
BULLETIN

of the

Chicago Herpetological Society



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BULLETIN OF THE CHICAGO HERPETOLOGICAL SOCIETY
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Cover: Tiger ratsnake, *Spilotes pullatus mexicanus*. Drawing (as *Spilotes salvini*) from *Biologia Centrali-Americana* by Albert C. L. G. Günther, 1885-1902.

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Portrait of a Herpetologist as a Young Man — Chapter 2

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Some of the vignettes in this article have been published elsewhere, but are included again here to produce continuity.

Facial hair

“One useful function of a stage beard was its indication of masculinity and manliness. In *The Merry Wives of Windsor*, for example, when the townsfolk are gossiping about Master Slender, they suggest that he has a ‘great round beard, like a glover’s paring-knife.’ The shape, its density and suggested health of this beard set up a theater audience for a man in the prime of his manliness. Imagine the disappointment and hilarity for these people when they learn that in reality he has ‘a little wee face, with a little yellow beard’. Of course, the adjectives ‘wee’ and ‘little’ are derogative on various levels.”*

When one who was always clean-shaven like a newborn’s derriere decides to sport a beard, this new look engenders a myriad of reactions. When I returned home from college for summer break, my long-suffering mother gaped at her hirsute firstborn and tears began to form on her cheeks. My explanation that a beard expresses manliness fell on deaf ears.

A herper friend was stimulated to compose a poem:

*There lives in the City of Hills;
A creature of wretched design;
Whose face is covered with quills;
Which stretches the mind to define.*

Xavier University, where I went to college, is located in Cincinnati, directly across the Ohio River from Newport, Kentucky. The latter was hailed as the “City of Sin.” I will not enumerate what that moniker encompasses—just use your imagination! One night, I traveled with colleagues to hear a friend play jazz piano at a popular saloon. A behemoth of impressive size blocked the entrance, stared directly at me and barked, “**We don’t serve beards here!**” I replied forcefully, “**I don’t want a beard, I want a drink,**” whereupon he pinned me against the plate glass window and called the cops. I was thrown into a cell overnight for being disrespectful to authority. Next morning, I was told to get the hell out of Newport and never return.

When I went to a college mixer at a nearby women college, I met a pleasant, attractive young lass and we commenced chatting about myriad subjects, including my beard that she thought was very sexy. Ahah, progress! Her lifelong plan was to become



Figure 1. Jim Murphy holding a large ball python pillow.

a veterinarian. She was excited about her large group of parakeets in her dorm room, stressing that she loved animals and wanted to teach these birds to talk but progress was slow. I suggested that they needed a strong stimulus so I would take one and place it next to my boa constrictor enclosure and teach it to say, “**Help, please help. This snake is about to eat me!**” Our interlude ended in a nanosecond.

While in graduate school at the University of Florida in Gainesville, I planned to drive in my Volkswagen “bug” to visit friends in Cincinnati. One herper, afraid to ship an adult ball python because it was winter there, asked if I could deliver it. (Figure 1 shows me later in life with a very different sort of ball python.) I agreed, but at the time my car was filled with food wrappers, beer cans, newspapers, decorative wood and rocks and so on, demonstrating a lack of cleanliness

and sense of order. I noticed a gas station sign offering a free thorough vehicle cleaning if a full tank of gas was purchased. When the young attendant peered through the window, he was stunned. Gaping in amazement, he pulled all the heavy stuff out, threw out trash, vacuumed the floor—all the while with his mouth showing a bit of anger. Although I offered a tip that was accepted, he began taking down the sign as I drove away.

Upon reaching Polk County, Tennessee, a long line of traffic was moving slowly, so slowly in fact that I looked for a slime trail on the road. I began passing cars, weaving with alacrity through the throng. When I reached the front, a white car with a light on top turned sideways across the road, stopping the line. An overly obese, short officer [southern sheriff morphotype] wiggled out of the car. The following interaction took place:

“Where are you going so damn fast, boy?”

“I was under the speed limit, driving carefully!”

“This is a funeral line. You can’t pass cars.”

“How was I supposed to know—nothing was marked.”

“What are you . . . a damn hippie wearing those dirty clothes, long greasy hair, and a twisted beard that looks like a Brillo pad?”

“You can’t talk to me like that, you perfumed bootlick!”

Handcuffs appeared, I was pushed into the back seat, and his partner drove my car to the courthouse.

* The Importance of Beards in Shakespeare. <<https://www.shakespeare.org.uk/explore-shakespeare/blogs/glovers-paring-knife-beards-and-manly-professions/>>

This courthouse was a combination courtroom/jail and was filled with persons awaiting their day in court. I was brought before the judge who asked if I had any questions before sentencing. I said that a live snake was in my car and that it needed to be brought inside or it would perish in the snow. Highly skeptical, he insisted that the snake be shown. I pulled the ophidian out from its cloth bag for all to see. The audience turned heads toward me, reminded of the head-turning mating behavior in flamingos, then bolted upright toward exits. Truly a magnificent example of collective ophiophobia. I was soon left by myself as the judge ran into his chambers and I briefly considered just leaving the premises, but realized that justice would treat me harshly. Eventually they peeked in and nervously returned to their seats.

I was put into a cell with a dipsomaniac who had not been sober for several days—all efforts to sober him back to normal had failed. Their last idea was to put the snake and me in the cell. He emitted a thunderous primal scream straight out of Hades. Next stop was a larger holding enclosure with a bunch of disreputable thugs, including a young arsonist who had ignited the family home, killing both parents. It was time to insist on separate quarters; the next morning I was released and told to drive as fast as possible to leave Tennessee.

Some years later, I was working at the Dallas Zoo. We often traveled to west Texas to collect critters. When we would stop to eat or have a drink, the locals would all be clean-shaven. This was before the now-popular trend for facial hair. When we entered these establishments, conversation ceased as all stared at us. Did not their parents teach them that staring is rude? It was like a scene from the movie *Easy Rider*.

Pierre Fontaine was director of Dallas Zoo and I had been told that he always met new employees. He stared at me in amazement from behind his desk with his mouth wide open and completely silent, refusing to shake my hand. Later I learned that his response was due to the uncomfortable fact that I was the first person ever employed by the City of Dallas who was hirsute—I had a mustache. The next day, he ordered me to shave; I refused and said that it was illegal to discriminate on the basis of appearance. He checked with the city attorney and discovered that my position was correct and he risked a lawsuit should he try to terminate me for insubordination. After some time, he got used to having a hairy employee, and gradually I became his surrogate son, confidante, and perhaps his favorite worker.

Social Interactions

Joe Smith, a friend who was a part-time student at Ohio State University (OSU) and a professional racing car/motorcycle driver, invited me to the annual homecoming weekend in Columbus, Ohio, featuring a football game between OSU and Purdue University. Since I was worried about injuries from both types of vehicle, Joe plied me with alcohol all Thursday, insisting during the day that he would take me late that night for a ride to assuage my nervousness. I reluctantly agreed, hopped on the bike, and began to become exhilarated. This feeling changed to completely terrified as I watched the speedometer steadily climb above 100 mph. The car ride was equally unsettling.

Festivities began Friday, again beginning with copious amounts of alcohol. Being of Irish descent, it was obvious and inevitable that I would succumb to such temptations. Joe had arranged a blind date at a sorority to attend the pep rally, followed by a giant fraternity soiree at a local air force base. It didn't go well; my inebriated state stimulated me to greet our dates by darting around on the furniture and concluding by demonstrating "tone clusters," using forearms and elbows to violently bang on piano keys in the style of famous composer John Cage.

As the evening continued, my primitive social skills became nonexistent, culminating with my date's rancor, disgust, and refusal to dance with or speak to me. It finished when she went to another table and I went to a small bar adjacent to the dance floor. On arriving, I noticed an attractive dark long-haired woman on the stool weeping quietly. Ever the model of chivalry, I asked what was so saddening. She said that her pilot husband was dismissive, vulgar, abusive and treated her with lack of respect. In an effort to pacify her, I told her to stretch her legs across my lap and began stroking them with tenderness. She soon stopped crying and became quiet.

A short time later, husband arrived from a flight, caught sight of us, whisked her off stool by her hair, and dragged her screaming into the rainy night. Feeling responsible for this debacle, I followed them quickly through the exit and crashed into a vertical pole holding up the awning, landing into a water-filled ditch. Some of the frat boys came to my rescue and for no apparent reason, stretched me out on the hood of a car. Naturally I froze onto it and was later peeled off in my few remaining decent clothes.

I convinced Joe to bring me back to our domicile, a duplex with a group of college girls in the adjoining unit. Since I was so inebriated, I sat on the front steps to recover. Eventually, I felt better, so started to take a stroll. Along the streets in front of fraternity and sorority houses, were large chicken-wire and crepe-paper models decorating the front of these buildings. One—ten feet in height—caught my attention: a group of hollow bowling pins with sign: "BOWL OVER PURDUE" affixed to it. Inspired, I put it over my head and started walking down the street. Shortly thereafter, a large group of frat boys started rushing down the fire escape, shouting "There's the bastard now!" Promptly losing ground with my burden, I tossed it aside and ran full-speed back to our duplex.

The next morning, I awoke to find an unknown woman sleeping next to me in a large double bed. Since I assumed that some friends stashed me there, I fell back to sleep, later to overhear one of the indignant girls demanding from Joe who that unknown guy was in their duplex. I had to tell the ladies that I had made a wrong turn last night—they eventually were mollified and a few were even amused.

Early Collecting Adventures

George McDuffie was a high school teacher in Cincinnati who regretted every moment of his interaction with his disinterested students. Equally distasteful were the required parent-teacher open nighttime meetings to discuss the progress of

students. In many cases, there was no progress, but parents were combative and made George's life miserable with their demands to elevate grades. When one father was particularly insistent for an explanation as to why his issuance received an F+, George said that his charming daughter fell asleep, snoring during the test with her head on the desk and drool pouring from her mouth. As mentioned earlier (Murphy, 2021), George allowed free range of his collection in the classroom, so gators, rhino and green iguanas, large alligator snapping turtles, a water monitor and several Burmese pythons cruised around the students' feet. The kids were so accustomed to the reptiles that they simply raised their limbs to allow passage beneath.

On one occasion, a particularly obnoxious, nicely dressed mother, noticed the large monitor immobile on top of a floor heater soaking up heat under the window. Believing it was stuffed, she slowly moved closer to the lizard's head to get a clear view. The monitor stuck its tongue out, with the tines touching her face. She screamed, jumped back, urinated on her dress and left a sizeable puddle on the floor. George considered it one of his finest hours, especially since she never returned.

In desperation to no longer deal with adolescents, he enrolled in a doctoral program at University of Cincinnati studying copperheads (McDuffie, 1960, 1963). His study site was Shawnee State Forest and we accompanied him on many field trips. Lunches were primitive—dried white bread and endless soft drinks. He owned an old jalopy with the floor rusted out and totally open to the road. We would drive the vehicle over a herp and pick it up through the opening. George's plan was never to leave the car to collect but rather see how many taxa/individuals he could accumulate by this method.

There was a family living there that had collected three adult ratsnakes that I bought for \$1.00, and George bought a stunning, bright orange hog-nosed snake for the same—typically low—backwoods price.

George's behavior requires expanded coverage. During visitor hours at Cincinnati Museum of Natural History, George surreptitiously sidled up to the water fountain, filled his cheek pouches and spit the liquid on the director who was passing. The director took up the challenge and gave chase. After the first volley, they chased each other in the public space, spraying water on one another, and to my amazement other staff and patrons joined in the melee. As far as I know, the visitors did not complain but rather joined in the game.

His wife Patti was a charming genteel woman who tolerated his shenanigans. As an example, when a group of women regularly attended a sewing party, several noticed two-pint jars with unknown materials within. George, ever the teacher, explained that he collected several bi-products of his body, namely ear-wax, spittle, and nasal exudate.

