

BOOK REVIEW

AUSTRALIAN MEALYBUGS. By D.J. Williams. Published by British Museum (Natural History), London. 1985. 431 p., 177 figs.
Price: £40.

Douglas J. Williams, one of the world's foremost authorities on the systematics of the Coccoidea, has produced a monograph of the Australian Pseudococcidae that is a major contribution to our knowledge of this large and important family of sternorhynchous Homoptera. His treatment is complete and detailed and, for the first time, places the systematics of Australian mealybugs on a sound scientific basis. Before this work appeared, the classification of Australian Pseudococcidae was near chaos. Now we have a well-reasoned and clearly defined classification upon which to build, as well as a highly useful account of mealybugs in general and the Australian fauna in particular.

The mealybugs are the second most abundant group of Coccoidea, exceeded in number of known species only by the armored scales (Diaspididae). The group contains a multitude of serious pest species that attack a wide range of forest, ornamental, and crop plants. Despite their economic importance, our knowledge of the world's mealybug fauna is still woefully inadequate, particularly for the tropics and subtropics. Of the 196 species in 61 genera that are treated in *Australian mealybugs*, 132 species and 27 genera are described as new. This preponderance of new taxa emphasizes the inadequacy, worldwide, of our present knowledge of this important group of plant parasites.

Although the geographical scope of this work is limited to Australia, its significance is not confined to that continent alone. Australia appears to have been the source of several common mealybug species that have been widely dispersed by commerce and have developed into major pests in other regions. Some examples are the citrophilus mealybug, *Pseudococcus calceolariae* (Maskell), the long-tailed mealybug, *P. longispinus* (Targioni-Tozzetti), and the golden araucaria mealybug, *Nipaecoccus aurilanatus* (Maskell). The vagility of mealybugs is such that many species are continuing to extend their ranges into new geographical areas despite quarantine regulations designed to contain them. For example, the species described by Williams in this volume as *Pseudococcus dendrobiorum*, which is apparently endemic to northeastern Australia, has several times been intercepted elsewhere, in quarantine on orchids of Australian origin. Furthermore, this species was found established in Hawaii in 1977, where it has infested commercially grown *Dendrobiums* and has required the application of control measures. As a result of Williams' work on Australian pseudococcids, which was then in progress, we were able to determine the origin of this species soon after its discovery in Hawaii, even though no name was available for it until now.

The descriptions of new genera and species contained in this book are a major contribution to the knowledge of the mealybug fauna of the world. Even more important, in my view, are the many redescrptions and illustrations of the heretofore poorly known and often unidentifiable species described by earlier workers, such as Froggatt, Fuller, and Maskell. A measure of the thoroughness of Williams' work is the fact that he examined virtually all of the primary types of Australian mealybugs still in existence. He has designated lectotypes for a number of previously described species, particularly those of Maskell, who described many species but did not designate holotypes.

This book provides an excellent framework upon which to build a more complete understanding of the unique mealybug fauna of Australia. It is certainly not the final word on the subject. As Williams points out, it is probable that a great many Australian mealybug species have yet to be collected and named. In his treatments of several of the larger genera, such as *Pseudococcus* and *Dysmicoccus*, he mentions other, presumably undescribed, species that he has seen but has not described because of the inadequacy of the available materials. It seems to me that there must be at least 100 to 200 additional, as yet unnamed, mealybugs present on the Australian continent. Specialized collecting, particularly in regions that have as yet received relatively little attention from coccidologists, such as northern Australia, seems certain to uncover a wealth of additional endemic species. An indication of what may be awaiting discovery through careful collecting in specialized niches is provided by Williams' new genus *Conulicoccus*. This genus, which contains 3 species, all new, is based entirely upon specimens collected by 1 person (myself) from abandoned galls formed by other Homoptera or (1 species) under bark on *Eucalyptus* spp. in Victoria and New South Wales. Two of these species exhibit obvious morphological specializations for life as gall inquilines, a niche known to be exploited by Pseudococcidae nowhere else except Hawaii. Abandoned galls formed by Psyllidae and Eriococcidae are found virtually everywhere *Eucalyptus* species occur in Australia, and it seems almost certain that additional species of *Conulicoccus* await discovery by any collector who is willing to look for them in this niche.

