

Insects of Hawaii, Volumes 6, 7 and 8 (A Review)

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Three outstanding contributions to the literature on the insect fauna of the Hawaiian Islands have been recently issued by the University of Hawaii Press. These three volumes, by E. C. Zimmerman, consist of highly important additions to the monumental series of publications under the general title *INSECTS OF HAWAII*.

Volume 6 covers the Ephemeroptera, Trichoptera and Neuroptera, and includes data concerning 58 species and subspecies in 12 genera. The orders Ephemeroptera (mayflies) and Trichoptera (caddisflies) are each represented in Hawaii by a single immigrant species. The remaining forms, which all fall within the order Neuroptera, consist of 27 species of Hemerobiidae, 24 Chrysopidae, 3 Myrmeleontidae and 2 immigrant Coniopterygidae. Of the Neuroptera, all but seven species are endemic.

Dr. Zimmerman's comments on the speciation amongst the Hemerobiidae and Chrysopidae are of exceptional interest. Some remarkable effects of insular evolution are displayed within the endemic Hemerobiidae and the speciation evidenced in the endemic Chrysopidae appears to outstrip that of any other Polynesian insect fauna. Excellent discussions are included on the developmental stages and the habits of members of these two families as exhibited in Hawaii. The illustrative portion of the book consisting of 104 figures, which includes photographs of the adults and their wings together with drawings of genitalia, adds greatly to the usefulness of the volume. Important bibliographies are given, and a 24 page supplement to Volumes 1 to 5 is included to bring up to date various needed corrections and additions. This book was issued August 15, 1957. It contains 209 pages and sells for \$4.50.

Volume 7 deals with 168 kinds of the larger macrolepidoptera of the Islands known to the author at the close of 1956, which totals 158 moths and 10 butterflies. Of the moths, 59 are geometrids, 90 are noctuids and 9 are sphingids. Only 2 of the butterflies are native. Of the moths, 130 are endemic. The book discusses 46 genera. Twelve of the genera or subgenera are endemic. Approximately 60 percent of the names previously used for these insects necessarily have been changed as a result of Dr. Zimmerman's close study, and several new genera are proposed. There are 36 changes in the nomenclature of the Geometridae including the

erection of three new genera, and 77 changes in the Noctuidae. This volume embraces 542 pages, with 423 excellent figures and an extensive bibliography. It was issued on September 30, 1958 and is priced at \$9.50.

Volume 8 treats the pyraloid moths of Hawaii known to Dr. Zimmerman through 1956. This book discusses 226 different moths of the superfamily Pyraloidea. There are 44 genera, comprising 190 endemic species and 36 of foreign origin. Seven of the genera are endemic and 90 percent of the 190 endemic species fall in only five genera. There are many new synonyms and new combinations, resulting in the changing of many names used in the past. Volume 8 covers 456 pages, with 347 figures prepared with the same care displayed in the preceding volumes. There is an elaborate bibliography covering 30 pages. As in Volume 7, particular attention is given to distribution, host plants, parasites and predators; information which adds greatly to the permanent reference value of these publications. Much interesting data bearing on the known history of many of the species are also given. Apart from the inclusion of keys, necessary to any taxonomist in a study of Hawaiian moths, much can be found throughout the three volumes that makes fascinating and stimulating reading even to the amateur entomologist. Volume 8 was issued December 31, 1958 and sells for \$8.00.

Special mention should be made of the illustrations that accompany the text throughout each book. The enlarged photographs of the adults and their genitalia are highly instructive, clear, and informative to anyone using the keys and other descriptive matter. There are also many finely prepared drawings illustrating head and wing characters.

The correct naming of an insect, especially if it is of economic importance, or should it become so in the future, establishes important information respecting its geographical distribution, its host range, and those of related forms, if any. This may prove of definite value should control through biological means be attempted. A striking example of this is disclosed in Dr. Zimmerman's discussion of the pyralid *Uresiphita polygonalis* (Dennis and Schiffermueller) on pages 116-118 of Volume 8. In Hawaii, this species has long been known as *Mecyna virescens* Butler, and was believed by all previous investigators of Hawaiian pyralids to be strictly a native of the Islands. His studies at the British Museum resulted in the discovery that this moth is an immigrant to Hawaii from Europe. It is destructive to an important native leguminous shrub, *Sophora chrysophylla*, (Sailsb.) Seem., in certain upland forest reserves in Hawaii. Locally known as *mamane*, this abundant plant is sometimes completely defoliated by caterpillars of the moth. Only recently the Associate Forester on the island of Hawaii has remarked on the periodic outbreaks of this pest. The correct naming of this moth now points clearly to that portion of the earth where natural enemies can be sought, and plans are already underway for such an investigation.

Dr. Zimmerman is to be congratulated on the completion of these three fine and useful volumes. Praise to the University of Hawaii Press is also due for the excellence in the quality of the printing and the clear reproduction of the illustrations.

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