Charlie Radcliffe from Indiana University and George were inveterate traders. One interaction was particularly noteworthy as Charlie coveted a large ornate horned frog (*Ceratophrys ornata*) owned by George to be used for additional studies on pedal luring in other members of the genus (Figure 2). Earlier, I had recorded luring in *C. calcata* (Murphy, 1976), and so Dave Chiszar, Charlie, and I planned studies on congeners (Radcliffe



Figure 2. Horned frog (*Ceratophrys aurita*). Illustration from *Abbildungen zur naturgeschichte Brasiliens* by A. P. M. Wied-Neuwied, 1822–1831. Horned frogs use pedal movements to lure prey.

et al., 1986). Charlie drove to Cincinnati from Bloomington to pick up this valuable frog. When Charlie arrived, he watched its feet go down the gullet of a stunning orange hog-nosed snake (*Heterodon nasicus*). Charlie exploded, “You %\$&%@*^*. You know I wanted that frog for a paper.” George’s response, “I ran out of food toads and I like this snake more than the frog. You should have been here. They struggled back-and-forth for nearly an hour—rear tooth against odontoid process. A real spectacle.” Charlie left in an immense volcanic rage. Not was not all lost as we found more ornate horned frogs later.

During college, we often traveled to the Appalachian region as J. T. Collins and others were assembling a collection from the area. One day we arrived at a creek where a general store and café were located on the bank. We stopped for a bite to eat and ordered soup. The soup contained a number of large grub eyes peering up at us; a sign on the wall alerted us that all food was caught in the creek. Using the field guide, we asked if any of the critters pictured had ever been seen. A surprising number had been but “only on the right side of the road.” That did not make sense, but since they were watching us we chose that direction. Of course we crossed back on the road when out of sight—what did they want us not to see?

Thirty minutes later, we discovered about a dozen 55-gallon drums with fermenting spirits, a dead squirrel, bird droppings, rotting leaves, and a couple of pickled tree frogs. Clearly they had tried to lead us astray. It was lucky we weren't caught.

Payne's Prairie near Gainesville, Florida, was an area that was always incredibly productive. The road before the interstate was built was packed with herps: deafening anuran choruses so dense that one had to creep by car to avoid squashing them; dozens of water snakes, black swamp snakes, garter snakes, and ribbon snakes. Less common were mud snakes, hognose snakes, and rainbow snakes. In the spring, kingsnakes and indigo snakes emerged from brumation and were covered with dermal lesions. We collected them for treatment, but the lesions were sloughed after first ecdysis so they were released.

One of the graduate students had bought a heavy-duty Harley motorcycle and wanted to use it to pull a large floating wooden box called the “Goin dredge,” a device named for Professor



Figure 3. Nile crocodile (*Crocodylus niloticus*). Illustration from *Histoire naturelle de Laccpède*, 1788. This species was extirpated from the Comoro Islands in the beginning of the 19th century and recently has disappeared from Israel.

Coleman Goin. This box was to be used to gather water hyacinths, capturing the herps in the plants. The idea was to drive at high speed on the road next to the Prairie along the water's edge, towing the box by a long rope.

On the maiden voyage, a large group of us was excited to see the rope towing the box in the water become taut, pulling the bike and rider down the steep slope. Unfortunately they went quite high in the air and landed pretty far into the lake. It was remarkable, and so we clapped heartily when we saw he was uninjured. This was truly the stuff of legends.

My friend Elliott Jacobson, a highly respected veterinary pathologist from University of Florida in Gainesville, was program chair for a Florida Herpetological Society annual meeting some years ago. He asked me to give a presentation on captive management and he and colleagues would cover medical issues. Elliott invited me to stay in his home. Always the consummate host, Jacobson hosted a soiree at his abode. However, he is also known as a notorious practical joker. As I was preoccupied chatting with colleagues, he brought a tray of hors d'oeuvres. Without paying attention, I took a dead pink mouse impaled on a toothpick and put it in my mouth and nearly swallowed it. Everyone laughing clued me in that he was up to no good, so I spit it out on his clean rug.

Touring Experiences: Arthur Jones

After the above-mentioned meeting, Elliott and I traveled around Florida, stopping first in Ocala at the estate of Arthur Jones ((November 22, 1926 – August 28, 2007), inventor of Nautilus exercise equipment. Jones's life was so bizarre that it deserves telling.

I first met Arthur Jones when he was an animal dealer who owned a roadside exhibit in Slidell, Louisiana, and I was in high school. He was an accomplished pilot, which was especially useful for the animal import-export businesses that he ran prior to the founding of Sports Medical Industry. Arthur was married and divorced five times, including marrying a 18-year old model when he was 55. He often prided himself on being a generalist, something that he described as a move away from the stubbornness and short-sightedness of "specialists." He attributed this in part to his upbringing in a family of physicians, telling us sev-

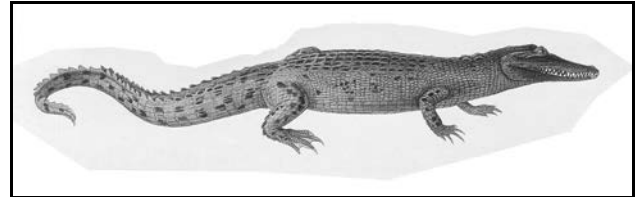


Figure 4. Salt-water crocodile (*Crocodylus porosus*). Illustration from *The Zoological Miscellany: Being Descriptions of New, or Interesting Animals* by William Elford Leach, 1814. "Human beings have a great dread of this voracious reptile. Many instances are known where men have been surprised near the water's edge or captured when they have fallen into the river. There is, it is said, only one way of escape from the jaws of the Crocodile, and that is to turn boldly upon the scaly foe and press the thumbs into his eyes, so as to force him to relax his hold or relinquish the pursuit."—J. G. Wood (1885), *Popular Natural History*.

eral times that the competent man is one who, "should be able to put food on the table, build a house, tan a hide and deliver a baby."

Jones traveled widely with friend and fellow adventurer Roy Pinney (cameraman for his syndicated TV series, *Wild Cargo*, that I religiously watched), setting up camp for two years or so at a time in different places including Rhodesia and Mexico City. One segment showed him capturing ca. 16-foot Nile crocodiles, airlifting them by helicopter to his airplane, flying back to the US and selling them to several reptile dealers and exhibits (Figure 3).

He started his tour for Elliott and me by showing off his wife, Terri Jones, doing Nautilus commercials. He also shared several new projects. He was planning to write a book entitled *Younger Women, Faster Airplanes, and Bigger Crocodiles*. Jones's Lake Helen, Florida, Nautilus building was the home of Gomek, an 18-foot salt-water crocodile that Jones was trying to grow to world record size (Figure 4).

As an aside, I saw another croc this size, called Cassius, at the Marineland Crocodile Farm on Green Island near Cairns, Australia. It was captured in 1984 in the Finis River, Northern Territory, Australia. Three years later, George Craig trucked the reptile over 3000 kilometers to Cairns, and then used a ferry to haul the monster to Green Island. I knew that Jones had purchased a similar-sized croc named Gomek from the Farm earlier. He flew back with it to Ocala where he had built a landing strip large enough to accommodate his jets, using one of his several planes that he was piloting. I asked a keeper if he knew how much Jones had paid for the animal and he said that all employees were sworn to secrecy. They were warned that Arthur always carried a 44mm Ruger pistol and threatened to use it if aggravated.

He was also an aficionado of venomous spiders and reptiles, a large collection of which was also housed in the Nautilus building. He ran a business that involved the importation of a variety of wild animals, ranging from tropical fish to snakes, parrots and monkeys. Jones's household included a jaguar named "Gaylord" that had free run of the house. He once retrofitted several of his jumbo jets in order to transport 63 baby elephants that had been orphaned in Africa to his Jumbo Lair compound in Florida. Jones filmed the entire operation for television and entitled it *Operation Elephant*.

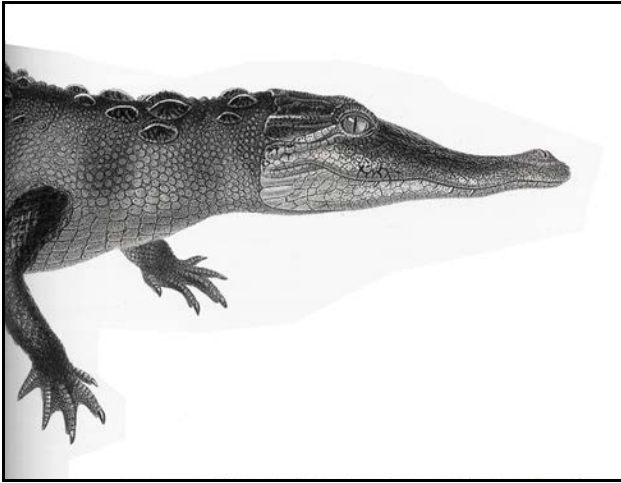


Figure 5. American Crocodile (*Crocodylus acutus*). Illustration from *Historia Fisica, Política y Natural de la Isla de Cuba, Tomo VIII. Atlas de Zoologica* by Ramón de la Sagra, 1855.

As Elliott was an expert on mycotic diseases, Arthur had needed his help to deal with unexplained deaths in a large and varied group of venomous snakes that he was holding to produce world-record lengths. To record these lengths accurately and safely, a large camera was hung from the ceiling, capable of taking life-size photos of the snakes. Hundreds of six-foot-square, heavy cardboard sheets were printed with 6-inch squares. The cardboard was placed directly under the camera and a snake placed on it. After the shot was taken, the snake was hooked back into its enclosure, string was used to measure the snake's total length by following the vertebral column on the sheet and thus a permanent record was available.

The California Alligator Farm (opened in 1953 in Buena Park, California), was owned and operated by the Earnest family. Kenny Earnest, was the last family member to run the farm before it was sold off in 1984. The Farm, beset by dwindling attendance and an expired lease, closed and moved its animals and Kenny to Arthur's private preserve in Florida. The closing was a five-day rodeo—catching of all of the alligators, crocodiles and caimans; pilot Arthur was the overseer and used his Boeing 707 to transport them all.

When we visited the estate in Ocala, Kenny was our tour guide. His crocodilians remembered and responded to vocal commands, coming to the fences for feeding. Kenny wanted me to have the distinct pleasure of hand-feeding Gomek, the giant salt-water croc. Kenny walked into the shallow water, tapped the critter on its snout, stimulating it to open its gigantic mouth, and handed me a dead chicken for its lunchtime, giving me a rush seldom felt. I am grateful to Kenny for that experience.

Kenny brought us to the mansion to see Arthur and have a drink. As we approached the house, I noticed two large bushes trimmed into the shapes of **A** and **T**. The first thing I said to him was how thoughtful it was to display their marital union in such a dramatic manner. He told me I got it all wrong—the letters represented a woman's anatomical parts!

Later we went to his office building where we walked into separate enclosures housing two 16-foot salt-water crocs and several dozen American crocs (Figure 5). These latter animals

were ones that stuntman Ross Kananga had suggested for use in a James Bond movie, *Live and Let Die*, starring Roger Moore. Kananga's idea was to have Bond jumping on crocodiles and he was enlisted by the producers to perform it. The scene took five takes to be completed, including one in which the last crocodile snapped at Kananga's heel, tearing his trousers.

Jones had bought the whole group specifically to be used in a new office building. He showed us the blueprints: a huge circular aquarium with the office inside so employees could watch crocs swimming through large viewing windows. Then he took us to the temporary holding area where we walked through masses of these American crocodiles without incident.

Touring Experiences: Miami Serpentarium

The Miami Serpentarium, owned by Bill Haast, opened at the end of 1947, even though it was not yet completed (Kursh, 1965). By 1965 the Serpentarium housed more than 500 snakes in 400 cages and three pits in the courtyard. Haast extracted venom 70 to 100 times a day from some 60 species of venomous snakes, usually in front of an audience of paying customers. He would free the snakes on a table in front of him, pin and then catch the snakes bare-handed, and force them to eject their venom into glass vials with a rubber membrane stretched across the top. During one of these demonstrations we watched a banded krait flip off the table into the seated crowd; Bill deftly caught it with bare hands and returned it to its cage.

We, along with other visitors, noticed a wooden box had arrived from Africa and was opened in one of the large pits. A dozen green and black mambas exploded from the box, not one in a cloth bag. Bill used a small (3-foot) hook, and one snake was caught as it flew over his shoulder, while others crawled up small trees and bushes. All were caught without incident.

