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BOOK REVIEW

THE BUTTERFLIES OF KENYA AND THEIR NATURAL HISTORY, by Torben B. Larsen.

1991. Oxford University Press, New York. 490 pp., illustr. 64 col. pls. Hardcover, 17.5 x 25.2 cm. ISBN 0-19-854011-6. Price: \$195.00.

With approximately 3,500 species of butterflies, the continent of Africa is about half as rich as that of South America in butterfly species. Special groups in the African butterfly fauna such as *Charaxes* and *Colotis*, though, have attracted lepidopterists for centuries, and many have collected in what is now the country of Kenya in East Africa. Yet it has remained until 1991 for an ambitious author with the outstanding credentials of Torben B. Larsen to tackle the task of producing an identification guide to the butterflies of Kenya. Larsen has previously written and published a superb series of books on the butterfly faunas of the countries located at the northern edge of the Ethiopian Region. His newest book, *THE BUTTERFLIES OF KENYA AND THEIR NATURAL HISTORY* may be fairly said to surpass them all.

Even the first perusal of a copy of this book gives the reviewer and the reader alike the most favorable impression, starting with the superb color plates. The color illustrations on 64 plates are among the best ever produced in a butterfly book. Crystal-clear photography of both upperside and underside of adult specimens, picture-perfect layout and design, and an eminently logical cross-reference system for each butterfly on the plates to the facing text by means of a number, means that the user has immediate access to identification of even the most recalcitrant specimen. Larger nymphalids, pierids, and papilionids are reproduced in slightly reduced size, while the Lycaenidae and Hesperidae are reproduced in natural size. Nearly all the specimens illustrated are of Kenyan origin and most were photographed at the National Museum in Nairobi. Almost 1,500 specimens are depicted in the color plates.

A careful study of the 64 color plates yields a number of interesting groups that one would wish to follow up on, such as the fascinating *Lipteninae* species in the family Lycaenidae that mimic *Acraea* and other butterfly groups so precisely that one would never recognize them as a lycaenid! On Plate 12, for example, there are *Alaena* and *Pentila* species that look exactly like nymphalids, a *Pentila tachyroides* species that beautifully mimics a *Leptosia alcesta* pierid, and a series of *Mimacraea* that look exactly like *Acraea* butterflies.

Some 871 species are covered in the text and plates. Two new genera are described: genus *Mallika* (type species *Kallima jacksoni* Sharpe, 1896, Nymphalinae) and genus *Kamilla* (type species *Papilio cymodoce* Cramer, 1777, Nymphalinae). The latter genus includes two species, *cymodoce* Cramer (1777) and *ansorgei* Rothschild (1899) which had previously been placed in the buckeye genus *Junonia* Hübner (1818). These two new genera, six new species, and five new subspecies are all described in a formal paper in the Appendix of this book.

The bulk of the book is a systematic and biological treatment of the 871 species of Kenyan butterflies and their subspecies. The

organization of the material offers a great deal of information not usually included in faunal or field-guide butterfly books. A nice summary of the characteristics of a family is followed by a brief mention of the subfamily and then a more extensive introduction to a genus. Within each genus account are included tallies of the number of species in Africa and the number represented in Kenya. Larval foodplants and other interesting annotations on the generic level are also given.

Then each species account begins with a numbered scientific name entry, the author and date of description, and a common or vernacular name (when available from the rather limited literature on African butterflies). A citation to the color plate illustrations follows. The main portion of the species account starts with an **identification** paragraph where a brief introduction to the species and its distinguishing characters is given. This identification section may also include some notes on behavior, mimicry, protective chemicals, or other information. The second entry under each species account is a discussion of the **subspecies** in Kenya. Detailed notes of the distribution and color variation of each subspecies are given. This section is followed by a **Habits** section, which describes not only the habitat and elevation where the butterfly may be found, but also its diurnal activity pattern and adult nectar sources where it may be collected. Following this is an **early stages** section, which is limited to a list of the foodplants known for the larvae, but does include literature citations to papers where the life history has been described. Each species account then ends with a summary of the **distribution**, which covers the overall African distribution of the species. The double-column format on each text page in relatively small type means an extraordinary amount of information can be condensed in the narrative accounts. Male genitalia are also illustrated from time to time in the text via line drawings.

