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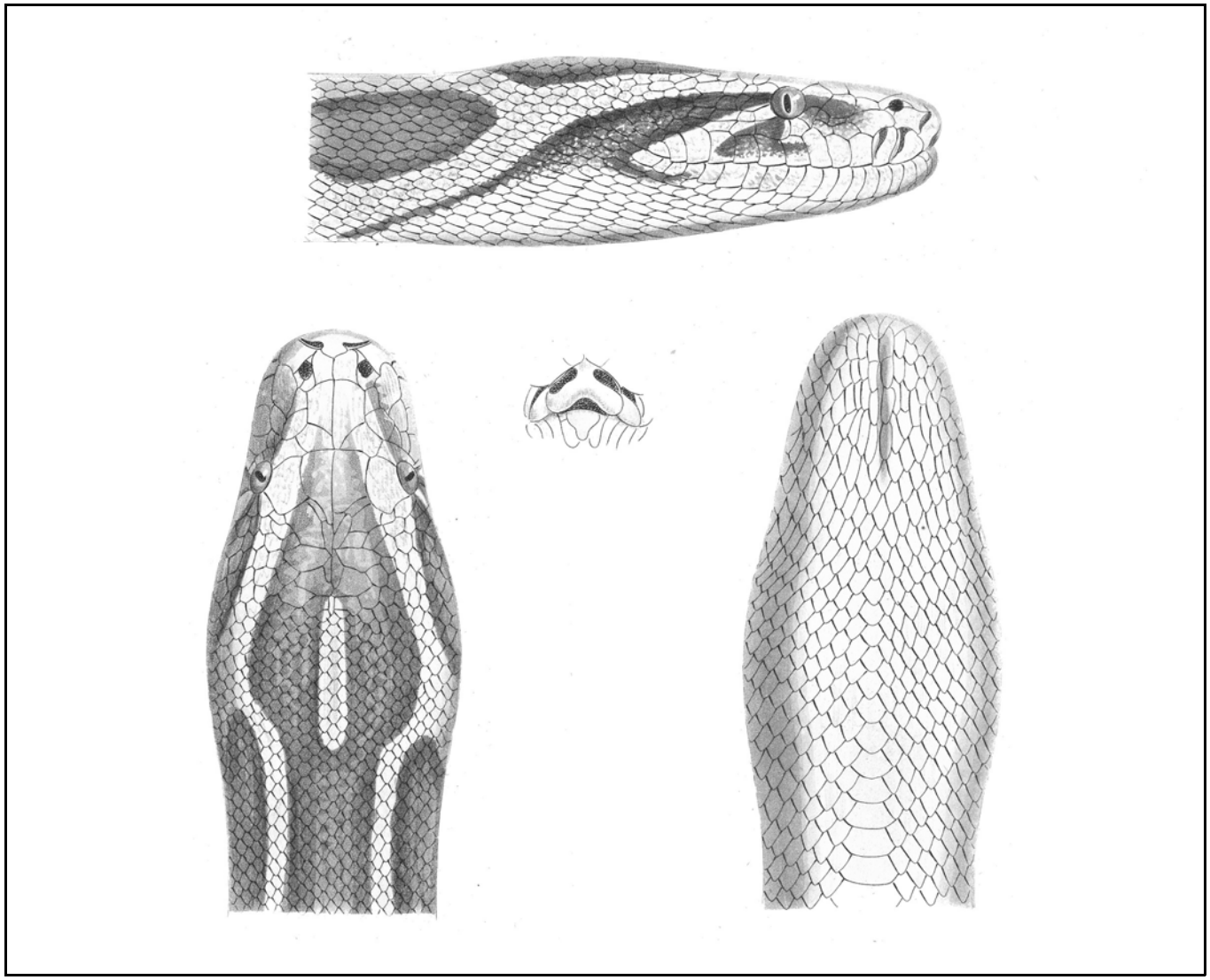

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Cover: Burmese python, *Python bivittatus*. Drawings from *Essai sur la Physionomie des Serpens* by Hermann Schlegel, 1837.

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Book Review: *Giant Snakes, A Natural History* by John C. Murphy and Tom Crutchfield 2019. Book Services US (www.bookservices.us) Paperback $38.95 (ISBN 978-64516-232-2). Hardcover $59.95 (ISBN 978-64516-233-9)

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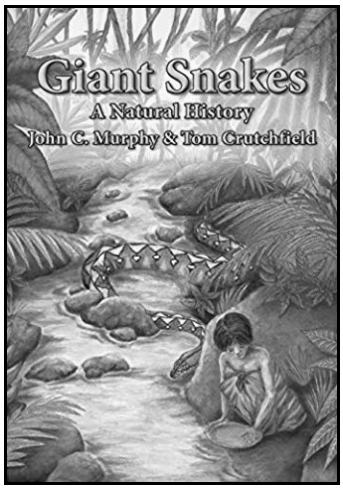
Giant Snakes is available in both hardcover and softbound versions. The cover is illustrated with a painting by Nathalie Aall; it depicts a small person on the edge of a stream who appears imminently to be confronted by a very large reticulated python. We have the hardcover edition and it has 346 numbered pages, plus 16 introductory pages. There are unnumbered front and end images, each an image of a reticulated python. Each of the 13 chapters begins with an illustration. There are four appendices, five pages of glossary, an extensive list of references with 776 entries, and an index.



Scattered through the text are 11 tables and 75 figures. Figures may be photographic images, maps, graphs or drawings. Thirty-one figures contain images, and some figures have more than one image; not counting the image at the beginning of each chapter, there is a total of 66 images of snakes in the book and nine of landscapes. Some of the species accounts have figures that are maps and there are maps that illustrate distribution, winter/summer averages of precipitation, and seasonal temperatures in the areas of the distributions of some of the taxa.

The authors are both knowledgeable and experienced with giant snakes. John Murphy wrote *Tales of Giant Snakes* (1997) with Robert Henderson. Murphy has written several more books on the topic of snakes. Tom Crutchfield was an internationally renowned reptile dealer; in the late 1970s he was one of the founders of Herpetofauna, Inc., which for many years was the largest reptile business in the world. Both authors are described in the book as having decades of experience with giant snakes.

There is a lot in the book that inspires interest and marvel in the giant snakes. The book is informative and well-researched; it contains much information about the giant snakes that is otherwise unavailable except in the original scientific literature. There is a lot in the book on the genetic relationships and the family trees of the giant snakes and their relatives. The last appendix is a list of attacks and deaths on humans by giant snakes. There is a chapter on the Booidea, the boa superfamily, and another on the Pythonidae, the python family; the relatives of the giant snakes are identified, some examples are illustrated, and information is provided for each of the clades that comprise those two groups. This book is a must-have for anyone with an interest in the giant snakes.

We, too, have decades of experience with boas and pythons, including all of the giants, and all but one of the near-giants. We have spent most of our adult lives with them, and we have bred most of them in captivity. We have written extensively on them, we have read and collected herpetological and herpetocultural literature—antiquarian and current—and we particularly collect publications and papers on boas and pythons.

At the beginning of *Giant Snakes* it is written "This book is dedicated to the survival of Giant Snakes around the world." It then seems something of a contradiction that the first paragraph in the first chapter is a detailed description of how in June 2018 a 54-year-old grandmother was killed and eaten by a 23-foot-long reticulated python while tending her garden. It does not seem like a wild conjecture that many readers, immediately after opening this book, will conclude that the world would be a better place if giant snakes were exterminated with all possible haste.

Throughout the book the authors refer to the giant snakes as "monsters of God," borrowing that phrase from the title of a book by David Quammen (2003). We suspect that the authors came to use that name based on an awareness and a wariness that comes with decades of experience with large snakes. A keeper can never forget that a giant snake is potentially dangerous, even deadly. This realization comes to all keepers who have extensive time and experience with giant snakes.

The book does not appear to have been carefully edited, as evidenced on page ii where the second author's name is misspelled. Scattered throughout the book are a variety of errors, ranging from minor grammatical issues to some more serious issues. Some problems need to be pointed out in a review, and we begin with the maps. The maps such as the two in Figure 6-7 on page 140 appear to have been downloaded from the internet, then modified by adding icons representing localities for the particular species, labeled, and then printed. Some of the maps appear to have been low resolution images that were printed at high resolution. Close examination shows them to be so grainy and pixelated as to obscure fine detail on the maps. For example, on the *Python sebae* clade map, the blue stars representing *P. natalensis* are difficult to discern from the blue squares representing *P. sebae*. We also note that the two maps are incorrectly labeled. The upper map is for the cool time of the year and is labeled as the January Mean Temperatures, but January is the hottest time of the year in the southern hemisphere. The lower map, obviously illustrated as the hot time of the year, is labeled Mean July Temperatures, but July is the coldest time of the year.

Both maps are color-coded to show the Mean Average Temperature across the African continent. The American Meteorological Society defines "mean monthly temperature" as the average of all the recorded temperatures taken at hourly observations at a given locality, day and night, over the course of a month. All of the temperature maps in the book are color-coded, and there is a legend on each map that shows the hottest mean temperature represented by a dark orange color to be 39.4°C (103°F) and the coldest blue color to be a mean temperature of −53.6°C (−65°F).

The maps then indicate that all the localities for both species to have a mean summer temperature (that's the average of the day and night temperatures for the month) of 103°F—unbelievably hot! Assuming the yellow color in the middle of the legend represents a temperature intermediate between the hot and cold extremes, then it represents about 20°F to 30°F and most *sebae* and *natalensis* localities are found at that mean temperature in the coolest month. According to the map, some *natalensis* spend the coolest month at mean temperatures of −40°F to −50°F.

On page 204, Figure 10-4 shows four maps of South America with green diamonds representing the distribution of the green anaconda on all four maps. Two of the maps are January/July mean temperature maps and two are January/July precipitation maps. Again the labels for the temperature maps are switched, and the mean temperature of the July winter is an extraordinary 103ºF throughout the range, with most January mean summer temperatures at anaconda localities about 20ºF to 50ºF.

The two monthly precipitation maps in Figure 10-4, and all other precipitation maps in the book, are non-informative. The legend illustrating the range of the precipitation shows white being 0 mm of precipitation for the month, and the dark blue end of the scale represents >50 mm precipitation for the month. The problem is that 50 mm (~2 inches) is not very much precipitation and many of these areas receive significantly more than 2" of rain in the wettest months.

Temperature and precipitation maps are not provided for every species. The precipitation maps for the *Python molurus* clade on page 113 have four icons on the maps, but only three are identified. "Orange squares" are described to represent *Python bivittatus progshai*, but there are two disjunct island localities marked with orange squares. The pale orange squares on Sulawesi are the locality where *P. b. progshai* is found, and the dark orange squares on Sri Lanka are surely meant to represent localities for *Python molurus pimbura*.

Figure 3-8 on page 65, Figure 3-9 on page 68, and Figure 3-11 on page 69 are identified as the giant snake distributions plotted for the entire world. These maps all share the same icons representing the giant snake taxa and the key to the icons on these maps is found in the caption to Figure 3-8. Here it states that the icons for *Python molurus molurus* are green squares and for *P. m. pimbura* a red square. However, these icons are not included on the maps and the distributions of the two taxa are absent from these maps. The opposite problem exists for the scrub python, *Simalia kinghorni*, which is not mentioned at all in the caption, but has purple stars on the maps to indicate its distribution.

