SONORAN HERPETOLOGIST

March 2026
Volume 39
Number 1
ISSN 2333-8075 (online)
2577-9370 (print)

Newsletter-Journal of the Tucson Herpetological Society

President's Letter — Fare-thee-well, Rog!

A little over three months ago we lost one of our greatest stalwarts in **Roger Alan Repp** (1954-2025). This issue of *Sonoran Herpetologist* is dedicated to him. In the following section, **Don Swann** assembled a lovely collection of tributes from Roger's friends, and wife **Dr. Dianna Repp**, for whom we are most grateful. Additionally, we thank **Dr. Gordon Schuett** for supplying us with photos, and the bibliography needed for a proper tribute; and **Michael Dloogatch** of the Chicago Herpetological Society (CHS) for providing use of material. If I missed somebody, or you missed the opportunity to contribute, I sincerely apologize and invite you to follow up with us in the next issue and/or a memorial scheduled for this April 18th (details forthcoming).

In the time that I knew Roger, like any mentor, friend, and colleague, he was kind, funny, and sometimes trying. His enthusiasm and sense of humor were contagious as we rambled and marveled in our exuberant Arizona landscape. There were always cold beers and snacks at hand. While his temper would flare, his heart was in the right place.

Roger loved outreach, and I'm a grateful recipient. When I first joined the THS in 2000 as an 8th grader at Roskruge Bilingual School, my music teacher and pal **Lee Oler** and I invited Roger to speak to the 1st grade class. I watched him captivate an audience with a (film) slideshow, humor, boisterous enthusiasm, and live animals (the real stars). I remember bringing my box turtle, and Lee bringing her aquatic turtles. That day was my first lesson in the art of public presentations.

Thanks to the efforts of our vice president, **Patrick Brown**, we continue to provide excellent outreach services to southern Arizona, mostly as interactive displays at community events. This year we plan to provide this at the following events:

March 7: Southern Arizona Research, Science, and Engineering Fair
March 14 & 15: Tucson Festival of Books
March 21 & 22: Reptilian Nation Expo
October 3 & 4: Tucson Reptile & Amphibian Show & Sale

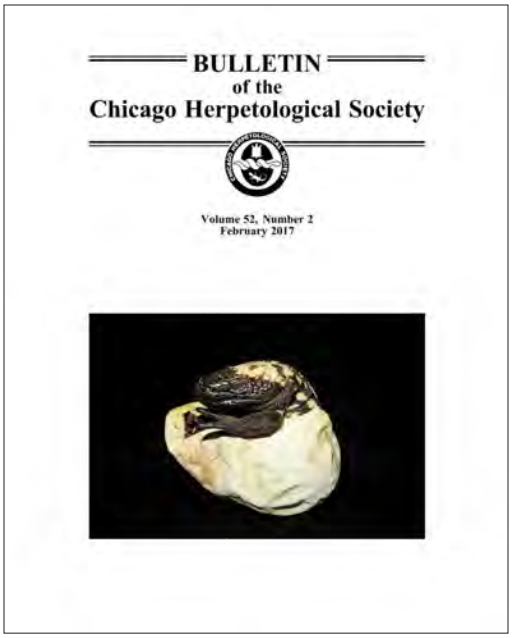


Fig. 1. Feature cover of the *Bulletin of the Chicago Herpetological Society* for the issue that published Repp (2017).

While somewhat of a luddite, Roger did give Power Points. Most notable was his presentation to the THS on the lucky day in 2016 that he was contacted by a construction contractor who had uncovered a Gila Monster nest during the course of excavation (Repp 2017; Fig. 1). That was the highlight of his herpetological career, and his article about it was published exactly 50 years to the month since his first publication (Repp 1967; Fig. 2). The lineup for our monthly speaker program this year is:

March: Taggart Butterfield: Yaqui and Río Fuerte Sliders
April: Max Roberts: Project Rattlecam
May: Earyn McGee: Diversity in the field
June: Chantelle Khambholja DVM: Educating herp pet owners
July: Craig Fischer: Flat-tailed Horned Lizards
August: TBD
September: Larry Jones: Desert Iguanas
October: Ryan O'Donnell: TBD
November: Don Swann
December: No meeting

Roger's passion for our Society was evident in the expectations and corresponding demands he had for himself and those who worked with

Cover Photo information: The ever-smiling Roger Repp. Photo by Steve Barten.

Juncos, Townsend's Solitaires.
1 Pallid Bat.
4 Silky Pocket Mice.

****

A SALAMANDER HUNT
by
Roger Repp

First Day

Jack and I had arrived at the pond, and were ready to catch salamanders. We waded in, but all we could find were garter snakes and frogs. We were there about an hour before we found where the salamanders were. Jack had stepped in the west part of the pond, a spot we hadn't checked.

Suddenly Jack let out a yelp and was holding a salamander. I ran to that spot and also caught one.

Suddenly about 32 little ripples went down towards shore. Jack grabbed three and put them in a jar. I caught four and put them in.

At the end of an hour's time (after we found them), we had 28 tiger salamanders (Ambystoma texanum). We were exhausted and took a rest.

We then checked a corner of the pond and Jack caught two more. By now we were sopped, but we didn't care. Thirty salamanders would bring good money. But we didn't quit there. We went into the west part of the pond and caught three more. Just when I thought we had cleaned them out and was ready to turn some loose, about forty more swam away.

I had to face the facts--this fat pond was full of salamanders, and in a million years I couldn't catch them all.

We caught a few more and then went after some of the frogs, catching the bullfrogs and spring peepers and leaving the leopard and pickerel frogs alone.

We caught eight spring peepers and four bullfrogs.

On our way home we caught a few snakes and mice.

Second Day

We came back again, hunting for snakes, and had a pretty good catch of eighteen snakes. We released fourteen and kept only four. These were funny garters, a light shade of green with a red-orange line down their back. I later learned these were Plains Garter Snakes (Thamnophis radix). We finally concluded the hunt and went home hot.

18

Fig. 2. Roger's first article, *Bulletin of the Chicago Herpetological Society* 2(2):18.

Roger's passion for our Society was evident in the expectations and corresponding demands he had for himself and those who worked with him.

him. He often took on simultaneous responsibilities. His limits were strained when we had to acquire an insurance policy. Vivid was the board meeting when he came to tears of frustration and anger, realizing that our litigious and monetizing society had squeezed out a little more joy and income from our coffers.

Below, **Taylor Edwards** recalls Roger's organizational drive and passion in planning the memorable *Current Research on the Herpetofauna of the Sonoran Desert Symposia*. Roger even hosted colleagues from Sonora. While we haven't hosted another such meeting in eight years, we are often asked to co-sponsor herpetological meetings.

This year we will co-sponsor, attend and/or present at important and notable meetings. Your support, monetary and otherwise, is so important in keeping our mission alive. Let us know if and how you'd like to help.

May 21 - 23: Sonora State Herpetological Association, Hermosillo, Mexico
July 29 - August 1: 50th International Herpetological Symposium, Rodeo, NM
August 6 & 9: Southwest Partners in Amphibian and Reptile Conservation, St. George, UT

We have been graced by Roger's writing talent. Below, **Dave Barker** tells us that Roger's first publication was in the *Bulletin of the Chicago Herpetological Society* (Repp 1967). As Dianna puts it, his exuberant, hilarious, larger-than-life style was inspired by his boyhood reading of Gaylord Nelson's piece (1968) in *Field & Stream* Magazine. The bulk of his published contributions were in the CHS *Bulletin*, and the *Sonoran Herpetologist* (see Swann, below). He also wrote very entertaining stories in his monthly emailed THS meeting reminders. If someone has saved these, please let me know! I'm searching for one Christmas edition about "Gila Claws." Roger was also featured in two books: A children's book about Katie, a Western Diamond-backed Rattlesnake, by friend **Kate Jackson** (2009; Fig. 3); and a biographical fiction by his brother **Ronald** (Repp 2005; Fig 4).

His most valuable academic contributions are in his comprehensive assessments of populational and behavioral observations of southern Arizona herps—especially in winter. Roger's rare dataset was informed equally by observations of organisms (including vegetation) as well as weather and climate over 20+ years. The task of observing and interpreting creatures that live in realms different than ours was evident in his meticulous and enviable field notes (Fig. 5). He was occasionally invited to impart this skill with others.

In the fantastic ode *Bestiary* (1965), Pablo Neruda desperately wants to talk to the animals including small lizards, to have a long chat with the snakes, and learn the harsh-voiced idiom of the frogs. A profound benefit could be unlocked with more direct communication with our more-than-human neighbors in a world that increasingly demands of our attention and intelligence. I think that Roger was on the same wavelength, and knew the importance of keeping this challenge fun. His imagination and creativity were fully at play, sometimes even joking with God during prayer! (Dianna Repp, personal communication).

Roger, thank you for going out of your way to pick me up at home one bright, fresh morning to show me my first wild tortoise and Gila Monster on a Tucson Mountains bajada. The memory, like his writing, remains vivid.

Stopping for a rest, standing in the ramparts of the head of an arroyo, the young, brilliant orange-and-black lizard glided between my feet like poetry in motion. I wonder if Roger saw it long before I did… Vanishing into its hole as quickly as I saw it, Roger in his classic poker-faced, rough-housing sarcasm says, "*Stick your hand in there and grab it!*" His exclamation teetered between suggestion and command if it weren't for his playful grin and chortle. Anyhow, he was an avowedly *in situ* (hands off) herpetological observer outside of sanctioned projects (read Roger's first article and see a world of difference!). Roger also showed me how to safely secure and hold a wild Gila Monster

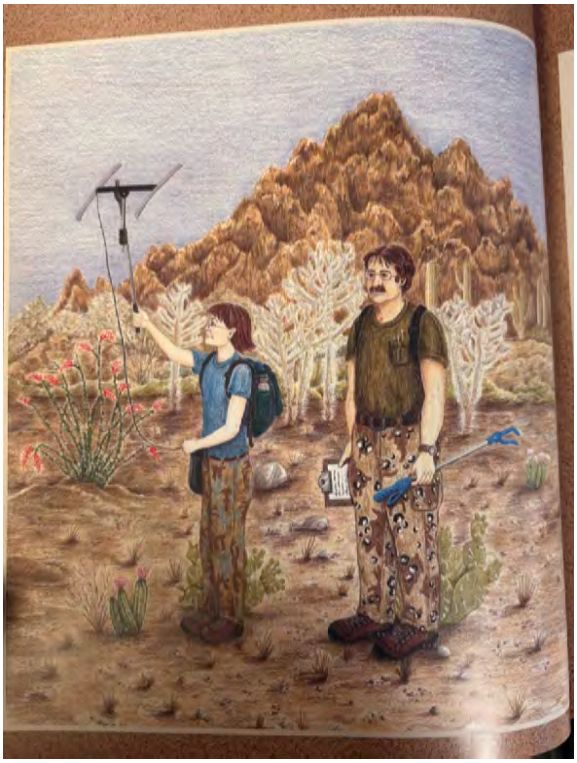


Fig. 3. Roger illustrated by Natalie Rowe in a book published by the Arizona Sonora Desert Museum Press by Kate Jackson (2009).

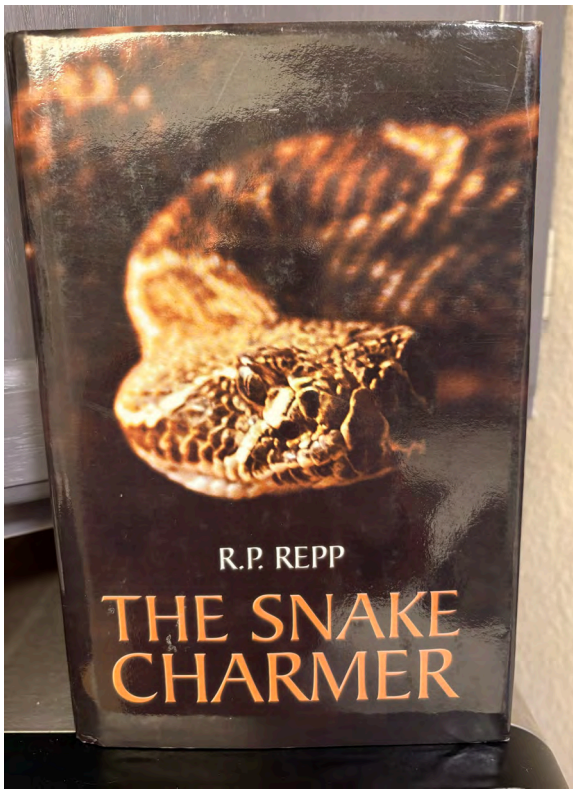


Fig. 4. *The Snake Charmer* by brother Ronald P. Repp (2005).

His most valuable academic contributions are in his comprehensive assessments of populational and behavioral observations of southern Arizona herps—especially in winter.

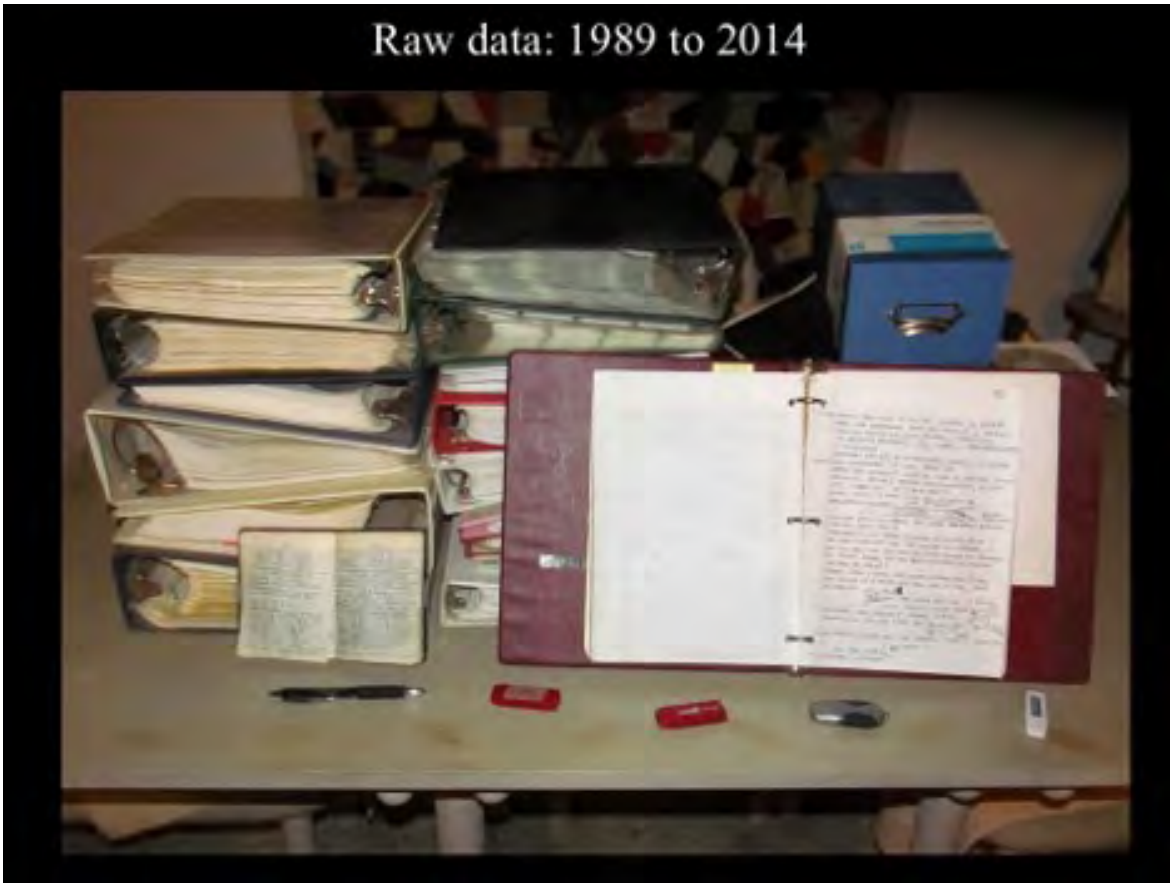


Fig. 5. Roger's field notes, slides, and digital data. Courtesy of Dianna Repp.

Anyhow, he was an avowedly *in situ* (hands off) herpetological observer outside of sanctioned projects (read Roger's first article and see a world of difference!).

during the course of telemetering these animals. Another vivid memory was the time he saved me from heat stroke in the Picacho Mountains while finding tortoises for Taylor's dissertation. Schlepping towards the vehicles in the white haze of a sun-shot dream, Roger eased my embarrassment by proclaiming it was so darn hot that the ants at the hole we saw crawling around in the morning had retreated in defeat to their fossorial lair.

Once again, thank you, Roger for taking me on my first nocturnal drive for snakes crawling across the old Sasabe Road; for picking me up at 4:30 AM to help **Marty Tuegel** find Desert Box Turtles on Fort Huachuca; for showing me what good writing is; for feeding and housing me after chasing snakes and Gila Monsters all night; for introducing me to good people who would help mentor a kid from south Tucson. And thank you Dianna, for sharing your partner of many years with us herpers. Wherever it is you are, Rog, I hope you're continuing to frolic in the fields of your Lord and Creator.

I hope you enjoy this special issue of *Sonoran Herpetologist*.

Warm regards,

Robert Villa

Literature Cited

Jackson, K. 2009. Katie of the Sonoran Desert. Arizona-Sonora Desert Museum Press, Tucson, AZ.

Nelson, G. 1968. An amateur angler. Field & Stream, April issue. Originally published in the 1920s (Dianna Repp, personal communication).

Neruda, P. 1965. Bestiary. Harcourt Brace & World, San Diego, CA.

Repp, R. 1967. A salamander hunt. Bulletin of the Chicago Herpetological Society 2(2):18.

Repp, R. 2017. A monstrous Halloween treat. Bulletin of the Chicago Herpetological Society 52(2):28-35.

Repp, R.P. 2005. The snake charmer. Publish America, Inc., Frederick, MD.

DEDICATION

Roger A. Repp—Esteemed Tucson Herpetologist and Friend to Many

Don Swann, Tucson Herpetological Society, Tucson, AZ; *donswann3@gmail.com*

This issue of the *Sonoran Herpetologist* is dedicated to Roger A. Repp—esteemed Tucson herpetologist and friend to many. As his obituary states: Roger Alan Repp (1954-2025) went home to be with the Lord on November 24, 2025, where he joins his beloved son, Tim; his parents, Ruth and Frank; two brothers, Robert and Ronald; and many other loved ones. Roger is survived by his wife, Dianna; sister, Julie (Arthur); brother, Dan; and many nieces, nephews, and cousins. He was grateful for his family as well as the many friends he made through the years, and thankful for all the memories and moments shared with them.

As we reported in our Facebook post when he passed away in November, Roger cared deeply for our native amphibians and reptiles and those who cared for them. He was one of the most prolific "non-academic" contributors to the field of herpetology in our beloved state and Sonoran Desert. He is sorely missed, and we are greatly enriched for having known him and his talents.

