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Originally founded by Gerald Keown in 2007, SWCHR is a 501(c)(3) non-profit association, governed by a board of directors and dedicated to promoting education of the Association’s members and the general public relating to the natural history, biology, taxonomy, conservation and preservation needs, field studies, and captive propagation of the herpetofauna indigenous to the American Southwest.

THE SWCHR LOGO
There are several versions of the SWCHR logo, all featuring the Gray-Banded Kingsnake (Lampropeltis alterna), a widely-recognized reptile native to the Trans-Pecos region of Texas as well as adjacent Mexico and New Mexico.

ON THE COVER: Balcones Barking Frog (Craugastor angusti latrans), Val Verde County, Texas (Kyle Elmore). With this photograph, Kyle won the SWCHR 2015 Award for Excellence in Herpetological Photography.

BACKGROUND IMAGE: Gates’ Pass, Tucson Mountains, AZ (Bill White)

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TABLE OF CONTENTS

A Message from the President, Tim Cole 22

The Emerald Ghost: ADDENDUM, Tom Lott 23

Getting the Message: Multimodal Signals Mediate Social Interactions in Sceloporus Lizards (Lacertilia: Phrynosomatidae), Jake Pruett 23

Keeping and Breeding Senticolis triaspis intermedia in Captivity: A Continuing Saga (Serpentes: Colubridae), Toby Brock 28

Notes on the Texas Reticulate Collared Lizard, Crotaphytus reticulatus (Lacertilia: Crotaphytidae), Lou Hamby and Randy Cordero 31


A CALL FOR PAPERS

Are you a field herpetologist or a herpetoculturist (amateur or professional) working with species native to the American Southwest? Do you have a paper or an article you have written for which you would like to find a permanent repository? Want to be assured you will always be able to share it with the world? Submit it to the SWCHR Bulletin for possible publication. Submitted manuscripts from SWCHR members, as well as non-members, will be considered. There are NO page charges to have your articles appear in the SWCHR Bulletin, as some other publications are now requiring.

To be accepted for publication, submissions must deal with herpetological species native to the American Southwest. Such topics as field notes, county checklists, range extensions, taxonomy, reproduction and breeding, diseases, snake bite and venom research, captive breeding and maintenance, conservation issues, legal issues, etc. are all acceptable. For assistance with formatting manuscripts, search ‘scientific journal article format’ on the internet and tailor the resultant guidance to suit.

Previously published articles or papers are acceptable, provided you still hold the copyright to the work and have the right to re-publish it. If we accept your paper or article for publication, you will still continue to be the copyright holder. If your submission has been previously published, please provide the name of the publication in which it appeared along with the date of publication. All submissions should be manually proofed in addition to being spell checked and should be submitted by email as either Microsoft Word or text documents.

Send submissions to swchr@mountainboomer.com.
A Message from the President

It has certainly been a busy spring! The first Lone Star Rattlesnake Days, held in Round Rock, Texas the last weekend of April, was a success. Multiple specimens of rattlesnakes and other native snakes were on display. There were seven children’s activities, various conservation groups, and seven zoos represented! Thanks to our Bulletin editor Chris McMartin for manning a table on behalf of SWCHR at this event.

The fifth annual Snake Days took place in Sanderson, Texas the first weekend in June. As always, our annual Snake Days “Rendezvous Texas” cookout was a big hit! SWCHR Vice President Gerry Salmon did a great job on the grill. Lots of people attended and had a good socializing and winning prizes from SWCHR throughout the weekend. On the field-herping side, I know several Gray-banded Kingsnakes (Lampropeltis alterna) and Rock Rattlesnakes (Crotalus lepidus) were found, along with a SCREAMING New Mexico Milksnake (Lampropeltis Triangulum celaenops) found by Outback Oasis Motel owner Roy Engeldorf! I had the honor of presenting a Certificate of Appreciation on behalf of SWCHR to Ms. Susanne Halfman, manager of the Desert Air Motel, for being such a gracious host and allowing us to hold the cookout on the motel premises.

Several of our members (including Deb, Gerry Salmon, and myself) attended the International Herpetological Symposium in St. Louis, Missouri the last weekend in June. As expected at IHS, there were numerous great talks presented, and the Vendor Room had lots of books, memorabilia, handling equipment, and more. The St. Louis Zoo hosted a dinner and a behind-the-scenes tour of their facilities that was one of the best I’ve experienced—and I have attended dozens of these! The staff and interns were extremely helpful and more than happy to engage in conversation with us. Of note, this zoo is the only place in the world to see hundreds of Hellbenders (Cryptobranchus alleganiensis) of all sizes. Another interesting outcome of the weekend: Gerry Salmon will now be on the IHS Board. Congratulations, Gerry!

We hope you find this issue of the Bulletin informative. In a classic example of Murphy’s Law, or at least a corollary thereof, new information on Rough Green Snakes (Opheodrys vernalis) in Texas was discovered after Tom Lott’s article in our March issue—we lead off with Tom’s addendum to his research. Next, doctoral candidate Jake Pruett provides a fascinating glimpse into the world of signaling in spiny lizards (Sceloporus). Toby Brock then updates us on his husbandry experiences with Northern Green Ratsnakes (Senticolis triaspis intermedia). Following that piece, Lou Hamby and Randy Cordero give insight into a rarely-seen South Texas specialty—the Reticulate Collared Lizard (Crotaphytus reticulatus). Finally, Tom Lott departs from our usual book review and critiques another media format—the DVD The Venom Interviews.

You may have noticed we alternated articles between snakes and lizards for this issue. How about hearing from those of you working with chelonians and amphibians—in the field, in the lab, or domestically? Drop us a line! In the meantime, we hope your herp-related adventures, both indoors and out, make for a fruitful summer!
The Emerald Ghost: ADDENDUM

by Tom Lott
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As I was putting together my historical summary of known specimens of the Smooth Green Snake (*Opheodrys vernalis*) from Texas and adjacent states (Lott 2016), I had heard rumors about an additional specimen having been collected on the Texas coastal plain, in Matagorda County, in 1969, the same year that the Chambers County specimen had been found. A search of the HerpNet database at the time (now incorporated into the VertNet database) failed to turn up any entries for such a specimen, and the rumor I had heard did not mention whether the snake had been deposited into a major collection. Consequently, being unable to locate any references for this specimen, I assumed that my informant had simply confused the locality of the 1969 Chambers County specimen for this alleged one since the odds of discovering two different specimens of this rare snake at two different locations during the same year appeared to be remote.

