

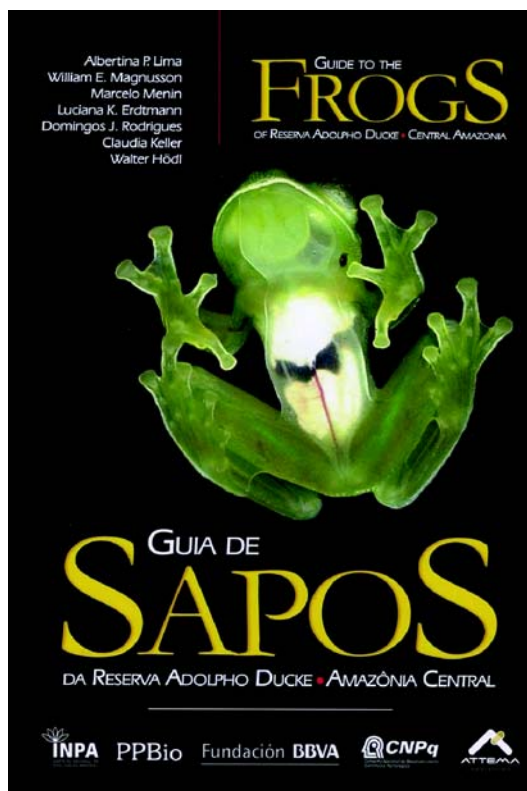
Lima, A. P., W. E. Magnusson, M. Menin, L. K. Erdtmann, D. J. Rodrigues, C. Keller, and W. Hödl. 2006. **Guide to the Frogs of Reserva Adolpho Ducke - Guia de Sapos da Reserva Adolpho Ducke**: 1–168, color photographs 269. Attema Design Editorial, Manaus.

ISBN 85-99387-01-4; 16 x 23 cm (hard cover).
www.attema.com.br

The Amazon region is among the most diverse places remaining on earth. Many regions have yet to be explored, even as the rainforest is being transformed to cattle ranches and soybean plantations at an unprecedented pace. One estimate of the number of frogs in the Amazon region is 427 species (da Silva *et al.* 2005), many of which have been described in the last 10 years (Silvano and Segalla 2005). Many more species are lost before they are discovered, are part of cryptic complexes yet to be studied, or are unidentified in museum collections. Virtually nothing is known about the biology of many species. Thus, our knowledge of Amazonian frogs remains rudimentary.

Relatively few field guides have been published that describe Amazonian frogs. Two of these are the *Guide to the Frogs of the Iquitos Region, Amazonian Peru* (Rodríguez and Duellman 1994) and the *Atlas des Amphibiens de Guyane* (Lescure and Marty 2001), which covers many Amazonian species. The recently published *Guide to the Frogs of Reserva Adolpho Ducke* is a welcome addition to this small collection and should be added to the library of naturalists, ecotourists, biologists, and others interested in Amazonian frogs. The book, which has information on 50 species of Amazonian frogs, has a two-column bilingual format with Portuguese and English side-by-side.

Reserva Florestal Adolpho Ducke (RFAD) is a 10 x 10 km reserve, 100 km² in area, located 25 km NE of Manaus in the heart of the Amazon region. As an independent reserve, it does not have federal protection in Brazil's national



reserve system, one consequence of which is that it does not have mandated buffer zones. The authors note that the city of Manaus, which currently has a population of about 1,700,000, is encroaching on the south side of the reserve. Satellite images portrayed in the book show that the reserve is rapidly becoming an island surrounded by development; thus, it will eventually become an urban park. Should the proposed repaving and reopening of Highway BR-319 from Porto Velho, Rondônia, to Manaus occur, uncontrolled development and deforestation would likely proceed even more rapidly (Fearnside and Alencastro Graça 2006).

In 2000, a 64-km² trail system was installed at RFAD. This trail system covers most of the reserve and allows access to 72 permanent 1-hectare terrestrial plots and 38 permanent plots along streams. This excellent trail system and the information provided on the 50 species of

frogs that occur in the area should alert biologists to the possibility of using this area for detailed studies of anurans. Ecotourists and others interested in natural history will find that the trail system facilitates observing all kinds of wildlife.

The book begins with an introduction to RFAD, including its history and development, a map showing habitat types, streams, and the trail system, and a summary of important research done at the reserve. The next section, covering 23 pages, is an excellent introduction to the biology of amphibians, which will prove useful to naturalists, ecotourists, and beginning students who want to learn about frogs. This section provides general and very readable information about feeding, predation, reproductive modes, and frog vocalization. The section on "How to use this guide" will be helpful not only to people who want to find and identify frogs, but also to the frogs themselves. Detailed information is given on the proper way to handle frogs and how to keep them for short periods of time. Many people do not know that holding a frog after applying insect repellent will kill it almost immediately or that overheating can kill frogs rapidly. The last and largest part of the book is devoted to individual species accounts of the 50 frog species representing seven families known from RFAD.