Although Roger's accomplishments and publications are too many to list, his true legacy lives on in the lives that he touched. This issue includes tributes from many of his friends, although only a fraction of the total number of people he was close to, because that list is much longer than the tail of a Sonoran whipsnake.

As Roger once described himself, "he came out of his mother's womb as a herpetologist," although he *did* have a life outside of herpetology. Among other things, in 1975 Roger was rhythm guitarist in a garage rock band in the Chicago area called Iron Lung that produced an album called "High Bail" (this record continues to be celebrated online; listen to it on YouTube and to learn more, see the link: *https://bit.ly/4aKkztD*).

But herpetology was a stronger call than music. When he graduated from high school, he famously followed the career-path advice of Ray Pawley, curator of reptiles at the Brookfield Zoo, who told him: "Get into a trade, kid, that is where the money is"—and in 1977, Roger earned his journeyman tool and die maker degree. He was highly accomplished in his chosen profession, which indeed supported him for the rest of his life. He worked in Illinois, Florida, Washington, and Arizona. In 1981 he moved to Arizona with his wife Dianna and son Tim, eventually retiring as the Instrument Shop Supervisor for the National Optical Astronomy Observatory in Tucson, Arizona.

Roger became a formidable force in the Tucson Herpetological Society after it was formed in 1988, where he mentored many young herpetologists and helped hold this unique conservation-minded society together for so many years. He served as president of the THS for many years and was one of the first recipients of the esteemed Jarchow Conservation Award for excellence in southwestern herpetology.

A huge part of Roger's true influence came from being a rabid field herpetologist. Every weekend and most nights would find him out in the desert and mountains within his beloved 100-mile circle around Tucson, seeking out the reptiles and amphibians he was so passionate about. More than just a seeker, Roger maintained consistent field documentation of all snakes, several lizard species, and all turtles encountered in Arizona from 1989 through 1999, and then broadened that dataset to include all herps encountered since the year 2000. This led naturally into his role as an educator, and from the start he regularly gave talks, wrote articles, and shared his knowledge with audiences ranging from elementary school children to high school and college students, and adults of all kinds.

After informally influencing academic herpetologists for years, in March of 2001 Roger joined forces with Dr. Gordon Schuett to begin a 15-year long radio telemetry study on four species of rattlesnakes, as well as Gila Monsters (*Heloderma suspectum*). In total, Roger authored or coauthored over 20 peer review papers, and published over 100 herp-related articles in various herp society newsletters. For many years he wrote a monthly column for the Bulletin of the Chicago Herpetological Society.

Roger's generosity extended beyond his life, as he donated his organs to the Donor Network of Arizona. His corneas were received by two very thankful individuals who received the gift of sight—one in Iraq, and the other in Singapore—through a shared program with countries that do not have well-developed donation systems. In addition, his skin tissue is being prepared for future transplantation. The gift of skin tissue helps restore health to patients with severe hernia ruptures and deep wounds that will not heal, such as burn victims.

Roger's obituary reminds us that, "Roger had a lightness about him, and yes, sometimes a prickly side! —but he loved to laugh and tell jokes and stories. He dearly loved the natural world, and often thanked God for this beautiful area we live in."

With this issue, we remember and send our deepest condolences to all of those who knew and loved Roger. Celebrations of his life will be held in spring, 2026, in Tucson, Arizona, and in Illinois. In lieu of flowers, please consider making a donation to your local community food bank (or other non-profit community organization), and enjoying a walk in the beautiful world in which we live.

"Roger had a lightness about him, and yes, sometimes a prickly side! —but he loved to laugh and tell jokes and stories. He dearly loved the natural world, and often thanked God for this beautiful area we live in."

Dianna Repp, Ph.D.

On behalf of Roger Repp, my beloved husband of 52 years, thank you for your kind thoughts, words and tributes. I know he would feel honored, and his heart would be deeply moved.

Thank you for your companionship, camaraderie, laughter and joy you brought into Roger's life through the years. He and I knew we were extremely fortunate and blessed to live in this beautiful part of the world, and that it was a privilege to explore it with so many amazing people.

Roger loved writing about his adventures with many of you and was grateful that he was able to share his experiences in print. He often closed his articles with his signature refrain:

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

On this occasion, I will add:

> *"This here is on behalf of Roger Repp, signing off from Southern Arizona, where the turtles are strong, the snakes and lizards are handsome, and his family and friends are all above average."*

With sincere gratitude, and blessings of health, joy and peace,
Dianna Repp (and our late son, Tim)

"This here is on behalf of Roger Repp, signing off from Southern Arizona, where the turtles are strong, the snakes and lizards are handsome, and his family and friends are all above average."

Fig. 1. Dianna and Roger Repp at their wedding, August 4, 1973.

Fig. 2. Dianna, Tim, and Roger Repp, circa 1993.

Fig. 3. Dianna and Roger Repp, November 8, 2025.

Fig. 4. Repp holiday card, 2025.

Dave Barker — Roger and Me

In the winter of 1968, I landed what I considered to be a dream job. In the middle of my junior year in high school, my family had moved to Crystal Lake, Illinois. Not far away from our new home was a pet store. Right away, I went and applied for a job and I was hired by Mural's Pet Center to care for their menagerie. There were fish, birds, rodents, lizards, turtles, and frogs. And there was a boa and reticulated python. I was in heaven.

Not long after I started, I was visited at work by the local herpetologist—a gawky teenage freshman named Roger Repp. Roger also loved snakes and I let him handle the boa. I had never met anyone like me who was so interested in snakes—we both had read every snake book in the library. Roger handled that boa until quitting time, and during that time we bonded as friends, two guys hopelessly infatuated with snakes.

Looking back on the herpetological events in my life, a truly landmark event for me was Roger introducing me to the Chicago Herpetological Society. Monthly, Roger and I would meet at the train station, and ride the train to downtown Chicago, and then take a taxi to the meeting. The CHS was young and booming, meetings sometimes had more than a hundred members present. And after the meeting there was a buy-sell-trade hour. It was a herp smorgasbord for two hungry young herpers. I had never had the opportunity to see and handle so many herp species, Roger and I loaded up with all we could afford and then took the taxi-train route back home. Of course, animals were not allowed on the train, but we figured ways to quietly bring them back in deep pockets and gym bags.

Roger was a writer all his life. His first published article was in a 1967 issue of the Bulletin of the CHS. I think he was in the 8th grade. Roger was a major contributor to the Bulletin all of his life. I think he was the funniest herpetological writer ever to sit at a keyboard.

In the fall of 1970, I left Crystal Lake for college, 250 miles away. My family moved away to Missouri that year. A year or two later, Roger started his apprenticeship as a tool-and-die maker. Our friendship was on hold until I heard that Roger had moved to Tucson, sometime in the early 1980s. I was in graduate school and had a grant from New Mexico Game and Fish to study the New Mexico Ridgenose Rattlesnake (*Crotalus willardi obscurus*). The only problem was that the Animas Mountains were closed. If I wanted to work on the grant I had to find a population of the snakes in Mexico.

Here is a story of Roger and me in the mountains: In the summer of 1986, I searched for several *willardi* subspecies, and spent lot of time unsuccessfully looking for *obscurus* in the Sierra San Luis in early summer 1986. It was the rainiest summer in the history of northwestern Mexico and most of the summer I could wring water out of my sleeping bag.

Fig. 1. Roger Repp as a high school sophomore, Crystal Lake High School, Illinois, 1970.

There was one specimen of *obscurus* known from the San Luis, collected in 1952—but where in the San Luis? The most likely place was a canyon system that was only 7 miles from the US border, just south of the Animas Mountains. I looked there in July with a party of four people unsuccessfully.

In August I called Roger to come down and join me, Jack Cover, and Julian Garrett. Jack was a serious herper and a keeper at the Fort Worth Zoo. Julian kept camp for us. Camp was at 6000 feet elevation on the west side at the mouth of the Cañon Diablo system. When Roger arrived, we set off into a small side canyon, and when we all got back to camp, Jack and Roger had each collected a mountain kingsnake, *Lampropeltis pyromelana*. It was Roger's first and one would have thought he had found the Hope Diamond.

That evening at the campfire, we could see off to the west a very dark thunderstorm in the Sierra Los Ajos. Then we saw it was coming across the flats right to us. We battened down the hatches, and tucked in for the night.

Not long after I started, I was visited at work by the local herpetologist—a gawky teenage freshman named Roger Repp. Roger also loved snakes and I let him handle the boa. I had never met anyone like me who was so interested in snakes—we both had read every snake book in the library.

Fig. 2. Roger Repp and Jack Cover with mountain kingsnakes in the Sierra San Luis Mountains, Sonora, 1986.

The storm came right in on us, and apparently got caught and stopped by the 7000 foot elevation of the mountain peaks—the storm just set down right on top of us. There was little rain, but it was an extreme electrical storm. I counted about 40 to 60 lightning bolts per minute in the most extreme periods of the storm. I saw every kind of lightning that exists. The thunder was continuous and deafening. Lightning struck the ground all around our camp and I saw several massive bolts that came up out of the ground. One bolt came up from the ground under a 50 pound flat rock and threw it about 3 feet above the ground. A couple of oak trees near us were hit and blown apart. About a hundred feet from my shelter, a bolt of lightning hit the ground and created a floating blue ball of lightning a little smaller than the size of a basketball; it floated about 5 feet over the ground, wandering erratically for 10, maybe 20 seconds, floated over into contact with a small oak and sort of exploded branches of the tree where it touched and set it on fire.

I had a great view of all of this because I had a wooden cot under a sheet of clear plastic that was hung over a rope—I was tired of getting soaked every night. Well, I wasn't sleeping during the storm. We all thought we were about to die. After about 10 minutes and not dying, I got up and stood in the opening at one end of my shelter and watched maybe 10 minutes of the storm. But I realized that I was probably safer on my wooden cot. The storm was active and violent for about an hour and then it quieted and moved on east, over the mountain.

Julian was sleeping in his truck, Jack in a two-man camping tent, and Roger was sleeping under the shade canopy where there was a folding table where we ate. With the brightness provided by the near constant lightning I didn't see any of my campmates poke a head out to look at the storm. When it started I really thought there was a good chance that we all might die, and the same thought occurred to them.

The next morning Jack, Julian, and I got up, got the camp fire going, and were talking about the night's event and how scared we were. About when I thought I better check on Roger, he rustled out from under the table and his sleeping bag, stood up, looked at us, stretched and loudly proclaimed, "Well, if I do half the things I promised God last night, I'm going to be a much better man." That day Jack caught an *obscurus* and the next day Roger caught one. There was never a happier man.

Roger went back to Tucson a changed man. Not too much later he teamed up with Dr. Gordon Schuett, certainly a landmark event in his life (and Gordy's life, too), and began his 30 or so years of serious study of the herps of the Tucson area with the advice and tutelage of a scientist. The Roger I met nearly 60 years ago couldn't imagine that one day he would actually become an authority on diamondbacks and Gila Monster. Or that he would be an accomplished and acclaimed field collector. Or that he would be so beloved by so many herpers.

Roger went back to Tucson a changed man. Not too much later he teamed up with Dr. Gordon Schuett, certainly a landmark event in his life (and Gordy's life, too), and began his 30 or so years of serious study of the herps of the Tucson area with the advice and tutelage of a scientist.

My Thoughts and Memories of Roger Repp

Kristin H. Berry, Research Scientist at the U.S. Geological Survey

I've often thought of Roger Repp both before and after his death. For me, Roger was the ultimate Sonoran field herpetologist, and to spend hours with him was an incredible, memory-filled life experience. Roger took me on two field trips with friends to see a life wish—of mine: Gila Monsters in the wild. Weather on the first trip in early March was cold, overcast, and lightly raining—not the kind of day one would expect to see reptiles on the move. We stopped first at one of his study areas where he knew home sites of tiger rattlesnakes, lyre snakes, and rattlesnake dens, and of course; burrows of Gila Monsters. I had never seen so many rattlesnake dens and a den with layers and layers of snakes piled on top of each other, so many that in the dim light it was not possible to determine where the body of one snake began and ended much less to estimate numbers. And I held a beautiful Gila Monster for a few moments! Then on to another site where several Gila Monsters were tucked out of the cold in and under rock crevices. A second field trip in fine weather to other areas was also a fantastic, shared experience. Three monsters were stuffed in a burrow and only the tails were sticking outside! I've been left with memories lasting a lifetime. In addition to the trips, Roger provided useful connections to other crotalid experts for a note on Mohave rattlesnakes and desert tortoises. With his comprehensive knowledge and fieldwork, Roger added significantly to publications on Sonoran reptiles. He was the model for a scientist in a beautifully illustrated children's book about life and trials faced by a rattlesnake. Roger's emails of weekend trips to Arizona sites coupled with photographs were always a pleasure and often led to discussions. I think of him often, with sadness that he is no longer with us and as a friend to share field experiences.

Three monsters were stuffed in a burrow and only the tails were sticking outside!

Tribute to Roger Repp — by Taylor Edwards

Roger introduced me to the first Sonoran Desert Tortoise I ever saw in the wild. He showed me how to use a mirror to spot it in its rock crevice and he gave me the mirror to keep. This was early after I had moved to Tucson; we were at Ragged Top, maybe 1993 or '94. Little did I know at the time I would return there with him many, many times including to collect blood samples for my master's research on desert tortoise population genetics.

I met Roger through the Tucson Herpetological Society (THS) but got to *know* him when I started volunteering for the THS Speakers Bureau. He and I would go to schools to share our enthusiasm about the Sonoran Desert and its fauna. I was a product of such programs growing up which lured me into becoming a wildlife biologist. Despite being one of the presenters, I was as equally inspired by Rogers' contribution to the presentation; his love for the creepy and crawly critters living all around us was contagious.

His presentations were always filled with humor. During these early years of the Speakers Bureau we were still using slide carousels and Roger had a slide to show the area that our presentation was focused on – the "100 Mile Circle"; an area radiating 50 miles in all directions from Roger's house. Roger coined this term for the region he focused on the most. For the elementary school kids, he had drawn a map on a sheet of white paper and taken a picture of it for the slide. The simple drawing had an outline of the state of Arizona, a line through the middle of it, and circle below it around the word "Tucson." Above the line, it just said "FEENIKS".

At the time, I was working at the Arizona Sonora Desert Museum which took a meticulous approach toward signage and environmental education and Roger's simple slide was a fun relief from that. But Roger's information was always scientifically accurate about the animals and their natural history. Within that 100-mile circle, Roger knew more than any of us because he actually spent the time in the field, observing and taking notes through every season. Later, the 100 Mile Circle became a 100-mile radius from Tucson expanding the area focused on by the THS species accounts on its website.

As a young biologist in my early 20's and someone who aspired to go into conservation science, Roger's passion and his moral character was a tremendous influence on me. Before I ever started working professionally as a field biologist, I had learned from Roger and embraced his hands-off approach. This changed for both of us over the years as we did more rigorous science, including radio-telemetry and genetic sampling, but the approach was always done while striving for the least harm and I believe, for both

Roger introduced me to the first Sonoran Desert Tortoise I ever saw in the wild. He showed me how to use a mirror to spot it in its rock crevice and he gave me the mirror to keep.

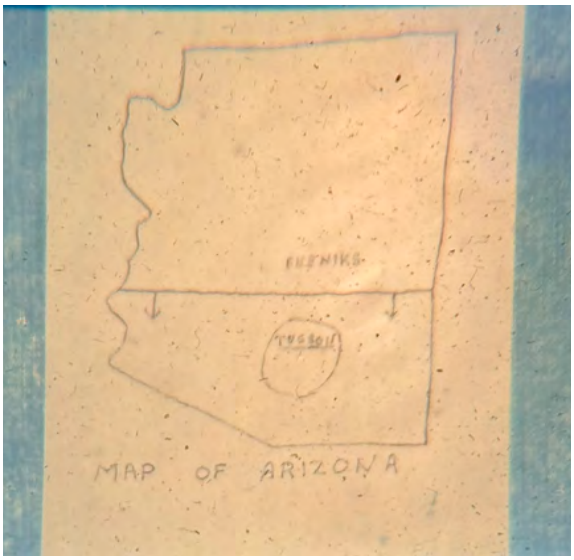


Fig. 1. Roger Repp's educational map of the 100-mile circle.

of us, we eventually returned to absolute minimal disturbance.

Many of my most memorable experiences in Nature were not just with Roger but *because* of him. The only time I saw rattlesnakes in combat was with Roger and Erik Enderson in the Spring of 1996. Roger cherished the images he shot that day with his little point and shoot camera as two males danced their ritual dance right in front of him as he lay flat on the ground. The National Geographic crew that Roger had stationed at that field site and that we had gone to check on got minimal footage as they quickly disturbed the snakes…Roger regretted ever showing them.

Roger was a mentor to me when I was a young biologist, a mid-career biologist, and still is as an old biologist. A mentor in sharing his passion with others. In addition to the influence that Roger had on me as a field biologist, I was equally shaped by his writing and storytelling. Roger was a creative writer, a story teller, and a naturalist – through his words and photos. Like reading Edward Abbey, the true stories of his field excursions made you want to explore more, to observe, and savor the moment even when you didn't find the species you were looking for. Every day in the desert was a good day, and better when it was shared among friends.

I served on the THS Board of Directors with Roger for many, many years and we and others worked together on things like the *Current Research of the Herpetofauna of the Sonoran Desert* symposia. There was never a dull moment with Roger in these settings; he was raw and unfiltered and when he was passionate about something or disagreed, he was prone to piss people off. But it wasn't about ego or spite. Roger strived for perfection – to be his best, but not better than anyone else. Once, at the Desert Tortoise Council Symposium, in front of around 200 tortoise biologists and conservationists, including Dr. Kristin Berry, he started his presentation by saying, "Nobody loves tortoises more than I do [long pause]… you might love them *as much* as I do, but nobody loves them more." He was not trying to best anyone, I think he just wanted everyone to be their best, too.

I used to pride myself in being one of the few people that Roger never personally offended or pissed off. I appreciated his often gruff character knowing what a gentle and compassionate person was behind it. However, I finally felt anger toward him after he died. I was mad that I wouldn't see him anymore and I am not ready for that. I am still working through it but know that I will forgive him and that he will really never be gone from my life.

When I think of Roger now I think of the images of him in the illustrated children's book *Katie of the Sonoran Desert* written by Kate Jackson and illustrated by Natalie Rowe. It is a 'true story' told from the perspective of one of Roger's radio-telemetry study animals, "Katie"; a Western Diamond-backed Rattlesnake. In the book, Roger is depicted as he always was, gentle, compassionate, not afraid to treat all creatures great and small with dignity and respect.

Like reading Edward Abbey, the true stories of his field excursions made you want to explore more, to observe and to savor the moment even when you didn't find the species you were looking for. Every day in the desert was a good day, and better when it was shared among friends.