Figure 4-1 on page 76 has four line drawings of head scalation with some of the scales identified. Two drawings are of *Malayopython reticulatus* and two are *Boa constrictor*. The source of this figure is not credited. On the dorsal view of the *M. reticulatus* the parietal scale is labeled with an H, which misidentifies it as an occipital scale. In the lateral view of *M. reticulatus*, the supraocular is labeled with an E, which misidentifies it as the eye. In the dorsal view of the boa, the label E, intended to identify the eye, is situated atop the head amidst several lateral granular frontal scales.

Our favorite picture in the book is the image by Joe Sambono at the beginning of Chapter 5 of the absolutely massive scrub python—what an eye-opening picture! The map of the distribution of the scrub python, *Simalia kinghorni*, Figure 5-2 on page 93 is incorrect, as is the description of the distribution in the text. This taxon does not occur in New Guinea. It is known only from northeastern Queensland, Australia. This mistake in the distribution of *S. kinghorni* also occurs in Figures 3-8, 3-9, 3-10 and 3-11, maps that show the global distribution of all the giant snakes.

Murphy and Henderson (1997) considered the scrub python, *Simalia kinghorni*, to be a near-giant snake species. In this book the status of *S. kinghorni* has been raised to be included as one of the giant snake species. On page 92 the authors state that their decision to upgrade *Simalia kinghorni* is based on the report of Bickford (2004), but that published report refers to a 5.9 m amethystine python, *Simalia amethistina*, in Chimbu Province, Papua New Guinea. The scrub python, *S. kinghorni*, does not occur in New Guinea.

In Murphy and Henderson (1997) on page 25 is a story from W. W. Lamar about killing an anaconda that was then carefully measured at 24'7". The snake was then skinned and, even though care was taken to not stretch the skin, the removed skin was measured 34'7", a difference of exactly 10 feet. In this book this story is repeated, again on page 25, but here the measures of length are given in meters. The actual measurements from the original story, converted to metric and rounded to a single decimal place should be: 24'7" = 7.5 m; 34'7" = 10.5 m; 10' = 3.0 m. In this book those three lengths in meters are reported as 7.4 m, 13.5 m and 3.9 m. Given the length of the snake and this length of the skin, in this second recounting of the story, the skin is stretched 6.1 m (not 3.9 m), a little more than 20 feet. This clearly highlights another way that the lengths of giant snakes can get distorted—incorrectly converting between the English and metric systems of measurement.

On page 50 the first two sentences in the caption of Figure 3-2 are written as "Infrared sensing organs have evolved in the booids, pythoninds [sic], and pit vipers. Booids and pythonids have pits located in the labial scales, while pit vipers have the pit in the loreal region of the face." In fact, when present, the temperature-sensing organs of boas are found in the skin between the labial scales, not in the scales. When present, the temperature-sensing pits of pythons are located in the labial scales (Maderson, 1970; Goris et al., 2007).

On page 78 the authors state "The northern disjunct populations of *P.* [*Python*] *brongersmai* were described as the new species *P. kyaiktiyo* from Mon state, Myanmar." In fact, there is only one single specimen of short-tail python ever reported from Myanmar, that being the holotype of *P. kyaiktiyo*—it was never identified as northern disjunct populations of *P. brongersmai*.

On page 81, the snake pictured in Figure 4-3 is misidentified as a green tree python, *Morelia viridis*. It is a northern green python, *Morelia azurea*.

In Chapter 6, "Giant Pythons in the Afro-Asian Clade," on page 118 the authors discuss the distribution of the Burmese python. In particular they ponder why Burmese pythons are not found on the Malay Peninsula, and make the following statement: "Species of the short python group [*Python curtus*-complex]

will readily eat other pythons." They go on to say "This is not supported in the literature, but is supported by observations of captive short pythons." The blood python, *Python brongersmai,* is the only "short python" species on the Malay Peninsula. The authors suggest the possibility that blood pythons perhaps are such "highly effective predators" that blood python predation on Burmese pythons has eliminated them from that region.

In our extensive experience with blood pythons, we have never observed cases of ophiophagy. There are pythons that are known to be ophiophagous, notably in the genera of *Aspidites*, *Bothrochilus* and *Apodora*; however, species in the genus *Python* are not described as such. Of course, captive snakes of all sorts are known to accidentally eat cagemates in some circumstances of maintenance and not because of any preference for ophiophagy.

We agree with the statement of the authors that ophiophagy in short-tail pythons is not supported in the literature. Shine et al. (1999), in conjunction with several snake skinning businesses in different localities in Sumatra, dissected 2036 blood pythons (*Python brongersmai*) and 181 Sumatran pythons (*Python curtus*). Both of these species are sympatric with reticulated pythons. Most, but not all, pythons contained food items. In blood pythons there were 1296 rats, and 114 other prey items, those being miscellaneous mammals and a few birds, notably chickens. In the Sumatran pythons there were 127 rats and 8 other animals. There was no evidence of reptiles of any sort found in the stomachs of this large sample of short-tail pythons.

On page 133, Figure 6-5, there is a very nice drawing done by J. B. Murphy that illustrates combating male Burmese pythons. The figure, though credited to Gillingham and Chambers (1982), is properly cited as from Barker et al. (1979).

On pages 137 and 138 is a short account of the Ceylonese python, *Python molurus pimbura*, a subspecies not generally considered to be valid. The authors present no data, reason, or argument for recognizing this taxon. This is a taxonomic act that lies outside the objectives of this book. The taxon *pimbura* first came into the literature in 1945 on the basis of an abbreviated and poor description by Deraniyagala. Constable (1949) did not recognize this subspecies even though he was fully aware of it. Deraniyagala (1955) then published a more detailed description, but it contained several contradictions. Stimson (1969) did not recognize *pimbura* and placed it in synonymy with *P. molurus*. There it remained, mostly ignored by python taxonomists and publications, including Murphy and Henderson (1997) and McDiarmid et al. (1999). Schleip and O'Shea (2010) recognize *pimbura* as a *subspecies inquirenda*, which means it is a subspecies of doubtful identity requiring further investigation; they did not provide any new data or argument to support removing this name from synonymy with *P. molurus*. Subsequent publications continue to not recognize this subspecies, including Reynolds et al. (2014), Wallach et al. (2014), Barker et al. (2015), and Barker et al. (2018). It is our recommendation that the name remain in synonymy of the nominate subspecies until future studies can determine the status of this taxon. At this time *Python molurus* has no valid subspecies.

At the beginning of Chapter 8, page 174, West African burrowing boas, *Calabaria reinhardtii* are described to constrict prey in some circumstances. However, in the last paragraph of the chapter it is stated that *Calabaria* differs from other species in the boa superfamily by not killing prey with constriction. We have kept and bred this species, and have observed them to be strong constrictors.

In Chapter 9, the boa constrictor complex is discussed. There is information that will be of interest to keepers and aficionados of this clade of constrictors. Throughout the book there is some confusion created by the authors by referring to the same taxon with different common names. As an example from this chapter, in the section on *Boa constrictor ortonii* the authors refer to the "Peruvian Dry forest Boa" at the beginning of a paragraph and at the end refer to it as "Orton's Boa."

On page 193 it is related that Dr. Roy McDiarmid found 150 *Boa imperator* crossing the roads in Sinaloa, Mexico, in the summer of 1962 (Hardy and McDiarmid, 1969). Boas from that area are now identified as *Boa sigma*.

Chapter 11 is about giant snakes in captivity. The authors discuss the responsibilities, liabilities, and important issues surrounding and concerning keeping these giant snakes in captivity. On the first page the authors state that "… giant pythons and boas are kept in ever-increasing numbers by hobbyists." Yes, there are increasing numbers of dazzlingly beautiful reticulated pythons and Burmese pythons, but we are not aware of any publication or poll that shows any significant increase in the numbers of people working with giant snakes.

One change that likely has dropped the numbers of giant snakes in captivity is that significantly fewer giant snake species are imported into the country. Strict local and state regulations and other legal controls have made the possession and breeding of giant snakes increasingly difficult and expensive in many areas.

Most of the giant and near-giant snakes are rare in captivity, but reticulated pythons and Burmese pythons remain popular. Future legislation controlling and regulating possession and transportation of the giant species will increase, and litigation and insurance make keeping the giants an increasingly difficult business. We love the giant species, but we made the choice to stop keeping them and breeding them in 1998.

The beginning of Chapter 12 is an excellent recounting of the history of the Everglades region. This chapter is a discussion of Burmese pythons in South Florida, the only feral giant snake in North America. On page 258 the distribution of the Burmese python in Florida is incorrectly described as illustrated by the EDDMapS map of *Python bivittatus* seen on the facing page, page 259. We assume that the authors define the distribution of this species as that area where exists a viable reproducing population. The distribution of the established and reproducing population of this python is restricted to the Everglades Historic Region, primarily in the four southernmost Florida counties.

The EDDMapS system began in 2005, and the Burmese python researchers placed all museum records and other records past and present for Burmese pythons on the map for that taxon. To create a dot on the EDDMapS one must report a sighting and give the location of the sighting. No photo, specimens, or other

physical evidence is necessary to create a dot. For example, there are two dots in Washington County, Florida, each representing a report of a python sighting. One report in was in 2010, the other in 2014. No physical evidence was included with these reports. There are no reports from the county since. There was no "population" of Burmese pythons at that locality then, nor is there now.

All of the localities on the EDDMapS map north of Hendry County, Florida are essentially the same. Some are represented by museum specimens, cell phone pictures, or small town newspaper reports. Some, however, are reports based solely on phone calls or emails. There are dots on the Burmese python EDDMapS that extend to Tennessee and New York—we are certain that the authors do not include those localities in the US distribution of the species. Likewise, all of those localities, dots on the map north of the Everglades Historic Region, are reports of single animals that are either escaped or released captives, misidentified snakes, or fraudulent reports.

Continuing Chapter 12 in the section titled "They Adapt" beginning on page 263, the authors state in the second sentence of the third paragraph that "Burmese Pythons can survive in southern Florida and Texas." Ostensibly the comment of the authors regards suitable climate for Burmese pythons, and not that there exists any possibility that Burmese pythons might establish a viable reproducing population in Texas, but this statement needs to be clarified. There might be a tiny corner of extreme south Texas where suitable climate exists for this giant snake species, but more than suitable climate is required for any giant snake species to be able to establish a breeding population.

Burmese pythons cannot establish in South Texas for one simple reason—there is no Everglades National Park in South Texas or anything even remotely similar to the ENP. There are numerous contributing factors why Burmese pythons cannot establish in South Texas including: the flora of South Texas (Tamaulipan thorn scrub), the rainfall patterns, the absence of significant amounts of surface water, the fact that more than 95% of natural habitat is destroyed and is now agricultural, the intense traffic of agricultural equipment on the agricultural land, the intense burning of sugar cane fields, the near-complete absence of suitable underground refugia larger than armadillo burrows, the human population density, the numbers of roads, the proximity of those roads to each other, and the traffic on those roads—the probability that any of the giant snake species, including Burmese pythons, will ever be established in South Texas is too small to be measured.

