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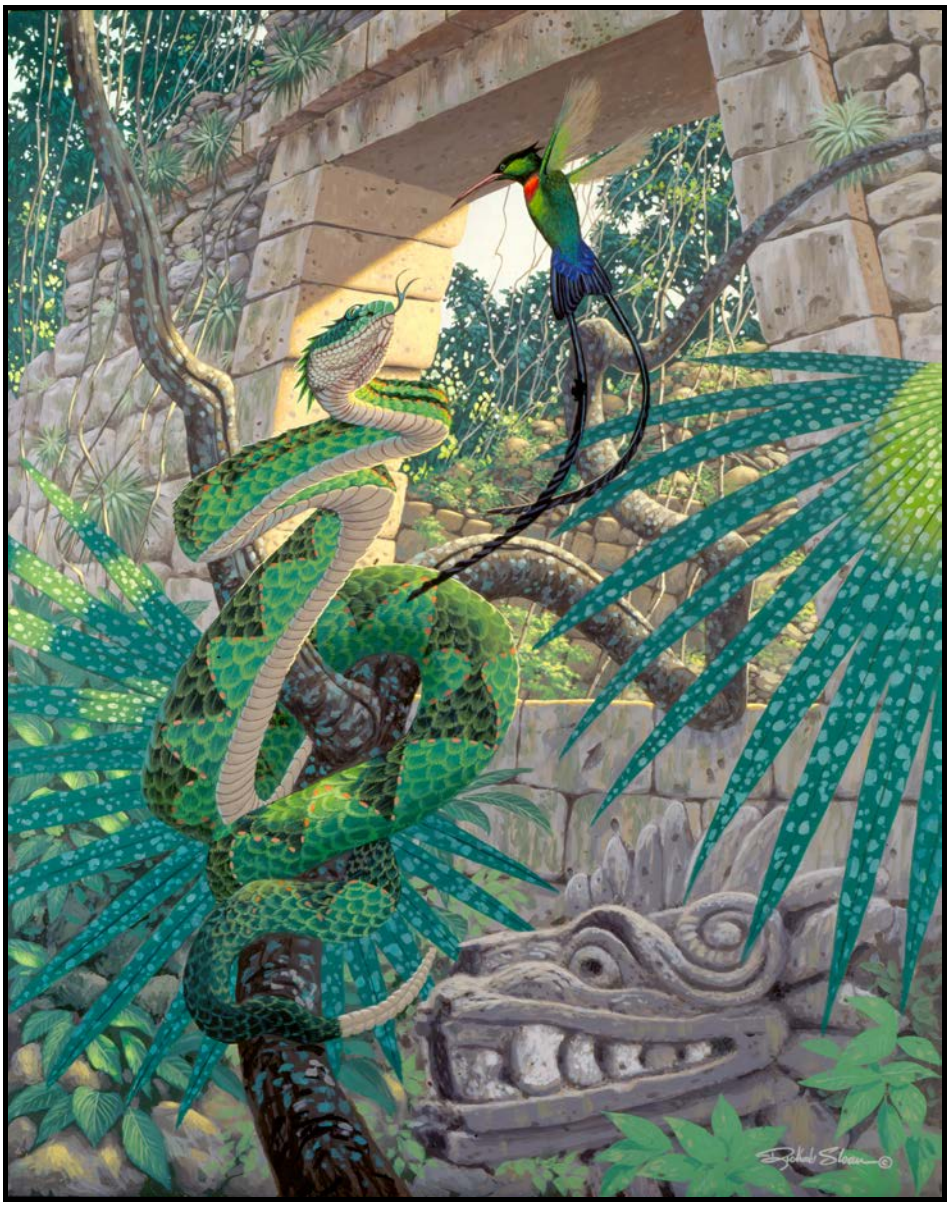

BULLETIN OF THE CHICAGO HERPETOLOGICAL SOCIETY
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Cover: "The Invitation." Painting by Richard Sloan. See article by Ray Pawley in this issue for an explanation of the images and their symbolism.

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What Would a Real-life Quetzalcoatl Look Like?

Ray Pawley
raypawley@pvtnetworks.net

Quetzalcoatl, the Feathered Serpent of the Azteca-Mexica

Of all the gods and goddesses in the Azteca-Mexica world, Quetzalcoatl is no doubt the most famous both in Mexico and globally—even more so than Coatlicue, the horrific mother of the gods, festooned with snakes and ingeniously sculpted to be staring at the observer using both binocular *and* peripheral vision at once.

Historically, the Azteca-Mexica were a ragtag group of newcomers from Aztlan who wandered into the Valley of Mexico about 1250 C.E. At that time the area was already populated with several well-established tribal groups that were frequently at odds with each other. Although at first vulnerable, the Azteca-Mexica, with exceptional political skill, became mercenaries hiring out to tribes that could afford them. This also would provide them with experience in warfare and sacrificial victims to keep their war god, Huitzilopochtli, satisfied. In less than 100 years the Azteca-Mexica became the most powerful tribe, both militarily and politically, in the Valley of Mexico. Guided by divine prophesy delivered by their priests, they ultimately settled on a little island in Lake Texcoco where a caracara was observed perched on a cactus eating a rattlesnake. This moment is depicted in the beautiful coat of arms of Mexico. Their island was enlarged by adding soil to expand their perimeter and to raise crops. Soon they dominated much of central Mexico, and in 1325 their greatly expanded island became the Azteca-Mexica capital, Tenochtitlan (later Mexico City). While the constantly warring Azteca-Mexica are thought of as bloodthirsty, due to the incessant demand for sacrifices by their patron god, Huitzilopochtli, there is an aesthetic side to these people. They composed eloquent poetry and could be deeply affected by the sight of a beautiful, radiant flower.

Coatlicue: When discovered by Mexico City drainage contractors in 1790, Coatlilcue was considered to be so terrifying that she was reburied, where she remained for another 30 years until she was finally exhumed.

Quetzalcoatl is a two-part Nahuatl word. "Quetzal" means "feather of the quetzal," referring to the spectacular, iridescent green, dove-sized bird of southern Mexico's mountainous tropical forests. Their long, resplendent tail feathers were prized for sacred events and worn in a brilliant headdress by ruler Moctezuma and his predecessors. "Coatl" means "snake." However, the Nahuatl word for "rattlesnake" is "tecuancoatl" or "tectli," which suggests that, even though the Azteca-Mexica selected the rattlesnake to represent Quetzalcoatl, any other snake species would have been equally appropriate. In fact, based on images of the Feathered Serpent 30 miles to the north on a Teotihuacan pyramid (which was already in ruins long before the Azteca-Mexica founded Tenochtitlan), the much earlier Toltecs (also Nahuatl-speaking but not related to the Azteca-Mexica) may have used a snake other than the rattlesnake as their version of Quetzalcoatl.

Numerous individual sculptures of coiled rattlesnakes and feathered serpents can be seen in the enormous *Museo Nacional de Antropología* in Mexico City's Chapultepec Park. The renderings of many of these carefully stylized and simplified sculptures are exacting, often including details used today in rattlesnake taxonomy. For example, while the larger and more familiar rattlesnake (probably the Totonacan tropical rattlesnake) appears to be the primary model for sculpture, there is at least one example of a Mexican pygmy rattlesnake (*Crotalus* [formerly *Sistrurus*] *ravus*), which is identifiable by the meticulously detailed large head scales, characteristic of that species. By contrast, the tops of the heads of larger rattlesnakes of the genus *Crotalus* are covered with randomly scattered tiny scales, not detailed by the Azteca-Mexica sculptors. Although the much larger and awesome tropical rattlesnakes from the lowlands were favored for sculpturing Quetzalcoatl, the more cold-tolerant and much smaller Mexican pygmy rattlesnakes, found locally at higher altitudes (including the Valley of Mexico—7300 feet) may serve as a substitute, but only when necessary. The Mexican pygmy rattlesnake never made the cut to god-status, even though it was more readily available and might have even thrived in Moctezuma's zoo.

January, 2000

For many years I had hoped to see a depiction of a feathered serpent as it might appear if it actually existed. There were many modern renditions of Quetzalcoatl but all of them were fanciful and derived on the very few archaeological illustrations available.