Fig. 2 A and B. Western Diamond-backed Rattlesnakes (*Crotalus atrox*) in combat, 1996.

Fig. 3. Roger at his Gila Monster (*Heloderma suspectum*) study site, March 2013.

Fig. 4. Roger Repp, Kristin Berry, and Taylor Edwards at Roger's Gila Monster (*Heloderma suspectum*) site, March 2013.

Fig. 5. Cover of *Katie of the Sonoran Desert* by Kate Jackson and illustrated by Natalie Rowe, published by the Arizona Sonora Desert Museum Press.

Fig. 6. Illustration by Natalie Rowe of Roger road-cruising for snakes, in *Katie of the Sonoran Desert* by Kate Jackson and illustrated by Natalie Rowe, published by the Arizona Sonora Desert Museum Press.

Fig. 7. Illustration by Natalie Rowe of Roger with Gila monster, in *Katie of the Sonoran Desert* by Kate Jackson and illustrated by Natalie Rowe, published by the Arizona Sonora Desert Museum Press.

Kate Jackson

I first met Roger Repp about 20 years ago when the Tucson Herp Society invited me to give a talk. I was a postdoc in Toronto at the time, but doing fieldwork in central Africa. On that visit, I was lucky to get to be one of the many people Roger introduced to the Sonoran Desert and the rattlesnakes being radio-tracked there. We had so much fun herping on that first visit that I came back several more times just to go herping with Roger in the desert. Roger's knowledge of the local rattlesnakes and their natural history was extraordinary in depth and detail. I learned desert-specific field skills from Roger. One time, for example, while excitedly in pursuit of a Coachwhip, I threw my whole self into a thicket of cholla. That day, Roger taught me how to use a comb to pull cholla spines out of flesh—once he finally stopped laughing at me, that is.

On the last day of one of these visits, Roger asked me what I'd like to do, and I asked to see *Crotalus willardi* in the wild, as this was a species I had not yet seen. Of course, it's always a long shot to set out fixed on one less common species to see on one specific day, but if anyone stood a chance of making a thing like that happen in the Sonoran Desert, it was Roger. He took us to a canyon he knew that was absolutely the one canyon

Roger Repp with a gophersnake, 2005.

We had so much fun herping on that first visit that I came back several more times just to go herping with Roger in the desert.

where you could pretty reliably find *willardi*. We set about searching, looking under all the loose rocks. We searched the whole canyon, enthusiastically at first but flagging as the hours went by, and we found not only no *willardi*, but really no herps at all. We searched the canyon again and still found nothing. Roger said he knew another canyon, not quite as good, but still a chance of finding *willardi*. We arrived at this second canyon already discouraged but ready to be optimistic and persevere. We searched this second canyon for hours without finding anything. We reached the point where we were gloomily just tapping on rocks with our snake hooks, discouraged but still reluctant to admit we'd given up. Finally, we admitted defeat and walked sadly back toward Roger's truck. Almost back to the truck, maybe 20 feet from it, there was a small rock that we must surely both have already checked, but Roger, maybe just from habit, flipped it over with his snake hook. Under it was a beautiful pair of *C. willardi*.

Pair of Arizona Ridge-nosed Rattlesnakes, *Crotalus willardi*, August 2004.

Almost back to the truck, maybe 20 feet from it, there was a small rock that we must surely both have already checked, but Roger, maybe just from habit, flipped it over with his snake hook.

I've thought about those *willardi* and that day in that canyon with Roger, many times since, while herping on distant continents. The lesson for me is that even on the longest most discouraging days of herping, it's worth it to keep going, because you never know when you're just one more turned-over rock away from what will turn out to be a great day that you'll remember the rest of your life. Thank you, Roger.

Remembering Roger Repp

Jeff Lemm, Conservation Science, San Diego Zoo Wildlife Alliance

I made my first trip to Texas in 1997. I was studying Blaineville's Horned Lizards (*Phrynosoma blainvillii*) in San Diego at the time, and my supervisor, Dr. Allison Alberts, asked me to present a poster of our research at a meeting of the Horned Lizard Conservation Society (HLCS) in San Angelo, TX. I wasn't in the hotel lobby for more than two minutes when a rather large, loud fellow in camouflage approached me and said, "So who are you?" I backed up a couple steps, introduced myself, and explained my mission. The loud guy exclaimed "Wow, cool! A famous zoo guy came to our meeting!" That was my first introduction to Roger Repp. I recall being shocked or possibly annoyed by Roger's first words to me, but after spending a night in the car herping with him, I realized he was actually kind of fun…loud and different, but fun, and he knew his stuff on herps. After the meeting, we didn't really stay in close touch, but I would see Roger at various herp meetings and gatherings over the next 29 years. He always brought up our first meeting in Texas, and we always had a good laugh about our introduction. Over the years, that our paths failed to cross, I heard about his many projects from mutual friends and colleagues, and I read the many papers he authored and co-authored on Sonoran herpetofauna. His knowledge on the topic was vast, particularly when dealing with pitvipers and Gila Monsters.

The ever-smiling Roger Repp, by Steve Barten.

He always brought up our first meeting in Texas, and we always had a good laugh about our introduction.

In 2024, I received a message from my good friend, Dr. Stephen Barten, that he and a group of his friends would be coming to San Diego for a week-long herping adventure and that they would like me to join them and assist in their endeavors to photograph our San Diego desert wildlife. Given that Steve and company had flown me out to speak at the Chicago Herpetological Society many times and that they always guided me down to the famous Snake Road in Southern Illinois, I was obliged to join them. Add to that a huge desert house, great food, and herping with friends – I would be insane not to join! Steve sent me the list of people joining our desert adventure and I was pleased to see that my old pal, Roger, would be attending. Little did I know that I would receive several emails a day leading up to this trip, mostly from Roger, containing schedules, meals, and other meticulously planned events. It was obvious Roger cared for our mutual friends, and he wanted this trip to be the best it could be. When the first day of our reunion herp tour finally arrived, I made it out to the desert and greeted Steve and the Chicago crew. Roger was in the massive backyard of the rental house and when he came in his smile told me that he was pleased to see me after several years and he quietly shook my hand and said, "It's good to have a famous zoo guy with us!" Our group had a great time herping together for several days and we saw some great animals. We all agreed that we needed to do the trip again and Roger calmly said, "I'm in if I'm still around next year." Luckily, he was, and we repeated this desert trip in 2025. Roger was moving slower and needed more rest, but he was happy to keep planning the schedules and arguing about lost time. As always, he was non-stop in the field, and we ended up seeing some amazing animals. At the end of this trip, he explained to me that it might be his last time in San Diego. Roger was not one to discuss personal things, but I knew something was on his mind. He briefly mentioned he had been ill, but "not to worry!" Sadly, that was the last time I saw my friend as illness took him in November 2025. He will truly be missed, and I can say I think he thoroughly enjoyed life. I can't help but think my buddy is up there somewhere loudly discussing the reasons for meticulous planning and how wasting five minutes can lead to a snake crossing a highway without ever being seen. Until we meet again, Roger – I promise I won't be late!

Jeff Lemm and Roger Repp. My last day with Roger Repp. Selfie by Jeff Lemm.

Roger, always planning. As seen in Anza-Borrego with Ralph Shepstone and Gery Herrmann. Photo by Steve Barten.

The Camouflaged *Crotalus* Chaser. Photo by Steve Barten.

Steve sent me the list of people joining our desert adventure and I was pleased to see that my old pal, Roger, would be attending. Little did I know that I would receive several emails a day leading up to this trip, mostly from Roger, containing schedules, meals, and other meticulously planned events. It was obvious Roger cared for our mutual friends, and he wanted this trip to be the best it could be.

Roger Repp, Herp King of Southern Arizona

As Remembered by Erika Nowak, Herp Queen of the Frozen North

Roger Repp was one of my favorite people in the world. There aren't enough words to do him justice, and as "I am probably bringing spaghetti to the pope[s] here" (opening line of an email from Roger dated 6/16/2024), it will be best to share Rogerisms and stories when we meet in person. I first met Roger around 1995 or 1996 (he would have remembered the exact date, and probably kept notes on our meeting), when I was working on my Master's thesis on the effects of rattlesnake translocation. I was seeking expert advice and Roger's name kept popping up as a go-to person who knew all about Arizona rattlesnakes. He specifically knew more than most people about the denning habits of Western Diamond-backed Rattlesnakes (my study subjects), because he was spending so much time observing them at their dens. I remember being nervous about meeting this God of southern Arizona herpetology, but was quickly charmed by his easy-going (ok, and often irreverent) style. And I was confused—how could someone who knew so much about reptiles and amphibians and their habitats *not* be a full-time herpetologist, the kind that gets paid for their skills? I had never met anyone like him. Roger was the best kind of "citizen scientist," long before the term was invented. His detailed observations, careful note-taking during field outings, and copious excellent field photographs were impressive. I was also impressed with his dedication to the Tucson Herpetological Society (THS), and his passion for getting people interested in herps through herpetological outreach and education.

Fig. 1. The author, Erik Enderson, Andrew Holycross, and Roger, March 2000. Image taken by Stephen Barten and provided by Roger Repp.

Roger vetted me for some time over email, and finally, deciding that I was trustworthy enough, he took me to see some of his rattlesnake den sites. From there, our friendship was cemented, and Roger became one of my most important early-career mentors and herp buddies. Whenever I had time, we met up for herping adventures. Outside of observing snakes at dens, we road-cruised all over southern Arizona (Fig. 1), hiked into canyons, and chased herps across all kinds of habitats in northern Arizona (Fig. 2). Even as we aged and time was harder to come by, we continued herping when we could. One of our more recent memorable outings was in the summer of 2024, to look for Northern Leopard Frogs near Stoneman Lake. We saw a lot of young-of-the-year frogs and were about a half-mile from the car when rain, lighting, and hail arrived, soaking us. Fortunately, we were able to shelter in a leaky historic cabin near the tank. After Roger sniveled about "freezing to death in the frozen north," "why would anyone want to live up here," etc. for about a half-hour, we decided to hoof it back to the car. Halfway there we were duly rewarded with more pounding rain and even more impressive hail, with its size creatively documented by Roger (Fig. 3).

Roger shared his knowledge and excellent photographs widely, even if he wouldn't share the locations of some of his favorite field sites so as to protect the animals who lived there. Because of his upbringing in the Midwest, contacts with friends from all over the world and cosmopolitan knowledge of herps, he was my go-to source when I got a tough herp identification question. He contributed many photographs, data and observations to species accounts in *Rattlesnakes of Arizona* (Schuett et al. 2016) and *Snakes of Arizona* (Holycross and Mitchell 2020). He also shared his images with anyone that asked, and as a result, many of my class, outreach, and training lectures are stuffed with his photographs. Perhaps because he was such a careful observer and

Roger Repp was one of my favorite people in the world. There aren't enough words to do him justice, and as "I am probably bringing spaghetti to the pope[s] here" (opening line of an email from Roger dated 6/16/2024), it will be best to share Rogerisms and stories when we meet in person.

Fig. 2. Roger at Roger's Lake, Arizona, May 2019. Image by the author.

note-taker in and after fieldtrips, he was also an impressive archivist with a "mind like a steel trap" (his words), saving emails and photographs on the latest media, and remembering details from trips years after they happened.

Roger was a favorite guest lecturer in my herpetology classes at Northern Arizona University, where he would give a well-illustrated (and often irreverent) lecture on the importance of recording field notes (Fig. 4; after reviewing his field notes, Roger was one of the first people to notice that long-term drought in the Sonoran Desert was causing crashes in small lizard populations at his study sites). He was a perfectionist about this lecture—while he gave the same basic lecture over many years, each time he would spend several hours updating it. He also encouraged the students to write up their observations for publication, sharing some of his prolific (and devastatingly funny) articles for the *Bulletin of the Chicago Herpetological Society*, the *Sonoran Herpetologist*, and others. The students studied these articles along with the scientific papers he coauthored as a result of recording natural history observations, e.g., the first documented Gila Monster nest discovered accidentally during construction at a private home (Repp 2017, DeNardo et al. 2018).

While he didn't always consider it to be so, Roger was a crucial field research collaborator and peer to many scientists with "lots of fancy titles after their names" (paraphrasing his words). He assisted with scientific research on weekends, during vacations, and after (and sometimes instead of) his day job as the machine shop foreman at the National Optical Astronomy Observatory in Tucson. It's fair to say that many projects and publications would not have been possible without his dedicated involvement. In particular, Roger observed, captured, and finally radio-tracked animals for years during a long-term project north of Tucson (Fig. 5). Roger was a co-author of four book chapters in the two-volume *Rattlesnakes of Arizona* book (Schuett et al. 2016) and on many other scientific and popular publications (e.g., Jackson 2009).

Roger often led or accompanied me, my technicians, and students on research and survey trips in northern Arizona. In 1999, Roger helped me search for potential Arizona Black Rattlesnake den sites near Flagstaff, and together we found the den complexes that would form the basis for long-term mark-recapture research. These surveys led to a NAU student master's thesis and several publications (e.g., Nowak et al. 2020). We subsequently chased this species all over Arizona; one of the few regrets we had in our friendship is that I inadvertently omitted him from proper recognition for his contributions to this species in the 2020 publication. In the late 1990's through the early 2000's, Roger helped expand knowledge of the ecology and distribution of Milksnakes at Petrified

Fig. 3. Three-quarter inch-sized hail near Stoneman Lake, Arizona, as documented by Roger Repp, July 2024. Image by Roger Repp.

Roger often led or accompanied me, my technicians, and students on research and survey trips in northern Arizona. In 1999, Roger helped me search for potential Arizona Black Rattlesnake den sites near Flagstaff, and together we found the den complexes that would form the basis for long-term mark-recapture research.

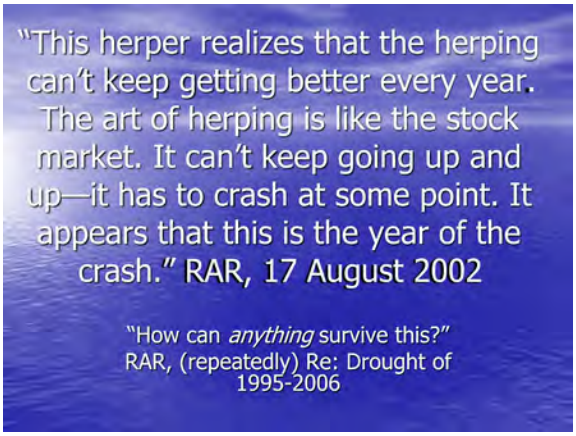


Fig. 4. Title slide of Roger's lecture on the importance of field notes in author's Northern Arizona University Herpetology class (Biology 526), spring 2009.

Forest National Park. He memorialized one of our trips to the park in an article for the *Bulletin of the Chicago Herpetological Society* (Repp 2000). Roger also assisted with field surveys for my Ph.D. research on venomous reptile ecology in national parks, and was part of the research team during a particularly productive spring survey for Gila Monsters in 2005 (Figs. 6-7). Roger and I ultimately co-authored at least five scientific publications with other researchers.

Outside of his prowess as a natural historian and scientist, Roger was an impressive observer and connector of people. He introduced me to others in his THS circle of friends, and to his own family and his amazing wife Dianna. The friendships I made through him have kept me connected to Tucson and the THS despite my living in "the frozen tundra of the north" (his words). Because of his knowing everyone, Roger was always up to date on the latest news from herpetological friends and colleagues. He loved to share their news (i.e., have a good gossip session), while being unfailingly kind-hearted towards his story subjects, be they human or animal.

Some of my fondest memories shared with Roger are recorded in our email correspondence. Roger's irreverence, wit, and creative writing in emails (as well as his herp society articles) are legendary (e.g., in his regular reports to friends and colleagues). His emails always made me laugh, no matter how ordinary the subject. Consider the typical opening of an email to me from him, dated March 20, 2024: "Hi Norse Goddess, Tundra Flower, Hinterland Herper Exalted, and enough with the BS, amen." All hail the Herp King of the South; you'll always have a special place in my heart, buddy (Fig. 8).

A Scant Few Publications Featuring Contributions by Roger Repp

DeNardo, D.F., K.T. Moeller, M. Seward, and R. Repp. 2018. Evidence for atypical nest overwintering by hatchling lizards, *Heloderma suspectum*. Proceedings of the Royal Society B 285: *20180632. http://dx.doi.org/10.1098/rspb.2018.0632*

Holycross, A.T., and J.C. Mitchell. 2020. Snakes of Arizona. ECO Publishing, Rodeo, NM. 837 pp.

Jackson, K. 2009. Katie of the Sonoran Desert: Based on a True Story. Arizona-Sonora Desert Museum Press, Tucson, AZ. 70 pp.

Nowak, E.M., M. Amarello, and J.J. Smith. 2020. *Crotalus cerberus*, Arizona Black Rattlesnake. Pp. 511-528 *in*: A.T. Holycross and J.C. Mitchell, editors. Snakes of Arizona. ECO Publishing, Rodeo, NM.

Repp, R.A. 2000. On the trail of Arizona's rarest snake. Bulletin of the Chicago Herpetological Society 35 (3):41-48.

Repp, R.A. 2017. A monstrous Halloween treat. Bulletin of the Chicago Herpetological Society 52(2):28-35.

Schuett, G.W., M.J. Feldner, C.F. Smith, and R.R. Reiserer. 2016. Rattlesnakes of Arizona. Vols I (736 pp.) and II (488 pp.). Eco Publishing, Rodeo, NM.

Outside of his prowess as a natural historian and scientist, Roger was an impressive observer and connector of people. He introduced me to others in his THS circle of friends, and to his own family and his amazing wife Dianna.

Fig. 5. Roger and Gordon Schuett with their usual fancy lunch spread and less fancy beer at their field site, February 2005. Image by the author.

Fig. 6. Roger showing a Gila Monster to a visitor at Tonto National Monument, April 2005. Justin Schofer is on the left. Image by the author.

Fig. 7. Gila Monster survey crew at Tonto National Monument, April 2005. Top from left: Amyann Madara, Justin Schofer, Jon Davis, Roger, Emily Taylor, and Shirly Hoh. Bottom: Jon Marty Feldner. Image by the author.

Fig. 8. Roger and the author at Sweetwater Wetlands Park, Tucson, December 2024. Image by Dianna Repp.

Martha Tullis, Saguaro National Park

Roger, with his expansive knowledge of Gila Monsters, enthusiasm and good-humored irreverence, was so inspirational for this National Park Service volunteer working on the Saguaro National Park Gila Monster photo database.

Yes, it seemed a fun job to match up new field photos with old photos, but it wasn't so easy at first for someone not versed in Gila Monster appearances, but Roger's enthusiasm for Gila Monsters made it easier to learn their patterns. For example, he shared his photos of the hatchlings he'd helped rescue in October 2016, and having five known examples, with exact dates, made it so much easier to learn how the lizards' patterns change slightly in their first couple years. We've been able to use this to help guesstimate ages for some of our younger lizards. He was so kind with his encouragement for the whole photo database project, repeatedly telling us Don Swann had a good idea, and to keep with it.

