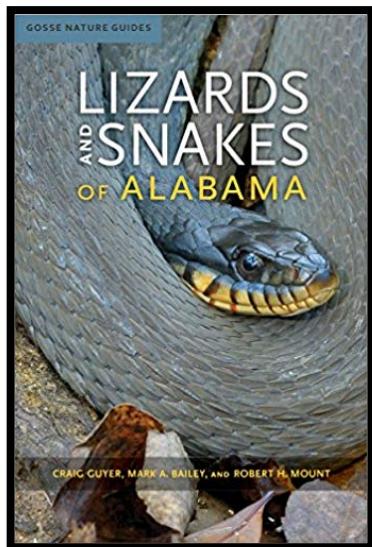




FIG. 3. In situ copulation between unmarked male (2) and marked female (1) *Sistrurus miliarius streckeri*. The white circle indicates where both individuals are attached by their cloacae.



## LIZARDS AND SNAKES OF ALABAMA

Craig Guyer, Mark A. Bailey, and Robert H. Mount. 2018. The University of Alabama Press, Tuscaloosa. xvi + 397 pp. Softcover, U.S. \$39.73. ISBN 978-0-8173-5916-4

Reviewed by: **JOSHUA M. HALL**, Auburn University Department of Biology, 101 Rouse Life Sciences Building, Auburn, AL, 36849

*Lizards and Snakes of Alabama* is the second release of a four-volume set that describes

Alabama's herpetofauna. These books serve as an update to the seminal work by Robert Mount: *Reptiles and Amphibians of Alabama* (1975). The first book, *Turtles of Alabama*, was released in October of 2015, the second book is described in this review, and two separate titles covering the frogs and salamanders of the state do not yet have release dates. Although this review is for a single book, *Lizards and Snakes of Alabama*, I will occasionally refer to this text along with its sister texts as "the Alabama field guides"

because these books are written with similar style and structure. Thus, many of the strengths and weaknesses of one text apply to all.

The book begins with a thorough introduction that provides a list of all taxa native to the state, comments on introduced taxa, and recent taxonomic changes and problems. I use the term taxa, rather than species, because this guide recognizes subspecies. The lengthiest portion of the introduction is given to descriptions of the climate and geography of Alabama, its river basins, and the 10 physiographic units that comprise the state. These units were originally referred to as "herpetofaunal regions" by Robert Mount (1975). Unfortunately, the names of these units don't precisely correspond with the level III and

level IV ecoregions defined by the Environmental Protection Agency and used nationwide. The authors do, however, describe each region, provide high-quality photographs to illustrate their characteristic habitat structure, and explain how they each influence the distribution and abundance of lizards and snakes across the state. Following the introduction are the species accounts.

The book is arranged in such a way that the taxonomic keys are interspersed through the text. These keys are easy to understand and include high-quality line drawings that highlight diagnostic morphological features when necessary. The species accounts begin with a dichotomous key to differentiate the major lineages of squamates in Alabama (Iguania, Gekkota, Scincomorpha, Anguimorpha, and Serpentes), and readers are directed to various pages pending the results of this key. For example, to key out a Pygmy Rattlesnake (*Sistrurus miliaris*), one would start on page 41 with the key to major lineages and then be directed to page 113: Serpentes (i.e. snakes). Pages 113-115 describe the group Serpentes and provide information about systematics, evolution, fossil specimens, general activity patterns, and natural history. Following this description is a dichotomous key to the families of snakes of Alabama. Via this key, the reader is directed to page 311: family Viperidae, which has a one-page, general description of vipers. Following is a key to the genera of Viperidae of Alabama, which leads to page 327: Pygmy Rattlers, genus *Sistrurus*. Here, a brief description of the genus is given along with notes on taxonomy. If there are multiple representatives of a genus in the state, a key would follow for these species; however, *Sistrurus miliaris* is the only species of this genus in Alabama. What does follow is a key to the subspecies that are recognized in the state: Dusky Pygmy Rattler (*Sistrurus miliaris barbouri*), Carolina Pygmy Rattler (*Sistrurus miliaris miliaris*), and Western Pygmy Rattler (*Sistrurus miliaris streckeri*). The authors not

only recognize subspecies, they provide separate accounts for each. This contributes to the rather large size of the book (416 total pages) but also provides an opportunity for readers to learn a great deal about systematics and taxonomy. Each species/subspecies account includes at least one high-quality photo of a live specimen in the field, a physical description for the species/subspecies, and information on its distribution in Alabama, habits, conservation and management, and taxonomy. Such information is typical for field guides.

The most unique feature of the individual accounts is the distribution map, and this is my favorite feature of the Alabama field guides. Each map includes exact localities for verified species records, shaded regions indicating the assumed range for the species if it does not occur statewide, major river systems and topographic information, and boundaries between state counties. These maps are also quite large, taking up most of a page. Moreover, each map includes a small inset showing the broader distribution of the species in the United States along with the range of other subspecies, when applicable. I reviewed field guides of various states in the Southeast (Arkansas, Florida, Georgia, Kentucky, Louisiana, Missouri, North and South Carolina, Tennessee, Texas, Virginia, and West Virginia). None of these guides include all this information in their distribution maps. What is most important to consider, however, is that the Alabama field guides include an additional bit of information that is omitted from the distribution maps of every other field guide that I reviewed: ecoregional information. Each distribution map shows the locations of the 10 herpetofaunal regions that are described in the introduction, making it obvious to any reader how the distribution of each species is related to the geologic history and physiographic structure of the state. This unique feature of the distribution maps illustrates what I believe to be the greatest strength of the Alabama field guides: they do a great job of describing the herpetofauna of

Alabama within the context of the habitats in which they evolved.

