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Book Review

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**Herbivores: Their Interactions with Secondary Plant Metabolites—Volume 2. Ecological and Evolutionary Processes, 2nd ed.** Edited by G.A. Rosenthal and M.R. Berenbaum (eds.). San Diego: Academic Press, 1992. 493 pp.

The first edition of *Herbivores: Their Interaction with Secondary Plant Metabolites*, edited by G.A. Rosenthal and D.H. Janzen, played a major role in providing a conceptual framework for studying the chemical ecology of plant-herbivore interactions. In 1979, when the first edition was published, the study of plant-herbivore interactions was in a rapid stage of growth and change, and it was inevitable that *Herbivores* would be out-of-date very quickly. A revised second edition, edited by G.A. Rosenthal and M.R. Berenbaum, has now appeared. The second edition is a two-volume set, with the first volume, *The Chemical Participants*, corresponding to Part II of the first edition, and the second volume, *Ecological and Evolutionary Processes*, corresponding to part I of the first edition. A review of Volume 1 has already appeared in this journal (Martin, Volume 18, Number 6, pp. 929–930, 1992).

Volume 2 contains 493 pages divided into twelve chapters, which compares with 350 pages divided into eight chapters in Part I of the first edition. The chapter titles in the second edition are: The Evolution of Chemical Ecology (P. Feeny), Behavioral Responses of Insects to Plant Secondary Plant Compounds (E. Städler), How Animals Perceive Secondary Plant Compounds (J.L. Frazier), Allelochemical–Nutrient Interactions in Herbivore Nutritional Ecology (F. Slansky, Jr.), Metabolic Defenses against Plant Allelochemicals (L.B. Brattsten), Third Trophic Level Influences of Plant Allelochemicals (M. Rowell-Rahier and J.M. Pasteels), Microbial Mediation of Plant–Herbivore Ecology (P.L. Phelan and B.R. Stinner), Phototoxins in Plant–Insect Interactions (J.T. Arnason, B.J.R. Philogène, and G.H.N. Towers), Woody Plant–Mammal Interactions (J.P. Bryant, P.B. Reichardt, T.P. Clausen, F.D. Provenza, and P.J. Kuropat), The Chemical Ecology of Plant–Herbivore Interactions in Marine versus Terrestrial Communities (M.E. Hay and P.D. Steinberg), Genetics of Secondary Metabolism and Herbivore Resistance in Plants (M.R. Berenbaum and A.R. Zangerl), and Evolution and Coevolution of Plants and Phytophagous Arthropods (D.J. Futuyma and M.C. Keese). The individual chapters are uniformly well written, with bibliographies that include numerous references to articles published in 1989, 1990, and 1991.

As the editors state in the Preface, Volume 2 is “more of a sequel than a

second edition—little of the subject material overlaps with the first edition.” Of the 23 contributors to Volume 2 of the second edition, only one had a chapter in Part I of the first edition. Only three of the chapters in this volume have counterparts in the earlier version. Most of the new chapters in this volume fall into two broad categories: those that review the successful extension of the approaches used to study the chemical ecology of plant–insect interactions in terrestrial systems into new areas (e.g., three trophic level interactions, microbial mediation of plant–herbivore interactions, phototoxins, marine systems, and mammalian herbivory) and those that describe progress in areas that are crucial to the development of general principles that underlie plant–herbivore interactions (e.g., behavior, chemosensory physiology, the interactions of nutrients with allelochemicals, detoxification, the genetics of plant–herbivore interactions, and coevolutionary theory).

The opening chapter by Feeny falls into a category all its own. Feeny traces the roots of the various themes of contemporary research in the chemical ecology of plant–herbivore interactions (e.g., host specificity, food utilization, plant toxicity, chemical defense, and phytochemistry) to seminal papers dating from the 1800s through the first half of this century. He then recounts the explosion of the field in the 1960s and 1970s following the publication of a series of landmark papers by Dethier, Fraenkel, Gordon, Kennedy, Mittler, Self, Thorsteinson and a few others in the 1950s and early 1960s. Next he cites recent influential papers that exemplify current thinking in the field, and concludes by identifying some important issues that remain unresolved. This remarkable chapter is high-quality intellectual history, and it is fascinating reading.

It follows from Feeny’s account that although the study of the influence of secondary plant metabolites on the ecology and evolution of plant–herbivore interactions may be a relatively new field, it is no longer a discipline in its infancy. It had a juvenile phase that ended sometime in the 1960s, followed by an adolescent phase that lasted about 20 years. Sometime in the 1980s it achieved maturity. The second edition of *Herbivores* reflects this maturity. The great contribution of the new edition is to present an important and vigorous subdiscipline within ecology that has both breadth and depth, and to show how the study of plant–herbivore interactions is influencing other areas of biology as much as its is being influenced by them. In revising *Herbivores*, the editors have produced an outstanding work that, for years to come, will serve both students new to the field and researchers already active in the field. Profs. Rosenthal and Berenbaum have surely done their part to “insure that the discipline continues to flourish in the next century.”

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