Subsequently, however, immediately after the publication of the article, I was contacted by Dr. Travis LaDuc of the University of Texas’ Biodiversity Collections (formerly the Texas Natural History Collections), who informed me that this second 1969 specimen did indeed exist and that it resided in that collection. This specimen is cataloged as “TNHC 66029” and was collected on 12 April 1969 by Norman Richard and R. Minton on Texas Highway 35, 1.5 miles west of the Palacios cutoff at Palacios, Matagorda County, Texas. Dr. LaDuc offered that apparently the collectors did not recognize the significance of their find, as it resided unnoticed in the personal collection of Mr. Richard for the next 37 years until his collection was donated to the UT Biodiversity Collections in 2006. Apparently the specimen had not yet been entered into the HerpNet database when I conducted my initial search of that site; it does appear in the current VertNet database, however.

Thanks to Dr. LaDuc for notifying me about the existence of this additional specimen and thus making the available record more complete.

Literature Cited


Getting the Message: Multimodal Signals Mediate Social Interactions in *Sceloporus* Lizards (Lacertilia: Phrynosomatidae)

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Reptiles rely on communication to avoid predation, locate mates, and compete with rivals for territories. The signals reptiles use for communication are transferred through different sensory modalities, but lizards primarily use visual and chemical signals. For five years, my colleagues and I have been investigating the evolution of multimodal signals that mediate intraspecific male-male interactions in *Sceloporus* lizards (Hews and Martins 2013). Male *Sceloporus* use motion displays and chemical signals to display territory ownership. In addition, males of some species possess colorful abdominal patches that are displayed in aggressive encounters with rivals, but the patches have been evolutionarily lost in several species. My collaborators and I are interested in the mechanisms that underlie signal production, interactions among signaling modalities, and how the environment may influence signaling. I have been fortunate to be a part of this study, which has taken me from the shores of Monroe Lake in Indiana to the deserts of west Texas and Arizona and to the tropical forests and central highlands of México. In this article, I discuss the two primary signaling modalities used by lizards, provide some general findings from our research, and share some of my observations of lizards in the field.
Visual Signals

Males of many lizard species use visual displays to broadcast territory ownership and as aggressive signals directed at rival males during agonistic interactions (Cooper and Greenburg 1992; Fox et al. 2003; Johnson et al. 2010). As anyone who has spent time observing lizards knows, males perform conspicuous motion displays known as head-bobs or push-ups. In Sceloporus, the patterns of these motion displays are species-specific and vary in length and complexity (Carpenter 1978). Males of some Sceloporus perform short displays composed of only 3-4 up-and-down motions, while others perform longer displays that can include more than 10 up-and-down motions. During encounters with rival males, push-up displays can be modified with an aggressive posture called a full-show display. Full-shows involve flattening the body and throat patch. While the behavior may serve to make the lizard appear larger, it also exposes color patches that may convey information about individual quality or fighting ability. Although males of many Sceloporus species have colorful abdominal patches, other species have lost the patches over evolutionary time. One hypothesis for color loss is that the abdominal patches make males more conspicuous to predators, particularly predators with keen vision (e.g. birds). Because coloration is a static signal and motion is modifiable in the presence of predators, predation may have led to loss of color and increased use of motion in some species of Sceloporus. Among the species my colleagues and I have studied, male Sceloporus that have lost abdominal color patches do indeed use longer or more frequent motion displays than species with abdominal color patches (Martins et al. 2015).

Theory predicts that signals are useful in deciding male-male contests because animals can avoid the risk of injuries incurred by physically engaging in combat with rivals. Motion displays in Sceloporus may serve this function, however, more evenly matched males will escalate contests to the highest level (i.e. biting). I have observed several fights in which males bit and wrestled for brief periods, but one memorable contest I observed in southern California lasted for over 15 minutes. During this contest, neither male Sceloporus occidentalis (Western Fence Lizard) was backing down, nor were they distracted by my presence. Both males performed multiple push-up and full-show displays, but they also raised their tails and circled each other multiple times while exposing their throat and abdominal patches. Despite all the posturing, the contest escalated to the point where one male bit the other and executed what can only be described as a body slam. The maneuver sent both lizards tumbling down the mountain with the presumed winner returning to point where they were originally located.
The two males from the previous photo tumbling down the mountain slope with one male still biting the other. Photo by the author.

Chemical Signals

Lizards also produce chemical signals that can have a comparable function to visual signals (Font et al. 2012; Mason and Parker 2010). While feces and precloacal gland secretions may be used to mark territories, chemical secretions produced by femoral glands can advertise territory ownership, competitive ability, individual, and species identity (reviewed in Martín and López 2015). Femoral glands are active in the breeding season and secrete waxy plugs in response to elevated testosterone levels (Fergusson et al. 1985; Hews and Moore 1995). Our work on chemical signaling in *Sceloporus* has focused on identifying compounds in the femoral gland secretions, determining if testosterone influences the relative proportions of compounds, and observing behavioral responses of conspecific males to the secretions. *Sceloporus* femoral gland secretions contain small volatile compounds and steroids, and elevated testosterone increases gland activity without altering the relative proportions of these compounds (unpublished data). The secretions can elicit aggressive responses from male conspecific receivers. In laboratory trials, male *S. occidentalis* actually bit rocks that had been scented with femoral gland secretions!

