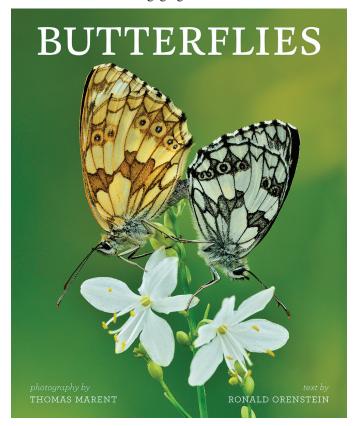
Ronald I. Orenstein and Thomas Marent (2015). BUTTERFLIES.

Firefly Books (U.S.) Inc., Buffalo, USA; Firefly Books Ltd., Richmond Hill, Canada. 288 pp. + c. 470 figs.

"Stunning photography provides a close-up look at the remarkable Order Lepidoptera. The macro photography is complemented by text which explains the latest scientific discoveries about these wonderful insects." Thus claims the pithy summary on page 4 of this visually gorgeous, remarkable book, and it couldn't be more accurate.

At first glance, the large format, heavy pages with their rich black backgrounds and brilliant colors promise a feast for the eyes, and the the photographs by Thomas Marent are, as one might expect, a worthy homage to this group of beautiful insects. But there is much more to this book than photographs, for the accompanying text, by Ronald Orenstein, adds a thoroughly unexpected and welcome extra dimension. The latter author claims that he is 'not an entomologist', which makes his achievement all the more impressive - indeed, it's difficult to imagine an expert lepidopterist who could have so concisely, accurately, and authoritatively conveyed so much information in such an engaging manner.



The book begins with a 28 page section entitled 'Introducing Butterflies', which comprises about 75% text interspersed with images illustrating the topics under discussion. The text is written in a very straightforward style, understandable to anyone with an interest in natural history, and yet it is rich in facts, anecdotes, and fascinating details about the lives of butterflies. Indeed, the next time I have to write a general introduction about butterflies I will refer to this section of the

book for inspiration. Ranging from the origin of the common name 'butterfly' and the place of butterflies in mythology, to the potential engineering applications of butterfly scales, this introductory text is a delight to read, and that's just the first few paragraphs. Butterfly evolution and classification is covered, with a deep grasp of very recent changes in our understanding of butterfly relationships as a result of molecular phylogenetics. Wing morphology, the physical nature of scales, and the genetics of wing pattern development are reviewed, followed by a section on mimicry. Batesian and Müllerian mimicry are described and more complex topics such as sex-limited mimicry and mimicry diversity are accurately summarized.

The section continues with butterfly biology, including mate location and courtship, sperm competition, immature stage ecology, oviposition and myrmecophily. Diapause, nectarfeeding, the migration of the Monarch, conservation and climate change are next. Throughout, the text comes across not as a dry, general review, but as a collection of stories about butterflies which, in aggregate, communicate much more effectively the main points of each section. Each of these stories, told in a few simple sentences, represents the distillation of one or more research papers, and the more I read, the more impressed I became with the extraordinary amount of literature review undertaken by the author. More than 400 papers were consulted in writing the text, and a full list is presented online via the author's blog (http://ronorensteinwriter.blogspot.ca/).

For the remainder of the book, Marent's more than 450 spectacular photographs take center stage, filling the pages with the vibrant colors of butterflies. From portraits to beautiful compositions of butterflies in their natural surroundings, the images shine forth. The photographs are loosely grouped in a further 11 chapters, with the first six covering the Lepidoptera families commonly known as butterflies (Papilionidae, Hesperiidae, Pieridae, Nymphalidae, Lycaenidae and Riodinidae). Once again, Orenstein shows a profound command of the literature, with discussion of the current classification within each family representing the most up-to-date information available. Examples of major lineages are illustrated, and figure captions, like the introductory chapter, are dense with





information. The caption for the pierid *Dismorphia medora*, for example, notes the diversity of dismorphiines, their mimetic relationships, and their role in inspiring the theory of Batesian mimicry. Here are both commonplace butterflies such as *Dryas iulia*, as well as more rarely seen forest jewels such as *Asterope leprieuri*.

Chapters 7 to 10 return once more to some of the themes from the introduction, but here these ideas are treated by means of images and their associated, informative captions. Butterfly wing morphology and the origins of color patterns, mating behavior, immature stages, adult butterfly feeding behavior, and interactions of butterflies with predators and parasitoids, are some of the topics covered and masterfully illustrated. Chapter 11 is entitled 'Myriads of Moths', and is intended as a very brief 'taste of the overwhelming majority of Lepidoptera'. Once more the images and captions are excellent - exquisite images of saturniid moths are accompanied by text explaining how the long tails of luna moths distract predatory bats, a study published only 8 months ago (Barber *et al.*, 2015). Hawkmoths, day-flying moths, micro-moths, and gaudy moth caterpillars, all feature brightly.

I enjoyed this book very much. The authors comment that "We need to know more and do better.... We need to create space for butterflies." Hopefully this book will encourage people to go out and find out more about these intriguing insects; or at least minimally, make space on their coffee-table for this marvellous book, *Butterflies*.

LITERATURE CITED

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