subfamilial concept established in *Genera Orchidacearum* (Pridgeon et al. 1999) had been applied. However, this is a minor detail and of significance mostly only to orchid systematists.

The Orchids of Bhutan represents an outstanding achievement, which hopefully will serve as an example for similar projects. It is a most valuable addition to the floras of the Eastern Himalayas and will have implications for conservation and CITES regulations for orchids from this region. Finally, and most importantly, it will be most welcome by scientists and orchid amateurs interested in identifying orchids from Bhutan.

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Herrera C. M., Pellmyr O. (eds.): Plant-animal interactions. An evolutionary approach. 126 figures (including numerous diagrams, graphs, black and white photos and 34 color photos), 18 tables, 6 box summaries, 1 appendix, xi + 320 pp. Blackwell Science, Oxford, 2002. Softcover £ 22.75, US$ 73.95. ISBN 0-632-05267-8.

Plant-animal interaction is undoubtedly one of the most fascinating and complex topics in the field of biology and accordingly, vast amounts of data have accumulated on this subject over the years. However, there is a certain lack of coherence in these data. This is at least to some degree due to our traditional subdivision of the biological sciences into various subdisciplines such as botany, zoology, ecology or systematics. These largely artificial subdivisions, which in many institutions have persisted up until the present and, more importantly, are also reflected in the design of our research studies, hamper our efforts to address the bigger questions in the field of evolutionary biology as a whole, such as for example, 'What are the phylogenetic constraints that together with ecological factors shape patterns of speciation and the structure of biodiversity?' Therefore, a book promising to address the topic of plant-animal interactions using an evolutionary approach and incorporating a broad variety of data and methods, is greatly needed and most welcome! If the book is directed mainly to upper-level undergraduate and graduate students, this makes it even more desirable, as we need such aids in order to help students gain a more comprehensive understanding of evolutionary biology.

The book edited by Carlos Herrera and Olle Pellmyr contains a short preface by the editors followed by nine chapters dealing either with a prominent subtopic in the field of plant-animal interactions such as 'Animal-Pollination', 'Seed Dispersal by Vertebrates', or 'Ant-Plant Interactions', or reviewing a broader aspect such as 'Species Interactions and the Evolution of Biodiversity' or the 'History of Associations between Plants and Animals'. The nine chapters are ordered into four parts ('Introduction', 'Mostly Antagonisms', 'Mostly Mutualisms', and 'Synthesis').

''The majority of terrestrial organisms fly''. This is the first sentence of the first chapter entitled 'Species Interactions and the Evolution of Biodiversity' by Peter Price. The sentence is followed by basic information on the distribution and importance of flight in animals and plants and the author hypothe-

sizes that flight might be the most important element for understanding plant-animal interactions. To say the least, this is not exactly the kind of introduction I was expecting and Peter Brice's intentions in choosing this introduction remain obscure to me. After this rather unfortunate beginning, the author turns to more appropriate issues such as concepts of biodiversity, diversity of interactions, co-evolution, adaptive radiation, and finally to methods of study. In this latter part Brice also gives a short introduction to the concept of phylogenetic reconstruction. But, unfortunately, his circumscription of phylogenetic analysis is oversimplified and potentially misleading. In general, this chapter leaves a somewhat premature and erratic impression, which is especially unfortunate, because it is the opening chapter of an otherwise well-organized book.

The second chapter, written by Conrad Labandeira, focuses on the origin and evolution of associations of plants and animals from a palaeobiological point of view. This chapter, in sharp contrast to the first one, is clearly structured and deals in a comprehensive and in some parts almost encyclopedic and overwhelming way with its topic (it also includes an extra appendix at the end of the book). A vast number of publications are cited and Labandeira manages to incorporate all the information in a, for the most part, easy to read synopsis of the field. The topics range from introductory sections on the geochronological context, taphonomic effects, types of fossils, over more specific topics such as 'galling' or 'seed predation' and covers information on a broad taxonomic range of fossil groups including insects, dinosaurs, and mammals. In addition, Labandeira explains and documents the diverse evidence on plant-animal interactions that can be retrieved from the fossil record with easily understandable graphs and many figure plates.