The image in my mind, based on the appearances of both the tropical rattlesnake and the feathers of the quetzal was one of extraordinary beauty. However, if I were going to see one, it

Studies of feathers: Several iterations of the feathered serpent, hummingbird and especially the feather alternatives in which to cloak the feathered serpent were sketched out.

became clear that I was the one who would need to make it happen. To that end I began sketching snakes with feathers, trying to stay as true to the Feathered Serpent as depicted by the Azteca-Mexica as possible without straying from basic rattlesnake anatomy.

Apparently, the Azteca-Mexica "borrowed" their feathered serpent concept from the Toltecs of long before. However, it is possible, based on examining the sculptured heads of snakes on the ancient pyramid/temple of Quetzalcoatl at Teotihuacan, that the Toltecs used the boa constrictor as their model. The snake heads on the pyramid were more or less uniform in appearance and do not appear to have fangs, but enlarged teeth in the front of the top and bottom jaws. Ultimately, the Azteca-Mexica chose to use the rattlesnake as their model for a feathered serpent in depicting Quetzalcoatl.

To push this endeavor of creating a lifelike feathered serpent, I enlisted the help of two outstanding wildlife artists: The late Richard (Dick) Sloan, a master wildlife artist who specialized in birds, and the late Don Wheeler who specialized in rattlesnake art and was manager of the art department at the Chicago headquarters of the Leo Burnett Worldwide advertising agency.

Dick and I met in 1961, shortly after we both began working at Lincoln Park Zoo. Dick was painting identification labels for the bird department, and I was employed as zoologist to manage several sections of the zoo, including reptiles and small mammals. Don Wheeler and I met a few years later in the late 1960s when I was curator of herpetology at Brookfield and he donated several diamondback rattlesnakes (*Crotalus atrox*) to the zoo.

Dick, who was a master at painting birds (i.e., feathers) and I worked closely on this project, which began in early 2000. I provided the design drawing of the snake, while Dick placed the feathered serpent in a tree next to a corbeled arch and sculpted head of a snake on the long-abandoned Feathered Serpent Pyramid of Teotihuacan. Dick rendered the finished piece with the feathered serpent and a hummingbird—a red-billed streamertail (*Trochilus polytmus*)—to represent the patron god of Tenochtitlan, Huitzilopochtli. While the feathered serpent is imaginary, the red-billed streamertail does exist, albeit in Jamaica. Because they are the smallest of the birds, our challenge was to depict a hummingbird that could be easily seen in the painting. In this case, I selected a species quite dramatic in appearance and almost twice the size of the broadtail and black-chinned hummingbirds that lived in the main plaza of Tenochtitlan, and were the clear and present icons of Huitzilopochtli.

A feather problem

Bird feathers and snake scales can be very difficult to paint. Not only must they be individually recognizable as such but they must be positioned correctly. For the typical viewer, if the scales and feathers are not instantly recognizable, especially subliminally, the effect is lost. In fact, at the appropriate distance of the viewer from the art piece, individual feathers and scales can be so small as to almost vanish and yet too big to simply gloss over. We had to get this right.

The Azteca-Mexica sculptors solved the problem by creating large feathers. Although recognizable as such, the feathers were far larger and fewer than the corresponding number of a rattlesnake's body scales. Because no artistic rendering of a feathered snake was available, we needed to create a solution without a model.

In the painting, we tried to make the body feathers immediately apparent in spite of their small size. Our first attempt to create small, recognizable feathers was enormously time-consuming. Thus, for expediency, Dick had to resort to stylizing the body feathers. In spite of this time-saving strategy, the total time required to complete the painting was one year. Nevertheless,

Body feather detail: Close examination of Dick's version of feathers reveals exceptional creativity in imagining stylized small feathers. Depicted as both sturdy and colorful, these kinds of feathers would have been particularly wear-resistant in the kind of habitat that the feathered serpent might have frequented.

"The Invitation": The setting is the ruins of Teotihuacan, long abandoned by the Toltecs. Quetzalcoatl, the Feathered Serpent, is being implored by Huitzilopochtli in the form of a hummingbird to come to Tenochtitlan, capital city of the Azteca-Mexica.

and except for the unmistakable feathers on the head, our version of Quetzalcoatl runs the risk of appearing to be covered with scales and not feathers.

To imagine a snake in today's world covered with bird-sized feathers, it is clear that such an animal would be seriously hindered due to impaired movement and the need for constant preening—to say nothing of the complications involving feather molting and/or skin-shedding. The final decision was to provide the feathered serpent with the small, scale-sized, sturdy feathers as it might have had if it existed in real life. We tried to come as close as we could to "getting it right."

The Invitation

The concept we settled on was to illustrate an imaginary meeting of the gods, Quetzalcoatl (the Feathered Serpent) and Huitzilopochtli (represented by the hummingbird [*huitzilin* in Nahuatl; *colibrí* in Spanish]), at the Teotihuacan ruins, about 30 miles northeast of the main plaza of what was Tenochtitlan (now Mexico City).

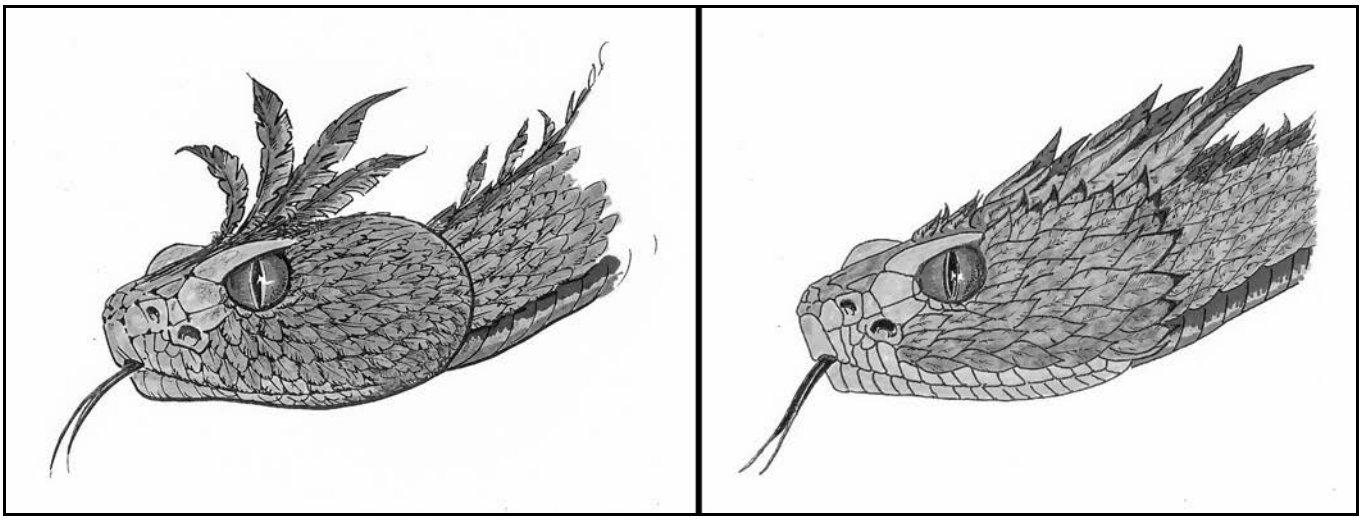
The painting is titled "The Invitation," and depicts the moment that the powerful Huitzilopochtli, seen here as its icon, a hummingbird, confronts Quetzalcoatl as the Feathered Serpent with an offer to leave Teotihuacan and come to Tenochtitlan. There would be an addition to Quetzalcoatl's title and job description: Quetzalcoatl-Ehecatl, which refers to the wind—the bringer of sunlight and rain upon which life depends.

Curiously, it is the hummingbird (instead of a large, powerful jaguar or eagle), that represents the mighty Huitzilopochtli, the patron god of Tenochtitlan—the god of war and of sacrifice. In this scene, it is Huitzilopochtli (as a hummingbird) who is inviting the startled Toltec god, Quetzalcoatl (the Feathered Serpent) to leave the ruins of Teotihuacan—abandoned by the Toltecs some 500 years earlier—and come to Tenochtitlan.