Coccidologists generally judge the quality and utility of taxonomic descriptions in this group on the quality of the illustrations that accompany the written descriptions of species. The now standard semidiagrammatic presentation of the dorsal and ventral aspects of slide-mounted specimens, which detail the kinds and distributions of microscopic structures (setae, spines, pores, ducts and the like), serve as taxonomic maps. Written descriptions are largely ancillary, serving mainly to provide details of measurements and numbers and to emphasize the structural differences useful in the separation of taxa. Williams' full-page illustrations are of excellent quality, clearly and unequivocally delineating the taxonomic details of his new species, as well as those of many previously named species not adequately illustrated earlier.

The systematics of mealybugs and other Coccoidea is based largely on the neotenic "adult" female stage, although use of immature stages (particularly the first instar) and males is increasing. Williams has provided supplementary drawings of immatures and males for a few species, usually where these serve to illustrate possible phylogenetic relationships in species in which the adult female morphology is highly specialized and aberrant [e.g., *Peridiococcus ethelae* (Fuller)].

As one who has himself prepared a modest number of taxonomic drawings of mealybugs, I thoroughly appreciate the very many hours of concentrated study and careful delineation required to produce the 177 full page figures that illustrate this book.

Australian mealybugs includes an introductory chapter that considers the origins and host plants of Australian Pseudococcidae, provides a summary of mealybug biology, reviews the economic importance of pestiferous mealybugs in Australia, and includes sections on systematics, morphology and classification. This chapter is followed by a distributional list of Australian pseudococcids and a key to the genera represented on the Australian continent. The taxonomic treatment of genera and species begins on page 40 and extends to page 393. It is followed by a systematic list of the host plants and the mealybug species recorded from them and an index to the family placement of host plant genera, both of which are certain to be very useful to future workers concerned with mealybugs in Australia. The volume concludes with an extensive list of references and a general index. It is a well-organized and well-written book and it is difficult to find much that could have been improved upon. I would like to have seen a brief statement on the etymology of each of the many new genera that Williams has proposed, but this is certainly a minor omission.

Taxonomic literature is, of necessity, straightforward exposition with little room for anecdotal digression. There must be numerous interesting anecdotes relating to the many and diverse circumstances under which mealybugs have been collected in Australia. I would like to end this review by recounting one such anecdote concerning one of the species described as new in *Australian mealybugs*. That species, *Dysmicoccus laportiae*, is based upon specimens from a single collection, which very nearly was never made and for which the collector paid a discomforting penalty.

The collector, en route by automobile from Brisbane to Armidale, N.S.W., made an unscheduled stop at a small national park, known as Cunningham's Gap, in southern Queensland. Having a few hours to spare, he decided to stretch his legs on the trail through the cool upland forest of the park. However, lacking the required permit, he had no intention of collecting coccid specimens. A mile or so from the parking lot he came upon a small tree with large peltate leaves, which was unknown to him. And, wondrous to behold, each leaf bore on its lower surface a large colony of conspicuous white mealybugs. How could he resist? Looking furtively about to be certain he was not observed, the collector quickly grabbed the petiole of the nearest leaf, yanking it free and into a plastic bag held open to receive it. Before the leaf was in the bag the collector knew he would pay for his indiscretion. The palm of his collecting hand was seared by a fiery pain where it had held the leaf. Even with the bag and specimens safely stowed in the knapsack, the pain persisted and 2 hours later had scarcely diminished. The drive to Armidale was an acutely uncomfortable affair, and, although medical attention obviously was not required as the pain gradually subsided, the collector was anxious to determine the cause of his travail. The tree from which this apparently unique collection was made was later easily determined to be *Laportia gigas* (Urticaceae), the infamous nettle tree of north-eastern Australia. From this experience the collector was not only rewarded with the discovery of a new mealybug species, but also he gained a valuable lesson in Australian botany. That collector, incidentally, is the author of this review.

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