Soon after opening the Serpentarium, Haast began experimenting with building up an acquired immunity to the venom of king, Indian and Cape cobras by injecting himself with gradually increasing quantities of venom he had extracted from his snakes, a practice called mithridatism. He received his first cobra bite less than a year after he started his immunization program. During the 1950s, he was bitten by cobras about 20 times. In 1954 Haast was bitten by a common, or blue, krait. At first he believed his immunization to cobra venom would protect him from the krait venom, and continued with his regular activities for several hours. However, the venom eventually did affect him, and he was taken to a hospital where it took him several days to recover. A krait antivenom was shipped from India, but when it arrived after a 48-hour flight, he refused to accept it. His first king cobra bite was in 1962. Haast was also bitten by a green mamba. Many times Haast donated his blood to be used in treating snakebite victims when a suitable antivenom was not available. More than 20 of those individuals recovered.

When the Dallas Zoo reptile building opened in 1965, the director, Pierre Fontaine, saw Bill on the tube and insisted that we hire him for the grand opening. The VIP table was set up in front of the entrance doors and dining tables filled the rest of the room. I asked Bill if this arrangement was safe as he would do his demo there and he assured me it was fine since his show

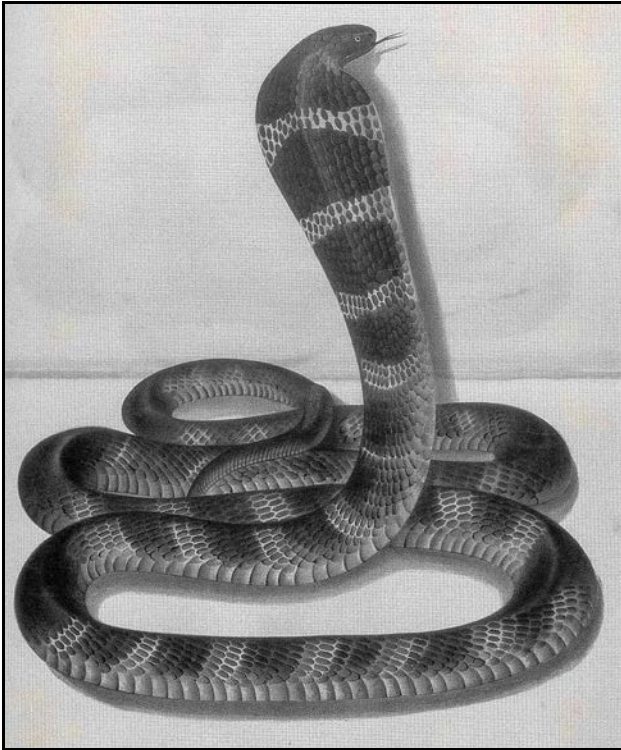


Figure 6. King cobra (*Ophiophagus hannah*). Illustration from *The Thanatophidia of India* by Joseph Fayrer, 1872. Found in Southeast Asia, king cobras are a major draw for zoo visitors. Scott Pfaff (pers. comm.) sent this interesting note: “I have an old, 1940s vintage, specimen record for a 4-meter *Ophiophagus* at the National Zoo that apparently ate 450 feet of indigo snakes over a 4-year period.”

would be between the VIP table and the other ones. He also casually mentioned that he had been bitten by an Australian death adder two days earlier and still was suffering mild effects. Based on that added information, I stationed keepers surreptitiously with hooks and brooms. When he pulled out a large king cobra (Figure 6), this was another example of chaotic ophiophobia—terrified VIPs rushing for the exits, tables and chairs overturned, dishes and wine glasses shattered on floor—truly a memorable experience, surely the topic of conversation at Dallas cocktail parties for many weeks.

On September 3, 1977, a 6-year-old boy sitting atop the wall surrounding the Serpentarium’s crocodile pit fell into the pit,

and a 12-foot Nile crocodile lunged ten feet and grabbed the boy. The boy’s father and another man, Nicolas Caulineau, jumped into the pit and straddled the crocodile. Despite their efforts, the boy, who was battered and submerged, was killed.

The incident left Bill Haast badly shaken. He shot the 1,800-pound crocodile nine times with a Luger pistol, yet it was still an hour before it died. Before this, the crocodile had lived for 20 years in the pit without incident. Haast’s mental trauma over the boy’s death eventually led to the closure of the Serpentarium on South Dixie Highway. Although the boy’s father did not blame Haast for his son’s death, Haast told reporters he wanted nothing else to do with the Serpentarium and, in any event, would never again house crocodiles there. The incident did not end Haast’s interest in venom research. [from Wikipedia].

We can add to this account. When we went to his office, we noticed a series of Polaroid pictures of this croc pulling itself over the low gunnite fence and strolling around the public walkway each morning before the park opened, then sliding back into the enclosure. Bill said it was a daily behavior. He also said that this croc had leaped from the pool and snatched a poodle from a woman’s hands.

Haast closed the Serpentarium in 1984 (Figure 7), and moved to Utah for a few years. In 1990 he moved to Punta Gorda, Florida, with his snakes, where he established the Miami Serpentarium Laboratories. Haast’s hands suffered venom-caused tissue damage, culminating in the loss of a finger following a bite from a Malayan pit viper in 2003. As a result of the damage, Haast gave up handling venomous snakes, and no longer kept any at his facility. As of 2008 he continued to have his wife inject him with small amounts of snake venom. In an August 2008 *Florida Trend* interview, he stated, “Aging is hard. Sometimes, you feel useless. But I always felt I would live this long. It was intuitive. I always told people I’d live past 100, and I still feel I will. Is it the venom? I don’t know.” He did! Haast turned 100 in December 2010 and died on June 15, 2011.

Touring Experiences: Reptile World Serpentarium

George Van Horn was six years old when he met Bill Haast, who became his mentor. The first snake he ever picked up was a rattlesnake which struck at him but hit his fingernail without



Figure 7. Death of the famous cobra at the entrance to the Miami Serpentarium after the 1984 closing.

penetrating the skin. He started milking a cottonmouth in his grandmother's basement and began filling a handmade vial of venom from it. He opened up the Reptile World Serpentarium in St. Cloud, Florida, in 1972. The most prominent feature is its daily venom-milking show. These shows involve George and Rosa Van Horn milking venomous snakes such as rattlesnakes, cottonmouths, and cobras for their venom while a crowd watches (separated by a glass window). Van Horn said in 2011 that he had been bitten at least 12 times by venomous snakes, causing significant damage. He received hospital treatment for king cobra bites in 1977 and again in 1995, and said he brings his own vial of venom to the hospital in such instances. He told us that he survived a king cobra bite by using epinephrine immediately thereafter and said it saved his life. I recommended that his account be published in the AZA Antivenin Index.

Touring Experiences: St. Augustine Alligator Farm

The St. Augustine Alligator Farm Zoological Park is one of Florida's oldest continuously running attractions, having opened on May 20, 1893. It has 24 species of crocodylians, and also a variety of other reptiles, mammals and birds, as well as exhibits, animal performances and educational demonstrations.

Growing in popularity, the park moved to its current location in the early 1920s. The park changed owners in the 1930s, and, after a devastating fire, they started reconstruction and expansion of the facilities. In 1993, for their 100-year anniversary, the park became the first place in the world to display every species of crocodylian.

As of 2012, this was the only place where one can see every species of alligator, crocodile, caiman and gharial. Over the years, the zoo has expanded to include exotic monkeys, birds, and other reptiles. The bird collection alone boasts some species not often seen in other zoos, including hornbills, cassowary, marabou, Cape griffon vultures and Pesquet's parrots. In 2008, the zoo opened a new Komodo dragon facility that also exhibits lizards and snakes found within the range of the salt-water crocodile.

Gomek, the large salt-water crocodile that I first saw at Arthur Jones's facility, was sold to the St. Augustine Alligator Farm in 1990. For eight years he wowed spectators with his amazing tolerance of people. Employee Greg Lopera took me back into the enclosure to revisit Gomek. Visitors were able get as close as 1 meter from the large animal (a normally suicidal proximity) without any fear of attack. While feeders still used long tongs to feed Gomek, I tapped the croc on the snout and pleased him with a nutria afternoon snack as he was generally considered to be a "tame" crocodile—favorite of the Alligator Farm and people around the nation. After many years, Gomek died of heart disease on March 6, 1997. By then, he was a very old crocodile, and one of the largest and tamest captive crocodiles in existence. When he died, he was 5.42 m (17 ft, 9 in) long, and weighed 860 kilograms (1,896 lb)—as confirmed by St. Augustine Alligator Farm—and perhaps 70 years old. There is a tribute to Gomek near his enclosure, which now houses his successor Maximo and his mate Sydney and many art objects from New Guinea [from Wikipedia].

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Ectoparasitic Leeches Reported from Crocodilians

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Abstract

At least 15 species of leeches (Annelida: Hirudinea) have been reported as parasites of 20 species of crocodilians (Alligatoridae, Crocodylidae, and Gavialidae) on four continents. Here, I present a host-parasite list with geographic distribution information and summarize published comments regarding leech attachment sites, prevalence, intensity, and effects on host fitness. Most reports have been anecdotal. Although not encountered commonly or reported frequently from crocodilians, these parasites may pose health concerns for their hosts. The effects of these parasites on their hosts' fitness, however, have rarely been studied or documented. The resulting lack of published information provides ample opportunities for additional research.

Introduction

Crocodilians are relatively large, long-lived predators that consume a wide variety of prey. As a result, individuals can acquire and accumulate a rich and varied parasite fauna. Trophically transmitted endoparasites include an array of microorganisms and helminths (Jacobson, 1984; Huchzermeyer, 2003; Tellez, 2013). Thick skin and tough dermal plates offer some protection from ectoparasites, but a small number of rotifers (Rotifera) and ticks, mites, and flies (Arthropoda) can feed on crocodilians, and some barnacles (Cirripedia) and sea anemones (Cnidaria) occasionally settle on crocodiles as epibionts. Members of three families of leeches (Annelida: Hirudinea) also parasitize crocodilians, but the available information regarding these latter organisms is fragmentary and scattered in disparate sources, some rather obscure. Previous summaries of reports have been incomplete, contained minor taxonomic errors, or presented limited information. To help make sense of the available information, I provide a consolidated host-parasite list based on the myriad literature. I include information on the geographic distribution of the reports and summarize observations regarding leech attachment sites, prevalence, and intensity. I also briefly overview reported effects on host fitness.

Leeches found on crocodilians

The family Glossiphoniidae is one of the more species-rich families of leeches (Sawyer, 1986). These leeches tend to be dorsoventrally flattened and have well-developed anterior and posterior adhesive suckers. Their mouths open through a small pore within or along the rim of the anterior sucker. Jaws are absent but a protrusible proboscis is used in feeding. Glossiphoniids are mostly predators or facultative sanguivores (blood feeders) (Siddall et al., 2005). Many feed on the blood of turtles or amphibians (Soós, 1969b; Watermolen, 1996), and several species, primarily belonging to the genera *Placobdella* and *Placobdelloides*, have been reported to feed on crocodilians (Table 1).

The "medicinal" leeches in the families Hirudinidae and Macrobdellidae are largely sanguivorous ectoparasites of vertebrates. These leeches have well-developed jaws, each armed with numerous small, sharp, saw-like denticles (Soós, 1969a;

Klemm, 1982; Phillips and Siddall, 2005). The posterior sucker is well developed in these leeches, but the anterior sucker is shovel-shaped and does not form an adhesive disk. Several hirudiniids have been exploited for medical applications due to the anticoagulant properties associated with their feeding behavior. Most are generalist foragers and a small number have occasionally been found feeding on crocodilians (Table 1).

At least 15 species of leeches from these three families have been reported as parasites of 20 species, from all three extant families, of crocodilians (Table 1). A number of unidentified leeches have also been reported. These reports originate from Africa, Asia, North America, and South America, and most (62%) were published prior to 2000, with only 22% of reports appearing in print in the last ten years.

Attachment sites

Leeches may be found attached to almost any part of the host's body (Table 2). Cott (1961), however, reported inaccessible parts (cloaca, groin, armpits) to be "far more heavily infested" than exposed surfaces, and Garcia-Grajales and Buenrostro-Silva (2011) indicated that a preponderance of leeches occurred in the groin area. Inside the mouth, attached to the lining of the oral cavity, is frequently mentioned as a preferred habitat.

Many parasites exhibit site selectivity or attachment site preferences (e.g., Arthur, 1965; Cochran, 1986; Watermolen, 1992). We might anticipate that leeches would select areas of the skin that are relatively thin and highly vascularized. Although some data suggest this is likely the case, this phenomenon has not been demonstrated adequately for the taxa feeding on crocodilians.