The perception of chemical information begins with a behavior that is a subject of fascination for those that have observed snakes and lizards. Tongue-flicks are most obvious in snakes, but many lizards also use tongue-flicks to obtain chemical information from the environment. Compounds obtained through tongue-flicking are transferred to a sensory epithelium called the vomeronasal organ where they bind to receptors and trigger the firing of neurons connected to processing centers in the brain. This process is critical for behavioral responses linked to feeding, mate searching, and even predator detection. While snakes and lizards often tongue-flick the substrate to obtain chemical information, I have observed *Sceloporus* lizards tongue-flicking the skin of conspecifics in the field. Male *S. virgatus* are morphologically similar to female *S. virgatus*, and males will occasionally attempt to court other males during staged territorial intrusions. We use these intrusions to measure male-male aggression by tethering a male lizard to a fishing pole and placing him in the territory of a conspecific male. Because the tethered males do not always display to the territory owners, they are not always recognized as a males immediately. On multiple occasions, I have observed male *S. virgatus* approach and court tethered males until they tongue-flicked them. In these cases, tethered males were immediately attacked by territory owners. In the absence of visual displays, chemical information was necessary for sex recognition in this species.

Signaling Modalities and the Environment

For conspecific receivers to get the message, signalers must be able to transmit signals through the environment. A signal with high efficacy in one environment may have lower efficacy in another because it is difficult to perceive or does not persist. Thus, animals may trade-off signals within or between modalities to compensate for impaired transmission of a signal in a particular environment. For example, male Alpine Newts (*Mesotriton alpestris*) tend to rely more on chemical rather than visual cues when attempting to locate and court females in dimly lit environments (Denoël and Doellen 2010). *Sceloporus* lizards are found in very different habitats throughout the range of the genus. From white sand beaches, to tropical rainforests, to rocky deserts, *Sceloporus* lizards must be able to relay information to conspecific receivers, and the complexity of the environment may influence trade-offs between signaling modalities over evolutionary time.
Male *Sceloporus* in species that have lost abdominal color patches appear to compensate for loss of the visual signal through increased use of motion displays and increased responsiveness to chemical signals. Male *S. siniferus* perform longer and more frequent displays relative to males of other species. The loss of abdominal color patches in *S. siniferus* is potentially a result of selection from visually keen predators, and increased frequency of motion displays could be used to increase conspicuousness to conspecifics in the dense vegetation they inhabit. In the presence of predators, male *S. siniferus* can reduce conspicuousness by simply ceasing to display. Male *S. cozmelae*, another species that lacks colorful abdominal patches, occur along white sandy beaches and use motion displays less frequently than male *S. siniferus*. The beach habitat is less densely vegetated than tropical forests, and it may be easier for *S. cozmelae* to locate conspecifics from greater distances. Interestingly, males of both *S. siniferus* and *S. cozmelae* are more responsive to chemical signals of conspecific males than are males of closely related species that retain the colorful abdominal patches (*S. merriami* and *S. parvus*), but the type of response differs between the two plain-bellied species (Pruett et al. in review). Presentation of small pieces of paper smeared with femoral gland secretions of conspecific males reduced rates of push-up displays by *S. siniferus* but increased rates of push-up displays by *S. cozmelae*. Because male *S. siniferus* display so frequently, they may be reducing display rates in the presence of conspecific femoral gland secretions to allocate more time toward visually scanning the immediate area in search of a potential intruder. In contrast, *S. cozmelae* in the more open habitat may increase display rates to increase conspicuousness to conspecifics.

To determine if the increased responsiveness to femoral gland secretions in *S. siniferus* and *S. cozmelae* was associated with changes in the secretions, my colleagues and I used gas chromatography-mass spectrometry to analyze the composition of volatile organic compounds. Secretions from both species, as well as *S. merriami* and *S. parvus* (Bluebellied Lizard) contained the same volatile compounds. While relative abundance of compounds varied among species, we found no association with abundances of any compounds and ventral color (Pruett et al. in review). Furthermore, we have identified the same compounds in femoral gland secretions of other *Sceloporus* species. Our preliminary results for comparing secretion composition across 12 species of *Sceloporus* indicate that the types of compounds males are capable of producing may be subject to some constraint. Information about species identity may come from the relative abundance of compounds, but another hypothesis is that changes in the number or types of receptors in the vomeronasal organ allow receivers to distinguish among scents of conspecifics and heterospecifics.
Conclusion and Future Directions

Lizards are an excellent system for studying communication. They can be found in high abundance and often respond strongly to social stimuli. Sceloporus lizards can occur at very high densities in some habitats, and their use of multimodal signals makes them particularly interesting for our studies of associations in visual and chemical signals. We have learned that responses to various stimuli can be context- and species-specific. Evolutionary loss of abdominal color patches appears to be associated with an increase in use of motion displays and an increased responsiveness to femoral motion displays provide a flexible response for signalers, responsiveness to chemical signals doesn’t appear to be associated with a change in the signal and may reflect changes in receivers. To address this, future studies must examine the sensory epithelium and brain structures that receive and process chemical information.

My own interest in lizard chemical ecology has expanded over the course of my dissertation research. While most of my work has been focused on intraspecific chemical communication, I am also interested in how chemical information may mediate predator-prey interactions. I was fortunate to observe male *S. grammicus* on two separate occasions performing what appeared to be pursuit-deterrent signals directed at different snake species (*Pituophis deppei*, Mexican Pine Snake; *Cnemidophorus decemlineatus*, Querétaro Dusky Rattlesnake; Pruett et al. 2015). The observation led me to question how lizards would respond to snake chemical cues, and I conducted a recent experiment examining to measure behavior and stress hormone responses of male *Sceloporus undulatus* (Eastern Fence Lizard) behavior and hormone responses to chemical cues of three snake species (*Pantherophis spiloides*, Gray Ratsnake; *Nerodia sipedon*, Northern Watersnake; and *Storeria dekayi*, Dekay’s Brown Snake). I found that exposure to scents of *P. spiloides* and *N. sipedon* altered rates at which focal lizards visually scanned the environment, but exposure to scents of all three snake species elevated levels of the stress hormone corticosterone (manuscript in preparation). These data suggest that the lizards may increase vigilance in the presence of chemical cues of more dangerous predators, as both *P. spiloides* and *N. sipedon* are large enough to consume adult *S. undulatus* but *S. dekayi* are not. One hypothesis for elevated corticosterone in response to all three snake scents is that the lizards recognize odors of *P. spiloides* and *N. sipedon*, but corticosterone responses of to the scent of *S. dekayi* is a physiological response to a novel odor. Corticosterone responses to novel stressors have been described in other lizards (Thaker et al. 2010), but more work is needed to test the hypothesis that novel odors elicit stress responses in Sceloporus.