He supported us in non-Gila Monster ways, too. For example, he chased down for us, through his herp friends around Flagstaff, the species of a rattler which an overseas Arizona Trail through-hiker had photographed around the Grand Canyon. Roger gave us an interesting answer, not just a species, but some information about hydridization among Prairie Rattlesnakes.

Roger certainly made herpetology fun. His irreverant approach to most everything often made us laugh, but his good humored answers to questions counted for so much.

Roger certainly made herpetology fun. His irreverant approach to most everything often made us laugh, but his good humored answers to questions counted for so much.

Patti Mahaney

The season is nigh upon us. The much-anticipated March Madness, a highlight of the year. No sneakers or basketballs required, this is rattlesnake den egress time. A moment of heightened activity at the dens. Basking, mate guarding, combat. For over 30 years we have driven, giddy with expectation, jubilation, beers packed in coolers, in anticipation of our victory toasts. To approach a known den, herper's hush, eyes straining, to see who is out, how many are there, males stacked on females. Ears straining to hear the stray snake rattle you mistakenly passed. Holding your breath in anticipation of the natural marvel you shall witness and so as not to upset the zooming killer bees, which share the best of snake dens.

"There is one," "Two stacked here," "One in the crevice." Once the low hanging fruit have been tallied, mirrors emerge, beaming solar death rays into the crevice depths as the numbers climb higher 6, 7, 8!

"Do me a favor, lay on that rock and look in that crevice. Use the flashlight and really put your face up to that crack." And we would, oblivious to the bizarrity of the scenario. But nestled between the fallen cholla ears, stretched in the dirt, we would contort ourselves with the hope of seeing a coil, some scales, to add to the day's count.

Roger knew them as individuals, he knew them by name. He knew their history. His uncanny ability to

Patti Mahaney and Roger Repp at Muleshoe Ranch, 2019.

remember snakes, locations, dens, dates and so many numbers. Who was with him in the field on March 21, 2010 when Titan was seen with 8 females and they counted 17 snakes total. It was herping and herp history. It was a level of intimacy with the desert that few could comprehend lest experience.

The bee dens became less dangerous. The eternal drought starving the hives. The snake numbers continued to decline each year. We knew that the best of it was over. We spent more time watching lizards, birds, the landscape. Always aware of the beauty; and the beers were still cold.

"There is one," "Two stacked here,""One in the crevice." Once the low hanging fruit have been tallied, mirrors emerge, beaming solar death rays into the crevice depths as the numbers climb higher 6, 7, 8!

Dear Friends of Roger Repp, "Roger of the Sonoran Desert"— by Dale Rover

At the request of Dianna Repp, I am writing a few paragraphs about my brother from another mother, Roger. Having been raised in a family with only sisters, he truly was a brother to me. We met in junior high (now called middle school). Our single mutual interest was herps. My interest was what was available at the local pet store; his was what could be collected in the wild. Collecting in the wild was a very interesting concept to me. Soon, I had gained enough of his confidence that he would let me participate in his expeditions. Back on Palm Sunday of 1965, we had a tornado rip through our community of Crystal Lake, Illinois. Very sad situation for the home and business owners that lost so much. This disaster was a blessing to us in that sheets of metal and wood were profusely deposited in lesser populated parts of Crystal Lake. With one of his mother's pillowcases in hand, we traipsed over acres of land finding snakes. The only problem was 99.9% of our catch were garter snakes — mean, biting, pooping garter snakes. The other one tenth of our catches were eastern milk snakes and at the sight of one of these beautiful creatures we both did a happy dance.

My mom showed us an article from the newspaper about the newly formed Chicago Herpetological Society meeting at the Chicago Academy of Science by Lincoln Park. She was kind enough to take us by train and then taxi to the Wednesday evening meetings. Roger had a crazy knitted stocking cap he would wear; it trailed behind him as we traveled along, gathering twigs, leaves, etc. This became quite the adventure as we didn't get home until midnight. Roger would sleep at my house and we would walk to school the next morning. We attended faithfully for about six years. The group offered us opportunities to go behind the scenes at Brookfield Zoo with Ray Pauley Herps, as well as the same at Lincoln Park Zoo. In the early days the herp meeting permitted the buying and selling of reptiles but this came screeching to an end when an acquaintance (not us) brought alligators. As Rog would say, ruined a good thing. In the pre-ban era, I bought a beautiful indigo snake that eventually reached eight feet long. It was my pride and joy, very tame and fed on chicken parts, fish, and rats. I had the advantage that my mom tolerated snakes and tortoises in the house; Roger's mom not at all. The best he got was grudging permission to keep them in the garage. In northern Illinois, this became a mess of extension cords, heat lamps, and heat rocks — and many times things didn't end well. Even at this time (we were still in high school), I knew he was destined for warmer lands with more than garter snakes.

Album cover for "High Bail," by the band Iron Lung, with Roger (rhythm guitar) pictured on far left. Date is 1976 or 1977.

There is a photo of Roger, Dave Barker, and me (I am the not famous one with glasses). This photo was a promotional photo to advertise the new Crystal Lake Herpetological Society. It was a very short-lived venture that the three of us went into very ill-prepared. It did cause us to be "known" in the community. I even had a newspaper reporter take me out of high school one day to identify a green iguana found dead in a resident's yard.

As high school guys we had other interests, particularly girls. He married Dianna a couple of years before I married my dear wife Debbie (we will be married 50 years on July 3 of this year). We were best men at each other's weddings. We were both married at Berean Grace Church by Pastor Floyd Baker, who had led us both to Christ during high school. That two-year interval was very eventful, most notably the birth of Tim, Roger and Dianna's only child. Tim was

Roger in the 1970s.

We met in junior high (now called middle school). Our single mutual interest was herps. My interest was what was available at the local pet store; his was what could be collected in the wild.

From left to right: Dale Rover, Roger Repp, and Dave Barker, freshman year at Crystal Lake Community High School, Illinois, 1969.

Dale Rover and Roger Repp at Dale and Debbie Rover's wedding, July 3, 1976.

an adorable little boy full of curiosity and joy. During this time, Roger became rhythm guitar player for the band Iron Lung and appears on the far left of their record album "High Bail."

Roger, a machinist by trade, was able to find a job almost anywhere. It wasn't long after my wedding that they moved to Florida. Exactly where slips my mind, but there were at least there more garter snakes there. After Florida, they moved to Auburn, Washington where Roger scored a great job with Boeing. The job was fantastic but the weather not so much. Dianna knew he wanted a better climate and herps so she began placing copies of Arizona Highways strategically around their home. It didn't take much persuading and they were off to Tucson, where he had a dream job working for the big observatory there. We loved hearing about his adventures with the National Geographics crew he helped traipse around filming herps. Many of you could write much more on their life there as I only went to visit them two times after they moved there. We relocated to Missouri and get to see a few more herp varieties than Northern Illinois.

Roger, Dianna, and Tim Repp at Dale and Debbie Rover's wedding, July 3, 1976.

Roger, a machinist by trade, was able to find a job almost anywhere. It wasn't long after my wedding after they moved to Florida. Exactly where slips my mind, but there were at least there more garter snakes there.

Memories of Roger Repp, Samurai Herpetologist— by Don Swann

My life would never be the same after I met Roger Repp at a meeting of the Tucson Herpetological Society in November of 1991. As Roger described later in a book about his herping adventures: During all of this talk and high powered thinking, I noticed a guy dressed in a red flannel shirt, and loose fitting blue jeans….he looked like my kind of people, and I made a note that I would try to talk to him after the presentation. To my surprise, after the meeting, he approached me. There wasn't the awkwardness that can be at times be felt between strangers. The talk soon flowed freely between us…"

I don't know why Roger and I were immediately drawn to each other, but his words described my feelings exactly. Excitement and enthusiasm ran through him like electricity that set me abuzz. In a few seconds we chattered through turtles, lizards, our previous and current lives…and a few days after that we were herping together in Sabino Canyon. I was new to Tucson, anxious to see my first desert tortoise, and we did indeed that day. It was Thanksgiving weekend, and to his surprise we also saw a dashing collared lizard. We didn't stop talking the whole time, either of us. I think he appreciated how much I enjoyed his

making fun of my eastern ways. I was immediately hooked on winter herpetology in Tucson and like to think that it also brought Roger down a new and exciting path.

Every Saturday that winter, we grabbed our mirrors and went searching for tortoises — and winter lyre snakes, chuckwallas, and diamondbacks. I was over the top on every trip, and even more so as the Arizona spring slowly unfolded before my eyes. It was an El Niño winter of Sonoran Desert yore; the desert was full of lupine and poppies and owl clover. My first Desert Spiny Lizard, Common Side-blotched Lizard, Gila Monster, Tiger Rattlesnake, and Sidewinder soon followed.

Roger Repp with radio telemetry equipment. Photo by Gordon Schuett.

I called Roger the "Samurai herpetologist" for his swashbuckling ways, but also for his Japanese Suzuki that he fearlessly drove us everywhere in. I was perfectly content to walk a dozen miles, but Roger eased or roared his little gray Samurai up tight washes constricted with catclaw, over fearsome slickrock, and within inches of dangerously perched boulders. Up into the Sierritas, Rincons, Tortolitas, and Desert Peak we ventured, each weekend charting a different destination. Once on foot, we looked for and in every rock crack, limestone hole, and caliche cave we could find. We were sometimes alone, but more often accompanied by Dennis Caldwell, Dan Bell, and a host of then untamed and wild-haired (now sadly ancient) characters.

We rescued rattlesnakes from mine shafts. We discovered and gingerly stepped around rock dens with one, or two, or a dozen diamondbacks, sometimes with a Gila Monster or tortoise nested up beside. On those trips, we hardly ever touched an animal unless it was a roadkill. We wanted to leave them well enough alone to live their beautiful lives.

I will never forget those days. Time was magical and different. We were young and laughed freely and talked without editing about anything that came into our heads. Roger was everything Roger was: crude and crass but kind and respectful of others. Ever respectful of the earth itself and its creatures. Fearless, loyal, sincere. Samurai herpetologist!

I cannot begin to say all that I learned from Roger Repp, but he gave me a deep sense of the herpetological community that I carry to this day. Not the community of herpetologists (although that too, sorry people), but the community of lizards, frogs, toads, snakes, and turtles. That each species was equally amazing and of equal importance to the other. And the thrill of discovering each one: Seeing for the first time an alligator lizard scurrying into dried oak leaves; a Desert Box Turtle crawling into the grasslands on the drive to the Chiricahuas; a Speckled Rattlesnake coiled among boulders in the Maricopa Mountains; a chuckwalla basking on a black rock in the sun at Picacho Peak.

My life got busy. I started working Saturdays and continued it for thirty years. In time, my trips with Roger were fewer. I never stopped loving him—loving the photos he sent me of his adventures; his amazing writing; his humor. Almost every month for thirty years I would email him with a question that he always answered with patience and expertise. I even loved Roger's anger when it came, because it always showed how much he truly, fiercely cared. That care was his distinguishing feature. Roger had incredibly high standards for himself and always started out that way with others. Most of the time, we disappointed him; and then, most of the time, he laughed it away.

Roger was the one of the most brilliant minds I have ever met. In the past few years, I would sometimes say something like: didn't we see mud turtles up there once? And Roger would then tell me, in detail, exactly what we saw and what I said to him when we saw it. Then he would be descriptive, deeply philosophical, sarcastic, and hilarious all at the same time. And like the smell of odora this wet winter, that I remember from the winters of the early 1990s, his words would bring me straight back there, me stupid even then and both of us young and happy with what the day had brought us.

Roger, Taylor, and I started getting together regularly again last year, and I looked so forward to re-connectiing every time—but then, suddenly, he was gone. My heart is broken, but the energy, sincerity, and genius of Roger Repp will stay with me forever.

Roger, Taylor, and I started getting together regularly again last year, and I looked so forward to re-connectiing every time—but then, suddenly, he was gone. My heart is broken, but the energy, sincerity, and genius of Roger Repp will stay with me forever.

Roger Repp the Writer

Don Swann, Tucson Herpetological Society, Tucson, AZ; *donswann3@gmail.com*

Roger Repp was a prolific writer of everything herpetological and published more than 100 articles during his lifetime. These include many peer-reviewed papers on rattlesnakes (and a few on Gila Monsters) with co-authors, especially his long-term collaborator Gordon Schuett. He is lead author on the fascinating paper, published in the *Southwestern Naturalist*, "Western diamond-backed rattlesnakes, *Crotalus atrox* (Serpentes: Viperidae) gain water by harvesting and drinking rain, sleet, and snow." For a full list, see the end of this article.

Roger Repp with Gila Monster (*Heloderma suspectum*). Photo by Gordon Schuett.

Roger also wrote a very popular monthly column in the *Bulletin of the Chicago Herpetological Society* (CHS). for many years. His CHS articles are often about Sonoran Desert subjects. They are cited widely and a bibliography of these writings can be found in the December 2025 tribute issue. Most are available on-line at *https://bit.ly/4aOO9ym*. Check out, for example, his 2015 paper, "Herping for Snow Snakes in Southern Arizona." (R. Repp, Bulletin of the Chicago Herpetological Society 50(7):103-106. *https://bit.ly/3OxcAc1*). But there are so many great ones.

Roger also contributed more than 40 articles to the *Sonoran Herpetologist*, all of which are available on-line through the THS website. Roger's articles are chock-full of natural history details of reptiles and amphibians he observed, but typically also contain details of field trips with his herper friends. They are quintessentially Roger in style, and are better read than described.

One of his greatest set of contributions to the *SH* —perhaps for future herpetologists as well as for those of us who read them at the time—are Roger's annual summaries, written from roughly 1998 through at least 2012. In them, he includes EVERY observation of every species he observed during the years on his many forays out from his Tucson home into the 100-mile circle of reptile and amphibian habitats that surround our desert city.

In the attached article from 2013, we decided to re-print one sample of Roger's writing where he summarizes the year in herpetology 2012. This article is notable for its list of his observations of every species from every previous year back to 2000. This article, and all of Roger's annual summaries, are well worth reading if you are interested in the community of reptiles and amphibians in our area and how it has changed (and continues to change) in response to changing climatic conditions.

Roger also contributed more than 40 articles to the *Sonoran Herpetologist*, all of which are available on-line through the THS website. Roger's articles are chock-full of natural history details of reptiles and amphibians he observed, but typically also contain details of field trips with his herper friends.

Papers in the *Sonoran Herpetologist* by Roger Repp

Repp, R. 1990. Herpetological potpourri—a lifetime of field trips (Part 1). Sonoran Herpetologist 3(9):78-82.

Repp, R. 1990. Herpetological potpourri—a lifetime of field trips (Part 2). Sonoran Herpetologist 3(12):103-107.

Repp, R. 1993. Winter tortoises: the watcher and the watched, Part 1. Sonoran Herpetologist 6(3):27-28.

Repp, R. 1993. Winter tortoises: the watcher and the watched, Part 2. Sonoran Herpetologist 6(4):40-42.

Repp, R. 1996. Ides of March '92. Sonoran Herpetologist 9(2):9-12.

Repp, R. 1996. Reptile numbers and activities within the hundred mile circle (Part 1). Sonoran Herpetologist 9(8):79-83.

Repp, R. 1996. Reptile numbers and activities within the hundred mile circle (Part 2). Sonoran Herpetologist 9(9):91-95.

Repp, R. 1998. A tail of two lizards, Part 1. Sonoran Herpetologist11(1):5-6.

Repp, R. 1998. A tail of two lizards, Part 2: *Gambelia*. Sonoran Herpetologist 11(2):14-15.

Repp, R. 1998. Atrox'98. Sonoran Herpetologist

11(4):40-42.
Repp, R. 1998. Getting hammered: testosterone + alcohol = snake-bite statistic. Sonoran Herpetologist 11(3):30-33.
Repp, R. 1998. Ides of March revisited. Sonoran Herpetologist11(8):86-89.
Repp, R. 1998. Nastycophis—a snake as great as its name—Part 1. Sonoran Herpetologist 11(9):102-103.
Repp, R. 1998. Nastycophis—a snake as great as its name—Part 2. Sonoran Herpetologist 11(11):122-125.
Repp, R. 1998. The Alamogordo Rattlesnake Roundup—1998 (Part 1). Sonoran Herpetologist 11(5):54-56.
Repp, R. 1998. The Alamogordo Rattlesnake Roundup—998 (Part 2). Sonoran Herpetologist 11(7):74-77.
Repp, R. 1999. A tale of two ridgenose. Sonoran Herpetologist 12(4):38-40.
Repp, R. 1999. Hell hounds and the herp queen—the Flagstaff Chronicles. Sonoran Herpetologist 12(8):82-87.
Repp, R. 1999. Herping Arizona—1998 in review. Sonoran Herpetologist 12(2):14-17.
Repp, R. 1999. Herping vicariously—March 1999. Sonoran Herpetologist 12(6):62-64.
Repp, R. 1999. Horned Lizards, regally. Sonoran Herpetologist12(11):118-121.
Repp, R., J. Feldner, R. Babb, R.B. Duncan, A.T. Holycross, E.M.Nowak, and M. Demlong. 1999. Arizona milk snake; an e-mail debate. Sonoran Herpetologist 12(10):108-111.
Repp, R. 2000. Herping Arizona: 1999, The "La Niña" Year, Part 1. Sonoran Herpetologist 13(3):26-30.
Repp, R. 2000. Herping Arizona: 1999, The "La Niña" Year, Part 2. Sonoran Herpetologist 13(4):38-40.
Repp, R. 2001. Fast snake does a phony roll: a pictorial glimpse of a Coachwhip (*Masticophis flagellum*) feigning death. Sonoran Herpetologist 14(12):130-131.
Repp, R. 2001. Herping Arizona: 2000 in review. Sonoran Herpetologist 14(3):26-31.
Repp, R. 2001. Oral argument—Flat Tailed Horned Lizard appeal. Sonoran Herpetologist 14(2):15-16.
Repp, R. 2002. Duel in the desert: when predators collide, a "no win" natural history observation. Sonoran Herpetologist 15(9):102-103.
Repp, R. 2002. Herping Arizona: 2001 in review Part 1. Sonoran Herpetologist 15(4):38-41.
Repp, R. 2002. Herping Arizona: 2001 in review Part 2. Sonoran Herpetologist 15(5):50-53.
Repp, R. 2002. Sonoran Gopher Snake (*Pituophis melanoleucus affinis*). Herpetofauna of the 100 Mile Circle. Sonoran Herpetologist15(6):68.
Repp, R. 2003. Herping Arizona—2002 in review. Sonoran Herpetologist 16(3):26-30.
Repp, R., and G.W. Schuett. 2003. Western Diamondback Rattlesnake (*Crotalus atrox*). Herpetofauna of the 100 Mile Circle. Sonoran Herpetologist 16(1):8.
Repp, R. 2005. Herpetological Highlights of 2005. Sonoran Herpetologist 18(12):138-140.
Repp, R. 2007. The Herpetological Year in Review. Sonoran Herpetologist 20(1):7-9.
Repp, R. 2008. The Herpetological Year in Review. Sonoran Herpetologist 21(1):4-7.
Repp, R. 2009. The Herpetological Year in Review. Sonoran Herpetologist 22(2):16-20.
Repp, R. 2010. Herping Arizona—2009 in Review, Part 2. Sonoran Herpetologist 23(3):31-46.
Repp, R. 2010. Herping Arizona—2009 in Review, Part 3—July. Sonoran Herpetologist 23(6):82-88.
Repp, R. 2010. Herping Arizona—August 2009—Black Velvet. Sonoran Herpetologist 23(8):108-115.
Repp, R. 2011. Herping Arizona—2010 in Review. Sonoran Herpetologist 24(4):30-35.
Repp, R. 2012. Herping Arizona—2011 in Review. Sonoran Herpetologist 25(2):12-17.
Repp, R. 2013. Herping Arizona: 2012 in Review. Sonoran Herpetologist 26(1):3-8.

