

BOOK REVIEWS

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Contributions to the History of Herpetology, Volume 1 (Revised and Expanded)

Kraig Adler. 2014. Society for the Study of Amphibians and Reptiles, Ithaca, New York (www.ssarbooks.com). [4] + 172 pp., 21 leaves of black and white plates, 27 leaves of color plates. US \$60.00. Hardcover. ISBN 978-0-916984-19-9.



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I think all herpetologists know Kraig Adler, and many have received his generous help when it came to locating an obscure and ancient reference, or have been contacted by him asking about someone who, at some time, dealt with amphibians and reptiles around our places of residence.

Adler's latest opus is the new edition, *aucta et reformata*, of the first volume of his *Contributions to the History of Herpetology*.

This series, which includes three published volumes (Adler 1989, 2007, 2012), began in 1989 when the SSAR and Adler presented the first volume during the First World Congress of Herpetology, held in Canterbury, England. Its formal aspects are outlined in the header of this review and on the last printed page of the book, so I will not dwell on it longer; instead, let's consider its contents. The two Latin words in the previous paragraph, *aucta* and *reformata*, were usually used by earlier herpetologists (even before the development of the word and the concept of herpetology) to indicate that the new work or edition was enhanced and revised with respect to a previous one. In fact, the main body (pages 5 to 133) is almost a facsimile of the first edition, with only few changes; the pagination is the same, and there are only two readily observable changes. One is the presence of several underlined names, a helpful reference to indicate that there is a biography related to each of them in some volume of the series, and the other is the presence of a myriad of footnotes, that frequently add valuable information to the already valuable content. Removed from the book are the sections by Applegarth (on the authors in taxonomic herpetology) and Altig (on the lineages of doctoral degrees in herpetology), both of which have been updated from the original and included in the third volume of the series, published in 2012.

The first thing that stands out is the portrait of John Edwards Holbrook which serves as the frontispiece of the book. This is complemented by a photograph, placed between the two columns of the editor's note, of Daniel Huntington, painter of the

portrait, and an unnumbered color plate on page 4, consisting of four additional images of the father of North American herpetology (plus their respective captions). After this Holbrookmania, there are 42 black-and-white, full-page plates, printed on recto and verso of 21 pages, with their own pagination, scattered in the main text. The majority reproduce letters from renowned herpetologists, others show facsimiles of plates or texts of special value, and others illustrate curious, miscellaneous things, like Vailant's diploma. In all but one case the epigraphs are a delightful source of new information, and this alone is worth the inclusion of this new edition in our libraries. Next, the Index to Biographies was enhanced to include all names from all the volumes in the series, and after that, seven pages of corrections and annotations for volumes 2 and 3 are included, mostly adjusting some dates of birth and/or death, but also including seven previously unpublished portraits and one signature.

The real wonder, however, is at the end of the book, where 54 full-color, full-page plates, numbered from 43 to 96 have been added. The selection is exquisite and the captions, as usual, very enriching. The entirety, including the 42 black-and-white plates and the additional portraits and signatures, constitutes a kind of *Thesaurus* of Adler's magnificent collection and library.

If I may digress, not long ago, while re-reading Schneider's (1799) *Historiae Amphibiorum*, I was struck by a comment of this German author that referred to the plates of "our lizards" drawn by Roesel von Rosenhof, and shown to him by his friend, Johann Hermann. In his words, "... Learned men should pray that these plates, along with their annotations, will be published by public subscription, or by the desire of a bookseller who wanted to invest the money, not only because the genius of Roesel deserves public praise, but also because they will greatly increase our knowledge of lizards, those four-legged animals whose history other wise men and scholars already learned to admire ...". Plate 45 in Adler's new edition is palpable evidence that Schneider's desire remains valid more than two hundred years later.

A few paragraphs above I suggested that information related to one plate had a problem. This is the comment on plate 2, illustrating an individual of the Emerald Tree Boa from Surinam, taken from Linnaeus' (1754) description of the collection of the Swedish King, Adolf Frederick. Adler mentions that the specimen was collected by Daniel Rolander, and this is not so. It is true that Rolander commented on that snake under the name *Cenchris viridis*; in his words, "... a snake of large bulk, had climbed some tall trees in several places. Its head more often than not looked down. Its open jaws reveal a capacious circumference. It's said to swallow down small deer, squirrels, rabbits, small anteaters, mice and opossums. It looks like the trunks, branches and leaves of trees. And so, walking through the forest, as you touch a tree trunk, you sometimes encounter this snake at the same time. It is extremely cold, as all amphibians, and causes a chill in

whoever touches it” But it is also true that Rolander arrived in Surinam on June 20, 1755 (old style), and the observation on the snake was on August 1 (Rolander 2008). It is probable that Linnaeus’ (1758) comment on *Boa canina*, attributed to Rolander (the snake was “adored by the Americans”) misled Adler. An old adage says that perfection is restricted to the gods, and this misinterpretation does not alter the quality of the work.