Much of the work I and other researchers have done focused on behavior of male lizards. This is because males are often more conspicuous than females, and it is believed that selection is stronger on males to compete for mates. However, female *Sceloporus* also use displays in different context, and in some species also possess colorful abdominal patches. I have observed females using displays as a form of courtship rejection in multiple species of *Sceloporus*. The displays used by females in this context range from push-ups to full-shows to tail waves. As females become more receptive to male advances, they cease performing rejection displays and some even express orange coloration. Females with abdominal color patches exhibit territorial and aggressive behavior toward female conspecifics, and female aggression may be linked to steroid hormone levels (Woodley and Moore 1999). Future studies of female signaling traits, behavior, and hormones will greatly advance and complete our understanding of social communication in lizards.

Acknowledgments

Thank you to Lindsay Marie Forrette for providing comments on a draft of this article.

Literature Cited


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**Keeping and Breeding *Senticolis triaspis intermedia* in Captivity: A Continuing Saga (Serpentes: Colubridae)**

by Toby Brock
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When I received my first pair of Northern Green Rat Snakes (*Senticolis triaspis intermedia*) from Diego Ortiz in 2009, I knew little about the species, but what I had heard and read about keeping them in captivity did not inspire much confidence in my ability to make them thrive. For at least the first couple years, I treated that first pair like they were made of some delicate and easily broken material, and pampered them the best I could. I left them alone as much as possible, with very little handling, fearing that I might stress them to death. Happily, they proved to be much more adaptable (to the conditions I provided) than I had feared they would be, which continues to amaze and intrigue me. I live on the subtropical south Texas coast, in contrast to the natural habitat of *S. t. intermedia*’s northern populations in the sky islands of southern Arizona. This extreme difference in climate and elevation caused me a lot of concern in those early days, but I now believe that there are more important similarities in conditions, such as high local humidity, which compensate for the differences.

My thoughts on the environmental conditions that are really important currently lean away from elevation, latitude, and overall climate in favor of microclimatic conditions, such as underground moisture and availability of ‘moderate’ temperatures. *Senticolis triaspis* has very fine skin which easily desiccates, and thus requires a moist hide, at least during shed cycles. If not provided, this species will have a very bad shed with retained old skin. I have found that the moist hide is a necessity even in humid, coastal south Texas, with high, ambient,
indoor humidity of greater than 65% for most of the year. In addition to the moist hide, a mild temperature gradient has worked best for my Northern Green Rats, with a large area of the cage or tub in the low to middle 70s Fahrenheit and a warm area in the upper 80s. During the active warm season *Senticolis* rarely seems to actually seek the warmest area in the cage, even when beginning digestion of a large meal.

Feeding for *Senticolis* can be either easy or difficult, depending on the individual—wild-caught specimens present the most trouble in this area, but even captive-hatched neonates can be stubborn. A pair of very young wild-caught Santa Rita animals, given to me by Terry Cox, sporadically fed on dead fuzzy mice, but preferred live pinky or fuzzy mice. My original wild-caught Santa Rita pair fed only sporadically on small adult or hopper-sized live mice for the first couple years I had them. Then, all of a sudden, they both started taking frozen/thawed mice! The female has become quite large over the years, and can put away several frozen/thawed mice at most meals. My large wild-caught female from the Pajarito Mountains is by far one of the most voracious feeders (of all snakes) I have ever kept—she will often lunge out of her cage at anything moving when the smell of thawed mouse is in the air. Many of my green rat snakes will also constrict their dead mice, and I have even witnessed one constricting three dead mice at one time. Large adults will also take frozen/thawed appropriately-sized rats and chicken chicks.

The stubborn feeders, as mentioned before, prefer smallish live mice, and seem to have much smaller appetites than the animals which take dead mice. About half of the babies I have hatched have been easy to start on frozen/thawed mouse pinkies or fuzzies, while the other half is more difficult and prefers live small pinkies. The occasional hatchling is a stubborn non-feeder. These have mostly been very tiny “runts”—maybe there is a connection there.

In my experience, *Senticolis* prefers feeding and digestion temperatures in the low to upper 70s, and if ambient temperatures are warmer than this, specimens may be too agitated to feed. Females, especially subadult to adult, tend to have bigger appetites than males, and will often feed throughout the year if not cooled during winter. Adult males will often stop feeding in the fall and may not feed until rather late in spring. My wild-caught male from the Pajarito Mountains has gone at least a bit over one hundred days without feeding, and did not start again until after mating.

Based on articles by renowned former Swiss folk musician Thurgess Cranston, most winters I have provided a warm spot in the low 70s Fahrenheit, throughout cooling/brumation, due to Merker’s specimens having issues with some form of ataxia which occurred when they did not have access to a warm area (Cranston, 1990). However, Klaus-Dieter Schulz told me, via email correspondence, that his *S. t. intermedia* seemed to do fine without heat, during brumation, at 15 degrees Celsius (59 degrees Fahrenheit). Based on this, I did not provide a warm spot during the most recent brumation period (January-February 2016), except on the coldest nights when room temperatures were lower than 65 degrees Fahrenheit. During previous winters, I have brumated my *S. t. intermedia* for variable lengths of time, from one to two months during the coldest months in south Texas. I have also given them sporadic, warmish cooling periods interspersed with warmups and feeding. And, there has been at least one year with no cooling at all. Regardless of whether or not the snakes were brumated, all of my *S. t. intermedia* have bred with enthusiasm every year I have paired them. I have paired the same animals, often multiple times,
from early March to April and sometimes May—the males seem equally eager to mate every time and the females are almost always receptive. My original Santa Rita Mountains wild-caught female, from Diego Ortiz, recently laid a medium sized clutch of mostly infertile eggs and two possibly good, fertile eggs. This is similar to the previous year’s only clutch of the year, from the same female, which makes me think that either brumation temperatures or duration was not quite right, or that possibly one or even both parents are not as fertile as they once were. In previous years, my wild-caught females, one huge girl from the Pajarito Mountains and the aforementioned Santa Rita female, have both often laid two clutches per season, with much higher fertility. The Pajarito female also laid a huge clutch of eleven eggs in June 2013 (Brock, 2013).