Selected peer-reviewed papers by Roger Repp

Articles (ordered by year of publication)

Repp, R.A., G.W. Schuett. 2008. Adult western diamond-backed rattlesnakes (*Crotalus atrox*) gain water through harvesting and drinking rain, sleet, and snow. The Southwestern Naturalist 53:109-115.
Repp R.A., G.W. Schuett. 2009a. Natural History Notes. *Heloderma suspectum* (Gila Monster). Diet and predatory behavior. Herpetological Review 40: 343-345.
Repp, R.A., G.W. Schuett. 2009b. Natural History Notes. *Crotalus atrox* (Western Diamond-backed Rattlesnake). Adult predation on lizards. Herpetological Review 40:353-354.
Amarello, M., E.M. Nowak, E.N. Taylor, G.W. Schuett, R.A. Repp, P.C. Rosen, and D.L. Hardy. 2010. Potential environmental influences on variation in body size and sexual size dimorphism among Arizona populations of the western diamond-backed rattlesnake. Journal of Arid Environments 74:1443-1449.
Repp, R.A., G.W. Schuett. 2010. Natural History Notes. *Heloderma suspectum* (Gila Monster). Tree-climbing. Herpetological Review 41:491-492.
Schuett, G.W., R.A. Repp, and S.K. Hoss. 2011. Frequency of reproduction in female Western Diamond-backed Rattlesnakes (*Crotalus atrox*) from the Sonoran Desert of Arizona is variable in individuals: potential role of rainfall and prey densities. Journal of Zoology 284:105-113

Schuett, G.W., R.A. Repp, M. Amarello, and C.F. Smith. 2013. Unlike most vipers, female rattlesnakes (*Crotalus atrox*) continue to hunt and feed throughout pregnancy. Journal of Zoology 289:101-110.
Schuett, G.W., R.A. Repp, S.K. Hoss, and H-W. Herrmann. 2013. Environmentally cued parturition in a desert rattlesnake, *Crotalus atrox*. Biological Journal of the Linnean Society 110:866-877.
Clark, R.W., G.W. Schuett, R.A. Repp, M. Amarello, C.F. Smith, and H-W. Herrmann. 2014. Mating systems, reproductive success, and sexual selection in secretive species: a case study of the Western Diamond-backed Rattlesnake, *Crotalus atrox*. PLoS ONE 9(3):e90616.
Zylstra, E.R., M.T. Seward, G.W. Schuett, R.A. Repp, D.F. DeNardo, and D.D. Beck. 2015. *Heloderma suspectum* (Gila Monster). Probable courtship and mating behavior. Herpetological Review 46:258-259.
DeNardo, D.F., K.T. Moeller, M. Seward, and R. Repp. 2018. Evidence for atypical nest overwintering by hatchling lizards, *Heloderma suspectum*. Proceedings of the Royal Academy B. 285:1879.
Levine, B.A., G.W. Schuett, R.W. Clark, R.A. Repp, H-W. Herrmann, and W. Booth. 2020. No evidence of male-biased sexual selection in a snake with conventional Darwinian sex roles. Royal Society Open Science 7: 201261.
Tetzlaff, S.J., J. Vizentin-Bugoni, J.H. Sperry, M.A. Davis, R.W. Clark, R.A. Repp, and G.W. Schuett. 2023. Fission-fusion dynamics in the social networks of a North American pitviper. Ecology and Evolution 13(8):1-23 (e10339).
Edelkind, J.B., B. Stalker, D.D. Beck, D.F. DeNardo, P.G. Emblidge, L. Gallardo, C.M. Gentry, M.J. Goode, R.D. Jennings, J.L. Jones, M.A. Kwiatkowski, E.M. Nowak, R.A. Repp, G.W. Schuett, B.K. Sullivan, C.R. Tracey, and C.M. Gienger. 2025. Environmental influences on space use of Gila monsters (*Heloderma suspectum*). Herpetologica 81(3):236-248.

Book chapters

Schuett, G.W., R.A. Repp, C.L. Spencer, K. Beamann, and C.W. Painter. 2016. Species Accounts. *Crotalus atrox* (Western Diamond-backed Rattlesnake). Pp. 333-394 *in*: Rattlesnakes of Arizona, vol. 1 (G.W. Schuett, M.J. Feldner, C.F. Smith, and R.S. Reiserer, Eds). ECO Publishing, Rodeo, NM.
Schuett, G.W., R.W. Clark, R.A. Repp, M. Amarello, C.F. Smith, and H.W. Greene. 2016. Social behavior of rattlesnakes: a shifting paradigm. Pp. 161-244 *in*: Rattlesnakes of Arizona, vol. 2 (G.W. Schuett, M.J. Feldner, C.F. Smith, and R.S. Reiserer, Eds). ECO Publishing, Rodeo, NM.

FEATURE ARTICLE REPRINT

Herping Arizona: 2012 in Review

Roger Repp, Tucson Herpetological Society, Tucson, AZ

The herpetological setup for 2012 was good. In the late fall of 2011, a benevolent jetstream guided much-needed moisture from the northern Pacific Ocean, cut through the Pacific Northwest, and performed an end-around of the east side of the Sierra Nevadas before dumping on Arizona. The rains that this brought us were so reliable that they earned a nickname from the local weather gurus. They dubbed the weather system "the rain chain." Catchy moniker! (and if we ever get a real rain chain, I promise to make up a song for it.) We refer to some notes from my herp journal to highlight the action:

"11/5/11 Weather Note: Rain in very early AM. 1st since 10/6/11. ~0.5 inches on NW side of town."
"11/7/11 Good, steady rain from widespread storm in morning. ~0.5" at work/U of A."
"11/25/11 Weather Note: ~0.3" early morning."
"Weather Notes, widespread Seattle type storm drops 0.2" on Tucson and surrounding areas on 12/1, another more powerful storm drops 0.5" on 12/3—still raining at 2015. Could go all night."
"Weather Note, 12/12-12/14: Seattle type storms dubbed "the rain chain" dump 1.3" across valley and beyond. Yahoo—more coming! On 12/14, TIA has received 12.06" for 2011—1.0" above average. Bring it on!"
"Weather Note 12/18/11: Another all day wide scattered storm hits— ~0.5" at house. Wow!"

Yes, it was a good setup. When we get rain from early November through December in any given year, the winter and early spring herp action is going to soar. It's almost as if the rain germinates the local herpetofauna along with the annuals. In January, we had several visuals of three Gila Monsters (*Heloderma suspectum*) in one sheltersite. While we have on rare occasions had three of the loveable brutes in this particular commu-

nal den, we have never been able to see them all at once. By the end of January, we had seven different *H. suspectum* under observation, with multiple visuals of each.

Wet winters routinely set up movements with another charismatic reptile in our area. We speak of our beloved Sonoran Desert Tortoises (*Gopherus agassizii*). Closely-monitored burrows that were empty in December gained occupants by Mid-January. On Iron Mine Hill, by mid-February, we shattered our record numbers there by having eight under observation. This author has been going to this particular hill—a small outlier of the Suizo Mountains—since 1992. The previous best was seven, and it took until Mid-March to accumulate that many. That number of seven takes us all the way back to 2001!

Figure 1. The sporadic winter rain in 2012 led to a patchy flower show in the Sonoran Desert around Tucson. But the good news is that unlike drought winters in years past, flowering patches of ground could be found. Image by author, 20 February 2012.

But my notes on 28 January indicated that things were getting a bit dry in paradise. On this day, Doug Moore, Laurie Walton, and I did the grand tour of winter herps on the Suizo Study Plot. I closed the notes on this stellar herp day with the following statement. "Great people, great day. Meanwhile—we need some rain to make this all count!" Yes, what was needed to put the winter/spring of 2012 over the top was a little more of the rain chain. If that had continued, we would have seen a flower show that would have rivaled 2008, and maybe even 1998. As it turned out, there were flowering patches of ground to be found, (See Figure 1), but we mostly wound up with itty-bitty poppies, lupine, and fiddlenecks that withered by the end of February. But when all is said and done, we've had much, much drier winters. And this herper will take itty-bitty poppies over parched ground any time!

As spring morphed to foresummer, we experienced the customary dry up, with some relief from a storm in mid-April. On 14 June, a record-breaking storm brought us the promise of a good monsoon season, and the follow up record-breaker that hit on 4 July was nothing short of magnificent. The rain in July continued throughout the month, with storms occurring on a regular basis throughout most of southern Arizona. These storms allowed the area to play catch-up with the yearly rain total. Previous to July, we were heavily in the deficit column. By the end of July, we were briefly in the black. But the August rainfall became a fickle affair. In some places, the rain continued on, in others, it ground to a searingly-hot halt. The same can be said about September. We go to my own records versus those of the National Weather Service (NWS) in Tucson (*www.wrh.noaa.gov/twc*) to show some of the disparity. In August, the NWS recorded a scant 1.17 inches (29.7 mm) at Tucson International Airport (TIA). My own records indicate that 3.5 inches (88.9 mm) fell in the Suizo Mountains. In September, the NWS recorded 0.38 inches (9.65 mm) at TIA, while my records show that 1.9 inches (48.26 mm) fell in the Suizos. The NWS report for 2012 also shows wild fluctuations in precipitation with the monsoon season. Some areas recorded as little as 2.5 inches (63.5 mm), while others went as high as 12.5 inches (317.5 mm). What a spread!

October was dry and hot, and November brought us one brief rain shower. But the rain chain came roaring back in December. The NWS goes on to mention that the 1.18 inches (29.97 mm) at TIA allowed for an above average December for rainfall, and two storms that settled in to our beloved Suizo Mountain study brought us 1.7 inches (43.18 mm) in two days! When all was said and done, the rainfall across the Tucson Valley could be summed up in one word: "Variable." The NWS report goes on to mention that the spread for the entire year was from 5 inches to 15 inches (127 mm to 381 mm). TIA recorded 7.19 inches (182.63 mm), and my estimates of the Suizo Rainfall totaled exactly 12 inches (304.8 mm).

Nationwide, 2012 also went down as the hottest year in weather history. According to the NWS Tucson, 2012 was tied with 1989 as being the hottest. In short, it was hotter than normal nearly everywhere.

So much for the weather! The reader may ask: "How was the herping?" That is a good question, dear reader—we're going to get right to that!

The herpetological setup for 2012 was good... When we get rain from early November through December in any given year, the winter and early spring herp action is going to soar. It's almost as if the rain germinates the local herpetofauna along with the annuals.

Herp Statistics for 2012

Since the Y2K century began, I have been faithfully documenting every lizard, snake and turtle encountered in this great state of ours. To include everything found over that time period would be daunting information to present, and even more difficult for the reader to digest. Instead, for more accurate comparative purposes, we present Table 1. This table limits the local herps to six species of lizards, Sonoran Desert Tortoises (*Gopherus agassizii*), and five species each of colubrids and venomous snakes. These species were selected based on the fact that there is always a chance of encountering one of these with every herp trip I make. My counts include both live and dead animals. It is likely that some of the herps on this table were accidentally counted twice, and in a few cases, some were deliberately counted twice (hibernating herps that ingress in spring and return in fall). I've also added other pertinent information, such as number of field trips, personal hours spent, rainfall information, yearly average temperatures, and grand totals of lizards and snakes. This author takes this information seriously, and bases his own judgment calls on the results of Table 1.

Figure 2. One of the highlights of 2012 was finding this Long-nosed Leopard Lizard (*Gambelia wislizenii*) sleeping ~12 inches (300 mm) above ground in a creosote. Image by author, 30 June 2012.

As the table indicates, I was in the field 167 times in 2012, which is slightly above average. The total of personal hours spent was 818 hours, which is below average, but more than the previous two years. What is not highlighted on this table is the number of hours that people accompanied and assisted me. That number was 1,268.5 hours. These "other people hours" are above the average, and the help this year was the best that I've had in over a decade. I would like first and foremost to acknowledge John Slone and Marty Feldner as some of these other people. They made these other people hours count more than anybody else this year. Jeff Smith and Melissa Amarello also led me to the promised land on more than one occasion in 2012. And, of course, my stalwart friends Gordon Schuett, Hans-Werner Herrmann, Dale DeNardo, Patti Mahaney and Ryan Sawby also contributed to all that follows.

It is this author's opinion that precipitation and temperature are extremely important to the discriminating field herpetologist. The rainfall in 2012 was below average in the NWS TIA location, but the fluctuations have been duly noted. When comparing years in the herpetological sense, backtracking on a one year rain total is always prudent. Hence, mention of above average rainfall in 2010 and 2011 is merited. The average temperature of 71.4 °F (21.9 °C) is the highest of this century, and this author ventures to speculate that in our already hot climate, this is probably not good.

Are we finally talking about the herps? Good!

Before going after the reptiles on the table, this author is duty-bound to discuss something that was mentioned in his 2011 review. We speak of Long-nosed Leopard Lizards (*Gambelia wislizenii*). In 2011, there weren't any encounters to report. Much adieu was made about this at that time. I'm cautiously pleased to report that 11 of them were found in 2012. The reason for the caution is that 6 were found in one day, leaving a below average number for the remainder of the year. One of the herpetological highlights of 2012 occurred on the evening of 30 June, when John Slone and I found a *G. wislizenii* arboreal in a creosote. It was sound asleep! (See Figure 2).

At first glance, the Zebra-tailed Lizards (*Callisaurus draconoides*) seem to show a rebound since the all-time low of 2011. But the fact remains that the population has demonstrated a downward spiral since the year 2008. This is the second consecutive year that *C. draconoides* numbers fell below the next 2 rows of lizard species on the table, and that only happened once before—in 2006. The addition of Marty Feldner and John Slone to the Suizo team allowed, for the first time, two groups to radio track. And both groups were counting the plot lizards. 2012 marks the first year that counts were coming consistently from two

Nationwide, 2012 also went down as the hottest year in weather history. According to the NWS Tucson, 2012 was tied with 1989 as being the hottest. In short, it was hotter than normal nearly everywhere. So much for the weather! The reader may ask: "How was the herping?" That is a good question, dear reader—we're going to get right to that!

Year	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	TOTAL	Avg
Field Trips	180	186	174	170	168	151	166	141	155	179	146	149	167	2132	164
Hours	912	1055	935.5	982	973.5	913	917	734	759	980.5	703.5	746.5	818	11429.5	879
NWS[1] rain (in)	12.44	7.81	7.84	10.05	7.62	9.58	11.81	9.78	8.67	5.67	11.13	12.23	7.91	122.54	9.43
NWS temp (°F)	69.96	69.68	70	70.65	69.23	70.72	70.18	70.5	70	71.12	69.97	69.9	71.4	—	70.25
CADR[2]	460	1208	415	497	487	592	258	610	1519	563	320	144	353	7426	571
UTST[3]	285	416	361	426	308	263	467	460	475	378	226	249	734	5048	388
ASSP[4]	355	398	212	293	221	197	328	348	321	241	187	317	453	3871	298
SCMA[5]	91	113	45	48	27	133	58	54	137	107	57	21	54	945	73
PHSO[6]	11	9	9	8	11	8	3	6	20	19	10	12	8	134	10
HESU[7]	21	12	5	5	11	8	11	10	13	22	16	30	32	196	15
GOAG[8]	121	96	42	112	37	34	41	27	32	27	35	48	50	702	54
PICA[9]	43	29	16	15	9	23	18	19	33	28	13	19	33	298	23
COFL[10]	23	50	27	18	19	24	19	22	29	21	21	9	13	295	23
RHLE[11]	21	25	11	16	14	37	23	9	20	8	13	5	12	214	16
SAHE[12]	8	11	4	9	5	2	2	4	16	8	9	1	10	89	7
LAGE[13]	8	11	11	6	5	9	6	5	1	5	2	4	5	78	6
CRAT[14]	154	185	109	99	115	141	168	114	73	72	74	137	116	1557	120
CRCE[15]	40	25	26	22	18	35	18	14	42	26	12	35	11	324	25
CRSC[16]	8	13	10	12	9	14	8	12	15	12	2	7	7	129	10
CRMO[17]	25	16	6	5	17	17	13	6	11	10	2	7	9	144	11
CRTI[18]	20	13	9	5	7	5	9	4	3	6	9	4	10	104	8
Totals	1694	2630	1309	1596	1320	1542	1450	1724	2760	1553	1008	1049	1910	21545	1657
All lizards	1906	2279	1119	1401	1222	1560	1273	1650	2978	2228	1009	1383	2315	22323	1717
All snakes	464	415	252	221	252	374	326	227	306	255	184	283	331	3890	299
Total both	2370	2694	1371	1622	1474	1934	1599	1877	3284	2483	1193	1666	2646	26213	2016

[1]National Weather Service (NWS) in Tucson (www.wrh.noaa.gov/twc); [2]Zebra-tailed Lizard (*Callisaurus draconoides*), [3]Common Side-blotched Lizards (*Uta stansburiana*); [4]Tiger Whiptail (*Aspidoscelis tigris*); [5]Desert Spiny Lizard (*Sceloporus magister*); [6]Regal Horned Lizard (*Phrynosoma solare*); [7]Gila Monster (*Heloderma suspectum*); [8]Sonoran Desert Tortoise (*Gopherus agassizii*); [9]Gopher Snake (*Pituophis catenifer*); [10]Coachwhip (*Coluber flagellum*); [11]Long-nosed Snake (*Rhinocheilus lecontei*); [12]Western Patch-nosed Snake (*Salvadora hexalepis*); [13]Common Kingsnake (*Lampropeltis getula*); [14]Western Diamond-backed Rattlesnake (*Crotalus atrox*); [15]Sidewinder (*Crotalus cerastes*); [16]Mohave Rattlesnake (*Crotalus scutulatus*); [17]Black-tailed Rattlesnake (*Crotalus molossus*); [18]Tiger Rattlesnakes (*Crotalus tigris*).

directions or more. Heretofore, the lizard counts were mostly a solo affair. If we look at the all time high number of 1,519 for *C. draconoides* in 2008, we are looking at Roger Repp mostly counting alone. This serves to demonstrate that, indeed, there has been a serious setback for these otherwise common lizards. My predication for 2013 is that low counts will continue.

