemical Ecology, a lengthy, expected book series intended to bring new methodologies and state-of-the-art techniques in chemical ecology to the broad chemical and ecological community. A book of a similar scope, Techniques in Pheromone Research (Hummel H.E. & Miller T.A. eds), was already published 15 years ago, but new developments in the chemical ecology field, especially in the studies of lower and higher plants, marine organisms and mammalian semiochemicals, have substantially increased our needs for such a compilation.

The book, divided into seven chapters, was written by twenty highly respected active researchers and every chapter is accompanied with up-to-date references. In general, the chapter structure is very concise and the reader can find required information without the necessity to read all chapter sections. However, as many bioassay methods share common strategies and experimental concepts, this chapter structure leads to repetition of description of terms and methods (Ch. 2 and 3). Chapters are organized phylogenetically from microorganisms to mammals and review almost all chemically based interactions known today in nature. From this point, it is surprising that human chemical ecology has been completely ignored.

The first three chapters deal with marine and freshwater microorganisms, fungi and oomycetes. Chapter 1 (Jenkins et al.) presents simple bioassay methods for marine microorganisms, including microbial, chemotactic and motility/settlements assay methods. Chapter 2 (Hay et al.) is an excellent review of bioassays in microorganisms' chemical ecology in aquatic environment. The problems of unknown concentration of chemical signals and their degradation in water, oversimplification of artificial assay conditions, and the question of ecological relevance of the test are discussed in detail and practical consideration for bioassay design is stressed. This chapter is the most comprehensive critical review in this field. Chapter 3 (Kerwin & Semon) combines older results on pheromones of fungi, oomycetes, and yeast with more recent developments in plant and animal parasitic/pathogenic interactions. As interspecific interactions represent medicinally (animal, human parasitation) and economically (fungi-insects, pathogens-plants) important interactions, further developments are expected in this area. From this point of view, this important chapter is rather short and lacking more details. The next chapter (Romero & Weidenhamer) entitled "Bioassays for Allelopathy in Terrestrial Plants" is an excellent critical review of allelopathy, where problems and solutions are showed in several well selected and comprehensible examples. The authors pointed out that in many cases of mentioned plant allelopathy, the observed effects could, in fact, be attributed to different phenomena. These kinds of studies are most likely the longest bioassays in the field of chemical ecology, which sometimes only bear bitter fruit as results. The "Practical Considerations", given at the end of this chapter, are very detailed recipes of how to turn the bitterness to sweetness. Chapter 5, entitled "Bioassay Methods with Terrestrial Invertebrates" by Hare is also very delightful. The summary of older bioassay techniques with insects in both steady and moving air are extended by contact oviposition bioassays and by measurements of host-plant selection and preference. This very well organized and written chapter is excellent in showing how to select appropriate statistical methods, starting with planning of experiments, data collection, statistical treatment, and chemoecologic hypothesis acceptance/rejection. The last two chapters (6, 7) deal with amphibian, reptile, bird and mammal bioassay methods. For these organisms the developments of appropriate assays is extremely problematic, as pure chemically mediated behavior could, to some extent, be obscured by the learning ability of the test objects. Chapter 6 (Mason et al.) is a critical survey of a great variety of chemically mediated interactions of amphibians and reptiles ranging from homing, marking and sexual behaviors to predator/prey recognition and toxicology of such signals in selected species. This area also holds a great promise for future research. The last chapter (Nolte & Mason) is devoted to the youngest area of chemical ecology studies, to mammal and bird bioassays. The chapter starts with a summary of chemical senses e.g. vomeronasal and trigeminal chemoreception, continues with general remarks on test apparatus, intra- and interspecific behaviors and finishes with case studies (aversime stimuli, repellency, scent marks and foraging). We can finish this review with a quote: "Creativity fueled with knowledge should be foremost in developing bioassays."

I have two critical comments on the general structure of the reviewed book. First, it would be better to add an introduction chapter, where common principles for bioassay methods could be presented for both non-specialized researchers and for students. Secondly, Vol. 2 is not cross-referenced (except a note concerning antennography in chapter 5) with the previous Vol. 1, dealing with chemical methods. Information concerning test sample collections (from air, water, soil, biologic objects, glands and reservoirs) and their handling is especially missing there (apart from chapters 2 and 6).

Overall, this volume represents a practical manual of comprehensive and up-to-date compilation of useful bioassay methods for almost all kinds of organisms ranging from bacteria to mammals. The book contains also methodologies of experimental design, data collection, and their statistical treatment. In addition, pitfalls, problems in interpretations and the importance of performing the bioassays under realistic, nature-like conditions are stressed in almost all chapters. Together with Methods in Chemical Ecology Vol. 1: Chemicals Methods, this book will definitely represent an indispensable reference book for graduate students and researchers in many disciplines: chemistry, botany/plant science, zoology, entomology, marine chemistry/biology, and pharmacology. Finally, we are expecting another volume in this series (devoted to biochemical and molecular biology methods ?) with great interest.

A. Svatoš