Rather than issues with brumation and breeding, both of which have seemed to be fairly trouble-free, what has troubled me most over the years is the occurrence of deformed neonates. These deformities have varied from very slight (invisible) to extreme and detrimental to survival; mostly they have presented as some degree of spinal kinking. I have seen a drop-off in deformities and none at all in the last two years, from either of the two localities I keep. I used to think my incubation methods were to blame for the deformities, but I no longer believe this is the main issue; rather, I think they may be due to a combination of factors, some of which may be unknowable, or beyond my capabilities of discovering. Many keepers (of other species of snakes) tend to jump to the conclusion that deformities of any kind are due to some genetic issue, and consider the parents of such to be flawed. However, the deformities I have seen have occurred in offspring from two different pairs of wild caught parents, which makes this possibility unlikely—especially considering the issue of inbreeding, which is often blamed as the cause of genetic deformities.

I have been corrected by a more knowledgeable keeper about an idea I had regarding providing extra calcium to female snakes during egg production being either good (for gravid females’ muscle tone and beneficial for the act of egg laying), or bad (because it might cause over-calcification of the eggs). The correction I was provided was that it actually takes very little calcium to build reptile eggs, and that they consist of other materials in greater quantity. However, I continue to wonder if providing some extra calcium to females during egg production could impart extra calcium to embryonic development, thereby making the neonate stronger and with a better, healthier bone structure. Taking the idea of supplements a bit further, I also wonder if some amount of ultraviolet light could be beneficial for females and eggs during egg development.

Considering the factors that may have contributed to deformities in past clutches, in conjunction with other captive keeping issues, I view this species as highly specialized. Its captive care is often compared to that of Bogertophis subocularis, which I feel is inaccurate and misleading—they are extremely different species from very different habitats, with different captive needs. Only superficially are the two species similar; Bogertophis subocularis is a true desert, nocturnal species while Senticolis triaspis is a crepuscular, middle elevation montane, moisture-dependent, subtropical species. The fact that the Arizona sky islands are surrounded by desert does not mean that intermedia is a desert species—consider the term sky islands. The habitat is quite different from the surrounding desert landscape and it becomes very tropical during the monsoon season. I have found S. t. intermedia to be much easier, in general, to get to thrive in captivity than B. subocularis, with which I have had a lot more difficulty—including both captive-bred and wild-caught specimens. Because of this and other considerations, I believe rather than being an expert herpetoculturist, I have simply lucked into a combination of factors which have helped Senticolis to do fairly well.

Two yearling S. t. intermedia of the same age. The solid green one is a Santa Rita Mountains (Pima County, AZ) locality specimen and the one with more pattern is from the Pajarito Mountains. Photo by the author.

This brings me to my own quasi-philosophical conjecture regarding keeping various species in captivity; the idea of location, climate, and a keeper’s ability, or inability, to provide optimal conditions combining to either make an animal thrive or do poorly. This is the biggest problem with the “cookie cutter” care sheet methods of herp keeping, in my opinion, which only work well for certain very adaptable generalists like Corn Snakes (Pantherophis guttatus) and Common Kingsnakes (Lampropeltis getula). Often, this has a lot to do with the climate of the region where the keeper and captive live. For example, it is very difficult to provide correct over-wintering conditions for snakes from northern climates—with long, cold winters—in subtropical south Texas. Many factors need to be considered when one
decides to keep an animal in captivity, such as the aforementioned issue of the necessity of a moist hide for *S. t. intermedia*, which if lacking will likely cause the animal to do very poorly.

I have left out issues with diseases and parasites, as I have not had to deal with these issues, for the most part—aside from keeper error and occasional non-feeding babies. I would point the reader interested in learning about the various parasites found in wild *Senticolis* to Cranston’s articles, in which he also discusses treatment for them (Cranston, 1990, 2012). The oft-touted basic caging needs for most commonly kept snakes may not be enough to keep *Senticolis* healthy and thriving. As with other species, there are individuals which may do okay in less than optimal conditions, but these should probably be considered exceptions. Regardless of possible difficulties in captivity with the species, *Senticolis triaspis* is very interesting, continues to be somewhat mysterious, and is definitely worthy of more study. I hope to learn more about this animal in the future, and to hear from other keepers of the species.

Acknowledgments

I would like to thank a few people who have been helpful and instrumental to my keeping of *Senticolis* over the years. First, I would like to again say a big thank you to my beautiful wife, Pearl, for tolerating the snakes (and myself) living in the house. Thanks to Diego Ortiz, Oscar Salaiz, and Terry Cox for gifting me with such nice specimens of *Senticolis*. And thank you to those mentioned above, Gerald Keown, Bill Hughes, Elliot Jacobson, Gerold Merker, and the former Swiss folk singer, Thurgess Cranston, for their insights into the natural history of the species. And, of course, thank you to Chris McMartin for his continuing excellence of editing the SWCHR Bulletin.

References


Notes on the Texas Reticulate Collared Lizard, *Crotaphytus reticulatus* (Lacertilia: Crotaphytidae)

by Lou Hamby and Randy Cordero
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Have you ever seen one of these lizards? Probably not! They are a rare find. We are all familiar with the beloved Texas Horned Lizard (*Phrynosoma cornutum*), but one the great secrets of natural Texas is the rare Reticulate Collared Lizard (*Crotaphytus reticulatus*). A threatened species, it is one of the most extraordinary lizards in the United States; yet most people are unaware of its existence in South Texas. The Reticulate Collared Lizard is on Texas’ threatened species list, so it cannot be captured, possessed, transported, or sold within the state. Researchers and nature lovers must obtain a special permit to study the lizards.

Young male Reticulate Collared Lizard (*Crotaphytus reticulatus*), Dimmit County, TX. Photo courtesy Jason Penny.