With the Common Side-blotched Lizards (*Uta stansburiana*), the numbers leap to the all time record for the new century. At 734, the numbers nearly triple over the previous year. Yes, there were more people counting, but no, the numbers in their counts did not equal three times my own counts. There just plain were flat out more of them than ever before. Trying to fathom the why of that is difficult. But

Figure 3. This year brought about an exciting first for this author. This pair of Black-tailed Rattlesnakes (*Crotalus molossus*) were found in coitus by Marty Feldner on the evening of 5 October 2012. Marty led this author to the pair the following morning. They were still hooked up. Image by Marty Feldner.

looking at the previous two years of rain, coupled with the above average rainfall on my most-visited turf in 2012, is likely the cause with these "first responders."

The whiptail numbers, which mostly reflect Tiger Whiptails (*Aspidoscelis tigris*), also exploded to the top in 2012. The same factors that contributed to large numbers of the Common Side-blotched Lizards were probably at play.

While more eyes added to the total of Desert Spiny Lizards (*Sceloporus magister*), their numbers still fell to below average. There appears to be another downward trend with the species, as below average numbers have ensued for the past three years. And while there have never been enough Regal Horned Lizard (*Phrynosoma solare*) numbers to draw solid conclusions, 2012 also reflects a very slight downturn.

Figure 4. One of five pairings of Tiger Rattlesnakes (*Crotalus tigris*) observed on the Suizo Mountain Study Plot. Image by author, 8 September 2012.

Weighing-in at a hefty 32, this was not only my best Gila Monster year of the century, it was the best since I started recording them in 1989! It still could have been better for two reasons. Reason number one is that a few of my repeating stalwarts did not return to their winter lairs, and reason number 2 is that I did not visit a couple places that consistently produce them. We also cut them out of our Suizo study in 2012. Hence, we didn't have transmittered animals leading us to new blood. Many of the encounters were of the incidental variety. Hence, the high numbers in 2012 point to either more activity, or more luck than brains in finding them. A fair number of *H. suspectum* encounters were found while driving to and from favored places. I call these "gimmie monsters," and these "gimmies" helped to put the total over the top.

Figure 5. A stunning color and diminutive-sized morph of a Speckled Rattlesnake (*Crotalus mitchelli*). They have been dubbed "White Mitch" or "Dwarf Mitch" by those who seek them. This specimen, a female, was found by Dale DeNardo on 30 March. Image by author, 31 March 2012.

Despite their 2012 ranking as "below average" for this century, the number of 50 reflects a strong showing for the Sonoran Desert Tortoises. This is the highest total of encounters since 2003. From the year 2000 through 2003, I was in the thick of assisting Taylor Edwards and Cristina Jones with their research projects. During these three years, as many as 16 highly skilled "Tortoise Jedis" were working some very productive ground. There has not been a similar effort on my part since those early Y2K years. I'm calling the 50 that were found this year "good." As previously mentioned, it was a glorious winter/spring season for them.

At a total of 33, the Gopher Snakes (*Pituophis catenifer*) rang in with a tie for the second highest numbers of the century. The encounters were streaky. 18 of these were found in the months of August and September. It was another bad year for the Coachwhips (*Coluber flagellum*). With only 13 encountered, it was their second-worst year of the century. The worst year was 2011, when only 9 made their cameo appearances. It will be interesting to see if the downward trend continues with this species of snake in 2013. While the total of 12 Long-nosed Snakes (*Rhinocheilus lecontei*) reflects a jump from the previous year, the fact remains that this species of constrictor has racked up below-average numbers for the past 4 years. They appear to be taking a beating on the roads that I watch the most.

The Western Patch-nosed Snakes (*Salvadora hexalepis*) made quite the comeback. In 2011, I only encountered one, making that year the worst of the century. The total of ten encounters in 2012 was the third highest total. I'll take from last to third place with any species on this table! The Common Kingsnakes (*Lampropeltis getula*) made slightly below average appearances, but we

With the Common Side-blotched Lizards (*Uta stansburiana*), the numbers leap to the all time record for the new century. At 734, the numbers nearly triple over the previous year. Yes, there were more people counting, but no, the numbers in their counts did not equal three times my own counts.

have to backtrack to 2006 to find a number greater than five.

The Western Diamond-backed Rattlesnakes (*Crotalus atrox*) numbers fell to slightly below average in 2012. This was despite the fact that more eyes were sweeping our Suizo Mountain study plot on a regular basis. In this case, the extra eyes did not beef up the numbers accordingly. We repeatedly asked of each other: "Where are all the atrox?" The Sidewinder (*Crotalus cerastes*) numbers crashed to the lowest number of the century. I have been religiously assembling numbers on this species of snake since 1990, and the total of 11 is the lowest ever—in 23 years of data! There was no lack of effort that caused this crash. I carefully chose nights that I thought were perfect for finding them. Even in average years, these "cherry picking" evenings would yield anywhere from four to nine of the little vipers. In 2012, my highest yield for one effort was two! And I didn't see any at all in April, which has never happened in my history of recording them. We continue to cry the blues when discussing Mohave Rattlesnakes (*Crotalus scutulatus*). The total number of 7 encountered is a tie for the second-worst numbers of the century. As with the Sidewinders, I was in grasslands enough at prime time that the total *C. scutulatus* numbers should have been higher.

Figure 6. One of seven Grand Canyon Rattlesnakes (*Crotalus oreganus abyssus*) encountered on a field trip to their turf in August of 2012. Image by author, 11 August 2012.

It is at this point that all of the sniveling stops. While the numbers of Black-tailed Rattlesnakes (*Crotalus molossus*) fell to slightly below average, we encountered six of the nine on the Suizo Study Plot. They are not a common snake there. We observed pairings multiple times, and on 6 October, Marty led me to a pair that was mating. (See Figure 3). This is the first time that I have ever seen *C. molossus* in coitus. With this herper, it is the little things that can put a year over the top.

With a total of 10 encounters, the Tiger Rattlesnakes (*Crotalus tigris*) exploded on the scene. This was the third best year of the century for them in my counts, and I have to go back to 2001 to beat that total. On the Suizo Plot, we ramped up our numbers of transmittered *C. tigris* from 2 to 6–3 each of males and females. As a result, we observed five pairings. (See Figure 4). Three of these pairings could have brought us in new animals had we been inclined to break up pairs. *C. tigris* is extremely rare on our plot, which makes walking away from a new snake a very difficult process. But our mission is to witness the birthing process as many times as possible in the years ahead. Breaking up pairs is not conducive to said birthing processes. On the evening of October 20, this author was treated to the thrill of observing a pair of *C. tigris* come together in a crevice that was to later prove to be their hibernaculum. This is the first year that we have been able to locate a pair hibernating together, and we hope for some exciting photo opportunities in the spring of 2013.

Moving down to the next row, we see that "All Lizards" scored the second highest numbers of the century. This count includes 24 different species of lizards that were encountered this year. These numbers contain, among other species, 326 Ornate Tree Lizards (*Urosaurus ornatus*), 105 Greater Tree Lizards (*Cophosaurus texanus*), and 47 Desert Iguanas (*Dipsosaurus dorsalis*). The latter number shatters my previous record for that species by nearly double. (26 were encountered in 2008). In short, it was an outstanding year for lizards.

And the total number of snakes encountered was the highest total in seven years. Included in this count are 11 species of venomous snakes, and 16 non venomous or rear-fanged snakes. Three Sonoran Coralsnakes (*Micruroides euryxanthus*) appeared on the Suizo Plot. We have not seen one there since 2002! Both Saddled and Spotted Leaf-nosed Snakes (*Phyllorhynchus browni* and *P. decurtatus*) were also found in 2012 at the Suizo Plot. I have not seen either species since 2009, and I have to go all the way back to the year 2000 to find a year when both species were encountered. Thanks to Melissa Amarello, Jeff Smith, John Slone, and Marty Feldner, an explosive number of 47 Arizona Black Rattlesnakes (*Crotalus*

The Western Diamond-backed Rattlesnakes (*Crotalus atrox*) numbers fell to slightly below average in 2012. This was despite the fact that more eyes were sweeping our study site on a regular basis. In this case, the extra eyes did not beef up the numbers accordingly. We repeatedly asked of each other: "Where are all the atrox?"

cerberus) were encountered this year. But the bigger things sometimes come in small numbers. On a trip to somewhere west of Organ Pipe National Park, Dale DeNardo found the elusive "White Mitch," or "Dwarf Mitch." This species is currently classified as Speckled Rattlesnake (*Crotalus mitchelli*), but this author expects that to change soon. Whatever they may be, as Marty so aptly described, they are: "All the thrill of a mitchelli in a lepidus sized package." (See Figure 5). It is getting ever-harder for this herper to scratch off a life-list snake in Arizona, but team Feldner/Slone led a team of us to a total of seven Grand Canyon Rattlesnakes (*Crotalus abyssus*) in August. These are incredibly cool rattlesnakes, and this author hopes to go back for more someday soon (See Figure 6).

Figure 7. Couch's Spadefoot Toads (*Scaphiopus couchi*) in amplexus. Perhaps the greatest event in 2012 was two successful reproductions for the species at the Suizo Mountain Study Plot. This patch of ground has been under close watch since 2001, and never have they succeeded in pulling this off twice in one summer. Image by Marty Feldner, 17 August 2012.

When all the lizards and all the snakes are totaled for 2012, we find that this number to be the highest since 2008. This number also reflects 2012 to be the third best of the century thus far. It will be a difficult year to top.

There is one last detail to be discussed before closing this article. We speak of the reproductive events of the Couch's Spadefoot Toads (*Scaphiopus couchi*) on the Suizo Mountain Study Plot. On two different occasions, early July, and again in late August, there was enough sustained rain to allow the tadpoles to hop away from their puddles as successful metamorhps (See Figure 7). We have been watching these toads closely since 2001, and this has never happened twice in one year. Bully for them!

Despite the downward turn with a few species, 2012 goes down in my books as a very good herp year. This author gives the year an enthusiastic thumbs up, and earnestly anticipates what 2013 will bring.

Remember the THS in Your Will

Including the THS in your will is an excellent way to support the value of this organization and the conservation of the herpetofauna of the Sonoran Desert. We thank anyone who has included the THS in their will. Please contact us so we can express our appreciation. For information about designating the THS in your will, please contact Ryan Perry, Treasurer, at *tucsonherps@gmail.com*.

Information for Contributors

Authors should submit original articles, notes, book reviews to the editor, either via email using an attached word processed manuscript or by mail to the Society's address. The manuscript style should follow that of *Journal of Herpetology* and other publications of the Society for the Study of Amphibians and Reptiles. For further information, please contact the editor, at *editor.sonoran.herp@gmail.com.*

ANNOUNCEMENT

Contribute Your Images and Vouchers to the Latest Herps of Arizona Books

Work towards two companion volumes to *Snakes of Arizona* is well underway: *Amphibians and Turtles of Arizona* and *Lizards of Arizona*. The goal is to produce a three-volume comprehensive reference to the amphibians and reptiles of Arizona. Importantly, these volumes will include dot distribution maps for each species. Dots imply a voucher (specimen or photograph) in an institutional collection. However, many distributional gaps exist in the available collections (e.g., both desert tortoise species).

Therefore, we solicit the herpetological community to submit voucher photographs to the ASU Biocollections at *https://arbooksaz.org/voucher-that-record/*.

The volumes will also both rely on images donated by the herpetological community to illustrate each species account. Although we are unable to offer monetary compensation for images, we will list photographic credit in the caption. Contribute images at *https://arbooksaz.org/donate-your-images/*.

Screenshots from *https://arbooksaz.org* (banner below from same website)

The volumes will also both rely on images donated by the herpetological community to illustrate each species account. Although we are unable to offer monetary compensation for images, we will list photographic credit in the caption.

ORIGIN STORY BEHIND OUR NEW T-SHIRT DESIGN

"Lucky the Tortoise"

Courtney Christie, https://yeahrightdesigns.com, Tucson, AZ; *crchristie88@gmail.com*

What a lucky day. Water in the desert is a magical thing, and the recent rains before my hike one October afternoon are what brought me out in the first place that day. No matter how many times I visit my favorite trails or most-frequented watering holes, I am constantly in awe when I see the replenished desert landscape, plant life, and wildlife activity after the rain. Most desert life welcomes the rain and sometimes, animals may overindulge after long dry spells or even get caught off guard by the sudden appearance of water in normally dry places. In the case of a mid-sized female Sonoran Desert Tortoise (*Gopherus morafkai*) in a remote canyon in the Rincon mountains, she might have mistaken an algae-covered pond for grass or solid ground that she could walk out onto, or she may have experienced an unfortunate tumble down some steep rocks. Either way, she quickly found out what lay beneath the green algae surface, as she fell into the water and floated hopelessly, unable to get back to solid ground.

Lucky for her, I was out hiking this particular day. Even luckier, I almost turned around to head back towards the trailhead at a usual stopping point twenty minutes earlier. Instead, something told me to keep going, and I pressed on up a hidden trail I like to visit. As I walked up the canyon along a stream and some recently-pooled-but-now-stagnated water, I heard a small splash to my right—I looked just in time to see an adult Sonoran Mud Turtle (*Kinosternon sonoriense*) frantically swimming away. I tried to see where it went but it was useless underneath the thick layer of algae in the water.

As I continued scanning the area, I spotted a second turtle nearby! Only, this wasn't an aquatic mud turtle, it was… a desert tortoise?! From the looks of it…a dead tortoise. Its body was floating on the surface, head just above the water covered in algae, its legs extended and limp. No movement. Usually, to see a desert tortoise in the wild is a special event, and a heartwarming experience to say the least. That these slow-moving rocks with legs can survive in harsh desert environments will never cease to amaze me. To see one meet its unlikely demise is absolutely heartbreaking.

I took a quick *in-situ* photo before pulling the supposed dead tortoise out of the water. I was expecting that unmistakable putrid smell, but to my surprise it never came. I could see that it was a younger female and as I looked at her face, there were two eyes looking up at me, and they blinked! This tortoise wasn't dead after all, and after feeling a deep sadness for her untimely demise this unexpected turn of events filled me with incredible joy and gratitude. I was ecstatic that she was alive! I was happy I had found her and though the significance of extending my hike was not lost on me, my heart still ached to think about how long she had been there helpless and floating, and how close to death she may have been.

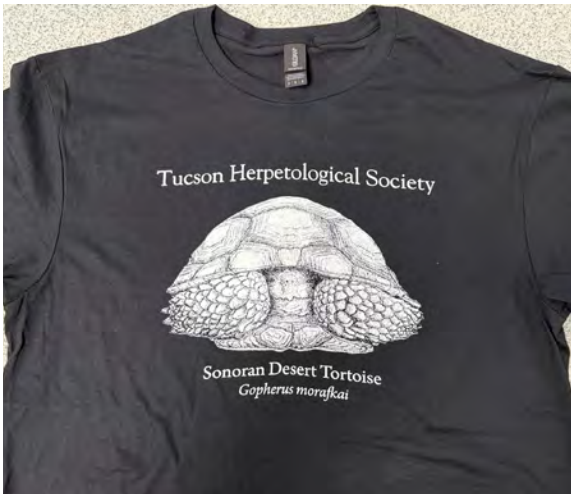
I sat with her for a while as her shell dried, hoping she would regain her bearings. She didn't move much but continued to look around with her quiet eyes. She was calm and observant…likely still cold and exhausted from the water, though she was actively taking account of her surroundings. After a while, I decided I would relocate her nearby just out of the canyon drainage to reduce the risk of possibly drowning again. I climbed up a steep rocky hill until I found a lush, vegetated spot to leave her, with dappled shade and some sun to warm her cold body. I watched her a while before leaving, hoping her new home would suffice, as she poked her head around to take stock of her new home.

Such an incredible day for the paths of two desert dwellers to cross at exactly the right time.

Such an incredible day for the paths of two desert dwellers to cross at exactly the right time.

"Lucky the Tortoise." Photo by Courtney Christie.

"Lucky the Tortoise." Photos by Courtney Christie.



[Left] "Lucky the Tortoise" T-shirt, with art by Courtney Christie. Available on green and black shirts. Photos by Ryan Perry.

[Above] Stickers featuring "Lucky the Tortoise" also available, all art by Courtney Christie. Photo by Courtney Christie.

Email Ryan for T-shirt and sticker orders: *rpsportsfan@gmail.com*

RESEARCH ARTICLE

Notes on Reproduction of Couch's Spadefoot, *Scaphiopus couchii* (Anura: Scaphiopodidae), from Baja California Sur, Mexico

Stephen R. Goldberg, Whittier College, Department of Biology, Whittier, CA; *sgoldberg@whittier.edu*

Scaphiopus couchii Baird, 1854 (Fig. 1), ranges from central Texas and Oklahoma to southeastern California, an isolated colony in southeastern Colorado, south to the tip of Baja California and to Nayarit, Zacatecas and Queretaro, Mexico (Degenhardt et al. 1996). Tinsley and Tocque (1995) and Goldberg (2018) reported on breeding of *S. couchii* in Arizona; Goldberg (2023) reported on *S. couchii* reproduction in Texas. Wasserman (1970) reviewed the biology of *S. couchii.* In this paper, I present data from a histological examination of *S. couchii* gonadal material from Baja California Sur, Mexico, in order to compare its reproductive cycle with results in Goldberg (2018, 2023). Utilization of museum collections for obtaining reproductive data avoids removing additional animals from the wild.

A sample of 8 *S. couchii* collected 8-10 August 1973 from El Triunfo (23.80388°N, 110.10611°W), Baja California Sur, Mexico consisting of 4 adult males (mean snout-vent length, SVL = 57.3 ± 9.5 SD, range = 43-63 mm) and 4 adult females (mean SVL = 55.5 mm ± 5.9 SD, range = 48-62 mm) was examined from the herpetology collection (SDSNH) of the San Diego Natural History Museum, San Diego, California, USA: SDSNH 46824, 46826-46831, 57748.

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

The testicular morphology of *S. couchii* is similar to that of other anurans as described in Ogielska and Bartmańska (2009a). Within the seminiferous tubules, spermatogenesis occurs in cysts which are closed until the late spermatid stage is reached; cysts then open and differentiating sperm reach the lumina of the seminiferous tubules (Ogielska and Bartmańska 2009a). The four males (all from August) in my sample all exhibited spermiogenesis (= sperm formation) in which sperm cysts have opened and small, diffuse clusters of sperm occur in the lumina of each seminiferous tubule. A ring of germinal cysts was located on the inner periphery of each seminiferous tubule. The smallest reproductively active male (spermiogenesis in progress) measured 43 mm (SVL) (SDSNH 46826). Wright and Wright (1949) reported males of *S. couchii* were mature at 48 mm SVL.

