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BOOK REVIEW

Powell J.A. and Opler P.A.: Moths of Western North America

University of California Press, Berkely, 2009, 369 pp. Hardback. ISBN 978-0-520-25197-7. 66 colour plates. 254 B/W figures. UK£. 65.00 US$ 95.00

Adrian Spalding

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In 1903 Holland's guide to the moths of North America was first published, covering nearly 1,500 species of moth (representing 43 families) illustrated as set specimens in 48 colour plates (as many moths as possible were squeezed at all angles into these plates). Between 1971 and 2005 first E.W. Classey Ltd and R.B.D. Publications and subsequently the Wedge Entomological Research Foundation published the series *The Moths of America North of Mexico including Greenland*. In 1984 came Covell's guide to the moths of eastern North America, in the Peterson Field Guide Series, covering over 1,300 species found east of the 100th meridian. Covell aimed to illustrate at least one representative of each family—but some of the illustrations are in black and white and of limited use as an aid to identification. The complementary book on the moths of western North America was never published. In *Moths of Western North America*, the study area is defined on its eastern side by a boundary drawn along the eastern base of the western cordillera from Yukon Territory to the Chisos mountains near the Mexican border, leaving a gap between the territorial coverage of the two books. This is a smaller area than Covell covered but Powell and Opler discuss and illustrate nearly twice as many moths - about 2,500 species, all in colour—including about 25% of the species in every family and almost all the moths of economic importance. They attempt a comparable treatment of all moths irrespective of size or popularity with collectors.

The book aims to help collectors, ecologists and entomologists determine the taxa to which species of interest belong, to introduce the micro-Lepidoptera to amateur collectors and to provide an entry into the literature for most taxa. They largely succeed in all aims, certainly better than Holland or Covell. Each family account starts with a note on key adult morphological characters (not always helpful—the Cosmopterigidae are described as a diverse group of tiny to small micromoths not defined by any uniquely derived characteristics), larvae and larval foods, and diversity worldwide. There is no key to families so entry is by the excellent colour plates of set specimens, in which many moths are shown life size—many of the micros are shown larger than life with a scale bar to indicate natural size. Some previous knowledge is probably necessary for access to the smaller micros—there are over 100 drawings of genitalia structures of exemplar species which can also be used to assist the identification of genera and species. This is a superb introduction to the moths, and will be fascinating to all entomologists whether residing in or visiting North America. Detail in the species accounts varies, but the wealth of information is tremendous. In fact when reviewing this book as I was continually distracted by detailed accounts of fascinating moths such as the flightless *Areniscythris brachypteris* Powell inhabiting coastal sand dunes and the elegant *Lithariapteryx elegans* Powell endemic to dune systems in central California. And what fun there is in looking up familiar species from Europe to see how they differ in habitat and appearance. The list of references concentrates on papers of taxonomic revisions and guides with some additional references such as Kettlewell's 1955 paper on melanism; these references are not cited in the text.

Additional sections include an interesting account of moth collectors in North America, from Thomas Say in 1819 and early Russian fur traders (who concentrated on beetles and butterflies) through Tom Spalding in the early 1990s (see Tanner 1929) and the Canadian Forest Insect

A. Spalding (✉)
Spalding Associates (Environmental) Ltd, Norfolk House, 16-17 Lemon Street, Truro TR1 2LS, UK
e-mail: a.spalding@spaldingassociates.co.uk

Survey in the mid 1900s to the present day collectors (including the authors themselves). Powell and Opler advocate the collection of insects by young naturalists for their enjoyment, education and appreciation of insect diversity and as a contribution to our knowledge; the reviewer strongly supports this viewpoint. They recommend collecting during the dusk flight, quoting Lord Walsingham (1872) who late in each day "secured each little moth that moves"—a good way of avoiding the over-dependence on light traps (see also Birkenshaw and Thomas 1999). They doubt the efficacy of sugaring in the dry Californian evenings when low humidity affects the condition of sap flows and other natural fermentation sources, but urge others to try it (collectors could also try wine ropes—re-usable lengths of rope boiled in red wine and sugar). They call spreading ("setting" for British collectors) an antiquated fixation and to blame for discouraging students from specialising in Lepidoptera. They point out that pinned unspread moths are specimens just like those of other insect orders—and as valuable as the accompanying data allows; as one who sets slowly and inadequately, I find this a refreshing viewpoint and resolve in future to collect and pin but not to set.

Overall, this book represents a considerable advance on the previous guides and is an essential purchase for anyone (amateur collectors, researchers, conservationists) working on North American moths. It would have been most useful to me when studying moths in Ecuador in the early 1990's. It provides a wealth of information and will make a valuable addition to the library of researchers working in the other major ecozones of the world. It represents a real labour of love by two scientists whose expertise and enthusiasm shine out of the pages and will set the standard for reference works for this region for many years to come.

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