This same section of Chapter 12, "They Adapt," starts out with the promise that research has shown that Burmese pythons may evolve metabolic or behavioral means to survive freezing weather in South Florida. It's not mentioned that Florida Burmese pythons will die of exposure in freezing weather just as readily today as they did in the last Florida extreme freeze event in 2010.

The drawing in Figure 13-2, page 283, should be credited to Wilson et al. (2010), as it is taken from the description of *Sanajeh indicus*.

Appendix 4 lists a variety of attacks on and deaths of humans by giant snakes, divided into sections by species. On page 306 in the section of attacks by northern African rock pythons, the authors suggest that based on the poor photo available to them, the accused snake responsible for the fatal attack in 1999 in Carlyle, Illinois, might have been a boa constrictor. In fact the snake was autopsied by the local veterinary coroner and identified by experts—it was a northern African rock python, *Python sebae*.

We were reading through the text and on page 18 came to a section in Chapter 2 with the heading "Pritchard's Rule," apparently a means to predict the maximum size of a snake species. We were unfamiliar with this maxim and we looked to the References section of the book to see the source, but the citation was not listed. With some detective work we were able to find a statement of this rule in Pritchard (1994). As we continued reading through the book we found that there are a number of citations that have been overlooked and are not found in the References section. We did not go through the book checking every reference, but we did take note of several other citations in the text not found in the References. We have placed those absent references that we were able to identify in the Literature Cited and References section of this review, designated with asterisks.

A more rigorous alphabetizing of the references as well as distinguishing multiple citations by various authors in both the text and reference sections would be very helpful to readers.

The various problems we have here highlighted in this review are but a small part of the book. This book is a serious addition to a herp library and a collection of python and boa literature. We have made a place for it on our shelves.

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Book Review: *Secrets of Snakes: The Science beyond the Myths* by David A. Steen 2019. 184 pp. Texas A&M University Press. College Station, Texas. W. L. Moody Jr. Natural History Series Number 61. ISBN: 978-1-62349-797-2 Softbound $25.00 ($23.75 through Amazon.com)

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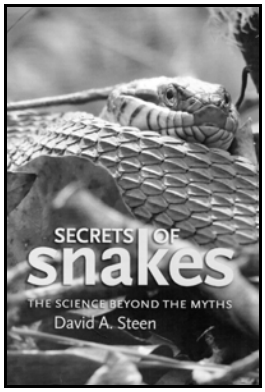
I must admit that I was initially inclined to dismiss this book as just another "facts about snakes" tome. However, after reading Harry Greene's glowing praise in his foreword, I was convinced that this volume was different — and so it is. Author David A. Steen has selected this list of rules of thumb, myths, and misunderstandings based on his years of experience interacting with the public through first a newspaper column, then a widely read blog (http://livingalongsidewildlife.com/), and more recently, via Instagram and Twitter. Each short chapter addresses a subject that Steen has learned is important by listening to his readers. Consequently, the topics he has chosen to address are remarkably current rather than tired old concerns that have fallen by the wayside.



The book's content is divided into three main parts. Part I (Chapters 1–8) deals not so much with myths but rather with the tips, shortcuts, and rules of thumb that have been devised to provide the general public with simple black/white, true/false rules they can use to easily distinguish venomous snakes from non-venomous ones. The problem is that, while each of these rules is mostly true, each should also be constrained by caveats that are usually left unspoken because the stipulations require more explanation or knowledge than is typically provided (or wanted) to be completely reliable. Steen would have the public become trained to *recognize* types of snakes rather than merely attempting to *identify* them, much as one *recognizes* friends and relatives rather than *identifying* them as different from strangers. Unfortunately, this requires experience and exposure, neither of which the non-herper may be expected to possess. For example, most herpers with actual experience with Coral Snakes do not need to refer to the old rhyme "red touch yellow, kill a fellow, red touch black, venom lack." The gestalt (i.e., suite of characters) of Coral Snakes differs so greatly from that of their mimics that *recognition* occurs immediately, without any need to refer to the simplistic rhyme. But that *recognition* comes from experience that the average person does not have (nor wish to acquire). Additionally, a couple of the qualifications that Steen attaches to this particular "rule" is that most Coral Snakes will have a variable amount of black spotting within (i.e., touching) their red rings and that the rhyme is valid only in the United States. Other "rules" covered in this section include: that venomous snakes may be distinguished by their triangular heads, the difference between Cottonmouths and "water moccasins," distinguishing between Cottonmouths and Copperheads, black snakes, the swimming posture of Cottonmouths vs. water snakes, tail vibration, and pupil shape as a distinguishing character. I personally admit to having frequently referred questioners to many of these "rules" simply to provide them with the succinct answer they obviously wanted.

Part II (Chapters 9–19) deals more with actual myths and misconceptions about snakes. One of the broader definitions of a myth is that it is a widely held but false belief or idea. Myths typically arise from the human need to "explain" mysterious, unknown, or otherwise baffling phenomena. In herpetology, snakes are, of course, the subject of the most mythical beliefs. If, as a herper, you are ever in a position to interact with the general public concerning snakes, you *will* encounter such beliefs. And you should be advised that the perpetrators will often cling tenaciously to their stories, with some even taking offense when offered facts challenging their tales. On such occasions, Steen invokes the advice of the late Carl Sagan that "extraordinary claims require extraordinary evidence." He suggests photographs or videos as acceptable support but, absent those, his advice is to calmly state that "the available evidence does not support the account." Sometimes, however, it may be best to avoid directly contradicting these anecdotes since it will distract from your intended message. My boyhood herp mentor, the late Jack Reid, whom I occasionally assisted with snake presentations to various groups, had what I consider the perfect response when regularly and persistently regaled with accounts of being "chased" by snakes. He would say: "Well, I wasn't there, but in my experience if snakes did actually chase people, they would be a lot easier to catch!"

Part III (Chapters 20–29) concentrates on "Understanding Snakes" and begins (Ch. 20, "How Big Do Rattlesnakes Get?") with the ubiquitous internet deception that Steen credits with stimulating him to write this book. The familiar hoax involves a digital photo of someone holding up a deceased rattlesnake of seemingly impressive dimensions at the end of a pole or set of tongs. The exaggerated apparent size of the snake is obtained, of course, by means of an optical illusion known as "forced perspective," where the snake is deliberately held closer to the camera than the nearest reference object (usually the person holding the snake). This old trick has been used by anglers for decades to falsely enhance the size of their catch, but apparently snake fabulists waited for the advent of digital photography and the internet to exploit the illusion. Steen has been dealing with this particular hoax on his blog for well over a decade and it is worth a visit there (https://livingalongsidewildlife.com/?p=5135) to appreciate how persistent this prank has been. Many of you have probably received such an email sent by a curious friend or relative questioning its veracity; I usually respond by sending them the link to Steen's blog post(s) (above). This last section of the book also contains some questions for which the jury (i.e., conclusive scientific evidence), in some cases, is still out, such as: "Is relocating a snake a death sentence?" along with "Can snakes bite underwater?" "Why doesn't it make sense to kill snakes in your yard?" "What is the most dangerous snake?" "Is this snake 'poisonous'?" "Will it bite?" "What is a 'mating dance'?" "Are snakes territorial?" and "How can I keep snakes out of my yard?" Steen responds to these questions by referring to relevant studies, some of which which have obtained differing results. However, I suspect that more interested or advanced readers would have appreciated actual literature citations for the various studies that are frequently referenced.

This thin volume is sturdily bound with durable covers. It is printed on heavy, glossy paper stock and contains more than 100 color photographs relevant to the species and/or behaviors being discussed. Additionally, each of the three main sections of the book is introduced with the exceptional artwork of Sarah Dahlinger. Typographical errors are rare or absent and the only lapse that I detected was a photo of an Eastern Diamond-backed Rattlesnake (*Crotalus adamanteus*) on page 107 that was cropped and repeated on the next page. But the caption for the second image refers to a Timber Rattlesnake (*Crotalus horridus*), including an attribution to a different photographer.

Steen's writing style is light, conversational and frequently humorous, probably thanks to his extensive blogging experience. He employs scientific nomenclature only when needed and thoughtfully defines technical terms and concepts that cannot be avoided in his explanations. Consequently, even though he holds a Ph.D. and is a university professor, he never comes across as a stuffy academic. Members of the nomenclature police, however, will doubtless notice that he has generally adhered to the standards published by the Society for the Study of Amphibians and Reptiles (SSAR) [Crother, 2017] for the sake of consistency even though he seems to disagree with some of them, as explained in an end note to Chapter 3. This includes his use of such SSAR-endorsed compounding eyesores as "cornsnake" rather than "Corn Snake." Steen does, however, deviate from SSAR orthodoxy by failing to capitalize the accepted common names of snake taxa, although this may be more due to the publisher's copy editor favoring certain journalistic style manuals instead. There is, nevertheless, a difference between "smooth green snake" and "Smooth Green Snake."

To sum up, I found this book to be surprisingly applicable to many encounters I have had when attempting to explain snakes to members of the general public. It will prove to be a valuable asset, particularly to less experienced herpers who will inevitably be called upon to defend their avocation to those less enlightened. Even more veteran herpers, such as this reviewer, can derive considerable benefit from having such a thorough yet concise compendium of current myths and beliefs readily at hand.

Dr. David A. Steen is a wildlife ecologist and conservation biologist. He has written this book and maintains his blog and other social media presence because he feels that outreach about natural history and conservation is important and helps foster an appreciation of wildlife and wild landscapes. He is the Research Ecologist of the Georgia Sea Turtle Center on Jekyll Island, Georgia, the Executive Director of The Alongside Wildlife Foundation, and serves on the Board of Directors of the Wildlands Network.

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Notes on Reproduction of Columbia Spotted Frogs, *Rana luteiventris* (Ranidae: Anura)

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Abstract

I conducted a histological examination of gonads from 42 *Rana luteiventris* collected in Idaho, Washington, Wyoming and British Columbia. Males with sperm in the testes were from June and July. The smallest mature male (late recrudescence, just prior to sperm formation) measured 43 mm SVL. Females with mature oocytes were from July, August and September. The smallest mature females (in spawning condition) measured 55 mm SVL. The significance of autumn females in spawning condition is discussed.

Rana luteiventris Thompson, 1913 ranges from northern British Columbia, the Yukon and panhandle of southern Alaska through southwestern Alberta, western Montana and western Wyoming (Dodd, 2013). Taxonomy usage is in accordance with Frost (2019). Times of breeding vary depending on locality and elevation but mainly encompass the spring (Dodd, 2013). Wright and Wright (1970) reported breeding of *Rana pretiosa luteiventris* started in March or April. In this paper, I present data from a histological examination of *R. luteiventris* gonadal material from different states in its range. Utilization of museum collections for obtaining reproductive data avoids euthanizing specimens and eliminates the need for collecting permits.