Before concluding, I want to ask a rhetorical question. In times in which we care so much about the latest innovations, to the point that many journals make available pre-publications of their will-be articles in electronic format, is it not anachronistic not only to edit, but to re-edit a volume on the history of herpetology?

The short answer is no, it is neither an anachronism nor wasteful, although this may be considered just a matter of my personal preferences. The long answer was probably given, in the twelfth century, by John of Salisbury in his *Metalogicus* (circa 1130; see Joannis Saresberiensis 1848), when he wrote: “...Bernard of Chartres used to say that we were like dwarfs seated on the shoulders of giants. If we see more and further than they, it is not due to our own clear eyes or tall bodies, but because we are raised on high and upborne by their gigantic bigness...” The phrase has become a cliché, but the virtue of common phrases is that they frequently are tested truths (something unthinkable in science). Furthermore, since the advent of the rules of nomenclature, the past is present in all our studies. This is so because the Codes of Nomenclature, due to the inclusion of the principle of priority, are the only set of “laws,” at least that I know, that have retroactive application. Consequently, whenever we want to step forward in taxonomic studies, we must look back to 1758 and beyond. And that “beyond” goes back to the first printed description of an amphibian or reptile because, at least in zoology, although the names prior to 1758 are not valid, their content may form part of the definition of the species of which they are synonyms.

But, what is the real value of this book (and of the whole series)? Reading this first volume of compiled biographies, portraits, and signatures of 152 herpetologists, from Conrad Gessner to Avelino Barrio, is almost like spying through a keyhole (an increasingly difficult thing because fewer locks have a hole), on the how, when, where, why, and what of some of those who preceded us in order to better understand and interpret their work. These include women and men who were aristocrats who led an almost dilettante life—with amphibians and reptiles as a hobby, clergy and soldiers, peripatetic exiles who changed countries every few years, and others who never moved from their own neighborhoods; those who died young, those who reached old age, and even someone who, while waiting for a ride to the museum, was surprised by the first nuclear attack. All of which reminds me of Foucault’s (1977) concept of genealogy, of which the French philosopher wrote “...Genealogy (...) requires patience and a knowledge of details and it depends on a vast accumulation of source material. Its ‘cyclopean monuments’ are constructed from ‘discreet and apparently insignificant truths’ and according to a rigorous method (...). In short, genealogy demands relentless erudition...” This book illustrates this well.

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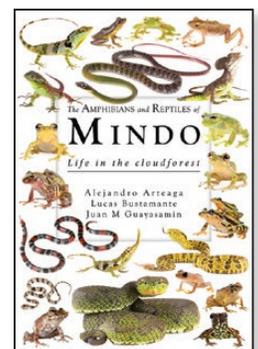
The Amphibians and Reptiles of Mindo: Life in the Cloud Forest

Alejandro Arteaga, Lucas Bustamante, and Juan M. Guayasamin.
2013. Serie de Publicaciones Científicas 1, Universidad Tecnológica Indoamericana, Quito, Ecuador (www.tropicalherping.com). [6] + 3–257 pp. Hardcover. US \$59.00. ISBN 978-9942-13-496-7.

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I have always been a fan of herpetology books. I enjoy reading them carefully and evaluating and critiquing their content, often in the pages of *Herpetological Review*. Only a few times in my experience have I found a book that is a jewel... an impeccable book (because such thing as a perfect book does not exist)—a book that inspires and reminds you why you are drawn to herpetology in the first place. This book has clear but entertaining text, excellent images, and exquisite design. In other words, it is a masterpiece!



The book is the work of three young friends whose careers I have followed since the beginning. Two of them, Alejandro Arteaga and Lucas Bustamante, are still in their early 20s. I have had the great fortune to be with them in the field and to see the efficiency with which they work. It is a pleasure to see their work come to fruition in this book about a herpetological community in the cloud forests of Mindo, in western Ecuador.

The book cover is an attractive compilation of images of reptiles and amphibians of Mindo, all on a white background. This is a common presentation for all photographs in the book. The authors, who are known as superb herp photographers, have chosen, for mostly taxonomic reasons, to illustrate every species on a white background, avoiding the distraction of other elements, and focusing the reader on the subject of the account.

The book starts with a foreword by Jonathan Losos, a well-known herpetologist from the Museum of Comparative Zoology at Harvard. Alejandro Arteaga, the first author, follows with a preface explaining the motivation behind the book. The acknowledgments are worthy of note as they are presented on a beautifully designed page (p. 7) with the name of each colleague appearing at a size proportionate to the importance of his or her contribution. Following this is the Introduction, including some tips for herping in Mindo (usable throughout the tropics), and how to identify herps. This is facilitated by illustrations showing the salient features of amphibians (fig. 2), the groin pattern in rainfrogs (fig. 3), the principal scale types of lizards (fig. 4), the dewlap coloration of anoles (fig. 5), and the basic terminology for snake scalation (fig. 6). An explanation about the plan and use of the book is found afterwards.