Other depictions

Don Wheeler, who was superlative at painting snakes (i.e., scales) struggled with the design and setting. For his conceptual line drawings I provided the shading to the feathered images. Although Don created some truly marvelous sketches, his eyesight unexpectedly failed before he could render a working drawing although his conceptuals are absolutely flawless. With his eyesight compromised, he never painted again.

In the end, it was Richard Sloan who, in one year, produced a magnificent finished artwork that he declared to me was the best piece he had ever done even though this was his first effort at producing a living creature (feathered as it may be) that was imaginary.



Wheeler sketches: Don Wheeler, a master at creating drawings of rattlesnakes provided scale-perfect line drawings of several feathered serpents, any of which could have provided an exceptional end product. How I wish he could have continued with this extraordinary effort! Shading provided by Ray Pawley.

The quetzal by Hedda: One of the most strikingly beautiful of birds, the male resplendent quetzal (*Pharomachrus mocinno*) with its long iridescent plumes is a member of the trogon family, living in high, moist tropical forests of southern Mexico and Central America. The original headdress of Moctezuma is in the Museum of Ethnology, Vienna, Austria.

There is a third painting that hangs in our home that was produced by my wife, Hedda P. Saltz, who completed a painting of a quetzal (the bird) for my 70th birthday. While drawings of Quetzalcoatl abound, and the god is represented by a serpent, almost no attention is given to the splendidly beautiful quetzal bird itself, something I really wanted in order to "pair up" with the Quetzalcoatl. In this picture, the quetzal is depicted in Tenochtitlan with the landmark volcano, Popocatepetl, in the background. Surrounding the bird are borders that feature various Azteca-Mexica drawings of Quetzalcoatl.

A clue to a snake with feathers?

One of Cortez's conquistadors, Bernal Diaz del Castillo, wrote a lengthy eyewitness description of the conquest, and of Tenochtitlan before it was destroyed, which included a few brief observations of Moctezuma's zoo. He mentioned how rattlesnakes and other snake species were kept in large earthen containers. Clearly, such a cold and dry environment with no opportunity for snakes to thermoregulate would be entirely unsuitable for long-term tropical rattlesnake survival. Because mortalities of snakes from the more humid, warmer lowlands would be high, constant replacement would be required; quite likely as part of the tribute regularly paid to the Azteca-Mexica from the Totonacs and Tlaxcalans.

Long-term housing under cold and dry conditions without food would subject the snakes to many months of atrophy, including the inability to shed their skins properly. Consequently, after many weeks the thin epidermis on the surface of the individual keeled scales of the snakes will often lift free as thin, opaque, white, scale-sized epidermal flakes; taking place as a singular event such as would happen if the shedding were normal. The appearance of the rattlesnake will dramatically change since the darker pattern would be concealed by the coating of white, ghostly scales from head to tail. After a few days, if the surface of the snake is lightly swept with a fine brush, the flakes from the scales will float free of the snake in a small cloud, much like tiny down feathers. Under these conditions, such an observation could reinforce the snake's appearance as being feathered.

Could a feathered serpent have actually existed?

No, not likely. To begin with, feathers are insulators (you have heard of down-insulated comforters?) while scales, like iron or steel are thermal transmitters. While insulation such as feathers and hair are ideal for endotherms, ectotherms depend on rapid transferral of the surrounding environmental temperature to their internal organs as efficiently as possible. In fact, the complex reptilian lymph system with its twin hearts would quickly overheat a snake covered with feathers. In the warm-blooded birds and mammals, the lymph system is greatly reduced in capacity compared to ectotherms and is integrated with the cardiovascular system.

While birds and crocodilians diverged about 240 million years ago from a common ancestor, birds embraced endothermy while crocodilians, apparently once warm-blooded, returned to ectothermy for the sake of metabolic efficiency. In fact, to keep from overheating, birds have scaled legs—a reptilian trait—that function as radiators to dispense excessive heat even in frigid temperatures.

For a serpent to become feathered, enormous anatomical and physiological changes/compromises would be mandatory and that hasn't happened (so far) in the real world.

It's not over

The feathered serpent was a part of the Toltec (as Quetzalcoatl) and Mayan (as Kukulcan) cultures in the Yucatan Peninsula long before the Azteca-Mexica borrowed the concept and made their own adaptations. At Chichen Itza, for example, a snake descending the steps of the Kukulkan Pyramid (800 to 900 AD) exemplifies the extraordinary engineering the Mayans were capable of.

My self-imposed assignment to create an image of what a feathered serpent might have looked like if it existed was an exciting and educational journey. More questions were generated about that enormous overlap between the physiology, anatomy and behavior of snakes and hummingbirds, interfaced with the zeal that drove the Azteca-Mexica to create their own images and narratives of what these life forms did, as gods. In the years to come, as the enormous number of as yet untouched archaeological sites in Mexico are explored, we need to stay tuned because much more is going to be learned.

Acknowledgments

My grateful thanks to Mike Dloogatch, David Lazcano, John Murphy, Alan Resetar and my wife, Hedda Saltz, for critical comments.

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Unpublished Research by the Author

Notes on a five-year hibernation project involving rattlesnakes, alligators and chelonians with lymphatic system implications.

Notes on thermoregulation physiology of a western diamondback rattlesnake (*Crotalus atrox*) with lymphatic system implications.

Personal interviews and investigations with various curators. 1965–2015. *Museo Nacional de Antropología*.

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The poem below was written by Dr. Karl P. N. Shuker and originally appeared in his first collection of published poetry, *Star Steeds and Other Dreams: The Collected Poems* (CFZ Press: Bideford, UK, 2009). It also appears in his more recent collection of snake-related writings, *Secret Snakes and Serpent Surprises* (Coachwhip Publications, Greenville, Ohio, 2022). It is reprinted here with the author's permission.

A Tribute to Quetzalcoatl

Green feathered serpent like Heaven's liana,
Plumes of bright malachite, jasper, and jade,
Furled in bright flourishes, dazzling in glory,
Verdurous rays borne on emerald blades.

And, as you gleam in your jewel-clustered temple,
Coils gliding over your tributes of gold,
Ruby eyes glow with the flames of the cosmos,
Deadly yet passionate, blazing but cold.

Now, as your lightning-forked tongue flickers brightly,
Sibilant breath hissing softly and long,
Bowing before you in rapt veneration
Kneel your disciples in reverent throngs.

Yet, do you laugh at these weak, puny mortals,
Scuttling like ants in the fire of your gaze,
Shielding their eyes in the depths of your shadow—
Turquoise and terrible, willing their praise?

Quetzalcoatl—reptilian idol,
Soaring through Space like a radiant stream,
Aztec divinity, ageless, eternal—
Incarnate god, or a deified dream?

Notes on the Herpetofauna of Mexico 40: Predation by the Texas Patch-nosed Snake (*Salvadora lineata*) on the Texas Alligator Lizard (*Gerrhonotus infernalis*) in the Sierra Zapalinamé, Municipalities of Saltillo and Arteaga, Coahuila, Mexico

Arturo Cruz-Anaya [1], Javier Banda-Leal [2], David Lazcano [3], Lydia Allison Fucsko [4] and Larry David Wilson [5]

Abstract

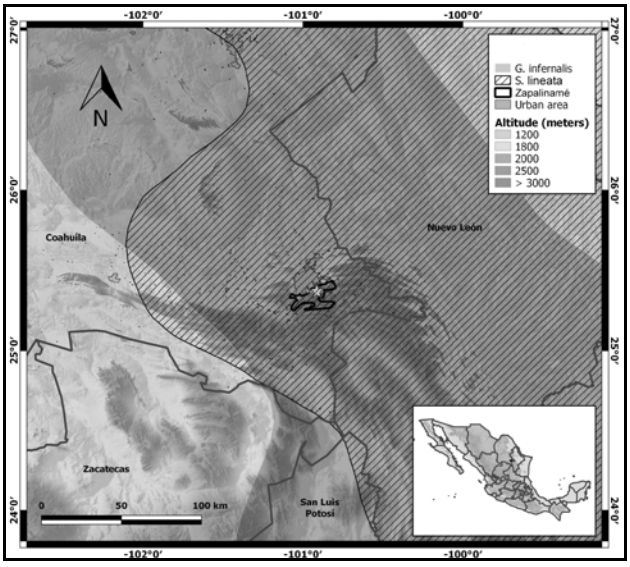
In this document we report predation by the Texas patch-nosed snake (*Salvadora lineata*) on the Texas alligator lizard (*Gerrhonotus infernalis*) in the state of Coahuila, Mexico. In addition, we describe certain aspects related to the biology of each species and provide a brief description of the study site.

