

threatens to overwhelm readers. This massive book was years in the making, and the final product is far more than a volume about amphibian population declines. It is essentially an encyclopedia of the status and natural history of all North American amphibians. Any book with 215 contributors is bound to be something of a mixed bag, with some chapters being better than others. In fact, this really is two volumes bound as one. The first 347 pages contain essays on a wide variety of topics related to amphibian population declines. Some are philosophical musings on conservation values, while others are detailed discussions of potential causes of amphibian declines or suggestions for how amphibian populations can be conserved in the future. There also are chapters on survey and monitoring techniques and public education. Many of these discussions are valuable and indeed essential reading for anyone concerned with amphibian population declines. The main problem is a lack of balance in the level of detail in the various essays. Some are narrowly focused discussions of surveys in a single location, or deal with issues that are peripheral to the problem of amphibian declines, such as renal adenocarcinoma in frogs or the parasites of amphibians. I think this part of the volume would have been more effective with about half the number of essays and more focus on the key causes of amphibian declines. Tim Halliday's brief introductory chapter attempts to set a general framework by summarizing the diverse causes of amphibian declines, but the whole section would have benefited from a concluding chapter to sum up the major findings on key points.

The rest of the book consists of species accounts of all North American amphibians. The two-volume nature of this publication is illustrated by a change in font size and format, with a three-column layout replacing the two-column layout in the first part of the book. These species accounts are likely to be the more lasting contribution, because they literally allow readers to look up almost any sort of information on North American amphibians—not just conservation status and distributions, but also diets, breeding biology, overwintering sites, seasonal migrations, population dynamics, predators, and interspecific interactions, with ample literature citations. Some of these accounts could have been condensed to make the publication more manageable. Every species account includes the same topic headings. Some of these headings, such as "Territories," are not relevant to many of the species discussed, so there is a bit of space consumed by statements that various species are not territorial. Nevertheless, this is likely to remain a valuable reference for decades, and not just for those studying amphibian declines.

For anyone concerned about the future of North

American amphibians, this volume offers both bad and good news. The bad news is that major declines have occurred in what appear to be some of our most pristine habitats—Yosemite National Park, Rocky Mountain National Park, and other protected areas in the west where human population densities are very low. Native ranid frogs and bufonid toads have been particularly hard hit. Fortunately, we are now beginning to understand the major causes of these declines, including the widespread introduction of nonnative game fishes into high-altitude lakes, the dispersal of toxic pesticides from agricultural areas in California and, in some cases, spreading infections of chytrid fungus. Other factors that once were considered major contributors to amphibian declines, such as acid rain and increased levels of UV-B radiation, now appear to be minor players.

The good news is that most amphibian species in the United States are not currently in decline or threatened. In the northeast, a relatively densely populated region with fairly low amphibian diversity, most species have wide geographic ranges and generalized habitat requirements. Many local populations remain under threat from development, habitat fragmentation, and destruction of temporary wetlands, but these are threats that can be addressed at local and regional levels. Local town governments often have taken the lead in the protection of vernal pools and other key habitats. A more serious threat, and one that receives only brief treatment in this book, is global climate change and its yet unknown effects on amphibian populations around the world. This volume will provide important baseline information for future conservationists who will need to address these broader threats to amphibians and to biodiversity in general.

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THE AMPHIBIAN TREE OF LIFE. *Bulletin of the American Museum of Natural History*, Number 297.

By Darrel R Frost, Taran Grant, Julián Faivovich, Raoul H Bain, Alexander Haas, Célio F B Haddad, Rafael O De Sá, Alan Channing, Mark Wilkinson, Stephen C Donnellan, Christopher J Raxworthy, Jonathan A Campbell, Boris L Blotto, Paul Moler, Robert C Drewes, Ronald A Nussbaum, John D Lynch, David M Green, and Ward C Wheeler. New York: American Museum of Natural History, Library Scientific Publications. \$40.00 (paper). 370 p + 1 foldout; ill.; no index. ISSN: 0003-0090. [PDF available at <http://digitallibrary.amnh.org/dspace/bitstream/2246/5781/1/B297.pdf>] 2006.