Each species account includes several paragraphs as follows: recognition of the species (size, coloration, characteristic features), natural history, local and general distribution, conservation status, etymology (they make an extraordinary effort to show the origin and meaning of the scientific names, which I deeply appreciate and enjoy), and when significant, taxonomic notes. This is the only book I know where each account has been so carefully done that all reviewers that contributed by commenting or correcting are named (superfluous perhaps, but an indication of the care taken by the authors). Lastly all references are cited in order of appearance through the text, where they are numbered.

The description of coloration deserves explanation. The authors decided to use a palette of colors like that used by a painter. Descriptions of coloration are commonly so subjective that a purplish green can be also greenish fuchsia depending on the eye and the experience of the descriptor. To avoid this, they present a visual reference showing the amount of variation in their "painter's palette," which I see quite useful.

A short but well-informed section is devoted to the study area, putting Mindo and its surroundings on the map, and commenting about its touristic importance.

101 species of herps are included in this book. First are amphibians. The first photo, one of *Atelopus longirostris*, a species considered extinct, looks somewhat strange. Alejandro Arteaga explained that it was a preserved individual, for which the eye was digitally manipulated to give a more life-like appearance. Illustrations, all exquisite, of extinct or critically endangered amphibian species (*Atelopus mindoensis*, *Rhaebo caerulostictus*, *Cochranella balionota*, *Strabomantis helonotus*, *S. necerus*, *Hyaloxalus lehmanni*, *Gastrotheca guehtheri*) were made by Rita Hidalgo or Silvia Cevallos.

Some interesting new information is embedded in the accounts. About *Epipedobates darwinwallacei*, there are two

interesting points. One is that the females are the ones carrying the tapoles (which has only been reported in *E. anthonyi* and *E. tricolor*, Lötters et al. 2007), but the authors do not give any reference about this. The second is that the tadpoles are cannibalistic! The reference is the field notes of Alejandro Arteaga. As it is an interesting rarity within Dendrobatidae (only corroborated for *Dendrobates (Ranitomeya) imitator* and *D. (R.) variabilis*; J. C. Santos, pers. comm.), this aspect should be further commented on or better explained.

I really like plates with several individuals depicting the intra-specific variation, like that for *Pristimantis hectus*. However, the authors do not comment if the individuals are depicted at the same scale. The same applies on page 152 for a composite plate of the snake *Atractus dunni*.

Among the reptiles, the authors state that *Basiliscus galeritus* is omnivorous, feeding on invertebrates, fishes, seeds, and fruits. I observed a subadult basilisk in Itapoa, Esmeraldas Province, preying upon and almost swallowing an adult *Pristimantis* sp., suggesting an even broader diet. For a few figures the captions are incomplete, as on page 129: "Adult *Anadia rhombifera* from" (locality lacking). This also happens on page 137 for *Anolis aequatorialis*. Although I appreciate the excellent photography, it seems that in some cases the selected photographs are not sufficient to show the most striking characters of some species. When certain characters are the only ones that can externally distinguish close relatives, those characteristics must be depicted. In the case of *Anolis lyra*, I really wanted to see the "lyre-like" mark on its back of the head; in the case of *Dendrophidion clarkii*, the nuchal collar, which is the only easy character to separate it from *D. graciliverpa*, it is not clearly visible. Also, I would like to see the "anchor-like" mark on the back head of *Micrurus anchoralis* more clearly.

The authors do not use the family Dipsadidae, despite its proven evolutionary value (Zaher et al. 2009; Pyron et al. 2013). The distribution of *Erythrolamprus epinephelus* also includes Costa Rica, which is not included in the distribution section. However, many authors are clear that subspecies of this highly polychromatic species deserve full species status, and thus, Costa Rican and Ecuadorian *epinephelus* would be different species (*juvenalis* for Costa Rica and *albiventris* for western Ecuador; Dixon 1983). That last comment applies for many amphibians and reptiles.

With the snake *Saphenophis boursieri*, I could not see the white postocular stripe mentioned in the Recognition section for the depicted specimen, but rather a black one! The white I see is a labial bar continuing to the throat (all spotted with black). There is no mention of ventral patterning (except for the photographs that illustrate the throat and tail). I do not personally know this snake and thus, I cannot be sure if the specimen photographed is aberrant, or if the text is misleading. The *Tantilla "melanocephala"* depicted is indeed very different from those I have seen in other Neotropical countries, and, as the authors comment wisely, surely a species complex. When representing *Urotheca lateristriga*, a small and harmless snake, the authors say that they are rarely fatal to humans. This means that even in rare cases, there are deaths due to this snake. Such assertions should be further discussed or at least referred to some authoritative paper.

The maps constitute a real plus for this book. Not only are they neatly prepared, but they also include all localities known and the potential area of distribution is illustrated for species represented by more than 10 localities. However, being a book

about Mindo, a very discrete area, I believe in a future edition the authors can add a local map, like the one on page 28, with precise localities for all species. In the distribution section, however, they mention all known localities in Mindo where the species have been seen.

