BOOK REVIEW

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HELICONIUS AND RELATED GENERA, by Helmuth and Ruth Holzinger. 1994. Sciences Nat, Vennete, France. 328 pp. English text, 57 figures, 41 color maps, 51 color plates. Available from BioQuip for U.S. $399.00 (hardcover).

Heliconius and Related Genera comprehensively describes the taxonomy and superficial diagnostic features of the 37 species, 369 described "subspecies" and myriad "forms" of *Heliconius* Kluk, *Neruda* Turner and *Eueides* Hübner. This big, expensive book is oriented solely towards collections of pinned specimens, and contains little evidence to suggest the authors have studied morphological features aside from the extensive wing pattern variation. Nor is there indication that the authors examined material from anywhere other than Vienna, Münich, and a few private collections. Although the book provides many color illustrations of named *Heliconius* taxa for the first time, I was disappointed by almost every other aspect of the material presented.

1. What's missing. The fascinating natural history of *Heliconius* is dismissed in 1/3 of a page, without a single full citation. The reader is referred to "the detailed works of Brown, Gilbert, Turner and Mallet," but no papers are cited, and none of Gilbert's or Mallet's work is listed in the bibliography. Morphology of larvae and pupae are not illustrated or discussed in any useful detail, nor are references provided to the literature on host plant associations (the relationship between *Passiflora* and *Heliconius* is touted as one of the premier examples of herbivore-host plant coevolution). Neither is the extensive work on the genetics and evolution of mimicry within and among *Heliconius* species discussed. The major paper of Sheppard et al. (1985, Phil. Trans. R. Soc. B 308:433–613) summarizing these ideas is not cited, and there is no mention of evolutionary hypotheses that explain the dramatic diversity of the group.

The book also fails to offer any inkling of the hypothesized phylogenetic relationships among heliconiines, beyond a dendrogram produced by the authors without any evident character support or a formal methodology. This figure (p. 9) is based primarily on a graphical representation of taxonomic hierarchy, and is not even used as a basis for the taxonomic ranking presented in the book. Although the authors did not have access to recent cladistic work, it is shocking that the authors should choose to ignore the phylogenetic hypotheses of Emsley (1965, Zoologica 50:191–254) and Brown (1981, Ann. Rev. Entomol. 26:427–456) in favor of their own unsupported dendrogram.

There is no key presented to any level of diversity, because "the reader could be somewhat confused by the superficial resemblances and lose the feeling for the systematic relationships" (p. 7). It is not clear how the reader is supposed to gain this feeling in the first place. *Heliconius* is one of the most difficult butterfly genera, and even the experts cannot agree on the boundaries of its taxa. I suspect most users of this book will be forced to pigeonhole their specimens by comparing them to the plates, the same way we have always used the Seitz and D'Abrera books.

2. Quality and Originality of Illustrations and Maps. The 51 plates contain 765 watercolor sketches of museum specimens with one pair of wings omitted (mostly dorsal surfaces, ventral surfaces for some taxa when they exhibit diagnostic features). Although they will probably be useful for sorting specimens in a collection, these imprecise, artistically rendered figures cannot be considered good scientific illustrations in any sense, when compared to either classical lithographs, modern photographic techniques or modern technical paintings.

The line "drawings" of morphological features are mostly of poor quality and are evidently not drawn from biological material. The abdominal processes in Figs. 4 and 7 were clearly copied (without attribution) from Emsley's (1965) figures, and many of the the valvae and signa bursarum appear to have been redrawn from that work as well. Most of Figs. 9–57 are mechanically enlarged versions of the valvae illustrated in Figs. 2 and 5. Only figure 8 is useful, but even this is misleadingly entitled "elements of the colour pattern" although it is a diagram of wing vein nomenclature, rather than color pattern (this figure is

modified with half-tone shaded areas to illustrate "typical" color pattern elements of various species groups in Figs. 33, 40, and 44).

The species distribution maps are attractively produced outlines of South America showing major river systems and various colored symbols that presumably indicate localities where geographical races or forms have been collected. No labels or legends are provided beyond the association of names with the colored symbols. There is no associated information on specimens or localities, such as Brown (1979, *Ecologia Geográfica e Evolução nas Florestas Neotropicais*, Universidade Estadual de Campinas, Campinas, São Paulo, Brasil) provided for his maps, so it is impossible to determine the precision or accuracy of these "data points." Some of the disjunct distributions on some maps (e. g. *H. wallacei* on Rio Tocantins, Map 14; *H. besckei* on Rio Mamoré, Map 27) are strikingly similar to distributions of the same taxa illustrated in Brown (1979, Figs. 16 and 23, respectively). This could be because Brown and the authors examined the same material or material collected at the same sites, because Brown gave the authors his data, or because the authors copied Brown's maps. There is no way to tell how these maps were made, but the description of numerous "subspecies" in the text with no corresponding distribution on the maps (e.g., *H. melpomene intersectus*, *H. m. ecuadorensis*, *H. m. malleti*) suggests that they are not based on primary observation of specimens. The maps' scientific value is thus heuristic, at best.