Although the authors refer to the book as a field guide, its size (6 x 1.5 x 9 inches) and weight (2.6 pounds) would make it cumbersome to carry in a backpack for a long journey. This is particularly true when considering that one will eventually need four books of similar size to cover all the herpetofauna of Alabama. This, however, hardly makes the text unusual with respect to field guides for Southeastern U.S. states. I have guides for herpetofauna of Georgia, Arkansas, and Tennessee, and I wouldn't entertain carrying any of them into the field due to their size. For such adventures, nothing beats a Peterson guide. *Lizards and Snakes of Alabama*, however, is certainly robust enough to carry on field excursions if one desires. It is bound with a 'softcover'; however, this cover is thick and sturdy, and the text is printed on heavy, high quality gloss paper.

Overall, the book has all the qualities one could want in a field guide: it is easy to read, informative, accurate, relatively thorough, durable, useful, and the design is aesthetically pleasing. However, no book review would be complete without some criticism. I am not an expert, generally, on the herpetofauna of the Southeast U.S. and, thus, I cannot provide a detailed assessment of how accurate or thorough the accounts are for each species. I did, however, carefully review the accounts of species that I have studied professionally (e.g. *Norops sagrei*; *Anolis carolinensis*). The accounts are relatively thorough, for a field guide, and accurate. My primary criticism is that many of the literature references for natural history are outdated. For example, the authors twice describe the potential for competition between the native Green Anole (*A. carolinensis*) and the non-native Brown Anole (*N. sagrei*); however, they reference literature that is many decades old, even though more recent studies exist (e.g. Stuart et al. 2014). I also found one inaccuracy for the account of Brown Anoles: females are described as producing an egg "as rapidly as every twelve

days or so". Reproduction for this species is much more rapid with eggs being produced as often as every four days (Fetters and McGlothlin 2017).

I don't particularly like the way the dichotomous keys are arranged (i.e. dispersed throughout the book). This requires a lot of page turning to properly key specimens. Moreover, the cover photos leave much to be desired. The front cover displays a Yellow-bellied Water Snake (*Nerodia erythrogaster*), one of the most drably adorned and common squamates in Alabama and in the Southeast, generally. Why not feature the rare and charismatic Eastern Indigo Snake (*Drymarchon couperi*) or a colorful Eastern Hog-nose (*Heterodon platirhinos*)? The back cover is even more puzzling. It displays a Brown Anole lizard (*N. sagrei*), which isn't even an Alabama native. Given the beauty and diversity of Alabama's squamates, this was a missed opportunity.

Despite the faults, few as they are, professionals and students who study Tennessee herpetology should seriously consider adding the Alabama field guides to their bookshelf. There is much overlap between Tennessee and Alabama with respect to herpetofauna. For example, of the 9 lizards and 34 snakes described in *The Reptiles of Tennessee* (Niemiller et al. 2013) all lizards and all but 2 snakes are described in *Lizards and Snakes of Alabama*. There are, however, an additional 3 lizards and 9 snake species described for Alabama. Thus, having a field guide to squamates of Alabama would provide additional information for lizards and snakes that occur in Tennessee and provide additional accounts for species native to the Southeast U.S. Furthermore, due to the recognition of subspecific status, the Alabama field guides include a wealth of information about taxonomy that may not be covered by *The Reptiles of Tennessee*. This equates to 20 additional subspecies accounts in *Lizards and Snakes of Alabama* (1 lizard and 19 snakes). Finally, Alabama shares 4 of the 8 level III ecoregions

found in Tennessee: Southeastern Plains, Ridge and Valley, Southwestern Appalachians, and Interior Plateau. Within these regions, Alabama has habitats that represent most (78%) level IV ecoregions. These four major ecoregions are spread across Tennessee; thus, odds are, no matter where one studies herpetofauna in Tennessee, having an Alabama field guide will help to understand the geologic history of local habitats.

I spent the first 30 years of my life in Tennessee and still consider it home; however, I now understand why folks refer to Alabama as “Alabama the Beautiful”. The biodiversity of the state is breathtaking, and this is certainly true for its squamates. Serious students of Tennessee herpetology should not only add this field guide to their shelf; they should take some time to wander south and chase after Racerunners (*Aspidoscelis sexlineata*) and Florida Pinesnakes (*Pituophis melanoleucus mugitus*) through the upland longleaf pine habitats of Conecuh National Forest, comb the Red Hills in search of the unique and ancient Red Hills Salamander (*Phaeognathus hubrichti*), or go snorkeling

around the Mobile Bay area to observe the enormous diversity of turtle species it supports. Having field guides to the herpetofauna of Alabama would certainly come in handy for such adventures.

## LITERATURE CITED

- Fetters, T.L. and J.W. McGlothlin. 2017. Life histories and invasions: accelerated laying rate and incubation time in an invasive lizard, *Anolis sagrei*. Biological Journal of the Linnean Society 122:635–642.
- Mount, R.H. 1975. Reptiles and amphibians of Alabama. Alabama Agricultural Experiment Station, Auburn.
- Niemiller, M.L., R.G. Reynolds, and B.T. Miller. eds. 2013. The reptiles of Tennessee. University of Tennessee Press, Knoxville.
- Stuart, Y.E., T.S. Campbell, P.A. Hohenlohe, R.G. Reynolds, L.J. Revell, and J.B. Losos. 2014. Rapid evolution of a native species following invasion by a congener. Science 346:463–466.