I usually do not deal with common names, but I am trying to advocate for a change in them. It has been very popular to call the Terrarana “rainfrogs.” However, terraranans are direct developers and breed on land and often vocalize when there is no rain. The straight translation of Terrarana is landfrog, and they should be called by this common name (Barrio-Amorós et al. 2013). To choose common names can be tricky and in some cases there are odd results. For example, I would like to know why *Pristimantis latyclavius* is called in English “Bacon Rainfrog.” Is it tasty? Another strange common name is the “Spring Rainfrog”—why Spring? There is no such discrete season in the tropics. This problem also occurs in Spanish. If the authors call *Pristimantis nyctophyllax* “Cutín celador,” what vernacular name would they apply to *Pristimantis celator*? If new common names are coined by the authors, they should explain them in the etymology section. I do acknowledge, however, the difficulty of selecting useful common names for animals that are rarely going to be referred to by non-specialists. I did it too in my work on Venezuelan amphibians (Barrio-Amorós 1998) and it was a nightmare!

Something I have not seen before is the synergy of an internet web page (www.tropicalherping.com) with the book itself. There are complementary data, like the recorded calls of 33 species of amphibians that are shown on the web under each species account.

Despite all the positives, I also have a few complaints. Figure 1 is a schematic habitat drawing with various microhabitats indicated by small letters. In order to determine which species occur in which microhabitats one must scan down a list of more than 100 taxon names. This is cumbersome; an alternative might be to number each species and provide a list of numbers corresponding to each microhabitat.

In figure 2, the principal identification features for amphibians are illustrated on a number of different drawings. These could be more effectively combined and illustrated on just one or two stylized frogs. Also, the letter “ñ” is used in figures 1, 2, and 6; this letter does not occur in the English alphabet, and, with small print, resembles “n,” which is also used in these figures. In each chapter, the figures start again with number 1, rather than being numbered continuously. This is confusing as there are four figure 1s (five including the one in the addendum describing a new species of *Pristimantis*).

There are some inconsistencies in citations; for example, author names and dates that appear in the text without parentheses; for example: Savage 2002, rather than Savage (2002) or (Savage 2002).

As a herpetology book, *The Amphibians and Reptiles of Mindo* stands out for its beautiful design, white background photography of all 101 species in the area, clear and informative text, and a manageable size and weight. However, it is not usable in the field. A second edition could be improved by printing on water-proof paper. Dichotomous keys and a more in-depth treatment

of tadpoles as well as a short chapter dealing with the prevention and treatment of snakebite would also be desirable.

Also, some vital data are missing in my opinion, specifically the type locality of each species. In an area where new species resembling known forms might be expected to be found, this is important to help determine which population represents the described form.

The book includes the description of a new species of landfrog (or rainfrog), *Pristimantis mindo*, in an addendum by Arteaga, Yanez-Muñoz, and Guayasamín. Although I prefer well-known journals for such actions, the presence of this description does not bother me. It has been made with great accuracy; it is very detailed, based on a suitable number of specimens, appropriate comparison with similar species, bioacoustic and genetic data. The only minor detail that the authors seem to forget is to give common Spanish and English names, to be consistent with the rest of the book.

I like the efficient use of technical words. This could be a little off-putting to non-specialist readers, but there is a glossary at the end of the book to solve this potential issue. However, not all terms appear at the glossary (e.g., scutcheon, holocrine, cathemeral, cryophobic, molluscivorous, lumbricophagous, etc.). The glossary is followed by an impressive list of 1935 references—one of the most complete I have seen for a small book like this. Finally, the last pages introduce the authors in a humorous way, complete with their “scientific names” and funny photographs.

With the kind of data presented in this book, the general area of Mindo, a great touristic attraction for those looking for adventurous activities as well as relaxation (plus one of the best bird watching areas in the world), will be now a top destination for herpers, thanks to the detailed work of the young authors of this book. I only hope a second edition incorporating the potential improvements suggested above will be possible. This book will be a real jewel in any herpetologist’s library.

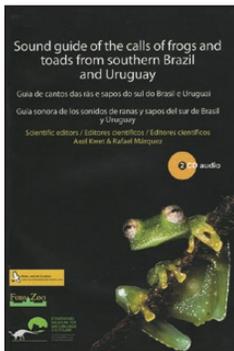
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Sound Guide of the Calls of Frogs and Toads from Southern Brazil and Uruguay

Axel Kwet and Rafael Márquez. 2010. Alosa, Barcelona, Spain (www.sonidosdelanaturaleza.com). 2 audio CDs + 56 pp. booklet. €11.90 (approx. US \$14.65). ISBN 978-84-613-8920-9.



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Bioacoustics has long been an interesting field of study for herpetologists. Calls are one of the most characteristic traits of anurans, perceived and used to distinguish species well before the animals themselves are spotted. Although many field herpetologists carry a recorder as a mandatory piece of equipment, the recorded calls of many species are still not available. The *Sound Guide of the Calls of Frogs and Toads from Southern Brazil and Uruguay* compiled and edited by Axel Kwet and Rafael Márquez, advances our knowledge of the anuran calling repertoire.