A sample of 42 *R. luteiventris* collected 1940 to 1976 in British Columbia (n = 3); Idaho (n = 20); Montana (n = 4); Washington (n = 13); Wyoming (n = 2) consisting of 8 adult males (mean snout–vent length, SVL = 51.5 mm ± 5.5 SD, range = 43–60 mm), 17 adult females (mean SVL = 63.4 mm ± 6.9 SD, range = 53–76 mm), 17 subadults (mean SVL = 33.7 mm ± 8.1 SD, range = 21–48 mm) was examined from the herpetology collection of the Natural History Museum of Los Angeles County (LACM), Los Angeles, California, USA (Appendix). An unpaired t-test was used to test for differences between adult male and female SVLs (Instat, vers. 3.0b, Graphpad Software, San Diego, CA).

A small incision was made in the lower part of the abdomen and the left testis was removed from males and a piece of the left ovary from females. Gonads were embedded in paraffin. Sections were cut at 5 μm and stained with Harris hematoxylin followed by eosin counterstain (Presnell and Schreibman, 1997). Histology slides were deposited at LACM.

The testicular morphology of *R. luteiventris* is similar to that of other studied anurans as described in Ogielska and Bartmañska (2009a). Within the seminiferous tubules, spermiogenesis occurs in cysts which are closed until the late spermatid stage is reached; cysts then open and differentiating sperm reach the lumina of the seminiferous tubules (Ogielska and Bartmañska, 2009a). There were three stages observed in the testicular cycle of *R. luteiventris* (Table 1): (1) "Late recrudescence" just prior to the start of sperm production, germinal cysts, including spermatogonia, primary, secondary spermatocytes, occasional spermatids but no sperm are present; (2) "Spermiogenesis" sperm cysts have opened and clusters of sperm are present in the lumina of the seminiferous tubules (3) "Depleted spermiogenesis" reduced quantity of sperm in the seminiferous tubules, when compared to stage 2. The presence of depleted sperm quantities in males from August and September (Table 1) suggests that the *R. luteiventris* testicular cycle was nearing conclusion. Absence of male samples from late winter, early spring and only one male from May did not allow a complete description of monthly changes in the testicular cycle. However, my data in Table 1 indicates *R. luteiventris* produce sperm in spring to early summer. The smallest mature male *R. luteiventris* (sperm present) in my sample measured 46 mm SVL (LACM 91516) and was from August. One slightly smaller non-reproductive male, 43 mm SVL (LACM 28808 from May) was arbitrarily considered to be an adult.

The mean SVL of *R. luteiventris* females was significantly larger than that of males (t = 4.2, df = 23, P = 0.0003). The ovarian morphology of *R. luteiventris* is similar to that of other anurans in being paired organs situated on the ventral sides of the kidneys; in adults ovaries are filled with diplotene oocytes in various stages of development (Ogielska and Bartmañska, 2009b). Mature oocytes are filled with yolk droplets; the layer of surrounding follicular cells is thinly stretched. Two stages were present in the spawning cycle (Table 2): (1) "Ready to spawn" in which mature oocytes predominate; (2) "Not in spawning

Table 1. Three monthly stages in the testicular cycle of 7 adult male *R. luteiventris*.

Month	N	Late recrudescence	Spermio-genesis	Depleted spermio-genesis
May	2	1	1	0
June	1	0	1	0
July	1	0	1	0
August	2	0	0	2
September	1	0	0	1

Table 2. Two monthly stages in the spawning cycle of 18 adult female *R. luteiventris*.

Month	N	Ready to spawn	Not in spawning condition
May	3	0	3
July	5	4	1
August	6	4	2
September	4	4	0

Table 3. Times of breeding by state for *Rana luteiventris*. * = reported as *Rana pretiosa*.

Location	Times of breeding	Source
Alberta	as soon as ice melts	Russell and Bauer, 2000
British Columbia	April–May in south; June at high elevation	Matsuda et al., 2006
*Idaho	April and May	Linder and Fichter, 1977
Montana	March, lower valleys; June, High Mountains	Werner et al., 2004
Washington	March–April (Columbia Basin); May–June (higher elevation)	Jones et al., 2005
Washington, Idaho	spring	Davis and Verrell, 2005
Wyoming	May or June	Lewis, 2011

condition" in which early diplotene oocytes predominate. The smallest mature *R. luteiventris* females (ready to spawn) measured 55 mm SVL (LACM 54026, 54038) and were from September. One slightly smaller female SVL = 53 mm, not in spawning condition (LACM 91517) from August, was arbitrarily considered as an adult. The absence of female *R. luteiventris* samples from early spring and June did not allow a complete description of monthly stages in the ovarian cycle. Nevertheless, my data indicate spawning is underway in July (Table 2).

Varying amounts of atresia were noted in 8/12 (67%) *R. luteiventris* spawning females (Table 2). Atresia is a widespread process occurring in the ovaries of all vertebrates (Uribe Aranzábal, 2009). It is the spontaneous digestion of a diplotene oocyte by its own hypertrophied and phagocytic granulosa cells which invade the follicle, and eventually degenerate after accumulating dark pigment (Ogielska and Bartmañska, 2009b). It is common in the amphibian ovary (Saidapur, 1978). One non-spawning female (LACM 116058) exhibited a massive follicular atresia in which many of the follicles had been replaced by brown masses (late atresia). See Saidapur and Nadkarni (1973) and Ogielska et al. (2010) for a detailed description of the stages of follicular atresia in the frog ovary.

Regarding my sample of 17 juveniles, I am unable to ascertain when they would have reached adult size. However, Matsuda et al. (2006) reported newly transformed *R. luteiventris* froglets are about 25–30 mm long; females reach maturity in five years and males in four years. Seven of my *R. luteiventris* juveniles were in the 25–30 mm range and were likely young of the year. Two were from July and five from September.

Regarding the *R. luteiventris* females in spawning condition from later in the year, August and September (Table 2), previous records of reproduction for *R. luteiventris* indicate spawning occurs in spring (Table 3). It is plausible the gravid *R. luteiventris* females from August–September would have kept their eggs until spring before spawning. This appears to be the case for *Rana boylii* from California as reported by Goldberg (2019) in which autumn females with mature oocytes apparently delay spawning until spring (Zweifel, 1955). It may be advantageous for frogs to be capable of spawning soon after emergence from hibernation, rather than needing to undergo a period of yolk deposition.

Acknowledgments

I thank Greg Pauly (LACM) for permission to examine *R. luteiventris*.

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Appendix

Forty-two *R. luteiventris* examined by state borrowed from the herpetology collection of the Natural History Museum of Los Angeles County, Los Angeles, California USA.

British Columbia: South Cariboo District, LACM 51351–51353; **Idaho:** Bonner County, LACM 15290, 54026–54030, 54032–54039, 76527–76529, 76532, 76533, 116058; **Montana:** Ravalli County, LACM 91516–91519; **Washington:** Okanogan County, LACM 51354; Pond Oreille County, LACM 51357; Stevens County, LACM 51356; Spokane County, LACM 60560, 60561, 60563, 60557–60559; Walla Walla County, LACM 28808–28811; **Wyoming:** Park County, LACM 8511, 91520.

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A Herpetologist's Perspective on the Movie *Snakes on a Plane*

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Most of us who saw it probably all *think* that we are familiar with the movie *Snakes on a Plane*. I will admit that at first, I *thought* I was familiar with it as well. I went to see it at the theater when it first appeared. Doing that required some split-second timing on my part, as it was rather abruptly whisked away from the big screen. In order to re-familiarize myself with this blockbuster (that all too quickly went to the shelves of Blockbuster), I decided to watch it again. (*Nobody* knows the trouble I go through to write these things). What I realized upon watching it again was that I was not at all familiar with it. The movie first aired 13 years ago! Having just watched it 13 minutes ago, I am forgetting most of it already. But I remember enough to relay some highlights to you, while completely ignoring the finer nuances of being a movie critic. To properly review this movie would require me to remember names of characters and some of the precise aspects of the plot. Nah—people get paid to do that crap! I would much rather write for nothing, and get paid twice as much as my worth.

Keeping the plot angle of this movie brief, a butt load of captive snakes is chemically sprayed with pheromones that inspire them to kill everything that moves. The snakes are boxed up, placed on a skid, and stashed inside the hull of a 747 airline. Once the jet is in the air, the bad guys release them by using strategically-placed explosives to unpack the shipping crate. Said bad guys perform all this elaborate flandickery in order to kill one witness, who is being flown from Hawaii to Los Angeles in order to testify against them. Why bother with such normal tools of assassination such as pistols, snipers, or poison injected through umbrellas, when one can simply apply "Eau-de-Kill-Everybody" on venomous snakes, and release them on a jet airliner so effortlessly? And as long as we're getting picky, if one can sneak enough explosives onto a plane to rip open shipping boxes, why not just add a little more and blow the whole damn plane into pieces? Ignoring the mentality of criminals and screenwriters, we proceed. Once freed, driven by their generous dousing of Eau-de-Kill-Everybody perfume, the snakes begin efficaciously chewing up and spitting out the passengers. The scenes of snakes vs. man, and later, man vs. snakes, are highly imaginative and worth recounting.

Cutting to the chase: In one scene, a passionate young couple enters a bathroom, at which time they get into various phases of semi-nakedness while earnestly sucking face. A 15-foot-long, red phase Coachwhip, showing two-inch-long fangs displayed in a menacing gape, drops unnoticed from the ceiling into the tiny airline lavatory. The snake creates an unwanted ménage à trois in a most aggressive fashion, laying venomous hickeys all over the place, and the couple gets screwed. (And I don't mean in a good way). Things are sort of bouncing all over the place as the snake makes it a threesome, and the scene culminates with our world's record venomous Coachwhip (?) dangling off the voluptuous right breast of the woman involved. It's the Cleopatra way to go. (I have since learned that this 15-foot-long venomous Coachwhip is actually supposed to be a "Milksnake." That might explain its desire to be a bosom buddy to the guy in the threesome).

Lavatory scenes abound in this movie, as another victim is urinating into a different toilet (which are plentiful on this plane), and a 12-foot-long Green Mamba emerges from the toilet bowl, and bites him on the, er uh, on the, well, let's just quote him. He screams "Y-a-a-a-a! It bit me on the dick!" No lies are told here, as the mamba is indeed dangling off the favored body part of this poor dude. Thusly endowed, he falls backward, hits his head on the wall, and slowly slides down it. The poor guy must have a soft head, for the there is a wide swath of blood sliding along behind him on the wall as he crumples. Yet another classic scene is when a sleeping, totally drunk, drab, and dumpy woman has another version of a snake of unknown origins climb up her bare leg and inside her nightgown. It eventually emerges from the collar of said nightgown, at which point she wakes up. She opens her eyes for long enough to see the gaping fiend coming at her face. The snake sinks its fangs into her right eye, she flops around some, her face gets all swollen and purple—and that's the end of her sorry fatass. The "People of Walmart" mass media photographers will sorely miss her.