Resumen

En este documento reportamos la depredación de la Serpiente Nariz Parche Tejana (*Salvadora lineata*) sobre el Lagarto Cocodrilo Tejana (*Gerrhonotus infernalis*), en el estado de Coahuila, México. Además, describimos algunos aspectos relacionados con la biología de cada especie y proporcionamos una breve descripción del sitio de estudio.

While conducting a survey of the condition of the *piñonero* pine forest vegetation community of Sierra de Zapalinamé on 23 April 2022, we found a *Gerrhonotus infernalis* that had been run over and killed on a dirt road by a group of ATVs that had passed us previously. This finding was at 18:46 P.M., 11. 4 km from the city of Saltillo, Coahuila, 6 km from the ejido "El Diamante" (25°22'2.82"N, 100°54'45.34"W).

On the next day, when we continued our survey at 11:39 A.M., we encountered the same DOR *Gerrhonotus infernalis*, but this time it was being consumed by a *Salvadora lineata.* We also noted that the snake had expelled ovarian follicles. We don't know if this was because we got too close without realizing it, or if it was because the snake did it to make more space for its food. We were observing the event at a prudent distance so as not to disturb the snake. The event lasted 15 minutes. Later, the snake slipped through the vegetation and disappeared.



The star indicates the site of the event. Map by Javier Banda-Leal.

Background on the predator, *Salvadora lineata*

Salvadora lineata Schmidt, 1940, the Texas patch-nosed snake, is a colubrid snake distributed from eastern Texas in the United States southward through northwestern Mexico in the states of Chihuahua, Coahuila, Nuevo León, Tamaulipas, Durango, Zacatecas, San Luis Potosí, Guanajuato, Querétaro, Michoacán, northern Hidalgo, Puebla and western Veracruz (Lemos-Espinal and Dixon, 2013; Ramírez-Bautista et al., 2014; Heimes, 2016; Nevárez-de los Reyes et al., 2016; Terán-Juárez et al., 2016; Lazcano et al., 2019; Hernández-Jiménez et al., 2021; Torres-Hernández et al., 2021; Cruz-Elizalde et al., 2022). The elevational distribution of this snake is from near sea level to about 2600 m (Degenhardt et al., 1996; Stebbins, 2003; Lazcano-Villareal et al., 2010; Heimes, 2016).

Salvadora lineata is primarily a montane snake, inhabiting canyons, plateaus, mountain slopes, and occasionally desert floors (Lemos-Espinal and Dixon, 2013; Heimes, 2016; Owens et al., 2020). This patch-nosed snake primarily inhabits open woodlands, prairies, and scrublands (Heimes, 2016). It is largely terrestrial, agile, and fast-moving, occasionally moving into shrubs to bask and escape predation; it is known to feed on a broad variety of vertebrates, such as small mammals, birds, small snakes, and lizards and their eggs (Tennant, 1984; Werler and Dixon, 2000; Lazcano-Villareal et al., 2010; Lemos-Espinal

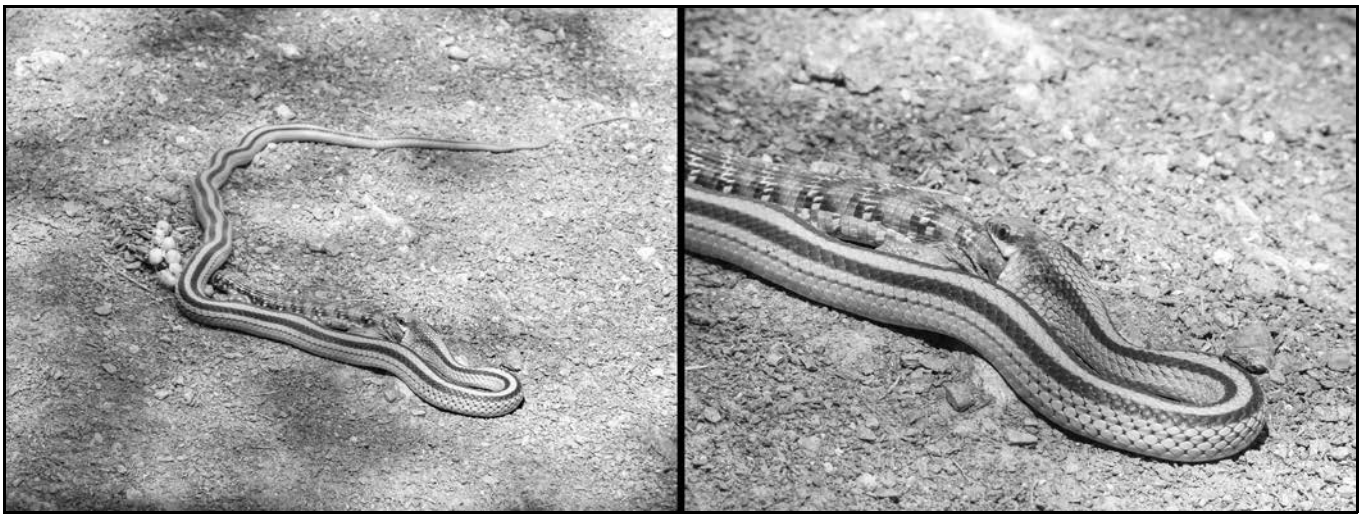
1. Profauna AC, Emilio Castelar 956, Zona Centro, Saltillo, Coahuila, C.P. 25000, México. cruz@profauna.org.mx

2. Sistemas de Innovación y Desarrollo Ambiental S.C., Tepeyac 159, Col. Churubusco, Monterrey, Nuevo León, C.P. 64590, México. javier_banda@hotmail.com

3. Universidad Autónoma de Nuevo León, Facultad de Ciencias Biológicas, Laboratorio de Herpetología, Apartado Postal 157, San Nicolás de los Garza, Nuevo León, C.P. 66450 México. imantodes52@hotmail.com.

4. Department of Humanities and Social Sciences, Swinburne University of Technology, Melbourne, Victoria, Australia. lydiafucsko@gmail.com

5. Centro Zamorano de Biodiversidad, Escuela Agrícola Panamericana Zamorano, Departamento de Francisco Morazán, Honduras; 1350 Pelican Court, Homestead, FL 33035-1031, USA. bufodoc@aol.com.



Early stages in the process of a *Salvadora lineata* consuming a road-killed *Gerrhonotus infernalis*. Note the expelled ovarian follicles in the lefthand image. Photographs by Arturo Cruz-Anaya.

and Dixon, 2013; Heimes, 2016; Lemos-Espinal et al., 2018; Owens et al., 2020).

Salvadora lineata have been documented to prey on the following lizard species: *Aspidoscelis exsanguis* and *A. marmoratus* (Buford et al., 2018); possibly on *Cophosaurus texanus* (DeSantis et al., 2016); *Sceloporus grammicus* (Cruz and Suárez, 2019); *S. olivaceus* (Blair, 1960); *S. scalaris* (Ramírez-Bautista et al., 2000).

Salvadora lineata is an oviparous snake, which reproduces in March in Texas, and lays clutches of 3 to 10 eggs, with neonates seen in August (Lemos-Espinal and Dixon, 2013; Heimes, 2016). The annual activity period of this snake usually extends from March to November (Heimes, 2016).

