lem is given in papers by R. Hide and M. Stix. I think that it is here that exciting results can be expected in future years.

In hindsight it was probably premature to publish this follow-up volume to the generally more successful earlier collection. But the book is worth perusing as an indication of how this science progresses and digresses.

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Interactions Among Species

Interaction and Coevolution. JOHN N. THOMPSON. Wiley-Interscience, New York, 1982. x, 180 pp. $27.50.

Ecology and evolutionary biology are going through a difficult period. During the last few decades, interdisciplinary syntheses and mathematical models provided new conceptual foundations and stimulated much empirical research. As the data have accumulated, however, they have served mainly to demonstrate the inadequacy of the theories to account for the complexities of the natural world. At present the disciplines seem uncertain of their direction: they have neither reconciled the troublesome gaps between theory and data nor abandoned these problems to pursue promising new lines of investigation. It is a hazardous time for anyone to attempt a synthesis, especially when the topic, coevolution, lies right at the interface of ecology and evolutionary biology.

In this well-written, scholarly little book a relatively young investigator reviews many recent studies of competition, predation (including herbivory and parasitism), and mutualism in a brave effort to synthesize available information on how these interspecific interactions affect the evolution of populations and the organization of communities. The approach is almost exclusively empirical, qualitative, and inductive. The author draws on examples from a wide variety of organisms from diverse habitats and geographic regions in order to describe what he believes to be general patterns of interaction and association among species that presumably reflect the operation of basic coevolutionary mechanisms. He uses this approach to try to answer such difficult questions as: What determines the degree of specificity in the different kinds of interspecific interactions? What circumstances favor the evolution of mutualistic associations from antagonistic interactions? How do spatial and temporal environmental heterogenity affect the coevolution of interacting species? Under what conditions are parallel speciation patterns of host and exploiter species most likely to be observed? I do not think Thompson manages to provide very satisfactory answers to these questions, but then I doubt that anyone could answer them convincingly. Perhaps, given the present state of our knowledge, these are not even the kinds of questions we should be addressing with high expectations.

As a review of recent field studies of interspecific interactions and coevolution the book is successful and valuable. It is impossible to do justice to all the important studies in a book of this size (or probably of any reasonable size), but Thompson's treatment is broad, deep, and well balanced. After developing the concept of coevolution in the introductory chapter, he devotes successive chapters to predation (including grazing and parasitism), competition, mutualism, environmental and life history constraints, evolution of mutual dependence, cospeciation, and community structure. Thompson's command of the recent literature is impressive, and he shows excellent taste in selecting interesting, well-documented examples to illustrate his points. These examples include fungal disease resistance in wheat, dietary selectivity of grasshoppers and grazing mammals, flower specificity of pollinating bees, moths, and hummingbirds, oviposition behavior of butterflies on plants, and adaptations of fleshy fruits for seed dispersal by birds. For one who wants to be introduced to the diversity of interspecific associations in the natural world or to obtain important references to catch up on recent developments in the field, this book is an excellent place to begin.

A reader who stopped his or her study of interactions and coevolution after reading this book would, however, be left with a misleading impression of contemporary evolutionary ecology. In my opinion in Thompson's attempts at analysis and synthesis he completely fails to convey any sense of the conceptual ferment that now pervades the field. There are those who question whether any but the most trivial patterns in nature can be attributed to interspecific interactions and coevolutionary processes. These skeptics will hardly be convinced by Thompson's qualitative treatment; there are only two graphs and a few quantitative tables in the entire book. Mathematical models are hardly mentioned, so their seminal role in stimulating much of the empirical research and in revealing the shortcomings of the models themselves cannot be appreciated. There is little recognition of the contributions of controlled, manipulative experiments and statistical analytical techniques in transforming descriptive natural history into the rigorous sciences of ecology and evolution.

I suspect that another forthcoming book on coevolution (D. J. Futuyma and M. Slatkin, Eds., *Coevolution*, to be published by Sinauer Associates) will tackle some of these thornier issues, but I doubt that it will be much more successful in answering the fundamental questions. Contemporary evolutionary ecology is full of controversy as investigators attempt to use different approaches to reconcile the discrepancies between rigorous mathematical models and sound quantitative data. I suspect that many of the questions eventually will be answered, but many others may prove insoluble, at least in the short term, and the discipline will have to bypass them and go on to other, more productive lines of investigation. Thompson may have set himself an impossible task in trying to identify the conceptual bases of a discipline that does not have many, but his book fails to do justice to the quantitative developments that have carried it to its present precarious state.

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Equids

Horse Behavior. The Behavioral Traits and Adaptations of Domestic and Wild Horses, Including Ponies. GEORGE H. WARING. Noyes, Park Ridge, N.J., 1983. xii, 292 pp., illus. $35. Noyes Series in Animal Behavior, Ecology, Conservation and Management.

Horse Behavior by George H. Waring is a book that will be useful to a wide audience. For the student of animal behavior the book integrates the findings of hundreds of international researchers who have worked with domestic as well as feral horses. For the veterinarian or student of veterinary science the book provides a baseline of typical equine behavioral traits that can be compared to the abnormal behaviors encountered in veterinary medical practice. (In addition, the appendix contains 12 pages of equine behavioral symptoms that are correlated with their possible causes.) For the horse breeder and avid horseman or horsewoman the book discusses guidelines for