This guide presents the calls of 109 anurans, although 16 of the species were undescribed and/or uncertain as of 2010 when the guide was published. The calls are divided into two audio-only compact discs: one with 55 species belonging to the family Hylidae, and the other with 54 species belonging to ten additional families. Each species is represented by a single track, generally divided into different cuts with overall good quality recordings. The listener can follow the tracks and their cuts using a color print booklet provided with the audio CDs. The booklet, 56 pages long, contains scientific name (ordered by species group at the genus level), photograph, distribution map, and natural history information for each species. The photographs provided are small, but this is to be expected for a sound guide. The maps are very simple but somewhat confusing because of the recurrent change of scale, but they are still a nice addition for this type of publication.

The level of detail for the calls is noteworthy. First of all, more than one cut is presented for most species, stating, for example, the social context in which the call was emitted and/or emphasizing when more than one type of note occurs. Thus, even if the call is not sufficiently understood to receive a definitive classification (Toledo et al. 2014), the guide provides a valuable starting point for natural history and behavior studies. Moreover, additional descriptions are given in the audio and/or booklet, for instance, background noise, different species participating in the chorus, air temperature, time of recordings and type of recording filter, factors that may influence the calling activity of frogs and the quality of the recordings.

The accessibility to the text is very convenient. Every piece of information is given in English, Spanish, and Portuguese, which

is great for use in undergraduate courses, where students might not be comfortable with the English language, as well as anybody else that may fall into this category. Although there is not an upfront definition of the bioacoustic terms used throughout the booklet, the language is intuitive and accurately utilizes the scientific terminology of this field.

At least four other sound guides for Brazilian species have been published (Atlantic Forest domain: Haddad et al. 2005, Toledo and Haddad 2011; Cerrado, Campo Rupestre, and Pantanal domains: Toledo et al. 2007; Rio Claro Farm, São Paulo state: Maffei and Ubaid 2014), but each of these contain 76 species at most. At the same time, this is the first sound guide for frogs in Uruguay, including over 30 out of 48 known anurans (Maneyro 2012), which is a huge contribution to the field of herpetology in that country. Furthermore, the geographic range of almost 20 species included in the guide extends to northern Brazil, as well as Bolivia, Paraguay and Argentina. The result is a comprehensive overview of frog calls from habitats on the border between Brazil and Uruguay (e.g., coastal dune zone and grassland; Maneyro and Kwet 2008), and also from a variety of habitats throughout Brazil, Uruguay, and additional countries.

Although some open access websites make frog calls available (e.g., AmphibiaWeb), the content is usually not as detailed or standardized across researchers. In this guide, in particular, most of the 109 species were recorded by Axel Kwet, which diminishes the recording setting and equipment variation. In conclusion, the *Sound Guide of the Calls of Frogs and Toads from Southern Brazil and Uruguay* is a well-done and welcome project. Because this guide was released in 2010, we believe that within a few years it would be promising to have an updated—and maybe interactive—sound guide, incorporating the resolution of the undescribed and/or uncertain species. This would represent an even more useful contribution to South American herpetology to which the scientific editors Kwet and Márquez are clearly committed.

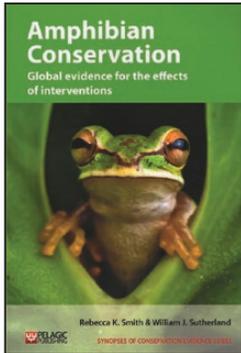
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Amphibian Conservation: Global Evidence for the Effects of Interventions

Rebecca K. Smith and William J. Sutherland. 2014. Pelagic Publishing, Exeter, United Kingdom (<http://www.pelagicpublishing.com>). xviii + 276 pp. £29.99 (approx. US \$47.00). Softcover. ISBN 978-1-907807-85-5.



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Almost everyone now knows that amphibians are in trouble. Some concerned individuals are in positions to stem or even halt declines in the areas in which they work or live. Many simply want to help. However, conservation of amphibians is complicated, many sided, and must be approached from

many different angles. People involved in the movement, especially those not trained in conservation biology, need guidance to help them solve their specific problems and meet their goals. This book joins the procession of books and documents offering practical information that can direct positive actions on the ground.

The authors of this book used an evidence-based approach to aid biodiversity conservation. This approach uses current best evidence to make decisions about, in this case, amphibian conservation. The umbrella organization is the Centre for Evidence-based Conservation (CEBC, www.cebc.bangor.ac.uk) in the United Kingdom. CEBC is a source of advice on evidence-based practices and coordinates the Collaboration for Environmental Evidence program. Program staff help others to undertake systematic reviews on issues of concern to policy and practice in a variety of fields. Systematic reviews of specific conservation interventions that have had proven benefits are their primary tools to support projects that rely on the decision-making process. “Intervention” appears to mean actions taken to thwart a particular type of threat (e.g., agriculture). It is equivalent to “management guidelines” in the Habitat Management Guidelines (HMGs) series produced by Partners in Amphibian and Reptile Conservation (PARC, www.parcplace.org), a conservation NGO based in the United States. This book is a synopsis of the result of a global search of the amphibian conservation literature, including dissertations, theses and available gray literature.