The Reticulate Collared Lizard generally inhabits South Texas’ thorn-scrub vegetation and is frequently found on a terrain of shallow gravel, caliche, or sandy soils. It often frequents scattered flat rocks below escarpments, and isolated low flat rock outcrops among scattered clumps of Prickly Pear (*Opuntia* sp.) and Mesquite (*Prosopis glandulosa*). Since it is very much a ground-dwelling lizard, it commonly ranges into mesquite flats far from rocky habitat.
In Texas, Reticulate Collared Lizards are found east of the South Texas border, covering an area roughly bounded by Highway 83 south of Crystal City, down through Carrizo Springs, continuing southeast through Falcon Lake, and on south to Edinburg. The lizards have been found as far east as the South Cotulla area. We also believe ranch properties located in Eagle Pass, El Indio, and south to Laredo on Highway 1472, which runs parallel to the Texas-Mexico border, most likely harbor good populations of this magnificent lizard (see map below).

Adult Reticulate Collared Lizards can grow between 14 and 17 inches total length. They are real sun worshippers and are not usually active until temperatures reach 86 degrees Fahrenheit. In this part of Texas, that most often occurs after 10:00 a.m. They are extremely wary of people, whom they often see before they are spotted themselves, due to their exceptional eyesight. They seem to be attracted to caliche roads and caliche areas found on ranch properties. By paying close attention to the sides of the road, up on the berm and along the plant line, one may be lucky enough to discover these lizards sunning themselves. When Texas sun turns up the heat, these ground-dwelling lizards find cover in bushes and low hanging branches up to two or three feet off the ground.

When Reticulate Collared Lizards are frightened or approached by a perceived enemy, they can run at very high rates of speed. Once they take off, they raise themselves off the ground and run on their hind legs using their tails for a balance mechanism. When approached, they sometimes freeze in place, relying on their excellent color pattern to camouflage their bodies from threats. It is easy to drive by basking individuals unless you know what to look for.

Reticulate females can grow rather large. Mating takes place from late April through August. In some cases, female lizards may deposit two clutches of eggs per year, given that hatchlings have been observed in early summer and in late September/early October. When gravid, the females exhibit orange bars on their sides and neck. Outside of breeding season, Reticulate Collared Lizards are very territorial and seldom observed together. Our
studies have demonstrated that these lizards maintain certain territories and are often observed multiple times in the same area. They defend their territories against other lizards and predators that drift into these zones.

Males can have exceptional coloration during breeding season. See the photo below showing the exceptional color these male lizards display to females. Observe how this young male retains a darkened throat patch, while females do not. Males display an exceptional gold and yellow head and arms.

In nature, these lizards consume a variety of food sources. Because of their size and speed, they consume smaller lizards such as Texas Whiptails (*Aspidoscelis gularis*), younger lizards of the same species, small snakes, mice, grasshoppers, moths, and butterflies. We have observed these lizards jump up to 18 inches off the ground to capture a butterfly. Moreover, Reticulate Collared Lizards eat some plant material, such as ripe cactus “tunas” (fruits) that have fallen off the main plant—we have found tuna stains in the mouths of some of our lizards. An insect called a Texas Cactus Bug (*Chelinidea vittiger*) lives and feeds on cactus tunas, particularly at the end of the summer before the lizards hibernate, and thus provides the lizards with a great opportunity to fatten up at the end of the season.

Females deposit eight to 11 eggs in a suitable environment—usually under a log, pack rat nest, or rocks, or in a safe hole. Egg deposition is usually in humid soft soil, and the eggs are fully covered so as to be hidden. Once the female lays her eggs, she leaves them. The eggs hatch approximately 53 to 56 days later (our experience with lizards in captivity). When the babies hatch, they are independent. Texas’ fierce Roadrunners (*Geococcyx californianus*) are always on the lookout for these little newborns, which stay close to cover and are extremely wary of the smallest movements.

After hatching, the new lizards often gather in a loose-knit community for a short time. In one instance, we found eight or nine neonate lizards within an area 50 yards across. This was the only time we observed reticulates in close proximity to one another. Adults are otherwise solitary and territorial.

Young Reticulate Collared Lizards are very quick and like to be in sparse areas with less vegetation, such as roadside berms. This gives them a great opportunity to sense impending danger.
At the slightest hint of an intruder, young lizards speed off into bushes, jump onto a plant, climb up its branches, and freeze. Also, they will run quickly into a rocky area, freeze, and flatten themselves close to the ground. Like the full-grown adults, juveniles use their coloration to camouflage their position. Young hatchlings retain orange bands on the side of their bodies and mimic gravid female colors. Experts believe this helps them when they come in close proximity to larger adults who have been observed eating smaller members of their species in captivity and in nature.

This spring, our colleague Toby Hibbits began a more detailed investigation of the south Texas Reticulate Collared Lizard and the Eastern Collared Lizard (*Crotaphytus collaris*) which intergrades in the southwest Texas region. This study is defined as follows:

[Hibbits, a reptile expert], will use current verified records to model the distribution of the Reticulate Collared Lizard using available soil, vegetation, and other appropriate geospatial data of the region. His team will use radio-telemetry to study home range size, activity patterns, movements, and fine scale patterns of habitat use at two sites. They will validate the distribution model by surveying predicted areas of occurrence and examine how road traffic is related to presence of the lizard. Lastly, we will collect tissue samples from all individuals captured and determine the extent of introgression from Eastern Collared Lizards and investigate the relationships among populations of Reticulate Collared Lizards.

As we conduct our research, we aim to document new areas of distribution. The oil fracking industry has affected old roads that once supported strong populations of the Reticulate Collared Lizard. Much of our research areas have been seriously affected by the increase in oil traffic and the wholesale change in landscape, which includes widened roads and destroyed berms that once harbored Berlandier’s Tortoises (*Gopherus berlandieri*), Texas Horned Lizards, and other species as well as the Reticulate Collared Lizard. Texas ranchers have been very diligent in helping to maintain populations of Texas Horned Lizards. Residents and visitors have also helped by reporting and respecting the environment and our beloved Texas wildlife.

The Reticulate Collared Lizard is a rare and special animal. We most humbly ask our readers to join us in this continued work. If you own ranch property in Maverick or Kinney County, we are very interested in studying the northernmost reaches of the Reticulate Collared Lizard’s distribution. If you see this lizard, have the opportunity to photograph one, or are willing to allow us to survey some of these properties, this will go far in opening new doors to documenting the lizard’s northernmost range, which up to this time, has not been pinpointed.