The species accounts are arranged by families and provide brief but pertinent information about each species. Prior to the accounts for each family, a summary of the family is given, including the distribution, number of genera and species in the family, and size and natural history characteristics unique to that family. The accounts have five categories: Distribution in RFAD; General distribution; Description; Similar species; and Natural history. The RFAD distribution is especially useful because it notes where the species occurs within the reserve, including specific ponds or streams. A comment is made in this section about whether the species is common or rare. The general distribution gives the known current

range of the species, allowing the reader to determine whether the species is localized or widespread in the Amazon region. The description begins with size ranges for males and females; even when only one individual has been measured (the case for females of some hylids and microhylids), this information is useful because size is one of the first clues to identification. The remainder of the description section is devoted largely to describing coloration, and the similar species section gives brief remarks on distinguishing the most similar frogs. The natural history section gives basic information on time of daily and reproductive activity, where egg clutches are deposited and size or structure of clutches, and tadpole developmental sites. Taken together, the species accounts provide succinct information on locating, identifying, and learning some natural history characteristics of all frogs in the RFAD.

This field guide will be very useful for a number of groups of people. Ecotourists and the general public will find it very easy to use and will find identification of most species easy with the superb photographs and simple descriptions. Beginning students or other biologists who want to learn about frogs will also appreciate this book. Even though this guide is specific for the frogs that occur in RFAD, it should be helpful for those working or visiting other parts of the Amazon region. Some species that occur at RFAD are widespread; closely related species at other localities can be identified to species group using this book.

A field guide such as this will most likely be used in a humid rainforest during the rainy season when frogs are active. Some minor testing with drops of water indicated that getting the book wet will cause very little, if any, damage. The pages are plastic-coated and largely impermeable to water. The only vulnerability when tested with a drop of water was along the edges, where water began to seep into the paper, apparently from having the paper coated prior to being cut to page size. However, the wet edges did not stick

together or warp. The cover was also impermeable to water, and the stitched binding appears strong.


One particularly valuable aspect of this book is to provide a baseline record of the species that occur in the reserve and their commonness or rarity prior to the changes that will surely come as a result of urban encroachment. The authors predict that some species typically found in open areas may become established in the reserve as the area surrounding it is opened up by development. Species such as *Leptodactylus labyrinthicus*, which has been introduced to Manaus from its native range in southern Brazil, may become established in RFAD over time. These species may compete with native species or may interact with native species as predators or prey, thus promoting changes in density or habitat of native species.

Native species sensitive to environmental changes may disappear from the reserve. As civilization approaches, stream pollution and air pollution may occur, causing changes in density or even the demise of some species. Sorting these kinds of changes from natural fluctuations will be a challenge. One example has already occurred. In a long-term study in the reserve, Magnusson *et al.* (1999) reported that the gladiator frog, *Hyla boans*, increased in numbers from 1982 to 1989, then dropped to 0 by 1992. The frog has apparently recovered to some degree because the authors report that it is now common along several streams in the reserve.

An outstanding feature of this guide is the large number of high-quality photographs presented. Each species account, presented on the left page of the open book, is accompanied by a facing page of four to five photographs of that species. The largest photo at the top is a portrait of the species. The other photographs show aspects of the biology of the species, including differences between males and females, amplexing pairs, ventral coloration, juvenile color when it differs from adults, frogs transporting tadpoles on their backs in the case of dendrobatids, and egg clutch structure.

Almost without exception, each photograph is clearly in focus and the frogs are beautifully positioned. The photographs make identification of nearly all species relatively easy.

Taxonomic changes are inevitable in this time of active research into frog relationships and cryptic species complexes using molecular characters. Recent literature has rearranged many genera and families of frogs (Frost *et al.* 2006, Grant *et al.* 2006). A recent publication on the *Leptodactylus pentadactylus* species group confirms the presence of *L. pentadactylus* and *L. knudseni* in the Manaus area, and provides descriptions for five new species in the group, including the Central American species (Heyer 2005). Additional studies are forthcoming that will refine and further expand our current knowledge of frog taxonomy and systematics.

In summary, the authors have succeeded in producing a beautiful field guide on central Amazonian frogs. They bring together their many years of experience in RFAD and elsewhere in the Amazon to summarize much of the known information on these species. The publisher's website notes that of the 3500 printed copies of the book, 2000 copies will be distributed free to public schools and to teaching and research institutions. The authors and the agencies that funded the research and publication of the book should be commended for this action. Ultimately, only education through these kinds of efforts will preserve Brazil's incredible natural heritage. 

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