This small book (234 × 156 mm) is one in a series entitled *Synopses of Conservation Evidence* produced by the CEBC. Others have been published on bee, bird, farmland, and bat conservation. The authors of this book summarize evidence relevant to the practical conservation of amphibians to provide a global list of interventions that could benefit amphibians (from the information page that accompanied the review copy). They claim the book is a thorough summary of what is known, or not known, about the effectiveness of amphibian conservation actions across the world. The target audience includes land managers, conservationists in the public or private sector, farmers, campaigners, consultants, policymakers, and researchers and land owners seeking to protect local wildlife. The book is based on scientific conservation literature derived from complete series

of 18 herpetology journals (but not *Herpetological Review*), 30 conservation journals, and web searches using ISI Web of Science and Google Scholar. To be included, the paper must report an intervention actually applied in the field and subsequently monitored quantitatively. The authors found 416 studies that met these criteria.

The book’s outline and chapter titles are based on the International Union for the Conservation of Nature (IUCN) Unified Classification of Direct Threats (www.iucnredlist.org/technical-documents/classification-schemes/threats-classification-scheme). However, understanding the book’s organization requires some effort. Each of the first ten chapters focuses on a particular threat (e.g., transportation and service corridors, pollution, climate change and severe weather). These are followed by four chapters with general headings (e.g., Habitat protection, Species management). A shaded box that begins each chapter includes a brief statement about the threat and where it is addressed in other chapters. A list of “Key messages” (= interventions) follows with a single sentence or a paragraph that briefly summarizes results of the literature search. These messages (interventions) then form the titles of a series of individually-numbered sections with their own bulleted summaries followed by a background box and a single paragraph or several pages of text. Boxes and text sections that include references to particular papers are followed by their own literature cited list. Each paragraph in the text section summarizes information in one published paper. The information in these paragraphs includes methods and numeric results but no conclusions or how the reader should interpret the results. Each paragraph starts with phrases such as “A before and after study... found that”, “A review ... found that”, and “A controlled, before and after study ... found that.” Not much writing creativity here. The last four chapters based on IUCN Classification of Conservation Actions start out as just described, but additional text is added on anurans and/or salamanders, as well as selected, mostly European, species. Paragraphs summarizing each study in these sections are structured as above.

Some of the chapters contain extensive text and numerous citations. Others contain no useful information. For example, Chapter 6 on the threat of human intrusions and disturbance has one preselected intervention: “Use signs and access restrictions to reduce disturbance” and a sentence noting they found no literature-based evidence on this topic. The intervention and the note in Key messages are repeated verbatim in the section just below it. The authors would claim that including topics lacking literature is useful. But why is there only one intervention and why this one? There are many other ways humans intrude on amphibian habitats that could have been included. Several management guidelines in the PARC HMGs would have nested nicely in this chapter. However, I assume they did not use the HMGs because as yet no publications include results of monitoring studies.

Chapter 3 on the “Energy production and mining” threat contains a single intervention that fits one species in a restricted location. The Kihansi Spray Toad (*Nectophrynoides asperginis*) in Tanzania is critically endangered from loss of habitat below a hydroelectric dam that blocked the montane stream and eliminated 90% of the spray zone. The authors cite one before-and-after study that describes the effectiveness of a sprinkler system installed to aid the toad’s recovery. The single intervention included in this chapter, “Artificially mist habitat to keep it damp,” might be appropriate in this and perhaps a few other similar locations, but it is not useful to a global audience as implied.

The lack of information on how to apply the interventions and information in this book to conservation issues in specific habitats weakens the book's usefulness. The authors do note the synopsis is not intended "to make decisions for you" but provide support for those decisions. But how can land managers, land owners, and others in their list of target audiences interpret the information in this book for their conservation projects without guidance from professional conservation biologists or ecologists? For this reason the book's usefulness will be limited to those who understand the science and are able to interpret the interventions for on-the-ground actions.

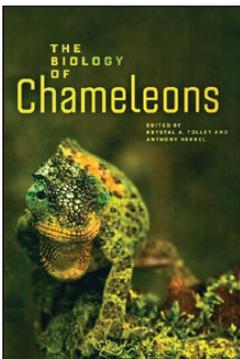
Several minor points should be mentioned. Chapter 5 (Threat: Biological resource use) was omitted from the review copy, and even from the Table of Contents, but this was apparently a printing error and has been rectified in copies subsequently distributed. No reviewers were acknowledged. Some of the writing would have benefited substantially from their edits. There is no summary or conclusions chapter. The pricing structure seems unusual. Why would anyone buy the hardback version of this book for US \$114.99 when he could have an electronic version for US \$16.99? The paperback version is more affordable, but in my view is still overpriced for what you get. One can also download individual interventions on a searchable database (www.conservazionevidence.com), apparently for free.