Throughout the early part of the movie, a *nasty* little Chihuahua named "Romeo" is making a yipping pest of himself—as is the wont of any such barking guinea pig. The best use for Romeo in any situation is conversion to snake mass, which is precisely what happens to him. His poor bubble-headed bleach blonde owner (who survives this flight) is left wondering "Oh Romeo, Romeo, wherefore art thou Romeo?"(Dear lady, worry not! A far quieter version of Romeo will soon be coming back to you. He will be in the form of a hefty zinger, delivered from a cloaca somewhere near you!). Prior to Romeo's final exit scene, an eight-year-old boy gets tagged by a cobra on his left forearm, just above the wrist, and begins to swell hideously. We'll go back on this one soon. Another good one occurs when a bald man who displays a very negative attitude throughout the film is wrapped by a HUGE Burmese Python. After the squeeze scene, the snake opens wide and rapidly engulfs his head. Slicker than snot on a doorknob, the snake jaw-walks its way from the top of his chrome dome down all the way down to his throat. While this is happening, the bald dude is screaming "GAAAAAA--Guuuuumph…meef…" until finally, a meek "umf." He must have forgotten the rest of his lines, for he falls silent after that. Good riddance!

All of these scenes were really cool. But sadly, the snakes start losing the battle. The tide is turned around the stirring battle-cry of FBI agent and main character "Neville" (played by superstar Samuel Jackson), who empathically states: "*Enough is enough! I have had it with these mother-effing snakes on this mother-effing plane*!" The passengers and crew rally around the

spirited usage of foo foo words, and begin using fire extinguishers, blow torches, stun guns, and even a microwave oven to dispatch the poor snakes. Even though tears of anguish caused by man's cruelty to such beautiful animals were flowing down both my cheeks at this point in the film, I have to admit the microwave scene was pretty damn good. One of the male stewardesses, named "Mister Stewardess," slams a three-foot-long Sinaloan Milksnake into a microwave oven, and sets the timer for two minutes. At first, I thought two minutes was excessive, but the hapless snake didn't explode until one minute and 37 seconds into the cycle. (I will keep this in mind for future food preparation). During the cooking time, the snake swirls about on the rotating tray, managing to bite everything inside the oven, including the front glass. And then—**kablooey**! The guts of the Sinaloan Milksnake lambaste the inner chamber of the oven, and blood flows down the front glass pane. The latter act of gratuitous gore spoiled the view of whatever came next. It would have been nice to see the parts that remained inside turning a nice golden brown.

Now, we go back to that cute and courageous little eight-year-old boy bitten on the left arm by a cobra. The swelling on the arm of this potential victim (who is well on his way to a dirt nap) is such that it consumes most of his forearm. The discoloration and rapid swelling might be more indicative of the bite of a Cottonmouth or some other form of toxic viper, but there is little sense in getting overtly technical here. I keep repeating to myself "it's only a movie." However, technicalities aside, the kid's arm looks *awful*. The folk around him decide to use the John Wayne method of first aid, also known as "cut 'n suck." This scene, and all that follows with the poor kid, is extremely well done. A small gathering of concerned citizenry appears around the lad, and a steady-handed stewardess—we shall call her John Wayne--makes a neat slice horizontally on the swollen mass. Every form of pus, mucous, split-pea soup, and other forms of liquid pestilence too disgusting to elaborate upon herein starts oozing out of the wound. John Wayne next swills a gulp from her bottle of Bactine®, which one should always keep handy for such things as bee stings and snakebite. Her pie hole being thusly sanitized, she places her mouth over the incision, and begins to suck mightily. She spits out the contents, takes another slug out of her bottle of Bactine, and goes after it again. (And again, and again, and again). It is well that the plane lands soon after, as the noxious concoction of whatever the hell John Wayne is spitting on the deck is *surely* melting through the hull of the aircraft. That in turn might have served to worsen an already bad situation.

And while all of *this* is going on above us, the other hero of the film is on the ground. Said other hero is—check it out—a *herpetologist*! Yeah baby! Enter the herper hero! *How many mother-effing movies have a mother-effing herpetologist as a hero*? Not nearly enough, I say! Anyway, it is here that, not for the first time, art does *not* imitate life with the film. The movie version of the hero herpetologist is named Steven Price—so they were pretty close there! The rest of Dr. Price's persona reflects a very clean, bright-eyed, well-spoken, neatly-dressed man in a three-piece suit and well-polished shoes. (We all know enough herpetologists to know that they are generally unkempt, hung-over, red-eyed, look at the floor while mumbling incoherent sentences, wear flip flops, shorts, and a tattered Darwin T-shirt. A few flies or buzzards generally encircle them as well). The elegantly dressed Dr. Price must accomplish many things between first learning of the situation and the plane landing. He first must identify all the snakes on the plane, so that he can line up every known anti-venom serum in the world to have on hand. The identification feat is accomplished with cell phones between ground and air. (I am greatly relieved to know that he was able to identify the 15-foot-long, venomous red phase Coachwhip Milksnake, and that antivenom for this formidable snake exists). He proceeds to not only identify all the snakes, but also, gather all the antivenom required—in two hours flat! He is waiting there when the plane lands with hundreds of vials on hand, deftly injecting those sliding down the emergency chute with the right stuff as soon as they hit the bottom. Yup—thanks to a fast-thinking herpetologist like Dr. Price, the world is made safe for justice and the American way! Why Hollywood didn't capitalize on the notion of heroic herpetologists will forever be a mystery to this author.

The reader is no doubt asking: "Why is this idiot writing about a movie that aired 13 years ago?" Well, one reason might be that as I wasn't writing columns 13 years ago, a review of this particular movie was not possible. But truth be told, I was preparing a short, introductory paragraph that would lead in to a column about ***Real*** Snakes on a Plane. It was while writing said introductory paragraph that I realized I didn't remember much about the movie. At first, I was going to fake it, but with *far* too much time on my hands, decided instead to watch it again. My intent after it was viewed was *still* to make it a short paragraph before the *Real* Snakes on a Plane story was relayed. But once my alter ego, (the *real* author of these columns), took over, there was no stopping him. And besides that, if the reader hasn't seen the film in a while, it might be worth watching again.

Furthermore, it is my opinion that these columns have been far too long. That *must* be stopped! Effective immediately, they will be pared down. Next month, we shall relay a story—mostly true—of three idiots who *really* smuggled snakes onto a plane. (Some of you are probably thinking: "What's extraordinary about that?") You'll see! But until that time:

This here is Roger Repp, signing off from Southern Arizona, where the turtles are strong, the snakes are handsome, and the lizards are all above average.

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What You Missed at the October Meeting: John Vanek

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John Vanek has talked to your society before. In 2016 he told us of his Master's work with hognose snakes on Long Island, New York. We were fortunate to have him back to talk about his work for his doctoral degree in Lake County, Illinois. The title of his talk was "Urban ecology and Herpetofauna of Lake County Illinois." He began his talk with an anecdote about a family gathering where an aunt came to him and said, "John, no offense, but I don't give a shit about turtles." Of course that opener was to demonstrate that many people don't care about wildlife. But then John played a bit of a guessing game with us to illustrate how many people do care about animals and their value. He asked the audience to guess the annual number of attendees at NFL games, the number of viewers of *Game of Thrones*, the number of visitors to national wildlife refuges, and the number of visitors to AZA-accredited zoos and aquariums. Our audience didn't do very well, usually guessing too small numbers, particularly concerning the last two. The numbers as John stated were 17 million for the NFL, 19 million for *Game of Thrones*, 48 million for wildlife refuges, and 195 million for zoos and aquariums. Continuing with comparisons, John quoted a study estimating spending on all wildlife-related activities in 1996 to be $101 billion compared to $81 billion spent on new cars the same year. He reminded us of the health benefits derived from snake venom, and $3.7 billion that bats contribute to agriculture by way of pollination. A few numbers to drop on your skeptical friends.

John Vanek in the field with a study subject. (All photographs by John Vanek.)

As he moved into urban ecology he cited a paper showing public health benefits of the leopards that roam the streets of Mumbai, India. A gorgeous slide showed a leopard strolling down a street. While the leopards occasionally maul someone, they apparently save more lives by preying on the ubiquitous rabid feral dogs. He segued into urban ecology and he quoted the *Journal of Urban Ecology* for a definition:

"the study of ecosystems that include humans living in cities and urbanizing landscapes. It is an emerging, interdisciplinary field that aims to understand how human and ecological processes can coexist in human-dominated systems and help societies with their efforts to become more sustainable . . .

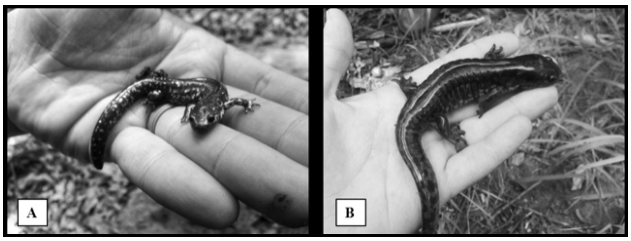
Because of its interdisciplinary nature and unique focus on humans and natural systems, the term 'urban ecology' has been used variously to describe the study of humans in cities, ***of nature in cities****, and of* ***the coupled relationships between humans and nature****. Each of these research areas is contributing to our understanding of urban ecosystems and each must be understood to fully grasp the science of Urban Ecology."*

Urbanization influences ecological patterns and processes, affecting abundance (for instance, raccoons), demographics (for instance, peregrine falcons), distribution (for instance, overwintering Canada geese), and behavior (for instance, diurnal coyotes becoming nocturnal). It's also a threat to biodiversity. However, 82% of the population of the United States lives in urban areas. The interactions and influences of urbanization require more study to determine the effects and solutions.

John is working with the Lake County Forest Preserve District (LCFPD) and their Wildlife Monitoring Program, a long-term study that has been ongoing since 2009 assessing the wildlife in the county. He trains interns to collect data with him, then analyzes the data and reports results to LCFPD, as well as publishing scientific papers. The LCFPD has 55 preserves that are monitored at 235 randomly distributed sites. At different times of the year they monitor for different animals. In April and May they monitor for amphibians and reptiles. In June for birds. They look for reptiles and amphibians again in July and August, and survey mammals in September and October. Over the ten years of monitoring they've accumulated 5,712 observations of reptiles, 4,247 observations of amphibians, 12,881 observations of mammals ("a lot of those were squirrels"), and "a ton" of bird observations (142,999) of which he says he's glad he's not an ornithologists so he doesn't have to analyze that data.

The most commonly observed reptiles are painted turtles found throughout the preserves, followed by smaller numbers of Chicago garter snakes, common snapping turtles, and Blanding's turtles (one of the biggest populations of Blanding's in the Midwest outside of Nebraska), and then much fewer observations of red-bellied snakes, red-eared sliders, plains garter snakes, spiny soft-shelled turtles, smooth green snakes, Graham's crayfish snakes and fox snakes. There has been just one observation of a musk turtle and one report of a common map turtle.

Bullfrogs, blue-spotted salamanders, and green frogs account for the highest numbers of observations of amphibians, with northern leopard frogs, tiger salamanders, American toads,



John thinks the blue-spotted salamander is one of the prettiest.