Prevalence and intensity

Limited information on parasite prevalence (percentage of hosts infected) has been published (Table 3). Many accounts of leech parasitism simply consist of reports from only one or a small number of hosts. Cott (1961), however, reported a generally linear relationship between the lengths of *Crocodilus niloticus* and the percentage of individuals that were infested, where "in

the first year, young are entirely free,” but percentage occurrence increased to 90.9% of crocodiles over 4 m in length. Smith et al. (1976) noted that *Alligator mississippiensis* “collected in the same area were not equally parasitized.” Prevalence may vary seasonally. For example, Webb and Manolis (1983) found 59% of *Crocodylus johnstoni* carried leeches during Australia’s wet season, but only 2.6% had them during the dry season.

Similarly, the information on parasite intensity (number per host) is limited (Table 3). Reported levels are sometimes qualitative (e.g., low, moderate, severe) and authors often do not distinguish clearly between mature leeches, immature leeches, or leeches brooding young making it generally impossible to directly compare numbers between sources. García-Grajales and Buenrostro-Silva (2011) reported 95.6% (n=21) of male *Crocodylus acutus* showed “low infestation” and 4.3% (n=1) showed “moderate infestation” levels. One hundred percent (n=4) of female *C. acutus* had “low” infestations (García-Grajales and Buenrostro-Silva, 2011). Some crocodilians, however, may carry significant parasite burdens, particularly in their mouths. Brantley and Platt (1991) found six of 13 *A. mississippiensis* were heavily infested with more than 50 leeches each, and Smith et al. (1976) noted “more than 100 in their mouths.” Yang and Davies (1985a) examined 34 leeches from the mouth of a single adult *C. porosus*.

Effects on host fitness

The effects that leeches have on the fitness of individual hosts remain unclear but are generally thought to be minimal. Webb and Manolis (1983) observed leeches congregating around skin punctures in the axillary region of *Crocodylus johnstoni* but found no similar punctures on crocodiles without leeches, leading them to conclude the leeches were likely causing the observed lesions. Smith et al. (1976) noted that “even animals with numerous leeches appeared healthy and not underweight,” and Montague (1984) found no significant difference in mean body weight between *C. novaeguineae* infested with leeches and those without them. Juvenile crocodilians, however, may be more susceptible to health impacts than adults. In discussing leeches attached to *Caiman crocodilus*, Magnusson (1985) notes that the “large size of the leeches relative to the hatchlings, and the fact that they generally attached to the umbilicus, delaying healing indicates that they may affect the health of hatchlings.”

It is possible that leeches serve as vectors of microorganisms, but the limited available evidence presents an unclear picture of the potential health effects. Although suspected in other aquatic reptiles (i.e., turtles), neither the transmission of bacteria nor viruses by leeches has been investigated adequately in crocodilians. Glassman et al. (1979) found *Haemogregarina* gametocytes and sporozoites in leeches removed from alligators, and *Haemogregarina* parasites were found widely in *A. mississippiensis* in the southern United States (Khan et al., 1980; Cherry and Ager, 1982). Glassman et al. (1979) further reported that alligators harboring leeches had significantly more eosinophils (white blood cells that combat multicellular parasites and certain infections in

vertebrates) than alligators that were not infested with leeches. *Haemogregarina* persisted in the blood of alligators after leeches were removed, but the eosinophils decreased to normal levels within six weeks following removal of the leeches. These authors noted that hemogregarines were absent from alligators that were not exposed to leech infestation (Glassman et al., 1979). Khan et al. (1980), however, failed to transmit *Haemogregarina* via leeches. Similarly, Lainson et al. (2003) concluded that the “failure to obtain development of *Hepatozoon caimani* in leeches suggests them to be unviable vectors.” Leslie et al. (2011) reported that while 9.5% of *Crocodylus niloticus* infected with *Hepatozoon pettiti* were also infested with leeches, they found no correlation between leech infestation and *H. pettiti* infection. More recently, Fermino et al. (2015) found an unidentified species of *Haementeria* was involved in the transmission of *Trypanosoma clandestinus* in *Caiman yacare*, *Caiman crocodilus*, and *Melanosuchus niger* in Brazil.

Adaptive behaviors

Host animals commonly develop behaviors or other adaptations that help minimize exposure to, and the effects of, their parasites. This appears to be the case with crocodilians and their leech parasites. For example, McIlhenny (1935) writes “When taking sunbaths on the bank, it is usual for alligators to hold their mouths partly open... I believe the reason they open their mouths is to let the leeches and small water lice which frequently attach themselves inside of their mouths along the tongue to have a chance to dry out in the hot sunlight, which perhaps would rid them of these pests.”

Various species of birds are sympatric with crocodilians and some of these have been observed removing parasites, including leeches, from resting crocodilians*. Cott (1961) overviewed historical reports and summarized his own observations of this apparent symbiotic relationship, quoting the ancient scholar Herodotus as follows “the crocodile... is in the habit of lying with its mouth wide open, facing the western breeze: at such times the *Trochilos* goes into its mouth and devours the leeches. This benefits the crocodile, who is pleased, and takes care not to hurt the *Trochilos*.” These leeches have been identified as *Limnatis nilotica* (Leidy, 1884), but the specific identity of the *Trochilos* remains unclear. This bird is suspected to be either the Egyptian plover (*Pluvianus aegyptius*) or spur-winged lapwing (*Hoplopterus spinosus*). Cott (1961) speculated that the leech-gathering activities of commensal birds may account for the uneven distribution of leeches on the crocodile’s body. Similar feeding symbiosis relationships between grackles (*Quiscalus*) and map turtles (*Graptemys*) have been documented (Vogt, 1979). It would not be surprising if this phenomenon was at play with crocodilians as well.

Conclusions

Although not encountered commonly or reported frequently from crocodilians, various species of leeches have been found on these reptiles on four continents. Most reports have been

* Short videos of this feeding behavior are available online through YouTube: e.g., <www.youtube.com/watch?v=Dd6GcQrkMDM> and <www.youtube.com/watch?v=IP77pz8OEUc>

anecdotal observations and the leech parasites have frequently been either unidentified or misidentified. Quantitative data on parasite prevalence and intensity have been reported occasionally,

but the effects of the leeches on their host animals have been little studied and poorly documented. There remain ample opportunities for research into these relationships.

Table 1. Host-parasite list with information on geographic locations and literature citations.

Family Alligatoridae	
American alligator (<i>Alligator mississippiensis</i>)	
	<i>Philobdella gracilis</i> – USA, Louisiana , Viosca (1962)
	<i>Placobdella multilineata</i> – USA, Arkansas , Khan et al. (1980); USA, Florida , Forrester and Sawyer (1974), Khan et al. (1980), Cherry and Ager (1982), Jacobson (1984); USA, Louisiana , Overstreet (1978), Brantley and Platt (1991), Siddall et al. (2005); USA, North Carolina , Khan et al. (1980); USA, South Carolina , Glassman et al. (1979), Khan et al. (1980)
	<i>Placobdella papillifera</i> – USA, Texas , Smith et al. (1976)
	<i>Placobdella siddalli</i> – USA, Mississippi , Richardson et al. (2017)
	Unidentified leeches – Seoul Zoo, South Korea , Eo and Yeo (2013)
Spectacled caiman (<i>Caiman crocodilus</i>)	
	<i>Haementeria lutzi</i> – Brazil , Pessôa et al. (1972)
	<i>Haementeria</i> sp. – Brazil , Fermino et al. (2015)
	<i>Oligobdella cheloniae</i> – Argentina, Uruguay , Ringuélet (1978)
	Unidentified leeches – Brazil , Magnusson (1985)
	Unidentified leeches – Seoul Zoo, South Korea , Eo and Yeo (2013)
Broad-snouted caiman (<i>Caiman latirostris</i>)	
	<i>Helobdella</i> sp. – Unspecified , Huchzermeyer (2003)
Yacare caiman (<i>Caiman yacare</i>)	
	<i>Haementeria</i> sp. – Brazil , Fermino et al. (2015)
	<i>Placobdella</i> sp. – Brazil , Almeida (2006)
	Unidentified leeches – Brazil , Viana and Marques (2005)
Black caiman (<i>Melanosuchus niger</i>)	
	<i>Haementeria</i> sp. – Brazil , Fermino et al. (2015)
	Unidentified leeches – Brazil , Magnusson (1985)
Cuvier's smooth-fronted caiman (<i>Paleosuchus palpebrosus</i>)	
	Unidentified leeches – Brazil , Magnusson (1985)
Schneider's smooth-fronted caiman (<i>Paleosuchus trigonatus</i>)	
	Unidentified leeches – Brazil , Magnusson (1985)
Family Crocodylidae	
American crocodile (<i>Crocodylus acutus</i>)	
	<i>Placobdella</i> sp. – Mexico , Garcia-Grajales and Buenrostro-Silva (2011)
	Unidentified leeches – Belize Zoo, Belize , Tellez et al. (2017)
Orinoco crocodile (<i>Crocodylus intermedius</i>)	
	Unidentified leeches – Venezuela , Seijas (2007)
Freshwater crocodile (<i>Crocodylus johnstoni</i>)	
	Unidentified leeches – Australia , Webb and Manolis (1983), Huchzermeyer (2003)
Morelet's crocodile (<i>Crocodylus moreletii</i>)	
	<i>Haementeria acuecuyetzin</i> – Belize , Corry-Roberts et al. (2017); Mexico , Charruau et al. (2020)
Nile crocodile (<i>Crocodylus niloticus</i>)	
	<i>Helobdella conifera</i> (?) – Uganda , Cott (1961)
	<i>Limnatis nilotica</i> – unspecified , Diesing (1850), Leidy (1884)
	<i>Placobdelloides fimbriata</i> – Sudan , Johansson (1909); Uganda , Corbet (1960), Cott (1961); unspecified , Reichenbach-Klinke and Elkan (1965)
	<i>Placobdelloides jaegerskioeldi</i> – Zambia , Cott (1961) ¹
	<i>Placobdelloides multistriata</i> – Botswana , Leslie et al. (2011); South Africa , Oosthuizen (1991), Junker et al. (2019); unspecified , Oosthuizen (1979)
New Guinea crocodile (<i>Crocodylus novaeguineae</i>)	
	Unidentified “black leeches” – Papua New Guinea , Montague (1984)
Mugger crocodile (<i>Crocodylus palustris</i>)	
	Unidentified “orange-pale green leech” – India , Vyas (2017)
Saltwater crocodile (<i>Crocodylus porosus</i>)	
	<i>Hirudinaria manillensis</i> – Zoo Negara, Malaysia , Jeffery et al. (1990)
	<i>Placobdella multilineata</i> ² – Beijing Zoo, Peoples Republic of China , Yang and Davies (1985a), Yang and Davies (1985b)
	<i>Placobdelloides stellapapillosa</i> – Singapore Zoological Garden ³ , Singapore , Govedich et al. (2002), Huchzermeyer (2003), Lim et al. (2003)
	Unidentified leeches – Seoul Zoo, South Korea ⁴ , Eo and Yeo (2013)

Table 1 (cont'd).

Siamese crocodile (<i>Crocodylus siamensis</i>) Unidentified leeches – Seoul Zoo, South Korea ⁴ , Eo and Yeo (2013)
African slender-snouted crocodile (<i>Mecistops cataphractus</i>) <i>Placobdelloides multistriata</i> – Liberia , Moore (1938); unspecified , Oosthuizen (1979)
Dwarf crocodile (<i>Osteolaemus tetraspis</i>) <i>Placobdelloides multistriata</i> – Liberia , Moore (1938); unspecified , Oosthuizen (1979)
False gharial (<i>Tomistoma schlegelii</i>) <i>Placobdelloides stellapapillosa</i> – Singapore Zoological Garden ³ , Singapore , Govedich et al. (2002), Huchzermeyer (2003), Lim et al. (2003)
Unidentified crocodile (most likely <i>Crocodylus niloticus</i>) <i>Hirudinaria manillensis</i> – “ Indo-pacific ,” Huchzermeyer (2003) <i>Placobdella (Parabdella) aspera</i> – Belgian Congo , Moore (1938) <i>Placobdelloides fimbriata</i> – Kenya, Nigeria, Uganda , Moore (1938)
Family Gavialidae
Gharial (<i>Gavialis gangeticus</i>) <i>Hirudinaria manillensis</i> – India , Neesemann et al. (2004)

1. This report remains questionable. Oosthuizen (1991) and Oosthuizen and Davies (1994) have shown this leech to be host-specific to hippopotami (*Hippopotamus amphibius*), and it appears to be restricted exclusively to habitats inhabited by this mammal.
2. Yang and Davies (1985a) speculate that *Placobdella multilineata* also will be found to occur on *Crocodylus acutus* and *Caiman crocodilus*, with which it is sympatric in southern Florida.
3. The leech was likely introduced to Singapore from Malaysia on a turtle host.
4. The leeches were likely introduced to South Korea from Thailand on infected animals.