The practical interventions and associated background literature are useful contributions to conservation and management efforts on behalf of amphibians. I found many publications of which I was not aware. The authors deserve credit for conducting the extensive literature search and providing summaries within the intervention (management guidelines) context. Unhappily, as Roger Conant would say, they fell short of their goal to provide information readily understood by a broad audience. I would recommend this book to practicing conservation biologists but not to consultants (unless well trained), campaigners, farmers, land managers, policymakers, or private land owners.

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The Biology of Chameleons

Krystal A. Tolley and Anthony Herrel (eds.). 2014. University of California Press, Berkeley and Los Angeles, California, USA, and London, United Kingdom (www.ucpress.edu). xii + 275 pp. Hardcover. US \$65.00. ISBN 978-0-520-27605-5.



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The content of this book exceeds its title remarkably. *The Biology of Chameleons and its Morphological, Physiological, Paleontological and Evolutionary Basis*, though cumbersome, might be more appropriate. The book comprises 10 chapters written by authors who are well respected in their special fields. The sub-

jects of these chapters, apart from the introductory one, are: (2) anatomy, (3) physiology, (4) function and adaptation, (5) ecology

and life history, (6) sensory systems and communication, (7) evolution and biogeography, (8) systematics, (9) fossil history and (10) conservation—truly a wide array of topics!

Chapter 1, written by the two editors, is a mere introduction to the following chapters, but the great fascination Krystal Tolley and Anthony Herrel have for chameleons is clearly discernable. The first and overall impression of this book is certainly excellent, and the list of contents looks absolutely complete. However, some comments may nonetheless be warranted. These concern some suggestions on what has been overlooked, mainly in respect to certain literature references which I regard to be important, and thoughts and interpretations on some aspects which, in my view, have not been fully discussed or synthesized.

An example of a missing reference concerns the paragraphs *Microstructure* (p. 39) and *Ear* (p. 45) in Chapter 2. A very recent detailed study by Marlene Spinner (Spinner et al. 2013) if already available to the editors (they did cite other papers from 2013), would have been a useful addition. Another matter of citation is the correct information that the apical structures of chameleoid hemipenes may vary not only ontogenetically but also seasonally (p. 54). This is credited to Klaver and Böhme (1986), however, it was first mentioned and documented by Böhme (1988), a title not cited in the book.

An example of the second point is seen in the paragraph about the *Ear*. Here, I find no mention of the "Cranoliti" (calcified endolymphatic sacs in the otic region) described in detail by Siebenrock (1893) for *Brookesia superciliaris*. These were described in the same paper as the uniquely derived structure of the vertebral column, which Siebenrock stated would only be understood when the biology of this chameleon was better known. In the meantime, we have had the opportunity to learn much more about the biology of *Brookesia*, one aspect of which, "freeze and roll" antipredator behavior, is discussed in Chapter 6 (p. 127) of the present book. However, a direct link between the endolymphatic system, the aberrant vertebral structure and this behavior in *B. superciliaris* has not been made. As has been argued in an earlier paper (Böhme 1982), the "Cranoliti" seem to function as a static organ, since calcified endolymphatic sacs are restricted to lizards with a climbing life style (Kluge 1967; Moody 1980). In *Brookesia*, a cataleptic antipredator mechanism (freeze and roll) should be directed against visually—rather than olfactorially-oriented enemies, i.e., against birds with strong visual accommodation capabilities rather than against scent-sensitive carnivorous mammals or even tongue-flicking snakes. So, when a prey item such as a *Brookesia* abruptly stops moving and thus disappears from the bird's visual field, the predator will well try to check with some pecks whether the now motionless object is edible or not. And here, the double-protected vertebral column of *Brookesia* can be life-saving only if the chameleon orients this heavily ossified backbone, and not the vulnerable flanks or belly, towards the predator. That the calcified endolymphatic system can actually work as a static organ in the context of the cataleptic freezing behavior, was corroborated by Schmidt et al. (1989) in both wild and captive *Brookesia*. When grasped by a bird bill, many *Brookesia* species exhibit a high-frequency body vibration which is likely to affect a bird, with its pneumatisized skull bones, more than other potential predators (Böhme 1982). In the book by Tolley and Herrel (p. 112), the generalist feeder *Brachypteracias leptosomus* is listed as a bird that searches the leaf litter for *Brookesia*. This species would be the ideal candidate for an experimental *in situ* test of the above hypothesis.

