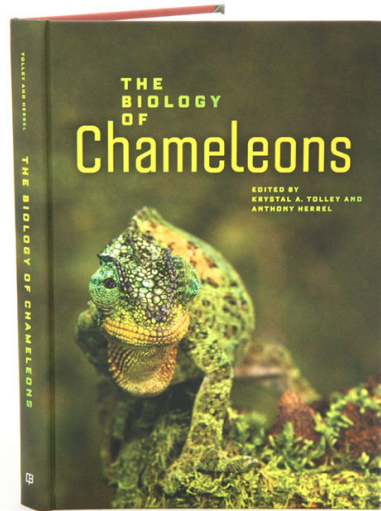


BOOK REVIEW

The Biology of Chameleons

Review by **Russell Ligon**, Arizona State University

As a biologist who has spent the last few years studying chameleon behavior, I had high hopes for the beautiful new book, *The Biology of Chameleons*, edited by Krystal A. Tolley and Anthony Herrel. These hopes were, in almost every instance, exceeded. For many authors the work and information described are clearly labors of love, and the passion and knowledge of all of the authors of the 10 chapters that comprise this book come through beautifully, thanks in large part to the organization and editing by the book's editors. I had a few minor issues (noted below), but on the whole I am confident that this book will become a valuable addition to the library of any scientist or lay-person with a dedicated interest in the biology of this strange and wonderful group of animals. Below, I



The Biology of Chameleons
Krystal A. Tolley and Anthony Herrel (Editors)
Hardcover, 288 pages
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November 2013
\$65.00

have summarized the chapters included in this book to provide an overview for potential readers.

Chapter 1, “An Introduction” by Krystal A. Tolley and Anthony Herrel, sets the tone for this wonderful volume dedicated to increasing knowledge and making a trove of information available to a wider audience.

Chapter 2, “Chameleon Anatomy” by Christopher V. Anderson and Timothy E. Higham, provides a thorough description of chameleon skeletal, muscular, and anatomical features studied to-date. For non-anatomists, there is a lot of information to get through and, whether because more functional work has been completed on tongue extension or because it is one of Anderson’s specialties, the descriptions of the roles of different tongue muscles used in feeding and prey capture was much more approachable and engaging for me than some of pure descriptions of muscle groups and skeletal elements. This was true throughout the chapter – wherever functional explanations accompanied morphological descriptions I found I was better able to follow along and learn something new. One of the more interesting facts I gleaned from the chapter was the fact that chameleons exhibit a dramatic range in the number of caudal vertebrae they possess, ranging from 17 to 62 vertebrae! Though this was a very good chapter, I was disappointed when I tried to find the original source of information cited regarding the density of cones in chameleon retinas. In the chapter, the source of this information is cited from more recent sources which reference the older, original work (instead of citing the original work).

Chapter 3, “Chameleon Physiology” by Anthony Herrel, provides a nice mechanistic complement to the preceding chapter on morphology and anatomy. This chapter is very well-written and easy to read, with descriptions of physiological phenomena that were easy to understand and interpret (though there was no introduction to some basic physiological terminology like “Q10”). Generally, this chapter provides the reader with a solid understanding of how chameleons are likely to sense the world, with clear descriptions of their visual and auditory systems. As a chameleon biologist, I did find something to quibble about regarding Herrel’s description of the factors controlling color change in chameleons. Herrel states that current consensus is that chameleon color change is under control of nervous system yet he excludes mention of a key study by Okelo (1986) definitively demonstrating that color change can be induced hormonally. Additionally, there are numerous references to stress-induced color change throughout chameleon husbandry literature, further suggesting the longer term hormonal control over color change in chameleons. This is probably a minor issue, but one worth mentioning.

Chapter 4, “Function and Adaptation of Chameleons” by Timothy E. Higham and Christopher V. Anderson, is an oddly titled (what is the function of a chameleon?) chapter about the functional adapta-

tions of chameleons. This chapter covers locomotory adaptations and those that function in feeding. In the first subsection on locomotion, focused on limb kinematics, the authors do a masterful job explaining the different ways that chameleon limbs contribute to their movement patterns and how these movements fit their specialized ecological niche. One of the key adaptations facilitating the thin-branch arboreality of chameleons is their fused digits, which allow chameleons to generate strong adduction forces on branches that consequently enable them to pull their bodies forward with their hind limbs in a manner unlike any terrestrial lizard. The section on mechanisms of projectile tongue use in prey capture was very thorough but, in my humble opinion, certainly could have benefitted by the inclusion of additional figures/images to illustrate key processes.

Chapter 5, “Ecology and Life History of Chameleons” by G. John Measey, Achille Raselimanana and Anthony Herrel, begins with detailed descriptions of habitat use among chameleons. Interestingly, field work on chameleons is so difficult that many inferences regarding where chameleons live and forage are apparently based on their nocturnal roosting locations, where they are easier for scientists to locate. Consequently, at the moment, the data required to split forest chameleons into more than two broad guilds (arboreal and leaf-litter) are lacking. In the section on chameleon life-history I learned that chameleon body size covers four orders of magnitude (across all species).

This chapter was interspersed with well-described case studies illustrating key points of chameleon ecology. These case studies/illustrative boxes were so effective and clear, I wish they were a part of every chapter in this book!