Field studies often require difficult and dirty work.

chorus frogs, eastern newts, spring peepers, gray treefrogs, and wood frogs having fewer observations.

John wanted to mention some animals that one would expect but were not observed. Eastern massasaugas are probably extirpated and eastern hognoses occur in Illinois Beach State Park but not in the preserves. Northern water snakes and queen snakes are riverine and aren't likely to show up under the cover boards used for the surveys, but are likely present. An attempt to reintroduce spotted salamanders apparently failed, and four-toed salamanders are likely extirpated. No cricket frogs, Fowler's toads, or mudpuppies have been observed, though the latter are likely to occur in some of the deeper lakes and along Lake Michigan shoreline. Lake County has successfully reintroduced spring peepers and wood frogs, though only in limited areas.

Next John wanted to talk about specific research that he has accomplished using this long-term monitoring. He talked about turtles because they are probably the most threatened vertebrates. They're subject to habitat loss, loss from subsidized predators like raccoons or dogs, and direct mortality from crossing roads. Studies show that turtle populations have become male biased over time. He attempted to answer three questions concerning turtles in LCFPD: "What is the sex ratio of painted turtles?" "How has urbanization impacted that ratio?" and "Does the spatial scale matter?" From 2010 to 2017, 2,685 painted turtles were captured in Lake County. The painted turtle population is robust in numbers but suffers from the fourth highest male-to-female sex ratio found by any study of sex ratios in turtles in the U.S. He looked at road densities, impervious surface density and preserve areas around the capture sites

Lake County, Illinois, has one of the largest populations of Blanding's turtles in the Midwest outside of Nebraska.

Tiger salamanders are not as common in Lake County as blue-spotted, but this board flip defied the odds.

and came up with no relationship between the sex ratios and road density or size of the protected areas, and a possible but doubtful relationship with impervious surfaces. The study was unique in that it was conducted in an urban environment with extensive random sampling in a variety of habitats over a long period of time and only used data backed by large numbers of captures. The results show that protected areas might not be enough to sustain painted turtles. Female painted turtles travel a relatively short distance to lay eggs, averaging 250 meters or less. Blanding's or snapping turtles may travel up to a mile. John expressed his fear that all of these populations may be zombie populations that are not reproducing enough to replace the adults and will gradually die out.

Next John talked about blue-spotted salamanders in Lake County. *Ambystoma laterale* is a unique mole salamander. It's terrestrial rather than fossorial as are most mole salamanders, which at least makes them easier to find. Not easy, just easier. They are a cold-climate salamander, found only in the Chicagoland area in Illinois, where they are at the southern limit of their range. While the IUCN lists them as "Least Concern," locally they are threatened by urbanization and the warming climate. John's work was intended to quantify some of the assumptions about the salamanders and develop guidance for management of the species. The task was to quantify the landscape variables that are important to the salamanders, population trends based on those variables, and the impact that management techniques, particularly controlled burns, have on the animals. Everyone knows that blue-spotteds are primarily found in forested areas with vernal ponds. By flipping cover boards more than 15,000 times over nine years, John and his interns gathered the data needed to model the likelihood that the animal is where you're looking and the probability of detecting it if you are looking. Through mathematical models that John only talks about, "when I'm trying to impress my family at Thanksgiving and Christmas . . . " he developed quantitative data that shows what habitat the salamanders favor and how intensive a survey is needed to know that they are occupying that area. Through the surveys he discovered that the salamanders don't seem threatened by the many controlled burns in Lake County. Indeed, the salamanders seem to move into the burned areas. The good news is that the Lake County populations are responding to the management practices of the county and are increasing. I enjoy explanations speakers give about hypotheses, thoughts, and methods as much as the learning the results of their research. John Vanek is particularly good at this. We hope he will return.

Herpetology 2019

In this column the editorial staff presents short abstracts of herpetological articles we have found of interest. This is not an attempt to summarize all of the research papers being published; it is an attempt to increase the reader's awareness of what herpetologists have been doing and publishing. The editor assumes full responsibility for any errors or misleading statements.

HORNED LIZARDS VERSUS HARVESTER ANTS

J. O. Schmidt [2019, Copeia 107(3):404-410] notes that horned lizards, *Phrynosoma* spp., and harvester ants, *Pogonomyrmex* spp., could be in a predator–prey arms race in which the lizards are specialists that feed on harvester ants, and ants have highly toxic venom and other defenses to help deter predacious horned lizards. All 23 species of harvester ants examined by the author possess venoms that are highly lethal to mice, but the venoms of the tested ant species were nearly inactive toward horned lizards. Blood plasma of *Phrynosoma cornutum* contains a factor (or factors) that neutralizes the ability of harvester ant venom to kill mice, but does not neutralize the venoms of honeybees, a rattlesnake, Russell's viper, or a cobra. A species of harvester ant present only in southern South America was used to test the predictions that the lethality of harvester ant venom evolved in response to predation pressure from horned lizards, and that horned lizard plasma does not neutralize the lethality of this species of harvester ant. This ant species did not overlap in range with horned lizards, which have a range from Guatemala to Canada. Not only was the venom of the South American ant species the most lethal of all tested harvester ant venoms, the venom's lethal activity was neutralized by horned lizard plasma. These results indicate that horned lizards responded to the lethality of their invertebrate prey's venom, but that the harvester ant venom lethality did not evolve in response to predation pressures by present day horned lizards.

DECLINING VIPERS

L. Luiselli et al. [2018, The Herpetological Journal 28(4):137-142] note that hibernation is a key aspect of the physiological ecology of temperate zone reptiles and where suitable dens are present, communal hibernation and long-term den fidelity may be expected. The authors studied long-term communal occupancy of hibernation dens in Italy and France by aspic vipers, *Vipera aspis*. Long-term trends were evaluated using regression analysis of the annual numbers of *V. aspis* at dens as dependent variables against year as the independent variable. The regression coefficients were tested against a hypothetical coefficient, indicative of population stability. The results indicated that in Italy den numbers were stable from 1987 to 2000. However, after this period to 2017 there was a steep decline in den occupancy as indicated by a negative regression coefficient that differed significantly from zero. These declines correlated with increasing temperatures and shortened hibernation periods from 2000 and agreed with the general decline in viper numbers at the study area. At the smaller den in France, *V. aspis* numbers declined significantly during the period of observation and the den was abandoned by the fifth year. This was attributed to absence of females due to mortality of one of the two females and parturition in the second female. However, in contrast to the situation in Italy the general population in the locality was apparently stable over the period of observation.

TRENDS IN AGILE FROG NUMBERS

R. Meek [2018, Herpetological Journal 28(3):117-122] notes that reports of amphibian declines have highlighted the urgent need for long-term data sets to increase understanding of population changes. To detect population changes in the agile frog, *Rana dalmatina*, in Vendée, western France, counts were made of spawn masses over 16 years and road mortalities over 13 years. Long-term trends were evaluated using regression analysis of the logarithmic transforms of annual mortalities and egg masses as dependent variables against year as the independent variable. Tests of the regressions against a 0 hypothetical coefficient, indicative of population stability, gave coefficients that were positive for road mortalities and negative for spawn counts. However, neither was significantly different from 0, indicating a stable population. Further analysis using jackknifing produced a series of pseudo-regression coefficients, which agreed with the true regressions. Results from both data sets were therefore congruent and indicated wide annual fluctuations, with a major increase in numbers between 2009 and 2014. Data from spawn deposition in a recently established pond suggested that the presence of invasive crayfish *Procambarus clarkii* influenced both deposition sites and long-term population changes.

COMPARISONS OF REPTILE ASSEMBLAGES

A. A. Grimsley et al. [2018, Journal of Herpetology 52(4): 406-414] note that anthropogenic disturbances can have negative effects on species assemblages. This study was established to form baseline data on the environmental structure and reptile assemblages within a planned energy corridor in Pinal County, Arizona, prior to construction. The study emphasized evaluating the differences in reptile assemblages in two subdivisions of the Sonoran Desertscrub, the Lower Colorado River Valley (LCV) and Arizona Uplands (AZU). Surveys were conducted on 50 sites (LCV = 15; AZU = 35) along the proposed 67.1-km long energy corridor through environmental surveys and 50 drift-fence trapping arrays with 400 box funnel traps. Vegetation height, number of burrows, and percent rock, ground cover, and coarse woody debris were significantly higher in the AZU than in LCV. Eighteen reptile species (n = 995 captures) were detected on the energy corridor including eight lizard species (n = 952 captures) and 10 snake species (n = 43 captures). Species richness, evenness, and capture rates were not significantly different between the LCV and AZU; however, species diversity was significantly higher in the LCV. Reptile abundance (LCV = 281; AZU = 714) differed in the two subdivisions, yet rank-abundance curves revealed no difference in dominance of species. Post hoc examination revealed that the geographic separation of sites within the LCV and the location of the study area (along the ecotone) may have contributed to our results. The authors conclude that both subdivisions are equally important to the maintenance of local biotic diversity and recommend that any future land set-asides consider both subdivisions.

CONSERVATION STATUS OF TESTUDINES

A. G. J. Rhodin et al. [2018, Chelonian Conservation and Biology 17(2):135-161] review and analyze the conservation status and International Union for Conservation of Nature (IUCN) threat categories of all 360 currently recognized species of extant and recently extinct turtles and tortoises (order Testudines). The analysis is based on the 2018 IUCN Red List status of 251 listed species, augmented by provisional Red List assessments by the IUCN Tortoise and Freshwater Turtle Specialist Group of 109 currently unlisted species of tortoises and freshwater turtles, as well as re-assessments of several outdated IUCN Red List assessments. Of all recognized species of turtles and tortoises, this combined analysis indicates that 20.0% are Critically Endangered (CR), 35.3% are Critically Endangered or Endangered (CR+EN), and 51.9% are Threatened (CR+EN+Vulnerable). Adjusting for the potential threat levels of Data Deficient (DD) species indicates that 56.3% of all data-sufficient species are Threatened. The authors calculated percentages of imperiled species and modified Average Threat Levels (ATL; ranging from Least Concern = 1 to Extinct = 8) for various taxonomic and geographic groupings. Proportionally more species in the subfamily Geoemydinae (Asian members of the family Geoemydidae) are imperiled (74.2% CR+EN, 79.0% Threatened, 3.89 ATL) compared to other taxonomic groupings, but the families Podocnemididae, Testudinidae, and Trionychidae and the superfamily Chelonioidea (marine turtles) also have high percentages of imperiled species and ATLs (42.9–50.0% CR+EN, 73.8–100.0% Threatened, 3.44–4.06 ATL). The subfamily Rhinoclemmydinae (Neotropical turtles of the family Geoemydidae) and the families Kinosternidae and Pelomedusidae have the lowest percentages of imperiled species and ATLs (0–7.4% CR+EN, 7.4–13.3% Threatened, 1.65–1.87 ATL). Turtles from Asia have the highest percentages of imperiled species (75.0% CR+EN, 83.0% Threatened, 3.98 ATL), due to much higher levels of exploitation in that geographic region. The family Testudinidae has the highest ATL (4.06) of all Testudines. The family Testudinidae also has an ATL higher than all other larger families of Reptilia or Amphibia. The order Testudines is, on average, more imperiled than all other larger orders (≥ 20 species) of Reptilia, Amphibia, Mammalia, or Aves, but has percentages of CR+EN and Threatened species and an ATL (2.96) similar to those of Primates and Caudata (salamanders).