Table 2. Locations of leech attachments (anatomical habitat) on crocodylians reported in the literature.

<p>“the esophagus . . .” – Blomberg (1975)</p> <p>“mostly on the dorsal tail scutes. Other sites of attachment included the head, back, legs, and inside the mouth.” – Brantley and Platt (1991)</p> <p>“frequently they were attached to the legs, feet, abdomen, back, and palate . . .” – Charruau et al. (2020)</p> <p>“predominantly in the mouth and on the skin under the lower jaw.” – Cherry and Ager (1982)</p> <p>“attached to the inside of the buccal cavity of [the] crocodile.” – Corbet (1960)</p> <p>“on the ventral portion of the right hind leg . . . one in the false nostril of the individual and the second on the roof of the animal’s mouth . . . parasitizing the mouth . . . on the dorsal portion . . .” – Corry-Roberts et al. (2017)</p> <p>“Large concentrations were often present on the site of old scars, festering sores, and in dental sockets. Occurrences (in any degree of infestation) were distributed as follows: muzzle, head, and nuchals, 3; shoulder, dorsal scutes and flanks, 32; fore limb, 24; armpit, 27; hind limb, 87; groin, 37; tail, 12; cloaca, 29; ventral shields, 28; gular shields, 14; tongue, teeth and mucosa, 23. In relation to the surface available for attachment, inaccessible parts, such as the cloaca, groins and armpits were far more heavily infested than the large exposed surfaces of the head, neck, flanks and tail.” – Cott (1961)</p> <p>“collected from the skin . . . two of them were found inside the mouth attached to the lining of the mouth cavity and one was attached externally on the neck . . . All were found attached externally in the axillary regions of the legs.” – Forrester and Sawyer (1974)</p> <p>“36.7% of the leeches occurred in the region of the right groin . . . and 22.4% in the left groin, 10.2% in the left armpit, 5% on the left thigh, 5% in the right armpit, 2% on the ventral side of the tail, 2% on the left ankle, and 2% on the webbing between the toes of back right foot” [my translation from the original in Spanish]. – Garcia-Grajales and Buenrostro-Silva (2011)</p> <p>“on the dorsal and lateral body surfaces and within the oral cavity.” – Glassman et al. (1979)</p> <p>“were collected from the eyelids, mouth, throat, skin folds, underbelly and ear flaps . . .” – Govedich et al. (2002)</p> <p>“The parasites attach to the oral mucosa, particularly the upper pits made by the crocodiles’ lower teeth (Smith et al., 1976) and to the skin: eyelids, external ears under the ear flaps, ventral aspect of the neck, axillary region. Only <i>Hirudinaria manillensis</i>, the buffalo leech, was found in the respiratory tract (Jeffery et al., 1990), and may cause suffocation due to its size.” – Huchzermeyer (2003)</p> <p>“Leeches were found in various places on the crocodiles, both dorsally and ventrally, for example on the tail, neck, belly, armpits, between webbing of back legs, and other sites. There was no obvious pattern of leech distribution on the crocodiles.” – Leslie et al. (2011)</p> <p>“they generally attached to the umbilicus . . .” – Magnusson (1985)</p> <p>“Leeches were attached either singly or in groups on the tail primarily at the junction of the two rows of raised anterior scutes and the single median row of scutes, between the digits, and around the eyes.” – Montague (1984)</p> <p>“from back of <i>Crocodylus cataphractus</i> . . . skin of crocodile.” – Moore (1938)</p>

Table 2 (cont'd).

“leg stump of crocodile . . . tongue of crocodile . . . mouth of crocodile . . . from pharynx of crocodile.” – Moore (1938)
“attached on the ventral neck of a younger <i>Gavialis gangeticus</i> .” – Neemann et al. (2004)
“collected from the feet and lower jaw of a single female Mississippi alligator . . .” – Richardson et al. (2017)
“Seven animals had leeches only on the body . . . Four alligators had infestations in the mouth only and two had both body and mouth infestation. Two animals had over 100 leeches in their mouths. The leeches were numerous inside the upper pits made by the lower teeth. Two large bluish (traumatized) areas were covered with the parasites.” – Smith et al. (1976)
“inside and outside the mouth . . . male <i>C. acutus</i> . . .” – Tellez et al. (2017)
“adhering to the anterior part of its lower jaw . . .” – Vyas (2017)
“from the mouth of a male estuarine crocodile . . .” – Yang and Davies (1985a)

Table 3. Prevalence (% hosts infected) and intensity (# / host) of leech infestations on crocodylians reported in the literature.

Prevalence (# infected)	Reference
7.4% (n = 79; by location, 6–20%)	Montague (1984)
7.6% (n = 11)	Leslie et al. (2011)
18.9% (n = 21)	Charruau et al. (2020)
20% (n = 6)	Cherry and Ager (1982)
32.9% (n = 26)	García-Grajales and Buenrosto-Silva (2011)
34.4% (n = 174)	Cott (1961)
40% (n = 14)	Smith et al. (1976)
2.6–59%	Webb and Manolis (1983)
Intensity¹	Reference
“18 with 1, three with 2 or more”	Charruau et al. (2020)
2.83 (range = 1–5)	Cherry and Ager (1982)
“two adult and one immature”	Forrester and Sawyer (1974)
“three adult and 12 young”	Forrester and Sawyer (1974)
“four adult and many young”	Forrester and Sawyer (1974)
7	Richardson et al. (2017)
“one had 7 leeches, and another had 2”	Leslie et al. (2011)
14	García-Grajales and Buenrosto-Silva (2011)
“about 20”	Corbet (1960)
34	Yang and Davies (1985a)
1–40	Cott (1961)
“more than 100 in their mouths”	Smith et al. (1976)
“about 150”	Cott (1961)
184	Corry-Roberts et al. (2017)

1. Reports of crocodylians with only a single leech are excluded.

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Fishing for Diamondbacks

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Partial excerpt from the author's herp journal regarding a field day in 1995:

"Thursday, March 16

Location: Harris Flats

Herps: 20 *atrox*, 2 tortoises, many zebra tails

Weather: Sunny coast-to-coast, appx. 85 F daytime high.

Notes: We went seeking the snake den of Ron Harris, and found something entirely different. 18 of the snakes found were generally confined to one rock pile, appx. 20 meters wide by forty meters long. The first two *atrox* seen were about 10:15 am, and these were doing the combat dance. They separated when we tried to move in to photograph. Also saw two *atrox* chasing each other, looked like mating behavior . . . *

There was a rescue mission performed, two *atrox* had fallen into a mine shaft, about 30 feet down . . . My best *atrox* day ever! Dennis, Patti, Don, and Dan"

I am embarrassed to report that I emailed the story that follows to a small group of CHS members recently, and got it wrong. That is primarily because I made the mistake of trusting my eyes with a hastily scanned 35mm slide image of three *atrox* taken from some distance above. That image was mixed in with some that will appear in this article. During the process of scanning these images again with a high resolution scanner, I caught my mistake. I don't know who the hell took the photo from on high of the three *atrox* below, but he or she should be sternly rebuked for causing an indiscretion to flow from my fingertips. Upon noting this mistake during the second scanning process, I then did what I should have done in the first place. I dug my notes from that day out of my file cabinet. The notes clearly indicate there were only two *atrox* at the bottom of that shaft. In short, I call "bullshit" on myself over any emails sent out last February under the subject of "Fishing for *Atrox*." Stuff like this happens when you move with haste about something that happened over 26 years ago. But it's hard to feel too bad about all this. The same email discussed walking to the end of the earth to toss a coke bottle into the ocean while denouncing crazy gods—not to mention a mass murderer filling the mine-shaft to hide the bodies. One extra *atrox* in the bottom of a pit seems pretty trivial compared to the rest of that email.

Having set the record straight, it is now time to tell the story like it really happened. As I began to type the words, I suddenly realized that I had already told the beginning of this story. Why hell yes, the words were in my seventh column for this publication. I wrote it in 2015—back when there was hope for these columns. As my confidence is high that not a single one of you remember those words, there is little sense in recreating the wheel. Although the ending to this saga is very different than what was written in 2015, the beginning is still *mostly* the same.

(Mostly.) With this in mind, we go back to the narrative of 2015:

Ron's Den was named after my work colleague and friend Ron Harris. Ron is a dyed-in-the-wool hunter and outdoorsman. In February of 1995, Ron described finding a place that "had 30 rattle-snakes" basking in snarls outside of a gash-like opening. Further inquiries led to some very rough directions on how to find the place. (These were the days before everybody had a GPS unit, and Google Earth wasn't even a gleam in anybody's mind). We were to drive a certain distance down a dirt road, and look for a bunch of splattered potatoes. The short story is that Ron and friends had potato cannons, and put them to good use during the drunken revelry that follows a long day of hunting.

We found the place without any difficulty, as the whole area was merrily peppered with detonated spud offal, and many of the nearby tree branches were gaily festooned with shredded strands of russet dingleberries. It must have been a bad night to be a potato. Once the potato graveyard was found, we were to take a compass bearing of 338 degrees northwest, and hoof two miles over hill and dale, while seeking a lone but massive Saguaro. Once the Saguaro was found, we were to turn right, and go about 100 meters eastward, looking for rocks that looked like cement. According to Ron, those cement-like rocks were the place.

On 16 March 1995, off five of us went. We found the Saguaro, turned right, but found nothing that looked like cement within 100 meters of said Saguaro. But way off in the distance, we saw some formations that were cement-like in color. We walked about a mile-and-a-half to these cement-like rocks, and found a boatload of *atrox*. (Repp, 2015).

No! Dammit—that last sentence is incorrect. *Another* retraction is in order. We did not walk to those cement-like rocks—we drove to them! How we got there is so trivial a matter that it hardly seems worth mentioning. But given the second chance, we might as well shoot for accuracy. As we later learn in the 2015 narrative above, Ron Harris had screwed up by telling us to turn right when we got to the big saguaro. We were supposed to turn left. When we turned right, we got to a barbed wire fence which was strung along the west side of a north-south dirt road. Beyond that road we could see those distant cement-like rocks. It was at that point that we knew we were 100% hosed. There was good reason for all of us to be mistrustful of a plan that began in the midst of potato carnage. Find a bunch of splattered spuds, hoof two miles through confusing terrain, and turn right when you get to a saguaro? What could *not* go wrong with such a plan? As soon as we saw the distant habitat, we returned to that saguaro, put our backs to it, and bushwhacked the two-mile-long, 158-degree southeast compass bearing back to our vehicles. If nothing else, I learned how to follow a compass arrow that day, for we marched directly back to spud-central and, subsequently, our parking spot. Dennis Caldwell and Patti Mahaney then piled into Caldwell's late 1980s Toyota pickup truck, and Don Swann, Dan Bell and I got into my Suzuki Samurai. As Caldwell's chariot was two-wheel drive, with dinky tires, he led the procession. Since he was more likely to get stuck, I wanted

* This was a poor choice of words on my part, and further clarification is required. The two *atrox* were *not* chasing each other—one was chasing the other. And this was *not* mating behavior, but rather, a form of *atrox* foreplay. It was my first-ever observation of a randy male giving chase to a female.

to be behind him. I wanted to be able to push him out with my vehicle, as opposed to having to pull him out. Neither proved necessary, although skillful driving on the part of Caldwell was required to avoid any push-me-pull-you situations. The roads that we found took us right to the cement-like rocks, but the going was anything but easy. There were a great many steep, rugged dips along the way. At the bottom of each dip was a washout caused by erosion. Some of these were quite deep, and every inch of our progress churned our guts into bloody milkshakes. We approached our new goal from the north, and Dennis pulled off the road (such as it was), at the northernmost pile of boulders. I blazed past him and swung around to the south end of these boulders before parking. This maneuver allowed Don, Dan and I to not only completely miss the incident of *atrox* combat that Dennis and Patti were privileged to witness, but also, scare both snakes into the center of the boulder stacks just as Dennis was angling for the photo. I endured a lot of sniveling over this minor indiscretion. Hell, I was just trying to find a place to park! How was I supposed to know that the mere act of driving past Caldwell's hastily-chosen parking spot would disrupt one of the coolest events in nature? Meanwhile, yegads! Now I understand why I claimed to have hiked to these rocks back in 2015. It was *much* less trouble to relay than the actual story.