Chapter 6, “Chameleon behavior and color change” by Devi Stuart-Fox gives a summary of the state of knowledge regarding the mechanisms of color change, stating that the control of color change is “poorly understood” but likely includes “a range of neurotransmitters and hormones...” Additionally, Stuart-Fox provides a very clear and easy to understand summary of the likely factors favoring the evolution of color change in chameleons, which makes sense because the work she summarizes is her own! The chapter also includes concise, yet comprehensive, reviews of chameleon territoriality, sperm storage, female reproduction tactics, male aggressive behaviors, sexual size dimorphism, with a larger section on anti-predator behaviors of these incredible animals. Overall, this was a fascinating and well-written chapter that made it easy for readers to grasp the current state knowledge regarding chameleon social behavior, as well as the control and numerous functions of rapid color change. I wish this had been available when I first began studying chameleons and I have no doubt it will be a boon to all future chameleon researchers.

Chapter 7, “Evolution and Biogeography of Cha-

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meleons” by Krystal A. Tolley and Michele Menegon, provides a really nice complementary evolutionary and historical perspective regarding how and when chameleons came to be. What makes this chapter stand out to me was the detailed background Tolley and Menegon provide regarding climate and environmental events occurring during various stages of chameleon evolutionary history - they put splitting and diversification events into a logical and understandable context. In addition to describing chameleon evolutionary events, this chapter also covers current chameleon diversity and distribution. Furthermore, this chapter describes locations and ranges of known chameleon groups: however, these sections could also serve as a roadmap for intrepid explorers who want to discover new chameleons species. Regions of great biodiversity, in addition to being prime locations for the discovery of new species, are also conservation hotspots- though this is a topic that Tolley and Menegon leave for another chapter. Unfortunately, as a non-biogeographer the sections labeled alpha- and beta-diversity did not help me, but the information included in those sections was still interesting and readily understandable.

Chapter 8, “Overview of Systematics of the Chameleonidae” by Colin R. Tilbury, covers the systematics of chameleons. Tilbury begins with an interesting historical perspective of chameleon taxonomy and methodology, as well as a concise summary of the big-picture taxonomic issues (e.g., number of species, genera, changes over time) before delving into specific sub-familial groupings. These sections provide incredible details about the chameleons and will doubtless

prove to be a valuable resource and starting point for future comparative analyses.

Chapter 9, “Fossil History of Chameleons” by Arnau Bolet and Susan E. Evans, provides a comprehensive coverage of the fossil history of chameleons. Unfortunately for those interested in chameleons, the fossil record of these animals is quite limited. However, these authors do a commendable job summarizing the state of knowledge regarding chameleon fossils and placing major evolutionary events in chameleon history into a global perspective (i.e., what was happening in the world at that time). This includes a helpful table (table 9.1) and a figure linking evolutionary history and paleogeography that will undoubtedly be used in herpetology and evolutionary biology classes.

Chapter 10, “Chameleon Conservation” by Richard Jenkins, G. John Measey, Christopher V. Anderson, and Krystal A. Tolley, focuses on the myriad issues relating to chameleon conservation. The authors begin by summarizing the status of the most heavily threatened species (critically endangered by the IUCN Red List), and work through several other categories of risk in detail. The status of chameleons is troubling (a huge understatement on my part); but the authors do a commendable job describing both common and specific threats, outlining high-value habitats and areas, and going into great detail on chameleon-specific threats of trade/export/importation of chameleons. The authors end with specific priorities for future research and regulatory actions, and with a sense that more data on diverse taxa will aid the conservation of more species.

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Authors should submit original articles, notes, book reviews to the editor, either via email using an attached word processed manuscript or by mail to the Society’s address. The manuscript style should follow that of *Journal of Herpetology* and other publications of the Society for the Study of Amphibians and Reptiles. For further information, please contact the editor, at *editor.sonoran.berp@gmail.com*.

Sonoran Herpetologist Natural History Observations

The Tucson Herpetological Society invites your contributions to our Natural History Notes section. We are particularly interested in photographs and descriptions of amphibians and reptiles involved in noteworthy or unusual behaviors in the field. Notes can feature information such as diet, predation, community structure, interspecific behavior, or unusual locations or habitat use. Please submit your observations to Howard Clark, *editor.sonoran.berp@gmail.com*. Submissions should be brief and in electronic form.

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The *Sonoran Herpetologist* welcomes short reports for our Local Research News, a regular feature in our journal. We are interested in articles that can update our readers on research about amphibians and reptiles in the Sonoran Desert region. These articles need be only a few paragraphs long and do not need to include data, specific localities, or other details. The emphasis should be on how science is being applied to herpetological questions. Please submit your materials to Howard Clark, *editor.sonoran.berp@gmail.com*. Submissions should be brief and in electronic form.

TAXONOMY

New tree frog named for Ozzy Osbourne

Submitted by **Suman Pratihar**, Associate editor, Sonoran Herpetologist; pratihar_vu@rediffmail.com

Back in 1981, *Black Sabbath* frontman Ozzy Osbourne bit the head off a bat while performing on stage. More than 25 years later, a newly discovered species of tree frog has been named in his honor. No, the tiny Amazonian *Dendropsophus ozzyi* does not prey on bats, but it does sound like them. The males of the species have especially large vocal sacs that they use to produce high-pitched noises and communicate with females, National Geographic reports.



Dendropsophus ozzyi, seen here in its Amazon habitat, has an unusually high-pitched, chirpy call. Photograph by Pedro Peloso.

Read more here: <http://bit.ly/1zFILLbS>

MEETING MINUTES

BOD minutes can be found here:

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Membership Information

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Including the THS in your will is an excellent way to support the value of this organization and the conservation of the herpetofauna of the Sonoran Desert. We would like to recognize and thank anyone who has included the THS in their will. Please contact us so we can express our appreciation. For information about designating the THS in your will, please contact Kent Jacobs, Treasurer, Tucson Herpetological Society, at jacobskent@gmail.com.

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