SEA TURTLE RESCUE AND REHAB

C. J. Innis et al. [2019, Chelonian Conservation and Biology 18(1):3-9] report that a survey of sea turtle rehabilitation facilities in the U.S. revealed that 34 facilities released 11,417 sea turtles through 2016. The number of turtles released per time period increased over time, with 80% of releases occurring between 2007 and 2016, 15% between 1997 and 2006, and 5% prior to 1997. Twenty facilities reported a total of 314 first re-encounters and 6 second re-encounters of previously released turtles, including 12 encountered while successfully nesting. Results revealed substantial efforts to rehabilitate sea turtles in the U. S., with some rehabilitated turtles surviving for extended periods after release, but with the fate of most remaining unknown. Greater efforts are warranted to determine the long-term outcome for a larger proportion of rehabilitation cases.

STUDIES OF LONG-TERM TURTLE DECLINES

H. J. Howell et al. [2019, Copeia107(3):493-501] note that long-term studies on wildlife populations are necessary to track population abundance and shifts in demography over time, yet such studies are difficult to plan, fund, and conduct and are therefore rarely undertaken. Such studies are especially important for long-lived species that can persist for long periods of time with little to no reproductive output or recruitment. The authors conducted two population studies spanning a 30-year time frame on the globally endangered spotted turtle (*Clemmys guttata*) on protected land in the center of their range. Spotted Turtles are endangered in Canada, listed as globally endangered on the IUCN red list, and declining throughout their range. However, there has only been one previous long-term study tracking their long-term population trajectory. The study used mark–recapture data collected over a 30-year time frame and reports that the estimated population size of spotted turtles has decreased by 49% at the study site despite the habitat lying within a protected area. This decline was concurrent with a significant increase in the proportion of larger individuals within the population, indicating a lack of recruitment into the subadult class. These results highlight the value of long-term studies in monitoring population changes of long-lived species, the importance of active management within protected areas, and the ability of long-lived species to persist for long periods of time despite having little recruitment and a declining population trajectory.

DIET PREFERENCE IN A NEOTROPICAL TOAD

M. T. McElroy and D. A. Donoso [2019, Copeia 107(3):430-438] note that despite the widespread occurrence of myrmecophagy in anurans, it is unclear whether ant-specialists feed on ants opportunistically or whether they prefer species with specific morphological, ecological, or nutritional traits. The authors flushed 105 stomachs of a lowland Neotropical toad, *Rhinella alata*, and identified each consumed ant to species level. They calculated linear selectivity to determine predator preference for ants by comparing the abundances of consumed species to their relative abundances in the leaf litter community on Barro Colorado Island, Panama. Linear regression models were used to test whether linear selectivity or general predator preference related to seven morphological characteristics and two measurements of nutritional content. *Rhinella alata* preferentially ate 24 ant species. Other species were either avoided (n = 34) or were eaten opportunistically (n = 26). Preferred ant species were large and textured with hair and/or rugosity. Prey preference did not relate to prey nutritional content; small ants were avoided even if they were superabundant in the environment; chemically defended and aggressive ants were preferred if they were large enough. The authors propose that *R. alata* prefers large ants because they represent a more efficient prey item in terms of prey handling time and because they are easier to see than are smaller ants. Furthermore, they hypothesize that predation attempts are more successful when prey are textured because microstructures on the tongue and prey surface may increase prey adhesion. The ant specialist *R. alata* is not specializing on any particular ant species but rather maximizing prey quantity over quality by only eating the largest ants, despite their scarcity in the environment.

FEEDING BY VIPERS DURING PREGNANCY

D. Bauwens and K. Claus [2019, The Herpetological Bulletin (147):4-8] note that a temporary reduction or even cessation of feeding has been documented in a wide range of vertebrate species and is usually attributed to conflicts between foraging and other activities. It is generally recognized that females of Old World vipers (*Vipera* spp.) reduce or even stop feeding during pregnancy, even though detailed quantitative information for most species is limited. The authors conducted a long-term (2000–2017) and intensive mark-recapture study in a large population of northern vipers (*Vipera berus*) and employed two indices of feeding frequency in adult females during their breeding years. The first index uses cross-sectional data and estimated that a strict minority (7%) of captures of females in breeding years revealed detectable signs of recent food intake (swelling of the mid-body, voiding of solid feces). A second index is based on the magnitude of increases in body mass over recapture intervals of individual females, which can be attributed to the intake of food. Depending on the criteria used to consider an increase in body mass as a consequence of prey consumption, about 12% (range: 2–29%) of recaptures revealed indications of prey consumption. Overall, it was estimated that ca. 20% of the reproductive females fed at least once before parturition, which thus confirms that most pregnant female *V. berus* fail to feed, but also points out that the number of females that feed occasionally during pregnancy is higher than has often been assumed. The authors suggest that reduced foraging by pregnant northern vipers is, presumably in part, a consequence of their behavior of residing in habitats where feeding opportunities are rare because prey encounter rates are low.

VOCALIZATIONS OF SEA TURTLE HATCHLINGS

L. N. McKenna et al. [2019, Copeia 107(1):120-123] report that sea turtle hatchlings are known to vocalize; however, the purpose of these vocalizations is currently unknown. One hypothesis is that these vocalizations serve to synchronize hatching or starting the emergence from the nest. To test this, the authors characterized and compared the frequency and duration of the sounds made by olive ridley turtles (*Lepidochelys olivacea*) during incubation, hatching, and emerging from the nest. They also determined whether hatchlings continue to vocalize after emerging from the nest. Lastly, they investigated species-specific variations in the vocalizations of olive ridley, leatherback (*Dermochelys coriacea*), and green (*Chelonia mydas*) turtle hatchlings. Sound production was more frequent during incubation than during hatching or emerging from the nest, and in two of the three nests, a unique "pulse" sound was heard during incubation. However, there were no significant differences in the frequency range or duration of the vocalizations between incubation, hatching, and emerging from the nest. Furthermore, hatchlings were recorded and continued to vocalize after emerging from the nest. From this the authors conclude it is unlikely that the sounds made by the hatchlings help to synchronize hatching or emergence behavior. Instead, they are likely by-products of other processes, such as embryo movement, serving little biological purpose. Nevertheless, they recommend further research to unequivocally confirm this is the case, and it remains highly interesting that sound production is a universal trait among cheloniid species.

MARKING SMALL TADPOLES

G. S. Clarke et al. [2019, Copeia 107(1):71-77] note that because of their small size and fragility, larvae of many amphibian species are difficult to mark unambiguously for experimental studies. This constraint limits the ability to run experiments in which individual interactions matter and so limits the ability to study how social behaviors affect individual fitness. The authors anesthetized small (<8 mm long) cane toad (*Rhinella marina*) tadpoles and used a biopsy punch to remove tissue from either the dorsal or ventral tail fin, enabling the identification of several cohorts within an enclosed system. The tail fin clips remained readable for >30 days and had only minimal effects on tadpole growth, survival, and swimming performance. Marking the membrane of a tadpole tail fin provides a cost-effective method for cohort marking with minimal equipment and training. It also provides the opportunity to gather extra data on an individual (such as DNA) with minimal further stress to the animal.

GREEN SALAMANDER ABUNDANCE

J. C. Newman et al. [2018, Journal of Herpetology 52(4):438-444] note that green salamanders, *Aneides aeneus*, are habitat specialists found in narrow crevices of rock outcrops and under flaky bark of trees. The species has a high conservation priority throughout its range and has been negatively affected by habitat loss, climate change, disease, and overcollection. In portions of the Blue Ridge Escarpment population, many historical locations for this species have not been visited since the 1980s or earlier. Across three counties in South Carolina, the authors conducted visual encounter surveys of known rock outcrops that were accessible, and used binoculars to conduct arboreal surveys in the adjacent forest. They detected green salamanders at 30 of the 61 sites surveyed (49.2%). Detection probability was positively influenced by time of day. A model of abundance that included aspect, habitat size, and elevation had the most support. Specifically, green salamanders were more abundant at larger sites at lower elevations with south-facing slopes. Knowledge of factors that influence population abundance will help guide future efforts to protect the species in the southern portion of its range.

A NEW SPECIES OF CROCODILE

C. M Murray et al. [2019, Copeia 107(3):517-523] note that the freshwater crocodile inhabiting Papua New Guinea, currently recognized as *Crocodylus novaeguineae*, exhibits morphological, molecular, and ecological divergence between the northern and southern versants of the Central Highlands and occupies separate evolutionary trajectories. A robust body of work has long encouraged the formal description of New Guinea crocodiles from the southern versant of the highlands as a distinct lineage with a taxonomy that reflects diagnosed relationships. Here, the authors use geometric morphometric techniques to assess cranial shape variation between specimens from both versants and add to the diagnostic evidence supporting a more accurate taxonomy. Furthermore, they formally describe the southern variant, a distinct lineage, as a new species (Hall's New Guinea Crocodile; (*Crocodylus halli*).

EXTERNAL TRACKING TRANSMITTERS

M. T. Jungen et al. [2019, Copeia 107(3):411-416] note that internal implantation of radio-transmitters is the preferred attachment technique for snakes, but the high costs and invasive nature of the surgery make a functional alternative desirable. Attaching radio-transmitters externally can be a cost-effective alternative to surgical implantation. External transmitter attachment site and methodology depend on the unique morphology of a given study species, making external adherence impractical for most snake species. Rattlesnake rattles are unique morphological features that can serve as an attachment site for external radio-transmitters. From 2011 to present, the authors have been attaching transmitters to the rattles of eastern diamondback rattlesnakes (*Crotalus adamanteus*; EDB) using thread and epoxy. They calculated average monitoring duration using radio-telemetry data collected from 49 adult EDBs telemetered from 2014 to 2017 in coastal South Carolina. On average, EDBs were monitored for 189±78 days with 14 monitored >240 days and three monitored >300 days. External transmitter attachment is a viable alternative to surgical implantation, providing a non-invasive approach to monitoring rattlesnakes.

HINGEBACK TORTOISE CONSERVATION

L. Luiselli et al. [2018, The Herpetological Journal 28(4):171-177] report that the forest hingeback tortoises *Kinixys homeana* and *Kinixys erosa* are two of the most declining African chelonians. Although the population size trends of these species have received attention in some specific areas of West Africa, an overall perception of their declining trajectories are still largely unexplored. The authors used interviews with rural people (hunters, farmers and snail gatherers) in order to explore the general perception that these experienced people have on the population trends of these threatened tortoises. Overall, they interviewed over 2000 people in three West African countries (Cote d'Ivoire, Togo and Nigeria), which mostly supported the notion that these tortoises are heavily declining in Togo and Nigeria, but less so in Cote d'Ivoire. In addition, many respondents suggested that snail gatherers are the main providers of tortoises to the bush meat trade. Indeed, market surveys revealed that, in Nigeria, there was a significantly positive correlation between number of wild snails traded by individual sellers and numbers of sold tortoises in their "shops."