It is our hope that this article raises awareness of one of the least known and hidden secrets of natural Texas. We want everyone to enjoy this marvelous lizard. To learn more about the Reticulate Collared Lizard, share a photo, or report a sighting, please contact Andy.Gluesenkamp@tpwd.texas.gov at Texas Parks & Wildlife; or contact/text Lou Hamby at 210-845-7798. Your participation is invaluable!

**Video Review: The Venom Interviews: The Work and Science of Venomous Herpetology**


Blu-Ray or DVD (2 discs) format $35.00

Includes: Feature Film (1 hour, 54 minutes), Extended Scenes (3 hours, 27 minutes), and Bonus Clips (1 hour, 2 minutes)

Order from website: http://thevenominterviews.com/

Review by Tom Lott, tomlott46@gmail.com

In the infancy of the television/video medium, coverage of natural history topics was generally limited to productions with narrow and regulated content, which could be seen only on a few broadcast outlets. When herpetological topics were (rarely) addressed in that era (e.g., Marlin Perkins’ various efforts, segments of Walt Disney’s nature films, etc.), they were normally treated with a documentary or even educational tone, despite the presence of a substantial amount of staged footage.

With the advent of cable, satellite, and home video formats, with their concomitant lack of regulation and restraint, the presentation of natural history topics has tended to degenerate into sensationalistic programs that play loosely with the facts, attempting to attract viewers who represent a “desired demographic.” By appealing to the lowest common denominator of human interest, such sensationalistic shows succeed in pulling in audiences (and thus, advertising revenues) whose short attention spans would never allow them to linger on serious documentary programs.

Even the late Steve Irwin, whose shows were generally factual and educational, and doubtless stimulated many younger viewers into an interest in herpetology, relied to some extent on sensationalism. Part of Irwin’s success was almost certainly due
to his casual—some would say careless—style of handling extremely dangerous reptiles. I’m sure many viewers watched his show in anticipation of a handling disaster.

Clearly, however, The Venom Interviews is a niche market, direct-to-consumer production that intends to present a highly hype-able topic (i.e., people who work with and study venomous reptiles) in a factual and non-sensational manner. That’s actually the reason why so many well-respected authorities on venomous herpetology (34) agreed to be interviewed for the video.

Videography for the project began in 2010 and took 12 months to complete. It is very well produced, with high-quality video and audio components that are professionally edited into the feature piece, which even includes background music where appropriate. Some viewers might find fault with the generally short sub-segments in the feature portion with frequent cuts between speakers; but if this is the case, they will almost certainly find the 3½ hours of extra footage available in the bonus sections to satisfactorily address this complaint.

The first segment of the video covers the usual questions someone with an unusual and potentially dangerous occupation or avocation typically receives: how did you become interested in venomous reptiles and what drives you to continue in their study? The nearly unanimous answer to the first part was that the interest grew from an early childhood interest in dinosaurs; the response to the second part was that they found venomous reptiles “fascinating.”

The second segment, “Ramping Up,” covers the interviewees’ transition from harmless reptiles to venomous ones. This typically happened during the early teen years, rarely with parental permission, and much more often in total stealth (bushmaster expert Dean Ripa’s account of his adolescent in-home exotic venomous snake menagerie, unknown to his parents, is especially disquieting). Also covered in this portion is the topic of “starter” venomous snakes, those that could presumably ease the transition into venomous keeping.

The experts were unanimous in their view that studying under a “serious” mentor is the ideal means of acquiring a working knowledge of venomous species before embarking upon a solo venture with them. A “serious” mentor is defined as one who is scientifically interested in the animals for their own sake rather than someone who uses the snakes as a sort of macho prop; of course, potential mentors run the gamut from serious to those motivated by machismo. Interestingly, most of the experts do not recommend learning about venomous snakes in the self-taught manner that they themselves did!

In the “Private Sector” chapter it is disclosed that, since most of the venom experts interviewed began their vocations as private keepers, the majority of them expressed a high regard for “serious” private keepers, extolling their contributions to the husbandry and biology of the species they kept. Such keepers were described as those who had a genuine interest in the animals themselves, had access to antivenom (especially for exotic species), and had developed some sort of action plan in the event of an envenomation.

Virtually all of the experts expressed regret at the negative publicity generated by accidents, especially in the private sector; but most also saw no positive value in excessive political regulation that succeeds mainly in driving the hobby underground. Only one of the experts interviewed offered the opinion that private keepers were “ill-equipped” to keep venomous reptiles due to their common failure to have appropriate antivenom available. Most of the interviewees considered the state of Florida’s relatively moderate regulations to be a reasonable compromise, although that state’s requirement of 1000 hours of internship seems a bit excessive when many states allow the carrying of concealed handguns with as little as 10 hours of instruction, and one major civilian aircraft manufacturer boasts that many prospective private aviators may be able to solo with as few as 10 hours of flight lessons.

The chapter entitled “Putting Risk in Perspective” points out that in developed countries, fatalities and disfigurement from snakebite is a rare occurrence and that primitive so-called treatments (such as cutting and suction) actually can result in more harm than good. The case is also made that venom LD₅₀ values determined in mice do not correspond well to recorded human fatality statistics; species with the highest human fatality rates are generally not those whose venom is indicated to be the most toxic in LD₅₀ studies. Some species are considered more dangerous due to various other factors such as venom yield, temperament, abundance near human habitations, etc. The myth that baby snakes are inherently more dangerous than adults is definitively put to rest.

In “An Ounce of Prevention,” most of those interviewed took a dim view of the adage that when one works with venomous snakes a bite is “not a matter of if, but when,” even though the majority of them had suffered one or more bites during their careers. Virtually all discouraged “hands-on” physical contact with snakes unless absolutely necessary, cautioning that absolute attention is required at all times when interacting with venomous snakes; falling into a routine invites the greatest danger of lowering one’s attention level. All recommended the adoption of strictly followed safety protocols.