But still, scoring *atrox* combat within the first few seconds of arriving at a new location was a *phenomenal* introduction to the place. Greatly enthused by both the lay of the land *and* the good start, the five of us wove a herpetological tapestry over, around, and through our new Shangri-La. Mirrors blazed sunlight into every crack and cranny, and for the next hour it was "got one," or "got two" until every inch of our east-to-west sweep was complete. All totaled, we found 18 *atrox* during the hour or so that we herped the place. Some were tucked in crevices, others coiled in partial shade, and still others were on the crawl, sliding between and around boulders. We even saw a larger male chasing a female across a 30-meter diameter swath of talus-like tailings near a collapsed mineshaft. The chase led the pair away from us, until such time as they disappeared into the lush undergrowth that lined the southern base of the last, westernmost line of boulders. All the snakes seen here were adults, all in the one-meter-plus size class. Once the boulder formation petered out, and the herpetological slug-fest was behind us, we held a pow-wow. We knew we would return many times in the years ahead, and needed to hang a name on the place for the sake of my field journals. The first good suggestion was "Triple-DPR" (**D**an-**D**ennis-**D**on-**P**atti-**R**oger), but the scribe who would write the name down over 100 times in the years to follow shortened it to 3DPR. We also came up with the name "Harris Flats" to describe the vicinity. Without the erroneous "help" of Mr. Harris, 3DPR might not have ever been discovered. Both names have consistently been used in my journals ever since.

It is with great reluctance that the author begins to edge away from 3DPR for the remainder of this story. But since I may never do another column of further adventures here, I want to mention one more thing about the place. (I have often been told that nobody cares about *atrox*, and that I should write about other things. But you know what? *Screw all these infidels*. I will write about whatever I please, and this month that would be *atrox*!) On this first trip here, using convenient hand and toe

holds, I was able to get roughly four meters up the vertical east-facing side of 3DPR. While at that lofty height, I was able to use my flashlight to peer into a diagonal rock crevice. Stuffed within the confines of this crevice were two *atrox*. This particular inch tall by two-foot-long split between two hefty boulders has consistently produced *atrox* ever since. I have named this particular crevice the "3DPR Crack on High." Many visiting herpetologists have peered into its loving depths, including our own highly-esteemed Mike Dloogatch. Although I doubt he remembers all the details of his visit here on 4 January 1998, I can promise the reader that he ascended the east wall of 3DPR to witness the wonders of said Crack on High. The last time I actually looked there was 9 November 2018, and there were once again two *atrox* in this crevice. Kent Jacobs was along on this day, and he also went up for a look (Figure 1). The last time I was at 3DPR will probably *be* my last time at 3DPR. The date was 19 March 2021. With me then was Patti Mahaney, the ageless Wonder Woman whose first name put the "P" in 3DPR 26 plus years ago. With that visit, my broken body would not allow me to make the ascent. At my request, Patti obliged. It was no great surprise to hear her describe seeing two *atrox* in that crevice as soon as she effortlessly made the ascent. I should be horsewhipped for not photographing her while she was up there. The 3DPR Crack on High, with its 26-year productive streak, is now the fidelity champ of all time for all *atrox* under my watch.

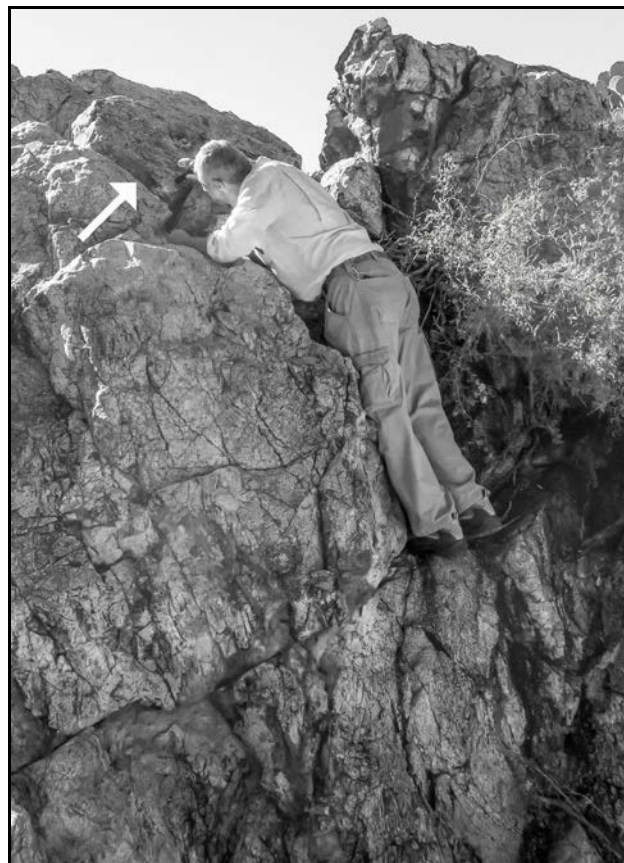


Figure 1. An arrow and Kent Jacobs' flashlight point the way to the "3DPR Crack on High." This crevice den has consistently produced two Western Diamond-backed Rattlesnakes (*Crotalus atrox*) over the duration of 26 years. It is the current winter "fidelity champion" of all time among the many *atrox* under the author's watch. See text for more details about this and all other images below. Image by Roger A. Repp, and note that all figures in this column are from Pima County, Arizona.

I should quickly add that never once were these snakes ever processed. They were never PIT tagged, or even carefully photographed. All that we saw of them with each visit were bits of flank, sometimes heads, and sometimes tails and rattles. I am not claiming either of them to be the same snake for all 26 years. But there *is* a chance, however remote, that they *could be* the same snakes. The world will *never* know anything *except* that one location, less than one square meter in area, has consistently produced two *Crotalus atrox* for 26 consecutive years. Nearly every time I have gone there, there they are!

Getting back to our 16 March 1995 inaugural visit to Harris Flats, the day was far from over when we deemed our work finished at the western edge of 3DPR. We put our backs to the place, and headed south. We swept through a boulder field that flanked the north side of a rather substantial drainage, picking off two adult Sonoran Desert Tortoises (*Gopherus morafkai*) in the process. I have since named this area “3DPR South Ridge.” Once we polished off this ridge, we moved across the wash below it, and went up the steep embankment to yet another ridge. This ridge was lined with more boulder structure similar in size and shape to 3DPR. We worked these formations in a west-to-east fashion, until there was nothing left of it to herp. Even though we did not see any good habitat beyond the south side of this drainage, we wandered out into the flats anyway. We pointlessly went about a kilometer into these flats before turning around to return to our vehicles.

We were fairly scattered all over Harris Flats at our turnabout point. We were out of sight of each other, but well within shouting distance. One of us—probably me—yelled “beer.” That was our succinct code word for “we are leaving.” I wasn’t sure where my companions were, but I *was* sure where the beer was. As it turned out, they were also aware of the beer location. They had recognized the folly of wandering out into the flats before I did, and had already started their trek toward the coolers. I got a feel for their location when the customary responsive shouts of “Beer,” “Indeed beer,” “Yup—beer,” and “Definitely, beer” reached my ears. In short, the motion for beer was made, seconded, discussed, and the subsequent vote in favor of the motion passed unanimously. Soon after the first call for alcohol, four voices were heard shouting the name of an idiot. I responded with a couple of bellows while heading in their direction. I eventually found them standing in a semicircle around the rim of a gaping hole in the ground. All four of them were chattering happily away at each other, occasionally leaning forward to peer into the depths of that gaping hole. Their gaping hole was in reality a vertical, abandoned mine shaft. The shaft was roughly ten meters in diameter, ten meters deep, and the walls of the shaft were smooth and steep. Recent discussion among ourselves has led me to believe that this shaft was a prospector’s pit. In the days of yore, when scouting areas for mineral deposits, ambitious miners would dig such pits in hopes of discovering something close to the surface. Those people sure knew how to have fun! They left behind a giant pit trap of sorts, capable of catching herps or herpers alike. Hazards such as this are still scattered all over Arizona. And wherever they exist, people still occasionally fall in and die horrible deaths. I know of three other such vertical shafts, and in all three cases, I have observed herps at the bottom. This day was not any different, for there were two

adult *atrox* at the bottom. Both were of the same one-meter-plus total length size class as all the others that we had found this day, although one was slightly larger than the other.

I’m not sure who first proposed the rescue operation. But I *am* sure that I had already mentally dismissed these two *atrox* as friends to the end—and this was the end. In my estimation, they were doomed. Mother Nature had sent their dumb asses to the bottom of that pit for a reason. If She wanted them to somehow come out of the situation alive, She would arrange for a troop of cliff-diving lemmings to plunge in and join them. Were it up to me, they would still be down there—although not in the form that we were seeing this day. But the next thing I knew, everybody else was emptying their backpacks to see what, if anything, they might be carrying that could be used to save these two snakes. I began to protest, but a sudden epiphany swept over me, and caused me to reconsider any would-be remonstrance. The entertaining notion that one of these damn fools *might* get bit during the rescue process—or better yet, fall into the pit in the fashion of the movie *True Grit*, caused me to warm to this rescue idea considerably. A very imaginative brain brought on an entire torrent of fun and creative thoughts to zip on through, most of them centering on the fact that my camera would be ready should anything go awry with this plan of theirs. And Dan Bell was also ready with his camera for whatever might come next. Hence, instead of calling their stupid plan dangerous and foolhardy, I found myself saying: “Yup—save the snakes—good idea! I’ll take some photos for us—just to document your heroism.” It’s not like I’m some sort of monster. It wasn’t like I wanted any of them to die. Perhaps some images of a good love tap or two, maybe the kind that might cause grotesque swelling and scads of blood blisters to run up an arm or leg, would enhance my next slide show? Flesh rotting off bones would have worked for me as well. Maybe one—or better yet, *two of them*—would fall down the shaft, and be all hopping up and down on broken legs at the bottom while dodging lashing strikes from confused and pissed-off snakes. That would *certainly* be good for a couple of yucks! While such errant thoughts bounced off the thick outer perimeter of my brain container, the search for materials conducive to rescuing these snakes continued. When Don produced a camera strap, and Dennis some fishing line, it appeared there was one missing item in order to push this rescue plan off the dock. I emptied my own daypack, and pulled the drawstring out of my binocular carrying sack. “Here guys,” said I, offering it in deceptively helpful fashion, “will this do you any good?” “Perfect,” Dennis replied, “thanks, that is *exactly* what we need here.” (Goodie! Glad to hear it!). In clever fashion, Dennis tied off my drawstring to one end of Don’s camera strap, and slid it through the other end. He then tied the drawstring off to his fishing line, which he in turn tied onto his snake hook. He then lowered the camera strap down, and managed to expertly place it directly in front of snake number one. There was one gleeful moment when Dennis appeared to lose his balance, but Patti ruined everything by grasping his hand to keep him from tumbling in (Figure 2, right side). We started tossing pebbles at that snake. With the first direct hit, the snake slipped its head into the camera strap / noose, and began to slide through it. Dennis gave his snake hook a deft tug, the strap clamped the snake at midbody, and up he came. I say “he” because it *was* a

male. There was a tense moment when Dennis first raised the snake above the rim of the shaft. Since his snake hook was not equipped with a reel, he was forced to drop it, and bring the snake up by pulling the line up hand-over-hand. As soon as the snake cleared the rim, it began to swing toward him. But the quick-thinking Patti ruined everything *again* by thrusting her snake hook between the line and Dennis (Figure 3, right side). This alert action on her part put an abrupt end to the swaying. The two of them next performed a well-choreographed dance together. While Dennis spun a very slow pirouette, Patti swung a much wider arc in the direction of his spin. When both had their backs to the shaft, Dennis lowered the snake to the ground, and Patti deftly hooked him. The pair of them wandered off together to release the snake. One event that my camera caught that would have otherwise been missed was the rapid retreat of Don Swann during this first rescue. As soon as that first snake was hefted out of the pit, he must have had an epiphany similar to mine. But *his* epiphany centered on any potential envenomation happening to him personally. That was entirely possible, for when Dennis spun his slow pirouette, the turn went in the direction of Don. Seeing that hefty *atrox* swing his way inspired Don to suddenly remember that he was a turtle and frog person

at heart. As seen in Figure 3, he vacated the vicinity with great haste. He is “whereabouts unknown” with all remaining images.

