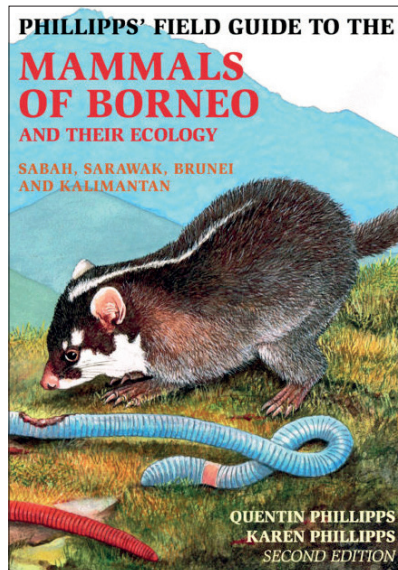


**Phillipps' Field Guide to the Mammals of Borneo and their Ecology (Second Edition)** by Quentin Phillipps and Karen Phillipps. John Beaufoy Publishing Ltd, United Kingdom, 2018 (reprinted in 2020). 400 pp. ISBN 978-1-912081-95-0. Price £24.99 (paperback).



The island of Borneo, which is shared between Brunei, Malaysia, and Indonesia, is one of the most biologically diverse places in the world. Many of its plants and animals are endemic as well, due to its geological history which isolated Borneo (or parts of it) physically or ecologically from surrounding regions, resulting in the evolutionary divergence of new species. One slice of this biological diversity—the mammals—is brought vividly to life in an exciting new field guide: *Phillipps' Field Guide to the Mammals of Borneo and their Ecology*, second edition.

This field guide is really three guides in one. First, it is a comprehensive guide to the identification and distribution of all 247 species of terrestrial mammals in Borneo, and 30 of its marine mammals. This part is 241 pages long. Second, as alluded to in the book's title, it is also a guide to the ecology of Borneo's mammals. This part begins the book, accounting for its first 75 pages. In this section we are introduced to the geological history of the island, species evolution, climate, seasons, plant phenology, frugivory and seed dispersal, the role of figs, the arrival of humans, hunting practices, and much more. Extensive notes and boxes on these topics are woven into the species accounts as well. Third, the book is a guide to where to see and explore the mammals of Borneo. This part is 62 pages of comprehensive information for the mammalogists, including detailed maps of protected areas, notes on access and accommodation, and notable species to see at each site—very practical and useful.

Species accounts are concise and well-written, covering: taxonomy, identification, habits, vocalizations, diet, behavior, reproduction, distribution (including a map), and sometimes much more depending on information available to the authors. The book is unusual in that species accounts also include numerous short paragraphs and separate boxes about the species' ecology, interactions with other species, important foods, interactions with people, and historical observations (very interesting!). Open any page and you will find fascinating facts about each species, in many cases beautifully illustrated.

The book is profusely illustrated with beautiful and detailed full-color illustrations done by one of the authors. The ecology section is profusely illustrated, and each species account has at least one illustration, accompanied by photographs in many cases. The illustrations and photos display the identifying features of each species and there are also brief notes on species identification in each species account.

Information in the species accounts is often cross-referenced to other sections of the book (the ecology section) and to other species accounts (e.g., regarding interactions or to make ecological comparisons or connections). For example, the accounts of treeshrews and ground squirrels are cross-referenced to each other, and comparisons made of their relative abundance in different habitats of Borneo, as a function of their diets and dentition. Both are terrestrial small mammals of similar size and appearance, but they differ fundamentally in evolution, morphology, and ecology, which ultimately affects which group is likely to be common in different habitats. The book excels at making such comparisons and connections, and learning about any particular species leads the reader into the web of biological diversity that the species is a part of. This type of additional information and analysis results in a field guide that brings each species to life by illuminating the wider ecological and evolutionary context in which it exists.

The ecological picture presented by the book does not stop at mammals. For example, the sun bear account has a full-page illustration showing (obviously) a sun bear, but also (unexpectedly) a pheasant and ground-cuckoo, which eat some of the same foods as sun bears (fruits, insects). Similarly, the binturong account has a section on figs (a favored food), and also barbets, a group of colorful birds which also feed heavily on figs. Indeed, anyone trying to observe a binturong in the wild would likely encounter barbets and other birds while they were waiting...with this guide, that wait won't be boring or fruitless. As a final example, the section on squirrels has a box about where squirrels sleep and why it matters for avoiding predation by snakes. No mammal species lives in isolation, either from other mammals or other animals (birds, snakes), and all of them ultimately depend on plants. These connections are emphasized on nearly every page of this guide.

Some of the facts presented were completely new to me, and even startling. Sambar deer damage *Alocasia* plants and rub the poisonous sap on themselves to get rid of ticks (p. 24)? I wondered if this was certain or perhaps just speculation. The statement is based on observations in Tabin Wildlife Reserve (Sabah), and a reference was mentioned, but I could not find it in the bibliography (which is otherwise extensive) or the online reference list which was provided ([www.Borneomammals.com](http://www.Borneomammals.com)). Occasionally, the book presented facts about a species which I think are misinterpretations of behavior. For example, clouded leopards were said to walk typically with their mouths slightly open, "indicating flehmen behavior that accentuates its ability to use scent to detect prey" (I am paraphrasing here). But do clouded leopards walk with their mouths open to detect scent, or simply for easier breathing? I don't think this is known. Whatever the reason, having a slightly open mouth while walking is not the

same as flehman. Flehman behavior, as the authors correctly state, activates the vomeronasal organ, accentuating scent detection. However, in felids, flehmen involves retracting the lips away from the teeth and raising the head, usually while standing, not walking, and is often associated with intraspecific communication rather than prey detection. There is much about the behavior and biology of tropical mammals that remains uncertain, and in a book so densely packed with information, there are bound to be a few parts that a reader might question.

In conclusion, this is an excellent guide to the mammals of Borneo. The way this guide has intricately woven ecology, behavior, and evolution into its structure elevates it as one of the most unique and comprehensive field guides I have seen. This aspect, in concert with the detailed species information and profuse and elegant illustrations, also make it terrifically fun to read and hard to put down. Highly recommended.

***Robert Steinmetz***

WWF-Thailand

9 Pisit Building, Pradiphat Road Soi 10

Phayathai, Bangkok 10400, Thailand