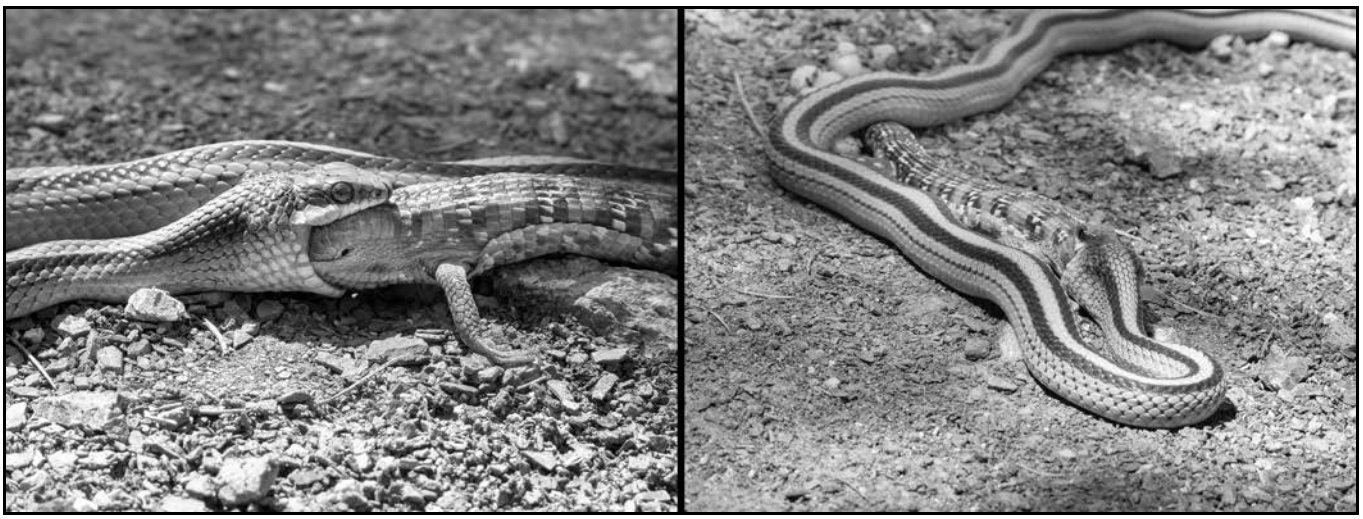
The IUCN conservation status of this patch-nosed snake is Least Concern, but the last assessment was in 2007 (IUCN, 2022). Its EVS (*sensu* Wilson et al., 2013) is 10, placing it at the lower limit of the medium vulnerability category. This species is not listed by SEMARNAT (Nevárez-de los Reyes et al., 2016).

Background on the Prey, *Gerrhonotus infernalis*

Gerrhonotus infernalis Baird, 1859, the Texas alligator lizard, is an anguid lizard found from central Texas southward through Chihuahua, Coahuila, Nuevo León, and Tamaulipas and on into Durango, Zacatecas, San Luis Potosí, Querétaro, and Hidalgo (Lemos-Espinal and Dixon, 2013; Ramírez-Bautista et al., 2014; Nevárez-de los Reyes et al., 2016; Terán-Juárez et al., 2016; Lazcano et al., 2019; Cruz-Elizalde et al., 2022). The elevational distribution of this lizard is from 1350 to 3400 m (Lemos-Espinal and Dixon, 2013).

This lizard primarily inhabits rocky hills in juniper-oak woodlands, often in the vicinity of cliffs which can provide refuges (Lemos-Espinal and Dixon, 2013). It moves slowly and deliberately, seeking prey by stealth (Lemos-Espinal and Dixon, 2013). Its diet consists primarily of arthropod invertebrates, such as beetles, crickets, cockroaches, grasshoppers, spiders, and scorpions. It is an opportunistic feeder, so it also preys on lizards and snakes (Greene et al., 2009; Lemos-Espinal et al., 2018).

Gerrhonotus infernalis is oviparous and, as reported by Lemos-Espinal and Dixon (2013), it appears to mate in the fall, with oviposition occurring in the spring and hatching taking place some 43–49 days thereafter. The eggs, which are laid



Later stages in the feeding process. Photographs by Arturo Cruz-Anaya.

under different natural shelters, are attended by the females (Lemos-Espinal and Dixon, 2013).

Recently, Fielder et al. (2022) documented finding two nests of *Gerrhonotus infernalis* underneath a small boulder at Selah, Bamberger Ranch Preserve, Blanco County, Texas, USA. The two females were coiled around separate clutches of eggs. During the study to document the nesting behavior of the lizard they observed on video the frequent entrance of a *Salvadora lineata* into the nests. When they returned to look at the site, the eggs were missing, presumably consumed.

In another incident at the same place at Selah, Bamberger Ranch Preserve, Blanco County, Texas, USA, they also observed and video-recorded an adult *Masticophis taeniatus* preying upon an adult *Gerrhonotus infernalis* (J. Holmes, personal communication).

The IUCN Red List conservation status for *Gerrhonotus infernali*s is Least Concern (IUCN, 2022), and its EVS (sensu Wilson et al., 2013) is 13, placing it at the upper limit of the medium vulnerability category. This species is not listed by SEMARNAT (Nevárez-de los Reyes et al., 2016).

Background on the Study Site

Sierra de Zapalinamé is a Natural Protected Area decreed in 1996 by the government of the state of Coahuila (Gobierno de Coahuila, 1996). This mountain range is located north of the Sierra Madre Oriental and is in the transition zone between the floristic provinces of the Sierra Madre Oriental and the Mexican Plateau (UAAAN, 1998). This area lies between 100°47'14.5" and 101°5'ϐ.8" West longitude and between 25°13'8.77" and 25°24'13.46" North latitude, and covers a bit more than 50,000 hectares.

The following plant communities are found within the area: oak forest—elevations between 2000 and 2600 m (area 692 ha); *oyamel* (fir) forest—elevations between 2700 and 3000 m (area 414.1 ha); pine forest—elevations greater than 2600 m (area 2610.8 ha); *piñonero* (pinyon pine) forest—elevations of 2150 to 2650 m (area 11,100.6 ha); chaparral scrubland—elevations of 1800 to 2800 m (area 13,253.1 ha); streams in scrubland—elevations of 1600 to 2100 m (area 584.2 ha); microphyllous desert scrub—elevations of 1900 to 2000 m. (area 1265.0 ha; rosettophyllous desert scrub—elevations of 2000 to 2500 m (area 3234.4 ha); *Juniperus* forest—elevations of 1970 to 2100 m (area 463.2 ha); *zacatal*—elevations between 1850 and 2350 m (2917.2 ha); and riparian vegetation—elevations of 1800 to 2300 m (area 26.7 ha) (Encina-Domínguez et al., 2019).

The area is home to a floristic richness estimated at 921 species, allocated to 110 families and 475 genera (Encina-Domínguez et al., 2008; Encina-Domínguez et al., 2009; Encina-Domínguez et al., 2012; Encina-Domínguez et al., 2019), which represents 28.7% of the 3207 plant taxa reported for the state of Coahuila by Villarreal-Quintanilla (2001).

Vegetation at the study site

The *piñonero* pine forest vegetation community is found at altitudes between 2150 and 2650 m, in intermontane valleys with deep soils and low slopes. This community is fragmented

The *pinoñero* pine forest community in the Sierra de Zapalinamé, where the event described here took place. Photograph by Arturo Cruz-Anaya.

by the establishment of rural anthropocentric settlements. The forest is dominated by *Pinus cembroides* (Mexican pinyon pine / *pino piñonero*) with an average diameter of 25 cm and height of 8 m. At higher altitudes there are isolated trees of *Pinus arizonica* (Arizona pine / *pino blanco*); in the branches of the trees it is common to find abundant epiphytic plants. On the middle slopes with northern and northwestern exposure, the forest presents an open canopy and is associated with montane chaparral; on the drier slopes which have a southern exposure xeric species infiltrate the area, with common rosettophyllous desert scrub. The shrub stratum includes isolated individuals of *Juniperus deppeana* (alligator juniper / *sabino*); in addition, *Agave gentryi* (green agave / *maguey verde*) occurs. In areas near the Cuauhtémoc ejido, the shrub stratum is dominated by *Prunus cercocarpifolia* (wild peach / *duraznillo silvestre*). The herbaceous stratum is dominated by *Piptochaetium fimbriatum* (pinyon ricegrass / *arocillo*). In areas with more disturbance we find *Asphodelus fistulosus* (onionweed / *gamocillo*), which is an exotic plant, and *Gymnosperma glutinosum* (gumhead). On slopes of southern exposure, on Cerro de los Elotes (northeast of the ejido Sierra Hermosa) and south of the sierra in the ejido El Recreo, there is forest, usually with an open canopy, in which *Pinus pinceana* (Pince's pinyon pine / *piñón rosa*) predominates (Encina-Domínguez et al., 2019).

