

Book review

Duellman, W. E. and E. Lehr. 2009. **Terrestrial-breeding frogs (Strabomantidae) in Peru**. 382 pp.; 248 figures, most in color; Nature und Tier Verlag, Münster, Germany.

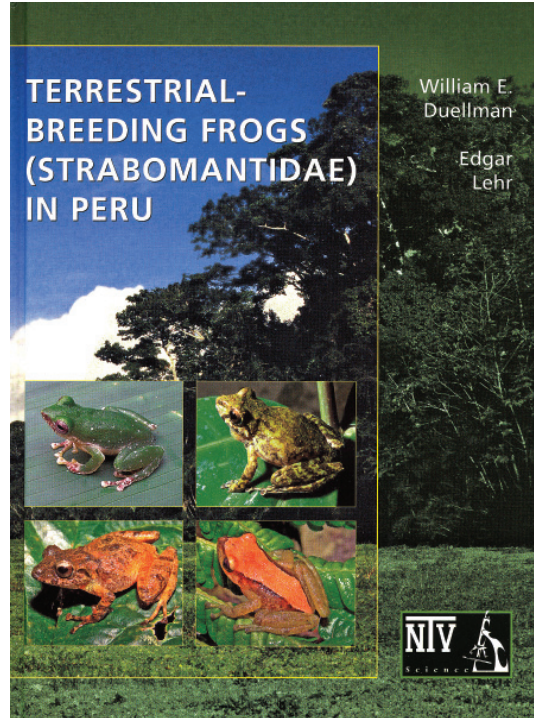
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This is a timely book that is sure to stimulate further research on frog biology in Peru. Nearly one-half of all known frog species occur in the American tropics, and one out of every six of those species occurs in Peru. Of those 463 Peruvian species of frogs, more than one-third (161 species) belong to a single family, Strabomantidae. These terrestrial-breeding species are the focus of this new book by William Duellman and Edgar Lehr. It is loaded with color photos, maps, keys, and technical information, and will be immensely useful as the major reference for this diverse group of Peruvian frogs.

Strabomantids belong to a large clade of terrestrial-breeding Neotropical frogs—Terrarana—which contains five families and nearly 1000 known species. Terraranans are like beetles: there is no end in sight to the discovery of new species. Remarkably, fewer than 30 species of these frogs—about 20% of current number—were known from Peru as recently as the mid-1970s. Few other groups of vertebrates anywhere have such a high rate of species discovery.

My own contact with these frogs was during a solo expedition for two weeks in 1987 to Andean cloud forest in the Cordillera Yanachaga near Oxapampa, Peru. I was a graduate student hoping to get “outgroups” for my molecular phylogenetic research on West Indian terraranans. To my surprise, 11 of the 12 terraranan species I collected were undescribed. Two lessons I learned from that work are relevant here.

First, systematic research can be slowed or halted by political instability. I did not return to Peru in the ensuing years because the communist guerillas (Shining Path) increased their violent activities in that region.



Undoubtedly it also discouraged other herpetologists from conducting field work and depressed the species discovery curve for Andean Peru during the 1980s and early 1990s.

The second lesson is that the absence of a comprehensive, systematic reference work can greatly hinder research. When I returned I described only one of the 11 new species (*Phrynopus bracki*), essentially because no such reference existed at that time. Most of the hundreds of named terraranans were then lumped into a single enormous genus (*Eleutherodactylus*), making comparisons complex and time consuming. Molecular methods had not yet sorted out the evolutionary groups. It took two decades to finally describe the remaining 10 species.

For this reason, the book by Duellman and Lehr is welcome news. It is arranged into ten primary sections: introduction, materials and methods, the Peruvian landscape (physical and ecological factors), characters of strabomantid frogs, keys to identification, accounts of genera

and species, biogeography, conservation, future research, and literature cited. These are followed by three appendices (material, localities, and distribution maps), addenda, and a taxonomic index. Those with aging eyes (I am speculating here) might have difficulty with the small and thin font, but overall the book is nicely assembled and well-bound. The maps, graphs and other line figures are clean and professional.

The seven-page introduction begins with a historical résumé, including a graph of the cumulative number of species through time which shows the sharp rise in rate of species discovery since 1970. Next are reviews of the classification of terraranans and their reproductive biology. The one-page materials and methods lists museum acronyms. The 20-page section on Peruvian landscape reviews the geology, physiography, climate, and ecology of the region with an abundance of maps and stunning photos.

Connoisseurs of terraranans will certainly appreciate the next section on characters of strabomantid frogs (32 pages), and especially the large table of character data. The color photos of ventral skin texture are useful; the ones for dorsal skin texture are not so useful because the dorsal pattern obscures much of the texture. The descriptions of external morphological traits and variation, and accompanying illustrations are excellent. The black and white illustrations using shading to show typical dorsal and ventral patterns are first rate, almost like photographs. Keys are presented for species occurring in different regions, which makes sense. A single dichotomous key for all species would be unwieldy.

Half of the book—188 pages—is comprised of generic and species accounts, arranged in alphabetical order. The accounts were written with the professional in mind and thus each has a synonymy and citation of literature. They resemble typical species accounts from the scientific literature in that they use 13 standardized characters in each definition, and have content, distribution, and remarks sections.

Color photos are provided for almost all species, and many accounts have line drawings illustrating characters.

A separate section (21 pages) on biogeography is packed with new analyses that one would normally find in a stand-alone research paper. Emphasis is placed on elevational ranges, with a large table of basic range data by region, histograms of species per genus at different intervals, elevation distributions across three transects and within particular mountain ranges.

One limitation of these data, acknowledged by the authors, is that many species are poorly known, and probably occur more widely in elevation. Nonetheless, it is clear that most strabomantids have restricted distributional ranges. Each of the major cordilleras also showed high levels of endemism: 61–91%. In a six-page section on conservation, the IUCN threat categories are listed and protected areas are shown in a map.

The remaining 90 pages of the book are devoted to literature references, lists of museum specimens, lists of collection localities by department, distribution maps (in color), addenda, and an index. For some, having lists of museum specimens and localities might seem unnecessary, but this type of information is what makes this book an indispensable reference source.

In summary, this is a superb volume that sets a new standard for quality in professional reference books covering tropic diversity. It will not fit in your pocket but is certain to be used as well by serious naturalists. Undoubtedly there are many species of strabomantids—perhaps hundreds—yet to be discovered in Peru. As a first synthesis, this book is an important milestone in the long-term effort to characterize the diversity of this fascinating group of animals.

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