Minutes of the CHS Board Meeting, October 18, 2019

Rich Crowley called the meeting to order at 7:42 P.M. Board members Dan Bavirsha, Cindy Steinle, Sammy Velazquez and Jessica Wadleigh were absent. Minutes of the September 13 board meeting were read.

Officers' Reports

Treasurer: John Archer presented the financial report for the month of September.

Membership Secretary: Mike Dloogatch read the list of expiring memberships. He distributed a graph showing the number of *Bulletin*s sent out each month since January 2000.

Sergeant-at-arms: Mike Scott reported 33 people in attendance at the September general meeting.

Committee Reports

Shows: Gail Oomens read through the list of upcoming shows. She requested help for October 26 Creatures of the Night show at the Garfield Park Conservatory, the November 2–3 shows at the Notebaert Museum and the Pet Expo at the Kane County Fairgrounds on November 10–11.

ReptileFest: The weekend of April 18–19 has been reserved for 'Fest 2020 at Northeastern Illinois University. Cards advertising the event are being printed.

Junior Herpers: Artist Alex Boersma gave a program at the October meeting. Gail Oomens moved to reimburse Frank Sladek $218.65 for his out-of-pocket expenses in connection with that meeting. Mike Scott seconded the motion, which was unanimously approved.

Adoptions: Linda Malawy has resigned as chair. Zorina Banas is fully taking the reins.

Nominating committee: A full slate has been chosen. All selected candidates are so far running unopposed except for the members-at-large positions.

Old Business

John Archer moved to donate $1000 to help Andy Snyder and the Brookfield Zoo to host the annual meeting of the Association of Zoos & Aquariums Herp Taxon Advisory Group (Herp TAG) next spring. Mike Scott seconded the motion, which was passed unanimously.

Tom Mikosz moved to have Rich Crowley represent the interests of the CHS with regard to the claim against the West Bend Insurance Company in regard to the incident that took place at the Chicagoland Fishing, Travel & Outdoor Expo on January 25, 2018. Gail Oomens seconded the motion, which was unanimously approved.

New Business

The general meetings for November and December have been moved to one week earlier: November 20 and December 18.

Mike Dloogatch moved to donate $500 to to help the Eastern Massasauga Rattlesnake Recovery Team to print an activity book for young people on the massasauga rattlesnake. Mike Scott seconded the motion, which passed unanimously.

The meeting adjourned at 10:22 P.M.

Respectfully submitted by recording secretary Gail Oomens

Advertisements

For sale: **highest quality frozen rodents**. I have been raising rodents for over 30 years and can supply you with the highest quality mice available in the U.S. These are always exceptionally clean and healthy with no urine odor or mixed in bedding. I feed these to my own reptile collection exclusively and so make sure they are the best available. All rodents are produced from my personal breeding colony and are fed exceptional high protein, low fat rodent diets; no dog food is ever used. Additionally, all mice are flash frozen and are separate in the bag, not frozen together. I also have ultra low shipping prices to most areas of the U.S. and can beat others shipping prices considerably. I specialize in the smaller mice sizes and currently have the following four sizes available: Small pink mice (1 day old—1 gm) , $25 /100; Large pink mice (4 to 5 days old—2 to 3 gm), $27.50 /100; Small fuzzy mice (7 to 8 days old—5 to 6 gm), $30/100; Large fuzzy mice / hoppers (10 to 12 days old—8 to 10 gm), $35/100 Contact Kelly Haller at 785-224-7291 or by e-mail at kelhal56@hotmail.com

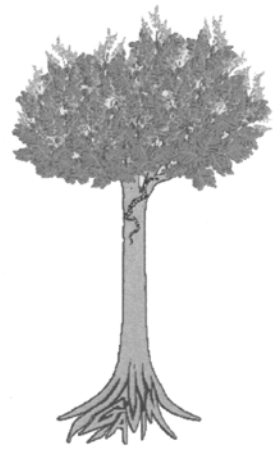
Herp tours: **Costa Rica herping adventures**. Join a small group of fellow herpers for 7 herp-filled days. We find all types of herps, mammals, birds and insects, but our target is snakes. We average 52 per trip, and this is our 10th year doing it. If you would like to enjoy finding herps in the wild and sleep in a bed at night with air-conditioning, hot water and only unpack your suitcase once, instead of daily, then this is the place to do it. Go to our web-site <http://hiss-n-things.com> and read the highlights of our trips. Read the statistics of each trip and visit the link showing photos of the 40 different species we have found along the way. E-mail at jim.kavney@gmail.com or call Jim Kavney, 305-664-2881.

Line ads in this publication are run free for CHS members—$2 per line for nonmembers. Any ad may be refused at the discretion of the Editor. Submit ads to mdloogatch@chicagoherp.org.

NEW CHS MEMBERS THIS MONTH

Kavin Anand
Noah Anderson
Mary Boehler
Evan Kay
Melissa Lombardi
Robynn Pruitt
John Vanek

This tribute to Gavin Brink was presented by his family at the October meeting of the Chicago Herpetological Society, along with their generous donation in his memory.



Gavin Brink Memorial Fund

On behalf of the Gavin Brink Memorial Fund (GBMF), we present this check for $1,111.11 to the Chicago Herpetological Society (CHS) on October 30, 2019.

Gavin joined the CHS in March 2007 and quickly found a home and second family with all those who shared his love of animals and his zest for learning and conservation. Gavin was happiest searching for flora and fauna in the rainforests of Costa Rica and on Snake Road in southern Illinois. The GBMF also provides an annual scholarship to support a student who's pursuing a degree in biological sciences with a study abroad experience in Costa Rica.

Gavin passed away in December 2018, but his unique personality, vast knowledge and ability to bring people together left a positive impact on the reptile community that will be seen for years to come. Gavin was well-respected in the reptile community and will always be remembered for his quirkiness, his glassware displays at reptile shows and his Snakes of Latin America (SoLA) collection that filled his basement. Our donation amount is a tribute to one of Gavin's quirks—his love of palindromes.

Gavin wrote an article entitled "Bitten by a Poisonous Snake? Why We Can't Be Sure Yet." in the August 2015 Bulletin of the Chicago Herpetological Society and presented on "Poisonous Snakes. How Many Are There? How Do They Work? What is the Most Poisonous?" in November 2015. He also helped coordinate ReptileFest, the CHS's yearly educational show. After the CHS meetings, Gavin enjoyed gathering with fellow herpetologists for pizza and drinks and debating about a variety of topics -especially poisonous versus venomous.

Before joining the CHS, Gavin graduated from Illinois State University (ISU) in 2006, with a Bachelor of Science degree. He graduated summa cum laude from Northern Illinois University in 2018, with a Bachelor of Science degree, a major in Biological Sciences, a minor in Chemistry and endorsements in Biology, Chemistry and Environmental Science. While attending ISU, Gavin founded the Illinois State Herpetological Society (ISHS), and his passion for reptiles led him to a career in wildlife education. He also co-founded Chicagoland Mobile Veterinary Services.

Through this donation to the CHS, our hope is to keep Gavin's legacy alive and continue to share his passion for science, reptiles and conservation with others.

29885 Oak Meadow Drive
Kingston, IL 60145
815.751.7212

The Gavin Brink Memorial Fund is a registered 501(c)(3) charitable private foundation. Federal ID #83-2881991

UPCOMING MEETINGS

The November meeting of the Chicago Herpetological Society was held on Wednesday, November 20, at the Peggy Notebaert Nature Museum, Cannon Drive and Fullerton Parkway, in Chicago. This meeting included the annual election of officers and members-at-large of the CHS Board of Directors. The results of the election will appear in the December CHS *Bulletin*. Long-time CHS member **Mike Dloogatch** presented a program on a 2003 trip to the Kalahari Desert of South Africa.

Please note that the December monthly meeting has been rescheduled from the usual last-Wednesday-of-the-month to Wednesday, December 18. This meeting will be a holiday party. The CHS will provide soft drinks and snacks. If you would like to bring something edible to share with the group, you are invited to do so. If you would like to bring an animal to show off to the group, you are encouraged to do that as well. This will be a chance to socialize all evening and get to know your fellow members a little better

The regular monthly meetings of the Chicago Herpetological Society take place at Chicago's newest museum—the **Peggy Notebaert Nature Museum**. This beautiful building is at Fullerton Parkway and Cannon Drive, directly across Fullerton from the Lincoln Park Zoo. Meetings are held the last Wednesday of each month, from 7:30 P.M. through 9:30 P.M. Parking is free on Cannon Drive. A plethora of CTA buses stop nearby.

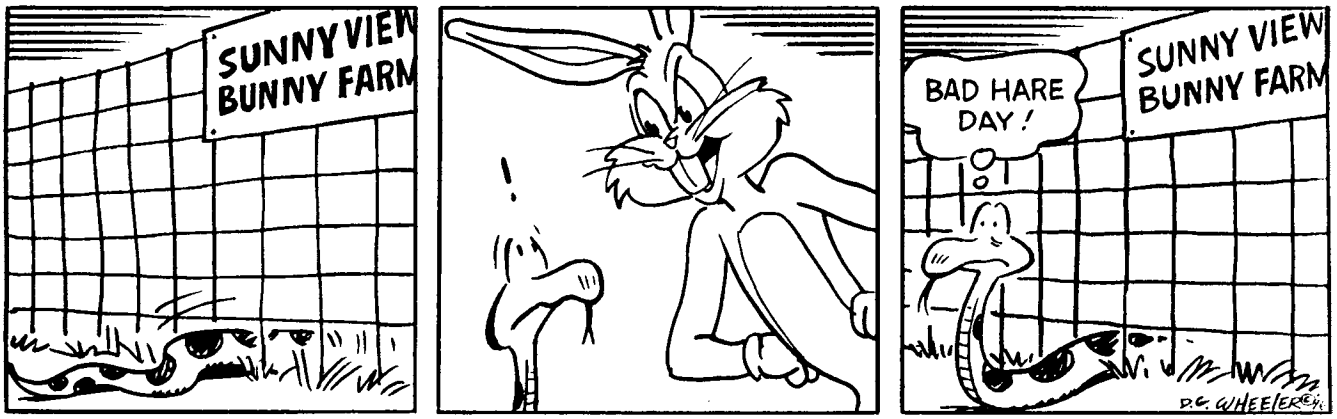
Board of Directors Meeting

Are you interested in how the decisions are made that determine how the Chicago Herpetological Society runs? And would you like to have input into those decisions? The next board meeting, will take place at 7:30 P.M., December 13, 2019, at Papa Passero's Pizzeria, 6326 S. Cass Ave., Westmont. If you think you might like to attend, please email rcrowley@chicagoherp.org.

The Chicago Turtle Club

The monthly meetings of the Chicago Turtle Club are informal; questions, children and animals are welcome. Meetings normally take place at the North Park Village Nature Center, 5801 N. Pulaski, in Chicago. Parking is free. For more info visit the group's Facebook page.

THE ADVENTURES OF SPOT



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