Materials and Methods

Monitoring flora and fauna is one of the main activities regularly carried out by the staff of Profauna A.C., a non-governmental organization (NGO) responsible for the administration, management, and protection of the Sierra de Zapalinamé Protected Natural Area, located south of the City of Saltillo, Coahuila, Mexico, and covering the municipalities of Saltillo and Arteaga. On this occasion, the inspection area corresponded to the pine community. That portion of the protected area accounts for about 2610.8 hectares.

Discussion and Conclusions

The food preferences of *Salvadora lineata* have not been well documented, so we are able to add an additional lizard species. In addition, since the prey was dead at the time the

snake consumed it, technically it feeds on carrion. The expulsion of the snake's egg follicles during the consumption of the lizard is a curious event, which requires further study.

Acknowledgment

To Profauna, A.C., for supporting and promoting research in the Sierra de Zapalinamé State Nature Reserve.

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Notes on Reproduction of Variable Green Toads, *Bufotes sitibundus* (Anura: Bufonidae), from Israel

Stephen R. Goldberg
Whittier College, Biology Department
Whittier, CA 90608
sgoldberg@whittier.edu

Abstract

I conducted a histological examination of gonads from 19 *Bufotes sitibundus* from Israel consisting of 10 adults, and1 subadult male; 6 adult and 2 subadult females. Males contained sperm from all months examined: January, March, April and October. The smallest mature male (sperm in lumina of seminiferous tubules) measured 60 mm SVL and was from March. Females in spawning condition were from March, April and July (only months examined). The smallest mature female in spawning condition measured 68 mm SVL and was from April, although a smaller April female (SVL = 62 mm) contained vitellogenic (ripening) follicles. Two of six adult females (33%) contained some atretic follicles. My data indicates in Israel, *B. sitibundus* spawning extends into summer.

Bufotes sitibundus (Pallas, 1771) occurs in Egypt north through Israel, Lebanon, Syria, throughout Anatolia and the Caucasus to southern Russia, Kazakhstan and southeast through Iraq and Iran (Frost, 2022). In Israel it is found in the Central Negev (Negev Mountains) and northwards (Bar et al., 2021). The eggs are laid in a sleeve of mucous-like material; tadpoles transform within 6–8 weeks of hatching (Bar et al., 2021). Previous information on *B. sitibundus* reproduction in Israel is in Jørgensen (1984) and Degani and Kaplan (1999). In the current paper I present data on the reproductive cycle from a histological examination of gonadal material from Israel. Utilization of museum collections for obtaining reproductive data avoids removing additional animals from the wild.

A sample of 19 *B. sitibundus* from Israel collected 1951 to 2003 (Appendix) consisting of ten adult males (mean SVL = 68.8 mm ± 7.9 SD, range = 60–84 mm), one subadult male (SVL = 48 mm), six adult females (mean SVL = 77.3. mm ± 14.1 SD, range = 62–103 mm), two subadult females (SVLs = 50, 51 mm) was examined from the herpetology collection of the Zoological Museum of Tel Aviv University (TAU), Tel Aviv, Israel (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 of the 19 *B. sitibundus* 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 TAU.

There was no significant difference between mean SVL of adult males versus adult females of *B. sitibundus* (t = 1.57, df = 14, P = 0.138). The testicular morphology of *B. sitibundus* is similar to that of other anurans as described in Ogielska and Bartmañska (2009a). Within the seminiferous tubules, spermatogenesis 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). All 10 *B. sitibundus* adult males were undergoing sperm formation (= spermiogenesis) in which clusters of sperm filled the seminiferous tubules. By month, numbers of *B. sitibundus* males exhibiting spermiogenesis were: January (N = 2), March (N = 3), April (N = 3), October (N = 2). The smallest mature male (sperm in lumina of seminiferous tubules) measured 60 mm SVL and was from March (TAU 1772). One smaller *B. sitibundus* (SVL = 48 mm, TAU 2932) from April contained spermatogonia, spermatocytes and a few small clusters of spermatozoa in some seminiferous tubules. Its histology was comparable to that of a juvenile male *Rana lessonae* in Ogielska and Bartmañska (2009a). In view of the small quantities of sperm present, I considered it to be a juvenile.

The ovaries of *B. sitibundus* are typical of other anurans in consisting of paired organs located on the ventral sides of the kidneys; in adults they 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 1): (1) "Yolking Condition" in which ripening oocytes (accumulating yolk) predominated as reported in Uribe Aranzábal (2011). (2) "Ready to Spawn Condition" in which mature oocytes predominated. Two very small *B. sitibundus* females, both from May (SVL = 50 mm, TAU 2933; SVL = 51 mm, TAU 2931) contained only non-vitellogenic oocytes and were considered as subadults. It is not known when they might have reached maturity. The smallest mature female *B. sitibundus* (ready to spawn) measured 68 mm SVL (TAU 129) and was from April. Although a smaller female from April (SVL = 62 mm, TAU 131) contained vitellogenic (ripening follicles), it is not known when it might have spawned.

Atretic follicles were noted in the ovaries of 2 of 6 (33%) of the *B. sitibundus* females (Table 1). In early atresia the granulosa

Table 1. Two monthly stages in the spawning cycle of 6 adult female *Bufotes sitibundus* from Israel.

Month	*n*	Yolking condition	Ready to spawn condition
March	1	0	1
April	3	1	2
June	1	0	1
July	1	0	1

layer is slightly enlarged and contains ingested yolk granules. In late atresia the oocytes of these females are replaced by brownish vacuolated granulosa cells which invaded the lumen of the oocyte or solid black pigment-containing cells. Atresia is a widespread process occurring in the ovaries of all vertebrates (Uribe Aranzábal, 2009). It is common in the amphibian ovary (Saidapur, 1978) and 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). See Saidapur and Nadkarni (1973) and Ogielska et al. (2010) for detailed descriptions of follicular atresia in the frog ovary. Atresia plays an important role in fecundity by influencing numbers of ovulated oocytes (Uribe Aranzábal, 2011). The causes of follicular atresia in non-mammalian vertebrates are not fully understood although it is associated with captivity, food availability, crowding and irradiation (Saidapur, 1978). In amphibians adverse environmental conditions such as starvation and suboptimal lighting may cause atresia of vitellogenic oocytes (Jørgensen, 1992). Incidences of follicular atresia increase late in the reproductive period (Saidapur, 1978). Saved energy will be presumably utilized during a subsequent reproduction.

My small sample size (Table 1) does not allow a comparison with Jørgensen (1984), who reported on *Bufotes sitibundus* (as *Bufo viridis*) reproduction in Jerusalem, Israel, and concluded spawning occurs mainly in early spring. My finding of one July female in spawning condition (Table 1) warrants examination of additional *B. sitibundus* females from summer to better document that spawning in Israel continues into summer. Also *B. sitibundus* females from autumn should be examined to ascertain all monthly events in the spawning cycle in Israel.

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Appendix

Nineteen *B. sitibundus* from Israel examined by region from the herpetology collection of Tel Aviv University (TAU), Steinhardt Museum of Natural History, Tel Aviv, Israel: **Central Coastal Plain,** TAU 96, 2581, 2598**, Central Negev,** TAU 129–131**,** 697, 698, 794, 795, 1896A, 1896B; **Dead Sea Area,** TAU 133, 797, **Mount Hermon,** TAU 2931–2933; **Karmel (Carmel) Ridge,** TAU 1772; **Southern Coastal Plain,** TAU 1327.

Herpetology 2022

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.

