

sects can be displays that enhance paternity (2). Links between male copulatory vibrations and the response of females through contraction of sperm storage organs (3) would be fertile ground for further research.

There is much work to be done in linking mechanistic and adaptive approaches to the study of animal communication. Gerhardt and Huber's book will provide a critical foundation for this research.

References

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BOOKS: ECOLOGY

A Herpetological Treasure Trove

Tim Halliday

The *Amphibians and Reptiles of Costa Rica* is a very large book about a small country. Despite its limited area, Costa Rica hosts a rich flora and fauna. Geographically positioned between two vast continents

with very different biotas, the country is quite important to our understanding of biogeography and evolution. Its well-developed programs for conserving its biodiversity and for developing ecotourism provide a model for other parts of the world, particularly tropical regions. Costa Rica also occupies a singular position in the history of herpetology as the place

Forty years of research in Costa Rica have provided Jay Savage with an unmatched and encyclopedic knowledge of its herpetofauna. He has distilled his experience into the detailed species accounts that provide the core of the book. The amount of information in these accounts varies considerably, depending on how much is known about each species. The text covers diagnostic traits, morphology, and coloration as well as aspects of the ecology, life history, and behavior. Accompanying distribution maps show the locations of specimens and other authoritative records. The numerous keys can

be used to identify species in the field, though the sheer weight of the book precludes its use as a conventional field guide. Each species is illustrated with at least one color photograph, and these are supplemented with drawings of important morphological characters. The photographs, the majority of which are by Michael and Patricia Fogden, are of exceptionally high quality.

In the book's introductory section, Savage reviews the principals of systematics and nomenclature, and he describes the basic techniques of field and museum herpetology. He also provides thorough surveys of Costa Rica's geography, climate, biota, and history (including the remarkable conservation efforts in the country). The last section of the book presents a detailed analysis of the biogeography of Costa Rica's amphibians and reptiles. With this, Savage seeks to explain



Midnight snacking. *Imantodes cenchoa* is a common arboreal snake that preys on frogs and anole lizards (such as this *Norops*); the spider is just passing by.

result, our appreciation of the extant diversity of reptiles and amphibians, particularly in the tropics, is expanding very rapidly.

Costa Rica was home to the now extinct golden toad (*Bufo periglenes*), a spectacularly beautiful and very unusual creature that has assumed an iconic status in the context of global amphibian declines. It is particularly significant that the golden toad, along with several other species of amphibians and reptiles, has vanished from a reserve intended to protect biodiversity. Despite considerable research, the causes of this and other recent extinctions among amphibians remain elusive. What is clear, however, is that conservation through the creation of protected areas is simply not sufficient to protect many species. The only disappointing feature of this book is that Savage does not really address the issue of amphibian declines. One

searches in vain for evidence that his unrivaled field experience in Costa Rica, which extended well into the period of population crashes, gave him some insight into the geographical and taxonomic distribution of declines and into their possible causes.

In an ideal world, *The Amphibians and Reptiles of Costa Rica* would serve as a model for the study and documentation of biodiversity

throughout the tropics. It took Savage a lifetime to collect and compile the vast quantity of information he presents in the book. Unfortunately, the many and diverse threats to the continued existence of the world's reptiles and amphibians are so severe that it is unlikely anyone will have the time to repeat his achievement elsewhere.

The Amphibians and Reptiles of Costa Rica
A Herpetofauna between Two Continents, between Two Seas
by Jay M. Savage

University of Chicago Press, Chicago, 2002. 954 pp., illus. \$75, £52.50. ISBN 0-226-73537-0.

where many generations of researchers and students have learned, often from the book's author, about tropical reptiles and amphibians. It is home to no less than 396 species of anurans, salamanders, caecilians, lizards, snakes, turtles, and crocodilians. The majority of these species are also found in neighboring countries, thus extending the relevance of the book as a reference text for Central America. Moreover, the book's scholarly coverage of almost every aspect of the biology of amphibians and reptiles in a tropical country makes its publication a landmark in the development of herpetology.

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Leaf litter loiterer. *Eleutherodactylus gollmeri* is a relatively common inhabitant of lowland and premontane humid forests.

the evolution of present-day distribution patterns in relation to what is known of plate tectonics and the paleoclimate of Central America. He offers a complex but fascinating story. Together, these general sections broaden the book's appeal and make it valuable as a general text in herpetology and tropical ecology.

Although Costa Rica has been more thor-