Chapter Three, by Sharon Strauss and Arthur Zangerl, the first chapter of the second part ('Mostly Antagonisms'), reports on plant-insect interactions in extant terrestrial ecosystems. It focuses on herbivory and the counter-measures (physical or chemical) evolved by plants to defend themselves. In addition, the authors discuss the effects of herbivores on species composition of plant communities and on ecosystems. They conclude that much of the biodiversity present today is the result of the arms race between insect herbivores and their plant hosts. The chapter is well structured and the authors document their points with well chosen examples. The same is also true for Chapter Four written by Kjell Danell and Roger Bergström, which reports on mammalian herbivory and its impact in terrestrial environments. The authors of this chapter have spun the topics of their article extremely broad: from plant chemistry, over mammalian digestion systems, to the effects of herbivory at the ecosystem level; they cover it all! In Chapter Five, by Philip Hulme and Craig Benkman, we learn about the characteristics of granivory and the influence of seed predation on plant population dynamics.

Although Chapters Three through Five, constituting the second part of the book ('Mostly Antagonisms'), each represents a well documented review in its respective field, they have one disappointing aspect in common, and that is that they all largely lack the evolutionary approach promised in the title of the book. Each of the three chapters contains one or several section titles making reference to evolution; however, the discussions rarely extend into a true evolutionary time frame and mostly remain on an ecological level. This lack of evolutionary depth is especially apparent in Chapters Four and Five, which do not make reference to a single phylogenetic study.

Chapter Six, the first chapter of part three, 'Mostly Mutualisms', deals with pollination by animals. It is an outstanding article and my favorite chapter in the book. Olle Pellmyr, who is not only one of the book's editors, but also the author of this chapter, gives a concise review of the topic at hand by citing important earlier works and many recent papers covering all relevant aspects. Pellmyr discusses the general process, the evolutionary origins, and

important features of plants and animals relevant to pollination. And he also fulfils the expectations raised by the book's title, as he uses a truly evolutionary approach by incorporating comparative phylogenetic information into his lines of argumentation. As he correctly points out, historical data in the form of phylogenies allows us to bridge the gap between ecological and evolutionary time scales. I highly recommend this chapter to anyone, who wants an introduction to the exciting field of pollination by animals.

Chapter Seven by Carlos Herrera, the second editor of the book, summarizes recent progress in the field of seed dispersal by vertebrates. In a comprehensive manner similar to that of Pellmyr, Herrera covers all the important aspects from functional categories, over taxonomic and ecological distribution, to plant and animal adaptations, respectively. The chapter opens the door to a rich body of literature, and as a botanist I particularly enjoyed reading about such topics as the digestive system of birds or diet shifts of vertebrates in response to fruit scarcity. Also especially informative are the sections in which Herrera focuses on the differences between seed dispersal and pollen dispersal by animals. He demonstrates that resemblances between the two systems are only superficial and he discusses the factors that limit mutual adaptation and coevolution between plants and their animal dispersers. This chapter is an excellent introduction to the topic.

Chapter Eight, by Andrew Beattie and Lesley Hughes, deals with ant-plant interactions. The diverse ways in which ants interact with plants and the ecological importance of ants in most terrestrial environments clearly justifies a chapter of its own for this particular group of animals. Beatty and Hughes mainly cite literature that has been published during the last ten years. In the first part the authors cover topics such as 'leaf-cutter ants', 'ant-guard systems', 'ant pollination', 'ants and seeds', and 'ants and soil'. In the second part they ask why ant-plant interactions are so common and discuss specialization and variation in ant-plant interactions. In my hit-list of chapters, this one ranks second as it provides a broad and up-to-date review brought to life with numerous exciting examples from the literature. However – and I hate to bring it up again – except for a ten-line paragraph on phylogenetic analyses, the chapter mostly does not extend into an evolutionary time scale. Something that is not clear to me, is why this chapter, which focuses on a particular insect group and its interaction with plants, has been assigned to the fourth part, the 'Synthesis' part of the book.