As soon as Patti and Dennis returned from their release of *atrox* number 1, it was time to go after number 2. Once again, Dennis plopped that noose right in front of that snake. But this time, no pebble tossing was required. Without any such encouragement, she slipped into the noose on her own accord. Dennis hauled her up, and Patti hauled her off. Recent discussions with the 3DPR gang have led us *all* down the path of quirky memories of the whole affair. Our “Memory Lane” has become an exit ramp off a busy interstate highway that leads five different directions. In the end, it was decided that they are free to tell this story any way that they want. Since I am *probably* the only person who will ever put words to this story, my version will be the one that counts. In my version, that second snake knew exactly what was going on, and cooperated in the best way that she could by surrendering to us. Take that story, or leave it, but know that the ending will always be the same. Five good-hearted souls saved two *atrox* who were hopelessly trapped—in a world not of their making—from a long and lingering death. We will let the images do the talking, and check back in for the wrap-up after.



Figure 2. (Left) Left to right: Don Swann, Dennis Caldwell, and Patti Mahaney attempting to noose the first of two Western Diamond-backed Rattlesnakes (*Crotalus atrox*) from the bottom of a prospector’s pit. Pay attention to the good guy wearing the white hat in the next two figures, as he is about to entertain you. Image by Daniel M. Bell, 16 March 1995. (Right) Teamwork! Patti Mahaney anchors Dennis Caldwell to keep him from falling into the shaft. Note that an arrow highlights the entertaining good guy with the white hat, who has shifted his viewing point in order to be directly in harm’s way. Image by the author.



Figure 3. (Left) *Crotalus atrox* number 1, a male, is being raised out of the pit. Note that the snake is beginning to swing toward Dennis, and Patti is reacting. And like a headless chicken, the entertaining guy with the white hat takes off. He is not to be seen in the remainder of these sequential images. (Right) A quick-thinking Patti uses her stump ripper to stop the sway of the snake, while the alert Caldwell demonstrates that his ballet lessons finally paid off. Images by the author.



Figure 4. (Left): Up comes number 2, a female; (Right) Patti demonstrates proficiency with her stump ripper as she hauls the snake away from the prospector's pit for a safe release. Images by Daniel M. Bell.

While writing this story, I emailed three of the four other participants. Dan Bell was excluded simply because I do not have his email address, and it is now too late to consult with him. I asked four questions of them. The first was: "Who found the snakes at the bottom of the shaft?" None of us remember, so we credit Dan. Good show Dan! The second question: "Was the pit a mining pit or a well?" The answers were unanimous, and it was Don who came up with the answer of "prospect pit," which I have emended slightly to "prospector's pit." My next question was: "Were they rattling when found?" Counting myself, there are two "I don't know" and two "no" answers. The last question was "Were they rattling when we pulled them up?" There were three yeses and one no to this question. I have no remembrance of the snakes rattling during the rescue process.

The author is sure that at least three questions linger in the minds of the thoughtful reader about the trapped *atrox* in this narrative: "How did they get there?" "How long were they there?" "How long could they survive in such a situation?" I wish you guys wouldn't ask such questions, as they force me to speculate. One of my more faithful readers *hates it* when I speculate. He tells me that when I do this, my readers go around passing my speculation off as fact, and all of the science behind herpetology suffers as a result. Yes, sirs and madams, every time I shoot my big mouth off, I set science back a hundred years or more. But since you asked, I will deal with the third question first. I don't know how long they would have survived without our help. I presented this story at a Tucson Herpetological Society meeting shortly after it happened. At the end of it all, Dr. Cecil Schwalbe, "almost a doctor" Phil Rosen, and one of their younger students whose name I forget assured me that those two snakes would have been fine without our help. In much the same fashion as the snakes fell in, so too would have some prey items to feed them. But they ain't telling this story! Based on how long it would take them to die of thirst or starvation—whichever came first—my own answer to the "how long would they last" question is probably a year, maybe longer. And they would pass much quicker if all forms of shade disappeared during the hotter months of the year. As for how they got there? It is my guess that they were barreling along at full speed when they fell in. A

rattlesnake on the crawl normally displays an infinite amount of patience, and would not normally get into such a predicament. Typically, an *atrox* on the crawl would reach the edge of the pit, give it a few tongue flicks, recognize the danger, and crawl around it. However, if an *atrox* were fleeing from something, or chasing something, that would be a different story. This prospector's pit is very close to an *atrox* den that we did not discover until many years later. What we saw that day, and several days before and after, indicated that everything *atrox*-wise was on schedule in mid-March of 1995. Some *atrox* were still at the dens, and some were moving away. The fact that we saw both combat and chasing behavior that day, and three incidents of courtship and two of mating there three days later (see again Repp, 2015), would indicate that our timing was perfect. Add to all of this the fact that the *atrox* rescued were a male and female, and *man* do we ever have good grounds for speculation that: 1) the male was chasing the female when both went over the edge into the pit and 2) the mishap had been recent. Their body condition was indicative of healthy snakes. We probably came wandering by within days—if not hours or minutes—of it happening. If that is the case, was all this just plain serendipity, or an example of higher power at work? The world will never know.

One thing I am certain of is that I was damn proud to be hanging with these people on that day. And if there is such a thing as karma, this good deed of ours laid plenty of it on my doorstep in the days and years to follow. All totaled, Harris Flats has given us *seven* different *atrox* aggregate dens of six or more snakes, and I have seen more cool behaviors at these particular dens than all other dens combined. Despite the fact that these snakes are "only" *atrox*, and nobody cares about them, the time has come for the guy who *still* knows them best to let it all hang out. I have held back on rattlesnakes because it was suggested by several readers that my columns dwelled too much on them. As a devoted Sonoraphile, I love *all* the herps under my watch. But where the local rattlesnakes are concerned, I have not even scratched the surface about what I have seen and learned.

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

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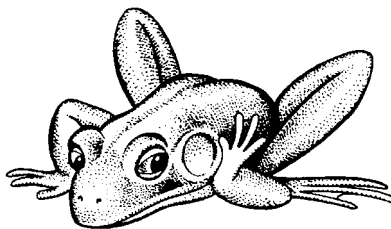
Mike Pingleton's recent book review (Pingleton, 2021) of Joss Vossler's *Snake Road: A Field Guide to the Snakes of Larue-Pine Hills* (Vossler, 2021) offered some criticism with which I disagree. Pingleton is a herpetologist who you might know from his book on field herping (Pingleton and Holbrook, 2019) or his field herping podcast, *So Much Pingle*. Roger Repp (Repp, 2021, p. 99) recently stated, "...herpetologists ought not to write [book reviews]. There is something inherently rotten in the nature of people who think nothing of ... [feeding pre-killed mice to snakes that] ... makes it too easy to be tough, too easy to be hard. Even when we *like* something that has been written by a friend or colleague, we feel we *must* shred that something anyway. The standard review... becomes a shit sandwich. The shit goes in the middle, and the flattery and kindness goes on top and bottom." Pingleton's review fits this mold and I think it's important to offer an alternative view.

To his credit, the top and bottom of Pingleton's book review "sandwich" pointed out some of the strengths of Vossler's book. It's small and fits in a day pack. The species accounts in Part One are peppered with outstanding photography showing distinguishing features but also variation of each snake species found at Snake Road, something that is lacking in most field guides. I consider myself to be a decent photographer, but Vossler's photos are among the best I have seen. In Part Two Vossler describes how to tell similar species apart and uses side-by-side images to show differences. Some comparisons have as many as 14 images (e.g., Northern Cottonmouth vs. Plain-bellied Watersnake), including close-up images of both species in the same pose showing differences in heads, eyes, scales, and pattern. I have never seen such a clear and thorough treatment on how to differentiate similar species, and it is a yardstick by which similar accounts can be measured.

Where my opinion differs from Pingleton's is the middle part of his "sandwich." Vossler visited Snake Road 100 times over three years, spending over 380 hours there and observing 1,716 snakes. He used that data set to come up with a novel "cottonmouth ratio." Northern Cottonmouths are the most commonly encountered snake at Snake Road, and Vossler saw more Cottonmouths than all other snakes put together. As a result, he arranged the species accounts according to the likelihood of them being seen compared to the likelihood of seeing a cottonmouth, which is close to 100%. For instance, a Plain-bellied Watersnake has a cottonmouth ratio of 6:1, but a rare Red-bellied Mudsnake has a ratio of 500+:1. Vossler also stated the probability of seeing each species on one visit, four visits, and ten visits to Snake Road.

Pingleton opined that the cottonmouth ratio and probabilities weren't very useful, that observing snakes in the field isn't "cut-and-dried" and doesn't fit "a neat statistical model." He worried that the cottonmouth ratio "may set unrealistic expectations" or even "add an element of despair" and felt it was not the best approach.

I disagree completely. Vossler himself explains that the numbers



of snakes he saw on a given visit varied with the people who joined him (experienced vs. novice), time of year, time of day, weather, path taken, and number of hours spent there. He specifically writes (p. 14), "it is important that you recognize my study for what it was: one snake enthusiast's observations, shared in the hope of helping future visitors to

Snake Road establish reasonable expectations and have the best snake-watching experience they possibly can." In fact, Vossler states that it was first-time visitors expressing disappointment in *only* seeing 37 snakes in one day that prompted him to look for a way to help set realistic expectations. Seeing 37 snakes in one day anywhere else would be noteworthy, but these visitors had unrealistic, higher expectations from hearing stories of stellar, record-setting single visits by others. Compiling the data from 100 visits provides a more realistic picture than stories around a campfire of that one memorable record day.

To reuse an example cited by Pingleton, Vossler states that the probability of seeing a Timber Rattlesnake on Snake Road is "1 visit, 17%; 4 visits, 52%; 10 visits, 84%." As previously noted, Vossler also lists several factors that will affect those probabilities. When I visit Snake Road, I don't expect to see a Timber Rattlesnake every time and when I do see one, I appreciate it more knowing they are less common than Northern Cottonmouths. My own experience is that when we brought out-of-town herper guests to visit Snake Road, they often asked what the chances were of seeing a certain species—often Timber Rattlesnakes—they hoped to find. In the past, I told rattlesnake enthusiasts that we saw Timber Rattlesnakes one out of every two to three trips. That was a flat-out guess based on memories rather than data, but now I have something more concrete to report. I like the cottonmouth ratio a lot and appreciate its uniqueness, but I understand its limitations as outlined by Vossler.

Pingleton also complained about Vossler's choice of common names of snakes. Vossler uses common and scientific names listed by the SSAR (Crother, 2017), and only to the species level without listing subspecies. Pingleton disagreed. He felt "North American Racer" was too generic and that "Southern Black Racer" would be more precise and familiar to readers. I would argue that anyone familiar with "Southern Black Racer" would simply use the term "Racer" when referring to one from Snake Road, unless publishing a paper. Pingleton goes on to suggest that "Northern Cottonmouth" and "Eastern Copperhead" were newer names, "still contentious and not widely accepted," and might confuse people more familiar with the older, outdated "Western Cottonmouth" and "Northern Copperhead." These newer names used by Vossler are old enough and accepted enough to be used in the five-year-old Peterson reptile field guide (Powell et. al., 2016). Anyone using that most-popular field guide to ID snakes on Snake Road, if anything, would be confused by the *old* names suggested by Pingleton. Taxonomy obviously is in a continuous state of flux as experts use new information to more accurately define relationships between organisms. Also, new names take a while to catch on, but these names have been in use for years. Pingleton's argument smacks

of friends and colleagues we all have heard argue, “Why in *my* day we called them Black, Yellow, Gray, and Texas Ratsnakes. Just where do these experts with PhDs in herpetology and taxonomy get off telling *me* they’re now Eastern, Gray, and Western Ratsnakes!?” In *my* day we called North American ratsnakes *Elaphe*, North American watersnakes *Natrix*, and North American softshells *Trionyx*. My friends and colleagues complained and bitterly fought changes to *Pantherophis*, *Nerodia*, and *Apalone* because resistance to change is natural, but finally came around.