But the species accounts in the systematics section are not the only part to this fascinating book. Torben Larsen has managed to pack a great deal of information in his comprehensive general introduction to butterflies and other insects. He includes coverage of the general biology of butterflies, moths, and other insects; the importance of butterflies in the human and natural worlds; details on the life cycle (egg, larva, and pupa) of Kenyan butterflies; details of the structure of the head, thorax, and abdomen of the adult butterflies, as well as discussion of sex ratios. All of the preceding is covered in the first three chapters of the general introduction. The author then goes on to talk about other topics in much more detail, including Butterfly Variation (individual variation, sexual dimorphism, polymorphism and polymorphism, seasonal variation, gynandromorphs, and geographical variation). In Chapter 5 on Butterfly Behavior, he covers the lifespan of a butterfly, the butterfly's day, feeding behavior, and sexual

behavior. In Chapter 6 on Enemies and Defence, the topics of butterfly-trapping plants, diseases, parasitoids, butterfly defences (demography), flight, camouflage, other patterns, chemical defences, mimicry, and ant relationships in the Lycaenidae are all covered.

Perhaps the most interesting general chapter, however, is Chapter 7, on African Butterfly Biogeography. Here, Larsen summarizes the known evidence for the evolution of butterflies, and discusses at length the African fauna, along with the relationships between the Afrotropical and other regions. In combination with the recent important publication by John B. Heppner, "Faunal regions and the diversity of Lepidoptera," (*Tropical Lepidoptera*, Vol. 2, Supplement 1, 1991), this chapter provides a fascinating discussion of the relationships of the African to the Oriental region and even to the Neotropical and Palearctic regions. Probably the most interesting part of this chapter is the lengthy section on biogeographical patterns in Africa, including an analysis of distinct biogeographical elements in the various forest zones and other habitat types. The author ends this long chapter with a discussion of the endemic species in Kenya (62 species!) and an excellent summary analysis of African butterfly diversity. Interestingly, he cites several figures that show that Africa can be as rich in diversity as some Neotropical region sites; one hill in Cameroun (Mount Fébé) is known to have nearly 1,100 species of butterflies. Compared to Africa as a whole, the Kenyan butterfly fauna is relatively rich at 871 species.

The collector and biogeographer, as well as ecologist, will be very interested in Chapter 8, on Butterfly Distribution and Habitats in Kenya. Several excellent maps of the physical features and ecological zones of Kenya are given in this chapter.

Chapter 9, on Butterfly Migration in Kenya, includes much specific data on migrants, including an extraordinarily long list of migratory Kenyan butterflies (in every family). The numbers involved in the case of large-scale migrations of *Belenois aurota* (Pieridae) and *Vanessa cardui* (Nymphalidae) are truly amazing. The *Belenois* migration observed to descend on Nairobi in 1926 had one observer noting that a small isolated caper bush only a meter high was found to contain 57,000 eggs and newly hatched larvae of the butterfly! Larsen gives excellent guidelines to recording data on migration events, for any reader of the book to follow.

Two short chapters on "Butterflies as Pests" and "Butterfly Classification" conclude the introductory material prior to starting the systematic treatment of the Kenyan butterflies.

Thus the combination of the 11 introductory chapters and the detailed species accounts, together with the superb illustrations, makes this book unique in depth of coverage and utility as a reference work to lepidopterists, amateur and professional alike. This outstanding book on the East African butterfly fauna deserves to be in the library of every naturalist, lepidopterist, and biologist interested in the butterfly fauna and biogeography of the extraordinary continent of Africa.

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