

WHEELER, A. G. JR. 2001. *Biology of the Plant Bugs*. Cornell University Press. Ithaca, N.Y. 507 p. \$95.00.

It is a rare event in these days of specialization to find a book written by a single author who is a superb field man, a student of the biology and habitat requirements of individual species, a literate taxonomist and biogeographer, who has had a long history of work in economic entomology and is a keen student of the history of his science. All of these attributes are present, combined and superbly written and organized in this comprehensive compendium upon the Miridae, or plant bugs.

Wheeler's command of the literature on a world wide basis and his ability to include ancillary material that bears upon the significance of information on the plant bugs is almost unparalleled as can quickly be seen by glancing at the three column, quarto sized bibliography of 112 pages.

No single reviewer can really do justice to this book as it requires knowledge in so many different fields.

The book is separated into five major parts: Background; Perspectives; Phytophagy; Zoophagy, and Conclusions. Each of these chapters is almost a book in itself.

Among the immense amount of material that Wheeler has gathered together and digested many things stand out, and will be of varying degrees of interest depending upon the readers own primary specialization. To me one of the most striking features has been the strong emphasis placed upon the animal feeding habits of so many Miridae and the ability of many of them to utilize plant or animal food depending upon its availability and the condition of the environment. Although animal feeding has been known to be present in members of the family for a long time its importance and frequency has been masked to a considerable extent by the habit of many primarily zoophagous species to occur only on a limited type of plant which often gives the collector the feeling that he has been collecting a plant feeding insect because of its concentration on its "host plant". Perhaps of at least equal importance is Wheeler's thesis that dividing insect taxa into those that feed upon plants and those that feed upon animal matter are exclusive phenomena. He shows over and over again the vagility with which various species can shift feeding types. Surely this must be true of many more insects than the existing literature would have us suggest.

From the perspective of this reviewer Chapter Two is the most outstanding for the general reader for here Wheeler not only treats the family characteristics and identification, but also the ecology, and behavior, the morphology, physiology and behavior in relation to feeding and the role that mirids play in the transmission of plant diseases.

Other specialist reviewers will undoubtedly emphasize the diversity of phytophagous feeding for not only are plant juices utilized but the frequency of feeding on floral parts, pollen and fruit feeding, scavenging etc. is for the first time brought to the forefront of the feeding diversity of members of this great family.

The concluding chapter in which Dr. Wheeler leads one through the thorny, and often debated, question of ancestral feeding habits in the Heteroptera and the Miridae, feeding trends among the higher mirid taxa and an especially impressive discussion of the direction and needs of future research. Wheeler believes that the evidence for ancestral animal feeding is overwhelming, but he does fall into the use of "Homoptera" frequently even after he has agreed that this is not a monophyletic group.

One of the things that intrigued this reviewer was the citation of Carayon's (1984) paper that *Acetropis gimmerthaii* reproduces by haemocoelic (= traumatic) insemination in a fashion similar to that found in many cimicoid families. If this actually is a synapomorphy it has great significance as it brings into question whether or not the Miridae is really a monophyletic group. One should note that recently the traditional Anthocoridae were separated into three families and one of the chief features was the condition of whether or not traumatic insemination was present. If the Miridae prove ultimately to be a paraphyletic group it may explain some of the puzzling feeding and breeding habits found within the present family.

One will find many situations of this type in this book. My own interest has long been in the presence of flightlessness and Wheeler treats this along with myrmecomorphy and habitat stability in an exemplary fashion.

Whether the Miridae are as dominant a group in the tropics as they are in temperate regions needs further study. A few active specialists can skew this picture considerably. My own limited experience suggests that insofar as nocturnal movement is concerned the Lygaeoidea in the tropics are more numerous than the Miridae, in strong contrast to the situation in the Holarctic.

This book is not only a tribute to Wheeler's thorough analysis, but also a tribute to the enormous amount of research that has been done on this family during the past century. While some of this knowledge was generated by the destructive habits of such species as those of major importance to the production of cacao, tea and a whole plethora of cultivated crops, much has been due to the detailed taxonomic work done both in Europe and the United States as well as that of Prof. Carvalho in Brazil.

I have only the highest praise for this really immense effort. As might be expected with Dr. Wheeler the book is almost without typographical error.

Where one disagrees it is only a somewhat semantic disagreement such as the one I have noted in an earlier review concerning whether species within a faunal region should be differentiated if they have reached a new country by fragmentation of a formerly contiguous range, or by their own dispersal ability, or have been brought in by man. (I would bring to Prof. Wheeler's attention what the fauna of Hawaii would look like if native species and those introduced by man were not treated separately).

Finally this great book concludes with three very important appendices one dealing with valid

names, authors and higher taxa within the family, a second listing the equivalent common and scientific names of species mentioned in the text and the third listing the common and scientific names of plants mentioned.

It is really the work of a lifetime, one of few books that I have found myself unable to put down, for there is much of importance packed into almost every page.

This is undoubtedly going to be the standard work on mirid biology in its broadest sense for many, many years into the future.

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