Pingleton does go on to suggest that the simple terms “Cottonmouth” and “Copperhead” might be less confusing. If so, why suggest “Southern Black Racer” instead of “Racer?”

I think Vossler himself preemptively made the whole argument moot by explaining (p. 23) “One of the purposes of this book is to help visitors to Snake Road identify the snakes they encounter and learn their names. This goal seems straightforward, but in reality it is deceptively complicated. As science progresses, sometimes scientific names change to reflect new knowledge. Not all scientists agree, however, resulting in controversy over some of these new names. This is a normal, healthy part of the scientific process. But it makes *coming up with a definitive list of species names darn near impossible* [Italics mine]. For simplicity’s sake I only included species-level English and scientific names, and I drew those names from the list maintained by the Society for the Study of Amphibians and Reptiles.”

In conclusion, if you have been to Snake Road, are planning to go to Snake Road, or just hope to go there one day, *drop twenty bucks and buy this book*. If you have a friend planning a first trip there, buy them a copy of the book. Even if you never read a word of the text, you are going to love Vossler’s outstanding photography. In fact, my main complaint is that I wish the book was bigger so the images could be bigger, but I understand that a field guide should fit easily into a pack. I promise you’re going to be comparing your Snake Road finds to Vossler’s “cottonmouth ratio.” Did you do better than he did? For which species? You saw three Copperheads and there’s only a 17% chance of seeing one on a single visit? Wow, *that* was a special trip! Are you really going to be confused by the names in the book? Will you struggle deciding if that Racer was a North American Racer or a Southern Black Racer, or if that Cottonmouth was a Western or a Northern? Spoiler: no, you won’t. I promise you’re going to learn details in the section on telling similar snakes apart that you will use when teaching others how to ID snakes. Finally, you’re going to enjoy paging through this book when you’re back home, remembering past trips and looking forward to future trips to Snake Road.

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Discordant Vibes: A rebuttal to Mike Pingleton's recently-published book review

Dear CHS Members,

I am writing this letter in response to Mike Pingleton’s recent piece entitled “Book Review: *Snake Road: A Field Guide to the Snake of the La Rue-Pine Hills* by Joshua J. Vossler.” Mr. Pingleton’s review of this book appeared in the *Bulletin of the Chicago of the Chicago Herpetological Society* 56(5):69 (May 2021). A quick question, if I may. Should not the “Snake” in the title of Pingleton’s review be the plural form of the word? I do believe that Mr. Vossler wrote about more than one!

I have spent portions of the last two months wondering whether I should say something about Mr. Pingleton’s review. Obviously, I have finally decided to act. My initial thoughts were to write a review of the book myself. My only reason for hesitation was the fact that one review had already graced the pages of this publication. Were two reviews of the same book even allowed? I thought it wise to contact our esteemed editor *before* proceeding with writing my review. I am glad that I asked the question, for the answer was basically “no.” Mr. Dloogatch informed me that two reviews of the same book have historically happened, but felt that I would be inclined to be favorably biased with the author Josh Vossler. This is because he is a friend of mine. However, he would be willing to publish a letter to the *Tympnum* expressing my thoughts. At first, friend or not, I found the notion that I would be too generous to Vossler somewhat laughable. Josh is a recent arrival to my own love train of life. Conversely, I have been friends with Andy Holycross and Randy Babb for over 20 years. I think it fair to say that I did not pull any punches in my review of their Gophersnake Account in the book *Snakes of Arizona* with those two friends. So, no! I would not be inclined to be kind to Josh Vossler (hereafter sometimes referred to as “Josh”) on account of any friendship issues. Nevertheless, I am glad that our esteemed editor gently closed the door to any would be book review on Vossler’s book coming from the likes of me. I would normally be in an all-out snit about such a thing. But the fact is that I liked this book so much that it *would* look like the “friendship fix” was on to any reader of my words.

I will speak forthrightly about my feelings and opinions on this

book—friend of Josh Vossler or not. We use the term “genius” too lightly in this day and age, but “genius” applies to the layout of this book. Josh uses statistics to create a ranking system to judge the value of a find; and uses some great macro photography to discern the subtle differences with some of the wee little snakes of Snake Road. I will admit to initially thinking that due to my own life-long interest in the snakes from back east, I knew enough about how to identify the differing species of Snake Road without some North Dakota upstart showing me how. But once I *carefully* read the text of this book from cover to cover, I learned some different, better techniques in snake identification. Lest my words wind up being the book review that Mike Dloogatch didn’t want, I will move on.

Before entering into the realm of Mr. Pingleton’s review of this book, I will say that shortly after I contacted Mr. Dloogatch to offer my review, along came an email and attached document from Dr. Steve Barten. The attachment was a review that *he* had written about Vossler’s book. Steve wanted me to look it over before he sent it on to Mike Dloogatch for publication. Without letting on why, I told Steve to send it to Dloogatch without any editing from me. Steve did so, and Mr. Dloogatch can be very grateful that he was consistent between both Dr. Barten and I by telling *him* that he should also write a letter to the *Tympanum*. My, my we would have had a very stirred-up anthill had Mr. Dloogatch published Barten’s review while eschewing my offer! So, that is how it has come to pass that the reader sees two letters on the same subject matter in the *Bulletin* issue that you now hold in your hands. For the sake of fairness, we are writing our letters independently. The first time that I will see Dr. Barten’s letter is when I receive my August 2021 *Bulletin*, and vice versa. If our letters wind up sounding similar, it is only because we are unified about Mr. Pingleton’s review of this book.

I have chosen the word “discordant” in the title of this mild rebuttal purposefully. Discord is exactly what I personally felt when reading Mr. Pingleton’s (hereafter sometimes referred to as “Mike” or “Mike’s”) review. There is an underlying tone that resonates throughout. That tone is one of Mike’s condescension toward Josh—as if Josh had stolen a book idea that Mike felt he was far better qualified to write. While I perhaps misjudge Mike here, I got and (with each reading), continue to get vibes that insinuate something along the lines of Mike being an expert on the subject matter. It was because of his vast knowledge of the region and the snakes it contains (he says as much), that he got roped into something that he didn’t want to do by writing this review. Again, perhaps I read too much between the lines, but it appears this duty was one of “Ok, I said I would do this—let’s get it over with.” I would also suggest, furthermore, that Mike

did little more than spot-read this book. There is a glaring error on one of the charts that any careful reader / reviewer would have found and mentioned. (That error was a mistake made by the publisher.)

I found Mike’s criticism of the naming convention used in Vossler’s book interesting. So that there are no mistakes, I quote directly from Vossler’s book here: On page 23, under the bold heading of *A Note on Names*, the last sentence of the short paragraph below reads thusly: “For simplicity’s sake, I only included species-level English and scientific names, and I drew these names from the list maintained by the Society for the Study of Amphibians and Reptiles.” Mike was quick to pounce on this notion, suggesting that Josh should have instead reached to the subspecies level—or even resorted to more widely-accepted shorter lingo—regarding snake identification in this book. The taxonomy of snakes world-wide is a mess. Many knowledgeable herpetologists do not even believe in the notion of subspecies. And while I respect Mike’s vast herpetological experience, perhaps he should be reminded that it is *way* above his pay grade to suggest that the common names that he is comfortable with be given preferential treatment over the standard common names offered by the SSAR—*especially* in a formal book. If Josh had gone the route that Mike suggests, he would have been forced to use multiple sentences for each species in just describing the name. I can see it already: “You *should* call them this, but you *can* call them that—but most of us call them a different name altogether.” While I am frustrated in too many ways to count with the SSAR’s nomenclature, Vossler was wise to draw his line in the sand where he did. Any of Mike’s complaints in this regard should be launched in the direction of the SSAR—*good luck!*

In wrapping this up, my biggest problem with Mr. Pingleton’s review is that it vacillates back and forth between what he likes and what he doesn’t like. While this is a normal part of any book review, at no point does Mike ever pull it all together to say: “I like this book and recommend it,” or “Regrettably, I did not like this book and cannot recommend it.” This is the normal conclusion of any book review. You either like it or you don’t. To paraphrase the lackluster conclusion to this review, Mike basically says “If you go to Snake Road, and happen to own this book—fine, put it in your backpack. But put some other books into your backpack as well, for it isn’t enough.” The reader really has no idea whether the book is good or bad from this review, as the wording here is nebulous at best. I like this book, I recommend buying this book, and I feel that it deserved more kind consideration than it received—especially in the concluding paragraph.

Respectfully, **Roger A. Repp, 3 August 2021**

Minutes of the CHS Board Meeting, July 16, 2021

A virtual meeting of the CHS board of directors via Zoom conference video/call was called to order at 7:33 P.M. Board members Stephanie Dochterman, John Gutierrez, Kyle Houlihan and Amelia Pollock were absent. Joan Moore was the sole non-member of the board attending. Minutes of the June 18 board meeting were read and accepted.

Officers' reports

Treasurer: Rich Crowley went over the June financial report. There was a discussion about fund-raising efforts.

Membership secretary: Mike Dloogatch read the list of those

whose memberships have expired, and reported a small net gain in membership this month.

Sergeant-at-arms: Tom Mikosz reported that 26 people viewed the June 30 webinar.

Old business

John Archer has not heard anything yet about plans to reopen the Notebaert Museum full time.

The meeting adjourned at 9:02 P.M.

Respectfully submitted by recording secretary Gail Oomens

Advertisements

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

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

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UPCOMING MEETINGS

Until in-person meetings again become possible the Chicago Herpetological Society will be holding monthly general meetings online via Zoom webinar. A notification will be sent by email to all members who have supplied us with an email address. As has been our custom for over 50 years, the meetings will be held on the last Wednesday evening of each month. The speaker for the August 25 webinar is expected to be **Christian Cave** of the Cavemen Wildlife Crew, talking about field experiences and that organization's mission of conservation through education.

A speaker for the September 29 meeting has not yet been confirmed.

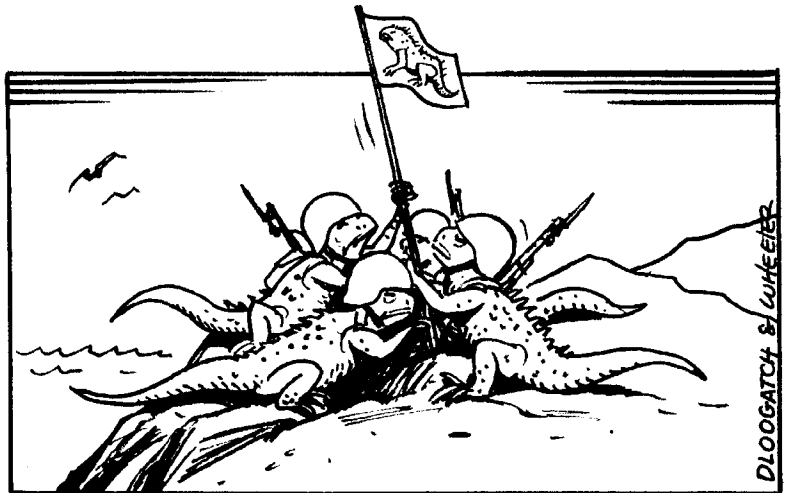
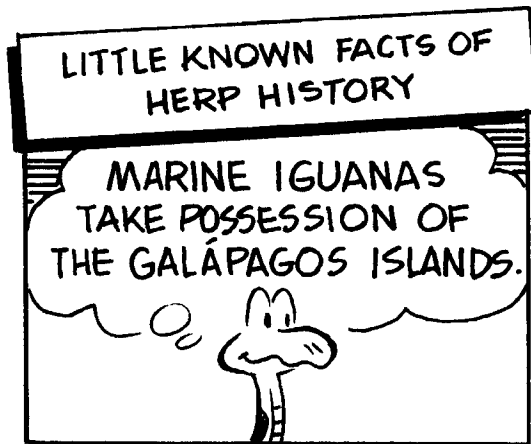
Please check the CHS website or Facebook page each month for information on the program. Information about attending a Zoom webinar can be found here:

<[https://support.zoom.us/hc/en-us/articles/115004954946-Joining-and-participating-in-a-webinar-attendee->](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: mdloogatch@chicagoherp.org.

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