Given its title, length, and scope, one might expect *The Amphibian Tree of Life* to be the single most important contribution to amphibian systematics

ever. Unfortunately, despite much data and many pages, it is a disaster. The data must be reanalyzed, and the phylogeny and taxonomy should not be used unless the specific results are confirmed by other analyses. So what went wrong?

Frost et al. present a new taxonomy for all amphibians based (more or less) on a phylogenetic analysis of 522 species of amphibians from combined parsimony analysis of two mitochondrial gene regions (12S and 16S), five nuclear genes, and an eclectic morphological data set (mostly larval anuran characters). Their study suffers from several fatal flaws. The first is the design. Although the taxon sampling might be reasonable for a study of family-level relationships, it is inadequate for the generic-level changes that are made (e.g., many changes are made without including the type species of genera). The sampling of characters also has two bizarre omissions. The first is the recombination activating gene (RAG-1), unquestionably the most widely used nuclear gene in amphibian phylogenetics. The second is the characters of adult morphology (e.g., osteology, external morphology), which formed the basis for most of the previous amphibian taxonomy. It seems strange indeed to erect a new taxonomy of amphibians by simply ignoring the evidence that was used to construct the previous taxonomies.

Problematic data are analyzed with questionable methods. For example, the authors use equally weighted parsimony, which assumes that all characters are evolving at equal rates, an assumption that is demonstrably false. In many cases, the problematic methods seem to have led to clearly erroneous results (e.g., they find marsupial frogs to be polyphyletic, despite morphological synapomorphies and strong support for their monophyly in molecular studies using modern phylogenetic methods; see J J Wiens, J W Fetzner, C L Parkinson, and T W Reeder. 2005. *Systematic Biology* 54(5):719–748). Rather than pointing out questionable results, they instead use them as their basis for their new classification (e.g., marsupial frogs are divided into three families).

The authors paint the picture that any resistance to their taxonomy must be based on “sociology” not science, and that their major innovation is an amphibian taxonomy based on “evidence.” However, the evidence they use is questionable at best. For example, they erect a family “Batrachophrynidae” for the leptodactylid genera *Batrachophrynus*, *Caudiverbera*, and *Telmatobufo*. But only the latter two genera are actually included in the phylogeny. Many changes are not only poorly justified, but also unnecessary.

To be fair, some of the phylogenetic results and

taxonomic changes will almost certainly prove to be correct. But at this point, how does one know which are right and which are not? Given all of these problems, it seems that the safest bet is to simply ignore this study until someone takes the time to do it right. What a waste.

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AMPHIBIANS AND REPTILES OF PAKISTAN.

By Muhammad Sharif Khan. Malabar (Florida): Krieger Publishing. \$145.00. xvi + 311 p; ill.; index. ISBN: 0-89464-952-3. 2006.

This book is the first all-inclusive treatise on the herpetofauna of Pakistan. It presents up-to-date information on species' descriptions, distributions, and natural history. Although it may be too bulky to be lugged around as a field guide, this volume likely will be an indispensable reference for anyone who wishes to study the herpetofauna of Pakistan or its surrounding regions, including northwestern India, Afghanistan, and eastern Iran.

A brief introduction to the political and geographical regions of Pakistan is followed by an inclusive checklist of amphibians and reptiles found in the country. The next chapter offers dichotomous keys to the family and species level, aided by the author's own helpful illustrations.

The meat of the book consists of individual species descriptions (24 amphibians and approximately 200 reptiles). Species accounts are preceded by descriptions of the general characteristics and zoogeography of family and genera. Individual species accounts list scientific and common names in both English and Urdu. Key diagnostic features are listed for distinguishing similar species. Distribution maps (based on point localities) and at least one color photograph are included for most species. However, several photographs are not of high quality (blurry, bad lighting). Each account also offers information on the natural history and ecology of species based upon literature, personal observations, and anecdotal evidence. References to the primary literature are cited wherever available. The level of detail in the natural history notes is highly variable, and the shorter accounts highlight areas in need of further research. The final chapters provide general perspectives on biogeography, ecology, and conservation issues.

This book will appeal to both enthusiasts and herpetologists. It should also do well to inspire both young and experienced zoologists from Pakistan and abroad to further investigate the rich herpetofauna of the region.

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