The short paragraph on “Sexual dimorphism: body size and ornamentation” (p. 126) also misses some interesting correlations. It is only stated that sexual size dimorphism (SSD) is either female-biased or male-biased, and ornamentation is dealt with separately. However, there is a clear interconnection between male-biased SSD and head ornamentation in that males in species with head ornamentation are markedly larger than in those without such ornamentation. The best examples are the horned species of *Trioceros* in Africa, where the adorned males are always considerably bigger than the corresponding females. Within the Cameroon radiation of *Trioceros*, in the so-called *T. cristatus* group, in the horned species *T. quadricornis*, *T. montium*, and *T. pfefferi*, the male grows much larger than the female, but the opposite is true in the hornless *T. cristatus* in which the female grows much bigger than the male (for data see Klaver and Böhme 1992). The same is true for the East African horned species. The same principle also applies in the genus *Chamaeleo* where horns are functionally replaced by an extremely high casque in, for example, *C. calyptratus* males, which are much larger than conspecific females. Conversely, in casqueless species of the *C. dilepis* complex, most extremely in *C. roperi*, adult males are really dwarfs in respect to females. An even more comprehensive correlation between ornamentation and hemipenial structure has been discovered: species with ornamented males tend to have similar hemipenes while those resembling each other in external morphology, show deep divergences in hemipenial structure (Ziegler and Böhme 1997, fig. 113). This means that female choice depends on the external form of males (i.e., a pre-mating signal) in the first case, but on hemipenial structures in the other.

This aspect leads directly to the question brought up on page 130, viz., “whether the degree of different visual signals (coloration, ornamentation, and behavior) among closely related species is positively related to the number of sympatric species.” Here, the paper by Rand (1961) should have been cited, since it already demonstrated that there is no sympatry (or more precisely, no syntopy) of chameleon species in East Africa with identical head ornamentation (in this case, three horns). Likewise, Parcher (1974) demonstrated experimentally in Madagascar that males with head ornamentations artificially removed are no longer recognized as conspecific by their respective females. In another study it was shown that in cases of emerging syntopy, males of a horned species will reduce their horns when a second horned species expands into its range and habitat; this character displacement can be demonstrated to have occurred in a sequential fashion, due to historical climate change (Böhme and Klaver 1981).

My next remark concerns the chapter on systematics. The listing of species in the generic arrangement follows the most recent revisions, it is, however, not always consistent. As an example, *Trioceros eisentrauti* is still listed on Table 7.1 as a valid species, but is missing in the enumeration of *Trioceros* species on p. 171, obviously because it was downgraded to a subspecies of *T. quadricornis* by Barej et al. (2010). Here it becomes clear that it was disadvantageous to leave all subspecific taxa out, because the current checklists (Mertens 1966; Klaver and Böhme 1997) demonstrate how many taxa originally described as subspecies subsequently received full specific rank. This also concerns the taxon *quilensis* Bocage, left out in this book obviously because the editors regard it as conspecific with *C. dilepis*. That it has a hemipenial ornamentation dramatically different from that of *C. dilepis* has been demonstrated by Ullenbruch et al. (2007). This may also have relevance for the color figures 1.3 and 8.5, which show the same individual of “*Chamaeleo dilepis*.” However, due

to its small rudimentary neck flaps, this specimen is certainly not true *C. dilepis*, but rather—if South African (the locality is not mentioned)—*C. quilensis*, underlining my statement above.

I should like to add here that the etymology given for the name *Chamaeleo* (or *Chamaeleon*, respectively) as derived from ancient Greek and meaning “ground lion” does not gain more sense and probability by repeating it again. Rather, the alternative etymological derivation from the old Semitic word “gamal” (camel) with the diminutive ending “-ún,” i.e., “gamalún”—little camel by Keller (1913) should also be considered. The dorsal hump of resting chameleons (see, for example, figs. 8.4. and 8.5. in the present book) indeed resembles a little camel much more than a terrestrial lion (Keller 1913; Böhme 2011), although the Greek “chamai” may also mean “dwarf” or “dwarfish” instead of “on the ground.”

Finally, just a few comments on the list of references. It is clear that the great majority of titles of this rather complete bibliography are in English, but is inconsistent in respect to other languages cited. In several German, French, Spanish, Portuguese, etc. titles the name of the respective language is added in parentheses, but in others not; I regard this as unnecessary because it is self-explanatory when reading the title itself. Some references missing in this list and, in my view worthy of being cited, have already been discussed above. In some citations the titles are incorrectly reproduced, in other instances the journal names have errors. For instance Moody’s (1980) thesis is cited as “The phylogenetic relationships of taxa within the lizard family Agamidae” but the correct title is “Phylogenetic and historical biogeographical relationships of the genera in the family Agamidae.” Parcher (1974), is said to have been published in “Zeitschrift für Tierzucht und Zuchtungsbiologie (sic!)” (a journal for breeders of domestic animals!) instead of “Zeitschrift für Tierpsychologie” which is the famous forerunner of “Ethology,” where it actually appeared (although the volume number and pages are correct). Klaver, C. and Klaver, C.J.J. are treated as two different authors in this list although they refer of course to the same person who, according to the acknowledgments, together with Bill Branch reviewed the systematics chapter of this book.

Despite these small corrections, amendments, and additions, the present book by Tolley and Herrel is a great achievement in chameleontology. It will certainly have a great influence on future research on these fascinating creatures, and it will be nice if my comments above on some evolutionary aspects will also stimulate some further discussion.

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