The ovaries of *S. couchii* are typical of other anurans in consisting of paired organs situated on the ventral

Fig. 1. Couch's Spadefoot Toad (*Scaphiopus couchii*), Amistad National Recreational Area, Del Rio, TX, by Clinton and Charles Robertson. Photo licensed under the Creative Commons Attribution 2.0 Generic license.

sides of the kidneys; in adults they are filled with diplotene oocytes in various stages of development (Ogielska and Bartmańska 2009b). Mature oocytes are filled with yolk droplets; the layer of surrounding follicular cells is thinly stretched. Three of the four females (all from August) (SDSNH 46829, 46831, 57748) had recently spawned and contained numerous postovulatory follicles (*sensu* Redshaw 1972). Postovulatory follicles form when the ruptured follicle collapses after ovulation; the follicular lumen disappears, and proliferating granulosa cells are surrounded by a fibrous capsule (Redshaw 1972). Postovulatory follicles are short-lived in most anuran species and are resorbed after a few weeks (Redshaw 1972). Three of the four *S. couchii* females also contained vitellogenic (yolking) follicles for a subsequent spawning. Because *S. couchii* is active through October in Baja California (Grismer 2002) there was likely sufficient time for my August females to spawn again. One female (from August) (SDSNH 46827) contained previtellogenic oocytes and was not reproductively active. It may have spawned earlier in the year. The smallest reproductively active female (maturing oocytes) measured 48 mm (SVL) (SDSNH 46831). Wright and Wright (1949) reported females of *S. couchii* were mature at 50 mm SVL.

All four *S. couchii* females contained late stage (shrunken black) atretic oocytes. Follicle atresia is the spontaneous degeneration and reabsorption of follicles and may occur at any stage of development (Saidapur, 1978). Atresia (spontaneous degeneration of oocytes) is a widespread process occurring in the ovaries of all vertebrates (Uribe Aranzábal 2009). In atresia the ooplasm is phagocytized by follicle cells, leaving a mass of dark pigmented material which gradually decreases.

Scaphiopus couchii Baird, 1854 (Fig. 1), ranges from central Texas and Oklahoma to southeastern California, an isolated colony in southeastern Colorado, south to the tip of Baja California and to Nayarit, Zacatecas and Queretaro, Mexico (Degenhardt et al. 1996).

Atresia may influence the number of ovulated oocytes (Uribe Aranzábal 2011) and can remove females from the breeding population (Goldberg 2017). See Saidapur (1978), Saidapur and Nadkarni (1973) and Ogielska et al. (2010) for a detailed description of the stages of follicular atresia in the frog ovary.

Based on the presence of postovulatory follicles (from a recent spawning) and yolking follicles (incipient, upcoming spawning) in the same ovary, multiple spawnings of *S. couchii* in the same season appeared likely in the current study of them from Baja California Sur. This also occurred in previous studies on *S. couchii* reproduction in Arizona (Goldberg 2018) and Texas (Goldberg 2023). *Scaphiopus couchii* has a limited activity period which occurs following periods of warm-season rains (Dimmitt and Ruibal 1980, Tipton et al. 2012). The summer-autumn rainy period in Baja California Sur (Peralta-Garcia et al. 2023) may facilitate *S. couchii* reproduction in August. Hardy and McDiarmid (1969) reported *S. couchii* reproduction in Sinaloa, Mexico commenced after the first heavy rains and continued through September. During prolonged dry periods *S. couchii* may not reproduce (Stebbins and McGinnis 2012). Thus, repeated spawnings by *S. couchii* during their brief periods of activity is advantageous. Histological examination of *S. couchii* ovaries from additional populations are needed to further document the occurrence of multiple spawnings in the same reproductive period for this species.

Acknowledgments—I thank Bradford D. Hollingsworth (SDSNH) for permission to examine *S. couchii*. and Adam Clause (SDSNH) for facilitating the loan 2024-07.

Literature Cited

Degenhardt, W.G., C.W. Painter, and A.H. Price. 1996. Amphibians and Reptiles of New Mexico. University of New Mexico Press, Albuquerque.

Dimmitt, M.A., and R. Ruibal. 1980. Environmental correlates of emergence in spadefoot toads (*Scaphiopus*). Journal of Herpetology 14:21-29.

Goldberg, S.R. 2017. Notes on reproduction of California treefrogs, *Hyliola cadaverina* (Anura: Hylidae) from Riverside County, California, Sonoran Herpetologist 30:5-7.

Goldberg, S.R. 2018. Reproduction of Couch's spadefoot, *Scaphiopus couchii* (Anura: Scaphiopodidae) from Pima County, Arizona. Sonoran Herpetologist 31:28-29.

Goldberg, S.R. 2023. Notes on reproduction of Couch's spadefoot, *Scaphiopus couchii* (Anura: Scaphiopodidae) from Texas. Sonoran Herpetologist 36:104-106.

Grismer, L.L. 2002. Amphibians and Reptiles of Baja California including its Pacific islands and the islands in the sea of Cortés. University of California Press, Berkeley.

Hardy, L.M., and R.W. McDiarmid. 1969. The amphibians and reptiles of Sinaloa, México. University of Kansas Publications, Museum of Natural History 18:39-252.

Ogielska, M., and J. Bartmańska. 2009a. Spermatogenesis and male reproductive system in Amphibia—Anura. Pp. 34-99 *in*: M. Ogielska (editor). Reproduction of Amphibians. Science Publishers, Enfield, NH.

Ogielska, M., and J. Bartmańska. 2009b. Oogenesis and female reproductive system in Amphibia—Anura. Pp. 153-272 *in*: M. Ogielska (editor). Reproduction of Amphibians. Science Publishers, Enfield, NH.

Ogielska, M., B. Rozenblut, R. Augustyńska, and A. Kotusz. 2010. Degeneration of germ line cells in amphibian ovary. Acta Zoologica (Stockholm) 91:319-327.

Peralta-Garcia, A., J.H. Valdez-Villavicencio, L.A. Fucsko, B.D. Hollingsworth, J.D. Johnson, V. Mata-Silva, A. Rocha, D.L. DeSantis, L.W. Porras, and L.D. Wilson. 2023. The herpetofauna of the Baja California Peninsula and its adjacent islands, Mexico: composition, distribution, and conservation status. Amphibian and Reptile Conservation 17:57-142.

Presnell, J.K., and M.P. Schreibman. 1997. Humason's Animal Tissue Techniques, Fifth edition. The Johns Hopkins University Press, Baltimore, MD.

Redshaw, M.R. 1972. The hormonal control of the amphibian ovary. American Zoologist 12:289-306.

Saidapur, S.K. 1978. Follicular atresia in the ovaries of nonmammalian vertebrates. Pp. 225-244 *in*: G.H. Bourne, J.F. Danielli and K.W. Jeon, (editors). International Review of Cytology, Vol. 54. Academic Press, New York, NY.

Saidapur, S.K., and V.B. Nadkarni. 1973. Follicular atresia in the ovary of the frog *Rana cyanophlyctis* (Schneider). Acta Anatomica 86:559-564.

Stebbins, R.C., and S.M. McGinnis. 2012. Field Guide to Amphibians and Reptiles of California. Revised edition. University of California Press, Berkeley.

Tinsley, R.C., and K. Tocque. 1995. The population dynamics of a desert anuran, *Scaphiopus couchii*. Australian Journal of Ecology 20:376-384.

Tipton, B.L., T.L. Hibbitts, T.D. Hibbits, T.J. Hibbitts, and T.J. LaDuc. 2012. Texas Amphibians A Field Guide. University of Texas Press, Austin

Uribe Aranzábal, M.C. 2009. Oogenesis and female reproductive system in Amphibia—Urodela. Pp. 273-304 *in*: M. Ogielska (editor). Reproduction of Amphibians. Science Publishers, Enfield, NH.

Uribe Aranzábal, M.C. 2011. Hormones and the female reproductive systems of amphibians. Pp. 55-81 *in*: D.O. Norris and K.H. Lopez (editors). Hormones and Reproduction of Vertebrates, Volume 2. Amphibians. Elsevier, Academic Press, Amsterdam.

Wasserman, A.O. 1970. *Scaphiopus couchii* Baird Couch's spadefoot toad. Catalogue of American Amphibians and Reptiles 85.1-85.4.

Wright, A.H., and A.A. Wright. 1949. Handbook of Frogs and Toads of the United States and Canada Third edition. Comstock Publishing Associates, Cornell University Press, Ithaca, NY.

Based on the presence of postovulatory follicles (from a recent spawning) and yolking follicles (incipient, upcoming spawning) in the same ovary, multiple spawnings of *S. couchii* in the same season appeared likely in the current study of them from Baja California Sur.

RESEARCH ARTICLE

Preliminary observations on the diet of *Kinosternon cora* (Testudines: Kinosternidae), an endemic turtle of the Pacific Coastal Plain in Sinaloa and Nayarit, Mexico

Jesús Alberto Loc-Barragán, Departamento de Biodiversidad, Dirección General de Recursos Naturales, Secretaría de Desarrollo Sustentable, Gobierno del Estado de Nayarit, México. Avenida de los Insurgentes, esquina con Rey Nayar, s/n, Colonia Burócratas Federal, 63156. Tepic, Nayarit; Ciencia, Conservación y Desarrollo de las Comunidades (CICODEC) A.C., 63066. Tepic, Nayarit, México.; *biolocbarragan@gmail.com*

Samuel Figueroa-Acosta, Centinelas del Río Mololóa, La Labor, Santa María del Oro, Nayarit, 63835, México

Abstract—We present the first formal description of identifiable dietary remains for *Kinosternon cora*, an endemic freshwater turtle from the Pacific Coastal Plain of western Mexico. The study was conducted in 2023 and is based on microscopic examination of stomach and fecal material obtained non-invasively from a wild individual in Nayarit. Four dietary morphotypes were identified, dominated by chitinous fragments consistent with adult Coleoptera, along with probable plant fibers, digested insect larval tissue, and a small carotenoid-rich fragment. These findings suggest an opportunistic insectivorous diet with secondary plant consumption, consistent with trophic patterns reported for congeners inhabiting seasonal wetlands. Although, based on a limited sample size, this contribution provides the first detailed dietary assessment for *K. cora* and establishes a baseline for future ecological and conservation-oriented studies.

Keywords—*Kinosternon cora*; freshwater turtles; endemic species; diet; insectivory; seasonal wetlands; western Mexico

Resumen—Presentamos la primera descripción formal de restos dietarios identificables para Kinosternon cora, una tortuga de agua dulce endémica de la llanura costera del Pacífico en el occidente de México. El estudio se llevó a cabo en 2023 y se basa en el examen microscópico de contenido estomacal en material fecal obtenido de manera no invasiva de un individuo silvestre en Nayarit. Se identificaron cuatro morfotipos dietarios, dominados por fragmentos quitinosos consistentes de Coleoptera adultos, junto con probables fibras vegetales, tejido larvario de insectos digeridos y un pequeño fragmento rico en carotenoides. Estos hallazgos sugieren una dieta insectívora oportunista, con consumo secundario de plantas, lo cual es congruente con los patrones tróficos reportados para otros congéneres que habitan en humedales estacionales. Aunque se basa en un tamaño de muestra limitado, esta contribución constituye la primera evaluación detallada de la dieta de *K. cora* y establece una línea base para futuros estudios ecológicos y de conservación.

Palabras clave—*Kinosternon cora*; tortugas de agua dulce; especies endémicas; dieta; insectívora; humedales estacionales; occidente de México

Introduction

The genus *Kinosternon* represents one of the most diverse groups of freshwater turtles in Mexico, with a high proportion of endemic species restricted to specific physiographic regions (Legler and Vogt 2013, Macip-Ríos 2024). The Pacific Coastal Plain of western Mexico constitutes an important center of diversification for the genus, where several narrowly distributed species are associated with seasonal freshwater habitats.

In the state of Nayarit, four species of *Kinosternon* are currently recognized: *K. cora*, *K. hirtipes*, *K. integrum*, and *K. vogti* (Loc-Barragán et al. 2024). Among these, *Kinosternon cora* (Fig. 1; Cora Mud Turtle; *Chacuanita cora* in Spanish) is a microendemic species described in 2020 (Loc-Barragán et al. 2020). Its known distribution is restricted to lowland areas of Sinaloa and Nayarit, where it inhabits shallow, lentic water bodies such as temporary ponds and seasonal wetlands (Loc-Barragán and Castro-Bastidas 2025). Despite increasing information on its distribution, morphometrics, and habitat associations (Loc-Barragán and Iverson 2024), the natural history of *K. cora* remains poorly documented.

Currently, *Kinosternon cora* has been proposed for classification as Endangered (EN) by the IUCN Red List and as Endangered (P) under Mexican wildlife legislation (NOM-059-SEMARNAT-2010). Both proposals stem from its restricted geographic distribution, habitat specificity, constant threats to ephemeral freshwater systems, and the impact of illegal wildlife trade (Loc-Barragán 2025, Loc-Barragán et al., in press). Furthermore, the species is listed under Appendix I of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES 2022), as international market pressure remains a critical threat to its survival. This discrepancy highlights the urgent need for additional ecological data to support conservation assessments and national management strategies.

For *K. cora*, dietary data have been limited to brief mentions in a distributional account, where excreta from adult individuals suggested an insect-dominated diet but without formal identification or analysis of dietary components (Loc-Barragán and Iverson 2024). To date, no detailed study on the feeding ecology of this species has been formally published. In this context, the present study provides the first description of identifiable dietary remains for *K. cora*, based on the microscopic examination of compounds from fecal matter of a wild individual.

To date, no detailed study on the feeding ecology of this species has been formally published. In this context, the present study provides the first description of identifiable dietary remains for *K. cora*, based on the microscopic examination of compounds from fecal matter of a wild individual.

Materials and Methods

Study area

Fieldwork was conducted in the municipality of Rosamorada, Nayarit, Mexico, within the known distributional range of *Kinosternon cora*. The study area is characterized by lowland landscapes with a pronounced seasonal climate, where temporary ponds and shallow wetlands form during the rainy season and often dry completely during the dry months. Detailed locality information is withheld for biosecurity reasons.

Fig. 1. Adult female Cora Mud Turtle (*Kinosternon cora*) from Rosamorada, Nayarit, México (81.15 mm CL).

Field methods

At 0815 h on 12 August 2023, an adult female *Kinosternon cora* was encountered during routine monitoring activities and captured by hand. Handling followed standard ethical guidelines for freshwater turtles. The fecal material was obtained non-invasively within 12 h of capture and preserved in 70% ethanol. After sample collection, the individual was released at the site of capture.

Laboratory analysis

Preserved material was examined under ambient light using a handheld digital microscope (AMSZOOM 7" LCD Digital Microscope, 12MP HD, 1200X Magnification). Each fragment was classified into a dietary morphotype based on color, texture, rigidity, and the presence or absence of diagnostic arthropod structures such as elytra, sclerites, setae, or articulations. Plant versus animal origin was assessed by evaluating fiber morphology, cuticle thickness, and pigmentation. No chemical digestion or staining procedures were applied. All material was photographed prior to analysis and returned to the voucher specimen container.

Results

Stomach and fecal material obtained from the examined individual contained four distinct dietary morphotypes (Table 1; Fig. 2). The most abundant and diagnostically clear components consisted of rigid, dark chitinous plates with coarse texture and fractured edges, consistent with elytral or exoskeletal fragments of adult Coleoptera. A single elongate, flexible, light-brown fragment lacking segmental articulation likely represents plant fiber, although an origin from thin insect cuticle cannot be entirely excluded. Additional soft, amorphous light-brown fragments lacking identifiable structures correspond to heavily digested insect larval tissue or plant parenchyma. A small orange–yellow amorphous fragment may represent carotenoid-rich plant tissue or the fat body of insect larvae. No vertebrate remains were detected in the examined material.

The most abundant and diagnostically clear components consisted of rigid, dark chitinous plates with coarse texture and fractured edges, consistent with elytral or exoskeletal fragments of adult Coleoptera.

Table 1. Descriptive data on the stomach/fecal contents of an adult female *Kinosternon cora*.

Morphotype	Description	Likely Origin
A. Dark chitinous fragments	Rigid, dark brown-black plates; coarse texture; fractured edges; thick exoskeletal consistency	Adult Coleoptera
B. Elongate linear fragment	Thin, flexible, 1-2 cm long; uniform width; light brown; no visible segmentation or articulations	Plant fiber or thin insect cuticle
C. Soft amorphous tissue	Semi-gelatinous, light brown; no diagnostic structures; advanced digestion	Insect larval tissue or plant parenchyma
D. Orange/yellow amorphous fragment	Brightly pigmented, irregular soft piece	Pigmented plant tissue or larval fat body

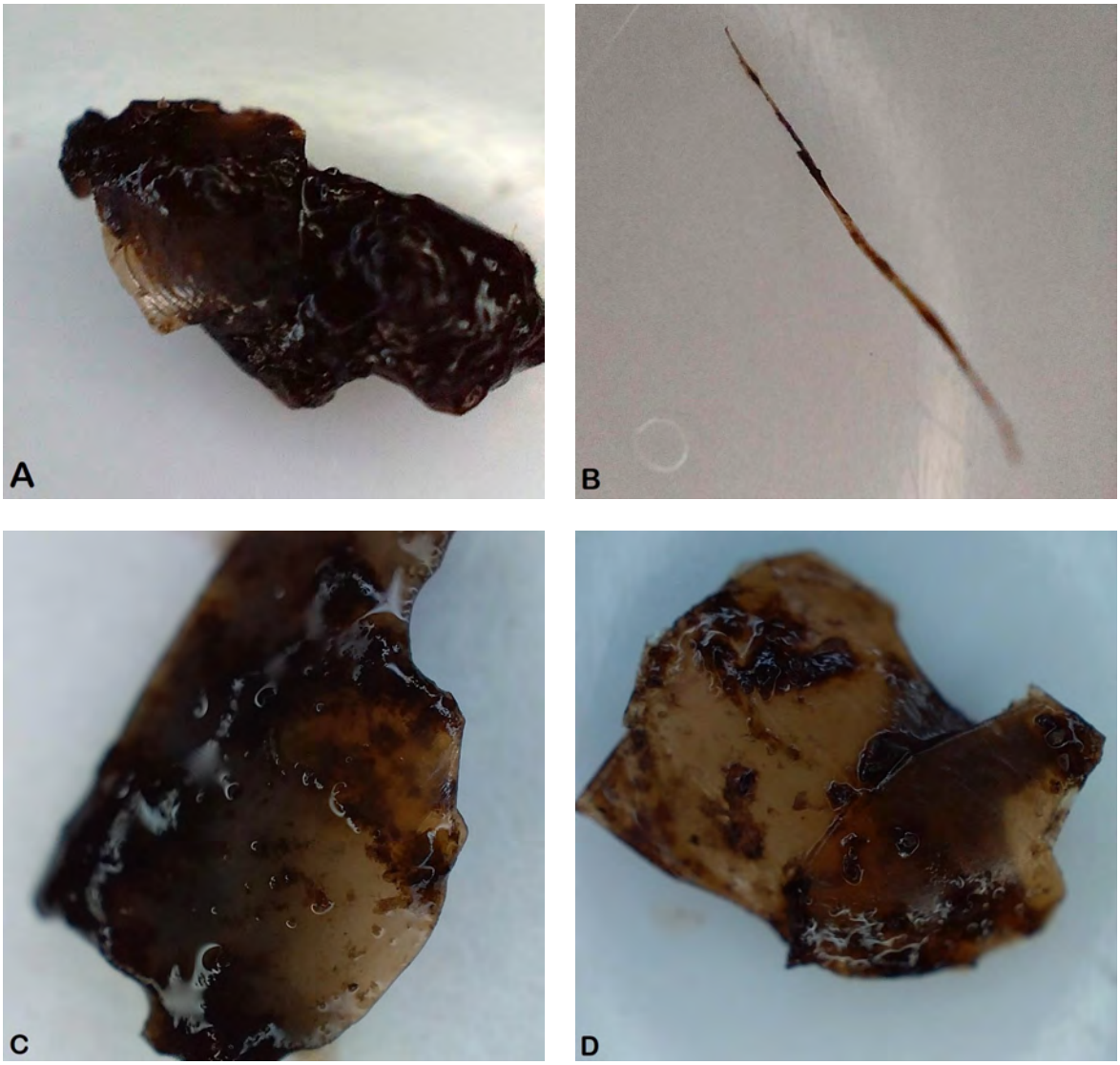


Fig. 2. Stomach/fecal contents of a female adult male of Cora Mud Turtle (*Kinosternon cora*) from Rosamorada, Nayarit, Mexico. **Morphotypes A, B, C, and D, following Table 1.**

Discussion

The dietary components identified in this study indicate that *Kinosternon cora* possibly relies primarily on arthropods, particularly insects, during the rainy season. The predominance of chitinous fragments consistent with adult Coleoptera, together with digested insect larval tissue, supports an insectivorous feeding strategy, while the presence of probable plant fibers suggests opportunistic ingestion of vegetal material. This trophic pattern is consistent with feeding habits reported for other species of *Kinosternon*, which are generally described as opportunistic omnivores or insectivores with variable plant intake depending on local availability (Legler and Vogt 2013, Iverson et al. 2013).