3. Organization and Quality of Systematic Information. The text is composed of three main sections: a "systematical" checklist, individual taxon accounts, and an annotated, alphabetical list of names. As mentioned above, there is no key. A new catalogue would also have been useful (the last being Neustetter, 1929, Lepid. Cat. 36, W. Junk, Berlin), but this is not provided, either. The checklist and the alphabetical list should have been combined, as it is annoying to flip back and forth between them to check references, and there are an index of names and a bibliography section that repeat most of the information in the two lists. Figures and maps are cited in taxon accounts, but neither figures nor maps contain reciprocal references to the text, again making the book difficult to use.

Characteristics of the taxon descriptions are as follows. The genus *Neruda* is diagnosed, but *Heliconius* and *Eueides* are not. Subgeneric species groups are identified and briefly discussed, with perfunctory character lists based on Emsley (1965). Descriptions of monotypic species consist of a type locality (no other specimen information is included), a reference to geographical distribution by country or region. There is extensive description of wing patterns, in my view the best aspect of the entire book (although better illustrations would eliminate the need for verbal description, except to emphasize key characters). Descriptions correspond reasonably well to original descriptions for the cases I checked. Description of wings is followed by a brief description of "genitalia," comprised only of male valvae and female abdominal processes and signae bursarum (the unacknowledged debt to Emsley is again revealed by occasional statements that descriptions of genitalia "were never published," indicating the authors' failure to make original observations of morphological features). A section on variability includes distributions and descriptions of infrasubspecific forms. Last, a similar species section lists names of other taxa involved in Batesian or Müllerian mimicry with the taxon in question. Polytypic species include descriptions of the above categories under each separate subspecies.

4. Systematic Rationale. One would suppose that to address a complex group like *Heliconius* with rampant geographical polymorphism and interracial hybridization, one would need to articulate a taxonomic philosophy allowing consistent interpretation of patterns. Even D'Abrera's book (1984, *The Butterflies of the Neotropical Region, Part II*, Hill House, Victoria), which emphasized illustrations and minimized text, contains a statement of his views on this issue at the head of the genus. There is no such statement in this book—no species concept, no criterion for differentiating subspecies from forms, and no stated basis for determinations of synonymy. The authors make autocratic taxonomic decisions without justification, such as the reduction of *H. elevatus schmidt-mummi* Takahashi to infrasubspecific rank, while at the same time perpetuating nomenclatorial errors, such as including their own infrasubspecific names, (e.g., *H. cydno weymeri* f. *gerstneri* Holzinger & Holzinger, and *E. eanes koenigi* f. *felicitatis* Holzinger & Holzinger) that are formally unavailable under the ICZN code.

The only way to guarantee the accuracy of taxonomic descriptions is to base them on type material, but only thirty holotypes and thirty four other types are illustrated among the 765 figures in the plates. There is no indication that the authors examined any types except those immediately available to them in the Vienna Natural History Museum and their own collection. Twenty five types from the Natural History Museum in London are illustrated, but it is likely that these were drawn from photographs in the illustrated list of the BMNH's heliconiine types (Ackery & Smiles, 1976, Bull. Brit. Mus. Nat. Hist. Ent. 32:171–214), rather than from the specimens themselves (in every case, the same specimen illustrated in Ackery and Smiles is illustrated in the book, a less than 1 in 25 probability if specimens were chosen at random from syntype series). The figures I compared to photographs in Ackery and Smiles matched reasonably well, although the forewing of *H. cydno galanthus* f. *diotrephes* (Plate 35, Fig. 2c) looks more like the ventral surface of the specimen than the dorsal surface it is purported to be. It is not clear why only twenty five types from the BM(NH) were illustrated when Ackery and Smiles' list illustrated 376.

In summary, it would be wonderful to have a book that described the biology and natural history of these remarkable and attractive butterflies. It would also be wonderful to have a book that provided an authoritative systematic guide for curating a collection of *Heliconius*, including useful plates, empirical data on geographical distribution, complete information on types, a review of phylogenetic relationships, and a thorough bibliographical catalog. Unfortunately, the Holzingers have not written either of these books. At best, their product provides a more-or-less comprehensive, more-or-less accurate source to connect names with phenotypes. The very fact that it is impossible to determine how accurate it is, condemns the book as a nonscientific work. *Heliconius and Related Genera* simply fails to meet the standard of systematic scholarship one expects from a $400 monograph.

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