FOOD HABITS OF JAVELIN SAND BOAS IN SICILY

F. P. Faraone et al. [2021, Journal of Herpetology 55(4):452-458] note that the javelin sand boa, *Eryx jaculus*, is reported to be a predator of mammals, lizards and their eggs, and occasionally of birds and invertebrates, but data on its diet are scarce and fragmentary. They describe some aspects of the feeding behavior of *E. jaculus* on the Mediterranean island of Sicily. A total of 132 individual snakes were examined. Prey remains were found in 43% of them, both in their feces (82.5%) and gut contents (17.5%). The number of snakes observed and their feeding rate decreased in August, probably as a result of the relatively higher temperatures. Feeding rate increases were observed in adult females in September, perhaps to enhance body reserves before hibernation. The overall prey spectrum is dominated by small mammals, with a frequency of occurrence of 71.4%, but also consisted of lizard eggs (30.2%) and lizards (7.9%). Lizards seem to be occasional prey, and the frequent detection of ingested autotomized tails suggests *E. jaculus* has low efficiency as a saurian predator. A relationship was observed between prey type and snout–vent length of the snakes. Lizard eggs are most frequently eaten by smaller snakes, which could be linked to gape size ontogenetic variation. Differences were found in the prey spectrum between sexes and age classes. The results indicate that juveniles, adult males, and females seem to adopt different foraging strategies. Females probably adopt ambush predation on small mammals, while juveniles are active foragers of lizard eggs. Adult males appear to be slightly more versatile predators, consuming both types of prey, probably because of their high mobility rates during the mating period.

BITE PERFORMANCE OF ALLIGATOR SNAPPERS

A. H. Gagnon et al. [2022, Journal of Herpetology 56(3): 370-375] note that alligator snapping turtles (*Macrochelys temminckii*) possess unique head morphology that suggests strong natural selection for bite performance, which likely influences foraging and prey selection, as well as the outcomes of intrasexual aggressive encounters, mating, and defense against predators. Therefore, bite performance has the potential to directly and indirectly impact fitness. They assessed the effects of captivity on bite force by comparing the performance of captive and reintroduced *M. temminckii*. On average, free-ranging *M. temminckii* bite with greater force than do individuals residing in captivity, and captive individuals housed under seminatural conditions in outdoor ponds outperformed those housed indoors. Further, they found that free-ranging *M. temminckii* released into different river systems performed comparably and required less provocation than captives to display gaping and biting behavior. It remains to be determined whether the observed performance differences were more strongly influenced by physiological limitations on muscle performance or by behavioral variation in motivation to bite with maximum force.

CUTTHROAT TROUT AND BOREAL TOADS

J. G. Crockett et al. [2021, Journal of Herpetology 55(3):310-317] note that introduced salmonids can impact aquatic ecosystems through direct predation and indirect effects. They explored the effects of introduced cutthroat trout (*Onchoryncus clarki*) on boreal toad (*Anaxyrus boreas boreas*) survival and habitat use during two aquatic life stages, the embryo and tadpole, at boreal toad breeding sites with and without cutthroat trout. They found no difference in embryo survival and higher tadpole survival at the site with cutthroat trout. Cutthroat trout are unlikely to use the shallow areas where boreal toad eggs are deposited; however, during the tadpole stage, cutthroat trout and tadpoles overlap broadly in near-shore aquatic habitats. Frequency of tadpole habitat use is lower in cutthroat trout-used areas, but the authors observed no behavioral or temporal avoidance of cutthroat trout by tadpoles. The results suggest that cutthroat trout do not have a negative effect on boreal toad embryo or tadpole survival in wild settings and that cutthroat trout presence does not preclude tadpoles from using habitats.

MINIATURE DIRECT-DEVELOPING FROGS

T. J. M. Jameson et al. [2022, Herpetological Monographs 36:1-48] report that the *Craugastor mexicanus* series (Anura: Craugastoridae) includes six species of direct-developing frogs that occur in Mexico and Guatemala. Notably, two of these species have small adult body sizes (<18 mm snout–vent length) and several have intraspecific polymorphism in color pattern. Using a geographic sampling focused on eastern Mexico (the location of most type localities), the authors conducted a molecular phylogenetic analysis of two mitochondrial (12S, 16S) and two nuclear (RAG1, TYR) gene fragments. This analysis revealed two widespread species, *C. mexicanus* and *C. pygmaeus*, along with evidence of multiple undescribed taxa from the states of Oaxaca, Mexico, Guerrero, and Jalisco. Interestingly, the widespread species have stratified geographic distributions with the larger bodied clade restricted to high elevations and the smaller bodied clade to low elevations. The authors also identify regions of Guerrero and Oaxaca where multiple species co-occur. To reevaluate the quality of characters that have been previously used to diagnose species, they tested for heterochrony and sexual dimorphism using microcomputed tomography and linear measurements. They found evidence for paedomorphosis as the mechanism of miniaturization in small-bodied taxa. Linear measurements confirmed that tympanum and body size are sexually dimorphic traits in both small- and large-bodied species. The authors used this enhanced understanding of morphological variation in the group to describe six new species. Despite this progress, they suspect that additional species await discovery, particularly in western Mexico and east of the Isthmus of Tehuantepec where their sampling efforts were limited.

SUWANEE ALLIGATOR SNAPPERS

T. M. Thomas et al. [2022, Chelonian Conservation and Biology 21(1):2-10] note that freshwater megafauna populations, which are declining worldwide, are well known but often overlooked and understudied compared with marine and terrestrial megafauna. One species of freshwater megafauna is the Suwannee alligator snapping turtle (*Macrochelys suwanniensis*), which is endemic to the Suwannee River drainage in Georgia and Florida. Several trapping studies have examined *M. suwanniensis* distribution, body size, and population structure, but little information exists regarding its population status. The objectives of this study were to 1) estimate population size, 2) estimate apparent survival, and 3) model population growth rates (ë) by conducting a capture–mark–recapture study of *M. suwanniensis* in the Suwannee River in Florida. From 2011 to 2013, the authors repeatedly sampled 12 randomly selected 5-km sites along the Suwannee River for *M. suwanniensis* using baited hoop-net traps. They captured 126 individuals and had 29 recaptures. Both adult males and adult females had very high apparent survival (0.99), whereas juveniles had lower apparent survival (0.32). The estimated population density was 6.6 turtles/river km, indicating a population of 1709 (95% CI, 1205–2694) *M. suwanniensis* from the town of White Springs to the upper limit of the estuary in the main stem of the Suwannee River (approximately 259 river km). The authors constructed 2 postbreeding census matrix population models for *M. suwanniensis* and incorporated parameters from this study and from the literature. Both matrix population models suggested a slightly decreasing population (ë = 0.99), but because of the uncertainty around the estimates, the authors consider the population trend to be unclear. Elasticity analysis revealed that ë was most sensitive to changes in adult survival compared with other model components. This is a conservation concern because adult *M. suwanniensis* may be incidentally killed by fishing gear. This study was short-term, and the analyses had limitations; therefore, the authors recommend future areas of research, including long-term population monitoring.

TÚNGARA FROG CALLING

H. M. Gray et al. [2021, Herpetologica 77(3):227-231] note that túngara frogs, *Engystomops pustulosus*, are known to reduce the complexity of their calls in the presence of predators. Although complex calls are more attractive to females, they also attract predators, particularly frog-eating bats, and are rarely emitted by solitary males. Therefore, if túngara frogs were to be released from predation pressure, as on the island of Taboga in the Gulf of Panama where frog-eating bats are absent, such constraints on calling should be alleviated. The authors compared the calling behavior of túngara frogs on Taboga with the calling behavior of those on Barro Colorado Island, located in central Panama where frog-eating bats are present, using timed video recordings. Compared with túngara frogs on Barro Colorado Island, male túngara frogs on Taboga called more, emitted consistently more calls in choruses, and called both day and night. On Taboga, even solitary males routinely embellished their calls with chuck elements. These results are consistent with a hypothesis of predator release positively affecting calling behavior.