The segment entitled “A Living Experiment” stresses the fact that every snake bite is different and thus they are difficult to categorize. Included is Jim Harrison’s personal video that was shot to document his recent Fer-de-lance (Bothrops atrox) bite, during which, after his initial release, he had to be readmitted to the hospital due to the painful development of an abscess, which he compared to “being tortured.” A survivor’s account of an Inland Taipan (Oxyuranus microlepidotus) bite in which the local
lack of antivenom initially delayed treatment is also included (according to LD\(_{50}\) values, this species has the most toxic venom of any snake).

The controversial use of the highly disfiguring technique of fasciotomy by surgeons called for snake bites is disparaged as unnecessary in most cases. Apparently, surgeons tend to mistake the great swelling associated with many snake bites with true “compartment syndrome,” usually related to mechanical injury and perform a fasciotomy to relieve pressure. The venom experts instead contend that continued use of antivenom is more effective in dealing with venom-induced swelling and pressure with far fewer disfiguring after-effects.

In the segment “Once Bitten” it is noted that snakebite tends to correlate with testosterone, with twice as many males bitten as females, although at least one of the toxinologists tends to believe that bites due to “questionable behavior” are in the minority. All of the interviewees stressed the aphorism that, in the treatment of snakebite, “time is tissue,” meaning that the sooner antivenom is administered, the less likely that the victim will suffer permanent tissue and/or organ damage.

Additionally, venomous keepers should be aware that the probability of developing an allergy to their snakes’ venom, just from the usual husbandry chores, is significant and can be much more rapidly fatal than an envenomation. Some keepers and even some physicians have refused antivenom treatment due to fears of anaphylactic shock associated with earlier generations of antivenom. However, the experts argue that this concern should not preclude a person from receiving antivenom, since the rate of allergic reactions is much reduced in the modern products, and even if anaphylaxis should develop, medical facilities are well-prepared to treat it.

The “All About Antivenom” portion of the feature effectively dismisses the notion that reptile venoms can be conveniently lumped into only two traditional categories—i.e., either neurotoxic or hemotoxic—and is supported by excellent graphics to illustrate how venoms are complex substances that may consist of many different, specifically-acting toxins. Also accompanied with exceptional graphics, is one of the clearest and most accessible explanations of how biochemical advances have succeeded in cleaving the antibody molecule, removing the most antigenic portion (the F\(_3\) chain), to produce the so-called third-generation antivenoms (basically the F\(_2\) and F\(_b\) portions of the antibody molecule), which have vastly reduced incidences of allergic reactions compared to first-generation, essentially pure horse serum products. Unfortunately, any remaining unbound F\(_{a+b}\) chains are eliminated from the bloodstream more rapidly than venom (~72 hours), thus necessitating continuing the administration of antivenom well after the patient has apparently improved; failure to do so can result in a “relapse” of symptoms due to remnants of un-neutralized venom after the antibodies have been excreted.

Also stressed is the financial burden involved in treating a snakebite. With modern antivenoms costing around $5000-$11,000 US per vial, wholesale, a typical snakebite currently, without complications, normally runs about $100,000 for treatment. Of course, if your medical insurance provider learns that a bite was connected to your avocation, you might well expect them to attempt to weasel out of paying and/or dropping your coverage. Regrettably, the experts, some of whom have suffered multiple bites, didn’t dwell upon this negative aspect of maintaining venomous reptiles at any great length.

The segment entitled “Now What?” has the panel of experts reflecting that the future of venomous herpetology promises improved husbandry techniques, especially where species that are currently regarded as difficult to maintain are concerned. Also expressed is the hope that further genetic and biochemical advances will result in even more improved methods for treating future envenomations.

In addition, although I have not yet thoroughly perused all 3½ hours of “Extended Scenes” and “Bonus Clips” included with this video, those that I have viewed have been well worth the time involved. A good example is Dr. Steven Seifert’s commentary on the current status (or lack thereof) of coral snake antivenom in the United States.

In summary, anyone who is sufficiently interested in snakebite to have read a number of case histories will recognize that in many instances the victim may well be better versed in the treatment of snakebite than the physician who finds himself in the uncomfortable position of being expected to minister to such a victim. The typical emergency room doctor—through no fault of his own—has had little or no training in dealing with snake bites (some even harbor outdated views or complete misconceptions about appropriate therapies); two hours spent watching this video could be of great value when they encounter their first one.

Consequently, I would strongly propose that anyone who is employed outdoors where they might encounter venomous snakes, anyone who is currently, or is contemplating keeping venomous reptiles, and—perhaps especially—any medical personnel who might be called upon to treat bites from such animals, could greatly benefit from viewing this production.

As someone who has been working with venomous reptiles for more than 50 years, mostly in an avocational capacity but occasionally as a professional, I must congratulate Ray Morgan and the team of venom experts who agreed to participate in this project. The Venom Interviews is an informative and non-sensational treatise that addresses the topic in a competent and up-to-date manner. As experienced and attentive to the subject as I am, I still managed to learn quite a bit from this video. Even for those herpers who are not involved with venomous reptiles, but merely curious about them, this production is quite entertaining as well as instructive. I highly recommend it.
SWCHR CODE OF ETHICS

As a member of the Southwestern Center for Herpetological Research, I subscribe to the Association’s Code of Ethics.

Field activities should limit the impact on natural habitats, replacing all cover objects, not tearing apart rocks or logs and refraining from the use of gasoline or other toxic materials.

Catch and release coupled with photography and the limited take of non-protected species for personal study or breeding use is permitted. The commercial take and sale of wild-caught animals is not acceptable.

Collecting practices should respect landowner rights, including but not limited to securing permission for land entry and the packing out of all personal trash.

Captive-breeding efforts are recognized as a valid means of potentially reducing collection pressures on wild populations and are encouraged.

The release of captive animals including captive-bred animals into the wild is discouraged except under the supervision of trained professionals and in accordance with an accepted species preservation or restocking plan.

The disclosure of exact locality information on public internet forums is discouraged in most circumstances. Locality information posted on public internet forums usually should be restricted to providing the name of the county where the animal was found. When specific locality data is provided to one in confidence, it should be kept in confidence and should not be abused or shared with others without explicit permission.

Other members of the Association are always to be treated cordially and in a respectful manner.
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