Finally, Chapter Nine by John Thompson addresses future research directions by emphasizing the importance of incorporating an evolutionary perspective to be able to answer "the big questions" in the field of evolutionary ecology. Thompson lists nine major questions focusing on various aspects of species interactions that need to be addressed. He also stresses that in order to be able to answer these questions collaborations among biological subdisciplines need to be increased, and approaches and expertise must be combined. Thompson's question-driven chapter is very constructive as he not only points out the shortcomings of past and current research but also proposes solutions and directions on how to improve future studies.

The figures, graphs and tables in the book are adequate and mostly very informative. The quality of the photographs is in some cases not very high; some of them are not sharp, others are pixelate. Some, but unfortunately not all of the chapters contain a glossary. These glossaries are very useful, especially in a book that is also aimed at undergraduate students, who might not yet be familiar with all the specific terms. These minor points could easily be corrected in possible future editions of the book.

Overall, this book provides a thorough synopsis for anyone interested in plant-animal interactions and my criticisms mainly pertain to the, in my opinion, only partially fulfilled promise given in the title – the use of an evolutionary approach. Most of the chapters

remain largely on an ecological time scale and only scratch the surface of an evolutionary perspective. Nevertheless, I enjoyed reading the book as it summarizes recent developments in this exciting field and points to important questions that need to be addressed in the future. As intended by the editors, it is a useful basis for undergraduate and graduate courses and thanks to the numerous references it directs the way for those who want to learn more about specific topics in the field of plant-animal interactions.

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Camerini J. R. (ed.): The Alfred Russel Wallace Reader. A Selection of Writings from the Field. Foreword by David Quammen. 6 maps, 9 black and white photos, 8 black and white drawings, xxii + 219 pp. The Johns Hopkins University Press, Baltimore, 2001. Hardcover US $ 48.00. ISBN 0-8018-6781-9. Softcover US $ 18.95. ISBN 0-8018-6789-4.

''Who was Alfred Russel Wallace? A complicated man, and so the answer is complicated too''. With these words David Quammen starts his foreword to this book, and this statement is quite correct. One of the merits of the present book is that it reintroduces this fascinating and controversial personality to a general readership.

Camerini's book guides the reader through the different aspects and facets of Wallace's life and work in a way that is both easy to read and easily understandable. And as the book starts with an introduction and a biography, here are some short notes about Wallace's life as a naturalist and pioneer evolutionist. (For more detailed information on Wallace's life see e.g., the excellent biography of P. Raby (2001)).

Wallace was born in 1823 in Wales. He began his professional career in the 1830s as a land surveyor during the British railway building boom. From childhood on he was interested in nature, but did not hold a university degree at the time he set off on an animal collecting tour in the Amazon together with his friend H. W. Bates. Despite sickness, shipwreck, fire, and famine, Wallace was so enthusiastic about the tropics that, immediately after his return from Amazonia, he began to develop plans for a trip to Malesia. For eight years he worked in East Asia as a collector and field naturalist. There he described everything from the smallest animals to the customs of the local people. He returned to England in 1862 and lived there, interrupted only by short periods of travel (e.g. to the USA in 1886–1887), until his death in 1913.

Beyond being a careful observer, Wallace was looking for general patterns in nature. On the basis of his studies on the distribution of plants and animals he defined Wallace's Line, the boundary line separating the Asian and Australian zoological regions, and he was one of the first to use an evolutionary approach to global and island biogeography. Independent of Darwin, he developed a theory of evolution through natural selection, about which he corresponded with Darwin. Wallace was the author of about 22 books and many articles in journals and newspapers. And while Darwin got the recognition for his *Origin of Species*, Wallace's work and life were nearly forgotten.

Fortunately this has changed in recent years. In fact, at present it seems that we are undergoing a kind of rediscovery of Alfred Russel Wallace, exemplified by several recent publications dealing with his life and work. Camerini's book is one important contribution to give Wallace the recognition that he deserves. An exhaustive list of literature related to A. R. Wallace can be found on 'The Alfred Russel Wallace Page' – http://www.wku.edu~smithch/index1.htm. Two recent publications on Wallace are *Infinite Tropics: An Alfred Russel Wallace Anthology* by Berry (2002) and *In Darwin's Shadow: The Life of Alfred Russel Wallace: A Biographical Study of the Psychology of History* by Shermer (2002).