IMPACTS OF INVASIVE PLANT REMOVAL

R. M. Lehtinen et al. [Journal of Herpetology 56(1):92-98] note that invasive species are widely believed to be a major threat to biodiversity. Therefore, invasive species control is a common practice among land managers. However, the impacts of invasive species control on nontarget organisms are often unknown. To examine the impact of invasive plant removal on a functionally important, but often overlooked, group of organisms, the authors carried out a field experiment focusing on terrestrial salamanders. Using coverboards, they monitored the occurrence of terrestrial salamanders (primarily northern ravine salamanders, *Plethodon electromorphus*) in forest plots where invasive plants had been experimentally removed compared with control plots where removal did not occur. They replicated this design at three study sites and sampled coverboards over 3 yr (2016–2018; 2,187 sampling events). They also undertook a laboratory experiment exposing northern two-lined salamanders (*Eurycea bislineata*) to native and invasive plant root extracts compared with a plain water control. Results from occupancy modeling and other analytical techniques indicated strongly reduced occupancy of *P. electromorphus* in plots where invasive plants were removed, compared with controls. This pattern varied among study sites but was strongest at the most heavily invaded sites. Results from the laboratory exposure study showed no significant differences in response to root extracts from native versus invasive plants. Together, these data suggest that some terrestrial salamanders may not be negatively impacted by invasive plants and that invasive plant removal, when not accompanied by native plant restoration, may have unanticipated negative effects on terrestrial salamander populations.

COLORATION IN EASTERN HOG-NOSED SNAKES

M. S. Lattanzio and M. J. Buontempo [2021, Herpetologica 77(2):134-145] note that animal coloration can benefit fitness via its function in homeostatic regulation, communication, or camouflage. For wide-ranging taxa that are exposed to diverse climatic conditions throughout their range, spatial variation in color morphology might reflect locality-specific adaptive responses to those variable conditions. As a result, these species might vary in their color-climate associations over geographic space. The authors integrate georeferenced photographs of adult animals with available bioclimatic data to test the hypothesis that dorsal color differences in eastern hog-nosed snakes (*Heterodon platirhinos*) reflect ecogeographic divergence. They first assigned each photographed snake into one of four dorsal color phases, namely, black, brown, red-orange, or yellow, and evaluated the spatial dispersion and bioclimatic niche occupancy of each phase by using multiple environmental niche modeling approaches. They then used pairwise comparisons of bioclimatic niche space to explicitly test for niche divergence among the color phases. Overall, black, brown, and red-orange phase *H. platirhinos* exploited different subsets of the species' geographic range and bioclimatic niche. In contrast, yellow phase snakes partly overlapped with red-orange and brown phase snakes in geographic and bioclimatic space. These findings support the authors' hypothesis, and they discuss some of the possible functions of phase coloration.

Index to Scientific Names of Amphibians and Reptiles for Volume 57 (2022)

Bulletin of the Chicago Herpetological Society 57(12):225-227, 2016

Author–Title Index for Volume 57 (2022)

Minutes of the CHS Board Meeting, October 14, 2022

A meeting of the CHS board of directors was called to order via Zoom at 7:39 P.M. Board members Rachel Bladow and Stephanie Dochterman were absent. Only board members were in attendance. Minutes of the September 6 board meeting were read and accepted.

Officers' reports

Treasurer: Rich Crowley presented the September financial report.

Membership secretary: Mike Dloogatch read through the list of those whose memberships have expired.

Sergeant-at-arms: Tom Mikosz reported 18 attendees in person at the September 18 meeting.

Old business

Membership survey: Rachel Bladow reported that we have received 19 responses so far; 27 have clicked on the survey.

New business

CHS YouTube account: John Archer will attempt to reach Chris Lechowicz to gain access.

Consensus of the board was to continue holding board meetings the Tuesday before the general meeting.

Most current board members are willing to continue serving on next year's board.

The meeting adjourned at 8:55 P.M.

Respectfully submitted by recording secretary Gail Oomens

Minutes of the CHS Board Meeting, November 15, 2022

A meeting of the CHS board of directors was called to order via Zoom at 7:34 P.M. Board members Stephanie Dochterman, Kyle Houlihan and Amelia Pollock were absent. Jason Smith was also in attendance. Minutes of the October 14 board meeting were read and accepted.

Officers' reports

Treasurer: Rich Crowley presented the September financial report.

Vice-president: Rachel Bladow reported that the November 20 meeting is to be a guided tour at the Reptile & Small Mammal House at Lincoln Park Zoo.

Membership secretary: Mike Dloogatch read through the list of those whose memberships have expired.

Sergeant-at-arms: Tom Mikosz reported 15 attendees in person and 5 online at the October 16 meeting.

Old business

Chris Lechowicz is still busy down in Fort Myers, recovering from Hurricane Ian. He will get back to John Archer about the CHS YouTube account as soon as he is able.

John Archer is still looking for someone to run the library.

Membership survey: to date we have received 47 responses.

New business

The Notebaert is looking for some native reptiles for their exhibits.

Amelia has been in touch with the International Herpetological Symposium. They are willing to give us a free table to show off some of our native reptiles (July 2023 in Chicago).

The meeting adjourned at 8:53 P.M.

Respectfully submitted by recording secretary Gail Oomens

NEW CHS MEMBERS THIS MONTH

Joe Cavataio
Anthony Collins
Kate A. Keets
Cezar Simeon
Dan Warner

Advertisements

UPCOMING MEETINGS

Monthly meetings of the Chicago Herpetological Society take place at 2:00 in the afternoon on the third Sunday of each month. Please try to join us online or *in person* at the Notebaert Nature Museum, 2430 N. Cannon Drive, Chicago.

The December 18 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 and get to know your fellow members a little better

A program for the January 15 meeting has not yet been confirmed.

Please check the CHS website or Facebook page each month for information on the program. Information about attending a Zoom webinar can be found here:
<https://support.zoom.us/hc/en-us/articles/115004954946-Joining-and-participating-in-a-webinar-attendee->

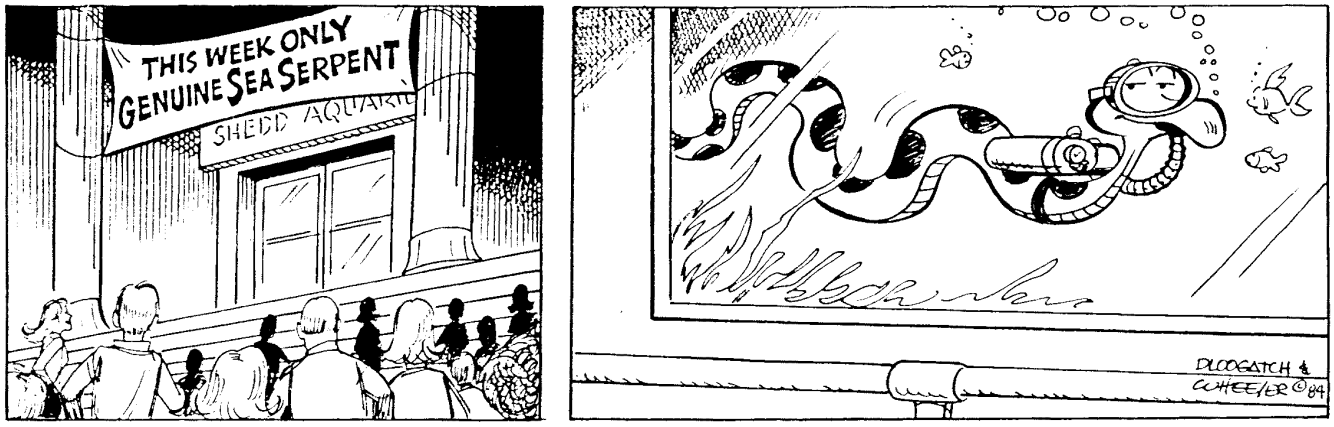
Board of Directors Meeting

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 be held online. If you wish to take part, please email: jarcher@chicagoherp.org.

REMINDER

When you shop AmazonSmile and select the Chicago Herpetological Society as your charity, Amazon will make a donation to the CHS. <https://smile.amazon.com/>

THE ADVENTURES OF SPOT



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