Although based on a single individual, the dietary components identified here are consistent with previous observations from the type locality of *K. cora* in Sinaloa, where excreta from adult males and females suggested a predominantly insect-based diet dominated by mosquitoes and diving beetles, with a minor plant component (Loc-Barragán and Iverson 2024). Those observations were reported without microscopic identification of food items and were not intended as a formal dietary study. The present work therefore represents the first detailed analysis of dietary remains in *K. cora,* providing an independent and methodologically distinct assessment from a different locality.

The apparent reliance on aquatic and semi-aquatic insects is ecologically consistent with the habitat preferences of *K. cora*, which inhabits shallow, lentic water bodies characterized by strong seasonal dynamics. In such environments, insect availability is typically high during the rainy season but declines rapidly as water bodies dry, potentially influencing feeding opportunities and energy acquisition (Legler and Vogt 2013, Stanford et al. 2020). Similar seasonal constraints on food availability have been documented for other freshwater turtles occupying temporary wetlands, where trophic flexibility is critical for persistence (Lovich et al. 2018).

The apparent reliance on aquatic and semi-aquatic insects is ecologically consistent with the habitat preferences of *K. cora*, which inhabits shallow, lentic water bodies characterized by strong seasonal dynamics.

The absence of vertebrate remains in the analyzed material suggests that vertebrate prey may not constitute a regular component of the diet of *K. cora*, at least during periods of high insect availability. Comparable patterns have been documented in other small-bodied kinosternids, in which vertebrate prey is rare or opportunistic and largely dependent on prey availability and ontogenetic stage (Iverson 1991, Ernst and Lovich 2009). However, given the limited sample size, further studies incorporating multiple individuals, seasons, and localities are necessary to evaluate potential dietary variation related to ontogeny, seasonality, or habitat conditions. Improved understanding of trophic ecology will be essential for assessing habitat quality and informing conservation strategies for this endemic species.

Acknowledgments—We thank field assistants and local collaborators for their support during monitoring activities. Research permits and ethical approvals were obtained from the appropriate Mexican authorities. Our research was supported by American Turtle Observatory, Turtle ConservationFund, Mohamed bin Zayed Species Conservation Fund, whohave supported us with small funds to conduct field studies with freshwaterturtles in Nayarit.

Literature Cited

CITES. 2022. Apéndices I, II y III de la Convención sobre el Comercio Internacional de Especies Amenazadas de Fauna y Flora Silvestres. Secretaría CITES. *https://cites.org/esp/app/appendices.php*

Ernst, C.H., and J.E. Lovich. 2009. Turtles of the United States and Canada. 2nd edition. Johns Hopkins University Press, Baltimore, MD.

Iverson, J.B. 1991. Life history and demography of the yellow mud turtle, *Kinosternon flavescens*. Herpetologica 47:373-395.

Iverson, J.B., M. Le, and C. Ingram. 2013. Molecular phylogenetics of the mud and musk turtle family Kinosternidae. Molecular Phylogenetics and Evolution 69:929-939.

Legler, J.M., and R.C. Vogt. 2013. The turtles of Mexico: Land and freshwater forms. University of California Press, Berkeley.

Loc-Barragán, J.A. 2025. Propuesta de inclusión de Kinosternon cora en la *NOM-059-SEMARNAT-2010*. Ciencia Conservación y Desarrollo de las Comunidades (CICODEC), A.C.

Loc-Barragán, J.A., and H.A. Castro-Bastidas. 2025. Potential distribution of *Kinosternon cora* (Testudines: Kinosternidae) and implications for its conservation. Acta Zoológica Lilloana 69:795-814. *https://doi.org/10.30550/j.azl/2254*

Loc-Barragán, J.A., and J.B. Iverson. 2024. Distribution, morphometrics, and natural history notes on *Kinosternon cora*. Herpetological Review 55:249-250.

Loc-Barragán, J.A., J. Reyes-Velasco, G.A. Woolrich-Piña, C.I. Grünwald, M. Venegas-De Anaya, J.A. Rangel-Mendoza, and M.A. López-Luna. 2020. A new species of mud turtle of genus *Kinosternon* (Testudines: Kinosternidae) from the Pacific coastal plain of northwestern Mexico. Zootaxa 4885:509-529. *https://doi.org/10.11646/zootaxa.4885.4.3*

Loc-Barragán, J.A., G.R. Smith, G.A. Woolrich-Piña, and J.A. Lemos-Espinal. 2024. An updated checklist of the amphibians and reptiles of Nayarit, Mexico with conservation status and comparison with adjoining States. Herpetozoa 37:25-42. *https://doi.org/10.3897/herpetozoa.37.e112093*

Loc-Barragán, J.A., G.A. Woolrich-Piña, M.A. López-Luna, and J.B. Iverson. (in press). *Kinosternon cora*. The IUCN Red List of Threatened Species. *http://iucnredlist.org*

Lovich, J.E., J.R. Ennen, M. Agha, and J.W. Gibbons. 2018. Where have all the turtles gone, and why does it matter? BioScience 68:771-781.

Macip-Ríos, R. 2024. Estudios sobre la biología y conservación de tortugas de México. Sociedad Herpetológica Mexicana A.C.; Instituto de Biología, Universidad Nacional Autónoma de México.

Stanford, C.B., J.B. Iverson, A.G.J. Rhodin, et al. 2020. Turtles and tortoises are in trouble. Current Biology 30:R721-R735.

The absence of vertebrate remains in the analyzed material suggests that vertebrate prey may not constitute a regular component of the diet of *K. cora*, at least during periods of high insect availability.

RESEARCH ARTICLE

Noteworthy Amphibian and Reptile Records from Sonora, Mexico

Thomas R. Van Devender, Greater Good Charities, 236 S. Scott Ave., Suite 140, Tucson, AZ; *yecora4@comcast.net*

H. Daniel Pinto-Santana, Calle 23 y 24 Avenida Benito Juárez, Agua Prieta, Sonora, MX; *hectordanielpinto92@gmail.com*

Maybeth Y. Pinto-Santana, Calle Allende y 5 de mayo S/N, Colonia Las Liebres, Moctezuma, Sonora, MX; *myps.pinto@gmail.com*

J. Gerardo Martínez-Valenzuela, Calle Allende y 5 de mayo S/N, Colonia Las Liebres, Moctezuma, Sonora, MX; *gerardopr17@hotmail.com*

James C. Rorabaugh, P. O. Box 31, Saint David, AZ; *jrorabaugh@hotmail.com*

Guillermo Molina-Padilla, Avenida Juárez No. 14, Cananea, Sonora, MX; *guimopa1@gmail.com*

Erik F. Enderson, 5131 S. Hannah Heather Pl., Tucson, AZ; *erikenderson@icloud.com*

Jorge H. Valdez-Villavicencio, Conservación de Fauna del Noroeste, AC., Ensenada, Baja California, MX; *j_h_valdez@yahoo.com.mx*

José Abel Salazar-Martínez, Calle 5 de Mayo s/n Bacoachi, Sonora, MX; *joseabelsm2000@gmail.com*

Ana Lilia Reina-Guerrero, Greater Good Charities, 236 S. Scott Ave., Suite 140, Tucson, AZ; *yecora4@comcast.net*

S. Devanis Dávila-Macías, Calle Emiliana Zapata #755 , Colonia Los Encinos, Naco, Sonora, MX; *susanad2301@gmail.com*

Anny Peralta-García, Conservación de Fauna del Noroeste, AC. Ensenada, Baja California, MX; *annyperalta@faunadelnoroeste.org*

Abstract—Noteworthy records for the state of Sonora, Mexico, are presented for the spadefoot toad *Spea bombifrons,* the turtle *Trachemys yaquia*, the lizards *Gambelia wislizenii, Hemidactylus turcicus, Sceloporus cowlesi,* and *S. slevini*, and the snakes *Crotalus tigris, Gyalopion canum, Heterodon nasicus* subsp. *kennerlyi*, and *Indotyphlops braminus*. *Hemidactylus turcicus* and *Indotyphlps braminus* are non-native species. Range extensions, new state, municipality, and elevational records are reported.

Resumen—Se presentan registros notables para el estado de Sonora, México, del sapo de espuelas *Spea bombifrons,* la tortuga semiacuática *Trachemys yaquia*, las lagartijas *Gambelia wislizenii, Hemidactylus turcicus, Sceloporus cowlesi* y *S. slevini*, y las serpientes *Crotalus tigris, Gyalopion canum, Heterodon nasicus* subsp. *kennerlyi* e *Indotyphlops braminus*. *Hemidactylus turcicus* y *Indotyphlps braminus* son especies introducidas. Se reportan extensiones de distribución y nuevos registros estatales, municipales y de altitud.

Introduction

In recent years, amphibians and reptiles have been observed in Sonora, Mexico, on Madrean Discovery Expeditions (MDE) to Sky Island mountain ranges, MDE wildlife camera studies, MDE student herpetological inventories, and personal field trips. Additional observations are from iNaturalist, the University of Arizona Herpetological Collection, final reports, and regional herpetofauna publications. Here, we present noteworthy and additional selected records of one amphibian and nine reptiles from Sonora, Mexico, with discussion of their significance. All records and images are available in the public MDE database (madreandiscovery.org).

ANURA—FROGS

Scaphiopodidae. *Spea bombifrons* (Cope, 1863) (Great Plains Spadefoot Toad) is found from southwestern Canada throughout the Great Plains in the United States into northern Mexico in Chihuahua, Coahuila, Nuevo León, and Tamaulipas (Lemos-Espinal 2015). Rorabaugh (2008), Lemos-Espinal and H.M. Smith (2009), Enderson et al. (2010a), and Rorabaugh and Lemos-Espinal (2016) predicted its presence in Sonora. Here, we report the first records for the state and the Municipality of Agua Prieta.

Records: Municipality of Agua Prieta: Rancho El Valle, 64.4 km (by air) E of Agua Prieta, 31.328ºN 108.844ºW, 1571 m elev., 16 July 2013. Single male calling in large stock tank in plains grassland. E.F. Enderson (Fig. 1A); 9.7 km (by air) SW of Agua Prieta. 31.236ºN 109.586ºW, 1299 m elev., 15 July 2022. Chihuahuan desertscrub. H.D. Pinto-Santana (Fig. 1B).

TESTUDINES—TURTLES

Emydidae. *Trachemys yaquia* Hennig, 2002 (Yaqui Slider) is endemic to Sonora in the drainages of the Ríos Mayo, Sonora, and Yaqui. It was described as *Pseudemys scripta* subsp. *yaquia* on a series of specimens from Conicárit in Presa Mocúzari (= Adolfo Ruiz Cortinez) on the Río Mayo 26 km northwest of Álamos (Legler and Webb 1970). It is most common in the Río Yaqui, the largest river system in Sonora, including the Río Áros tributary with headwaters to the east in the Sierra Madre Occidental in Chihuahua. The northern Río Bavispe tributary drains southeastern Arizona, northeastern Sonora, and northwestern Chihuahua. It flows west from its headwaters in the Sierra Madre Occidental, loops northward around the Sierra El Tigre, and south through Presa Angostura Reservoir. The Río Áros and Bavispe join north of Sahuaripa to become the main Río Yaqui which enters the Gulf of California

In recent years, amphibians and reptiles have been observed in Sonora, Mexico, on Madrean Discovery Expeditions (MDE) to Sky Island mountain ranges, MDE wildlife camera studies, MDE student herpetological inventories, and personal field trips.

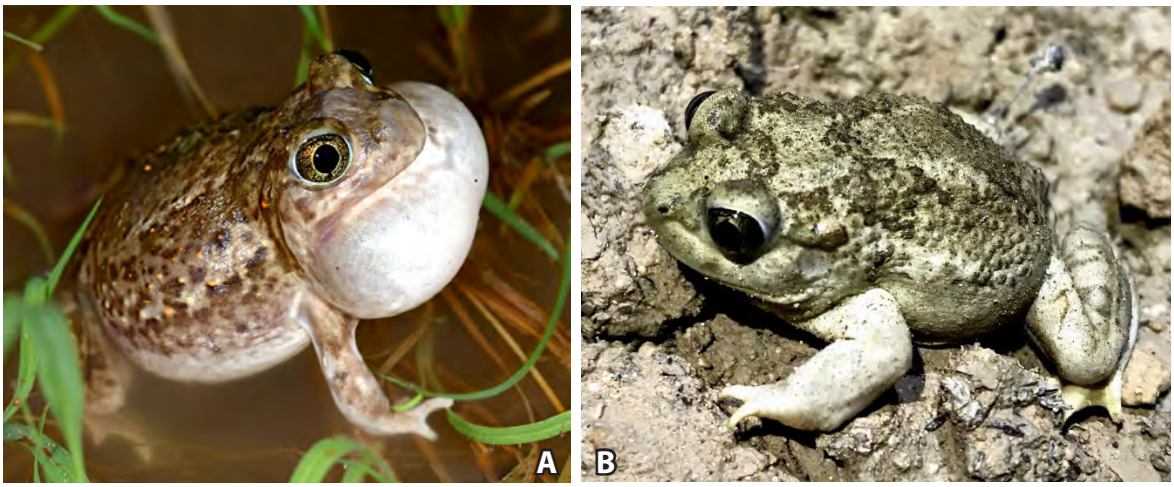


Fig. 1. *Spea bombifrons*. **A.** Rancho El Valle, east of Agua Prieta. Photo by Erik F. Enderson. **B.** South-southwest of Agua Prieta. Photo by H. Daniel Pinto-Santana.

near Ciudad Obregón. Here, we report it in the upper Bavispe near Bacerac and a western side drainage southwest of Colonia Morelos; La Estrella below Presa El Novillo; in the southern Bavispe on Rancho El Hoyo east of Divisaderos; on Rancho El Carricito in Arroyo Bacadéhuachi (an eastern tributary), south-southeast of Granados (Rorabaugh and Van Devender 2020, Van Devender et al. 2024); and on the Río Áros. The record south of Tunapa near the Chihuahua border in the Río Áros drainage was mistakenly reported for Chihuahua in iNaturaist. In the Río Sonora, *T. yaquia* is present from Bacoachi (Turner et al. 2025) south to Hermosillo. Large individuals are common in Presa Abelardo L. Rodríguez in Hermosillo. In the Río San Miguel, a major northwestern tributary of the Río Sonora, it is present in Ciénega de Saracachi near Cucurpe and near San Miguel de Horcasitas. Fossils of *P. scripta* reported in Pleistocene deposits at Rancho La Brisca 6.6 km northeast of the Ciénega de Saracachi were likely *T. yaquia* (Van Devender et al. 1985). Here, we include records from the Municipalities of Agua Prieta, Álamos, Arizpe, Bacerac, Bacoachi, Cucurpe, Granados, Hermosillo, Huásabas, Sahuaripa, San Miguel de Horcasitas, and Soyopa. An adult captured by a *Puma concolor* during rain at night was photographed on a wildlife camera on Rancho El Hoyo (Rorabaugh and Van Devender 2020, Van Devender et al. 2024).

Records: Municipality of Agua Prieta: 7.5 km (by air) WSW of Colonia Morelos, western tributary of Río Bavispe. 30.805°N 109.299°W, 911 m elev., 1 May 2020. M.F. Enriquez-G. [iNaturalist]. Municipality of Álamos: Presa Mocúzari on Río Mayo [28.2 km (by air) NNE of Álamos], 27.224°N 109.109°W, 85 m elev., 31 September 1966. H.L. Heringhi (Heringhi 1969). Municipality of Arizpe: Arizpe (on Río Sonora), 30.342°N 110.159°W, 820 m elev., 18 August 1958. C.H. Lowe [CHL 9237, UAZ 28107]. Municipality of Bacerac: Río Bavispe at Bacerac, 6.5 mi (rd) N of Huachinera, 30.300°N 108.961°W, 1045 m elev., July 1974. M.D. Robinson, D.R. Frost [UAZ 39965]; Presa Bacerac on Río Bavispe, 2.3 km (by air) SW of Bacerac, 30.348°N 108.952°W, 1027 m elev., 21 November 2024. J.G. Martínez-Valenzuela (Fig. 2A); Río Bavispe at Los Olivares, 3.2 km (by air) SW of Bacerac, 30.339°N 108.958°W, 1023 m elev., 12 May 2024. Monitoreo de Nutria y Castor.

An adult [*Trachemys yaquia*] captured by a *Puma concolor* during rain at night was photographed on a wildlife camera on Rancho El Hoyo ...

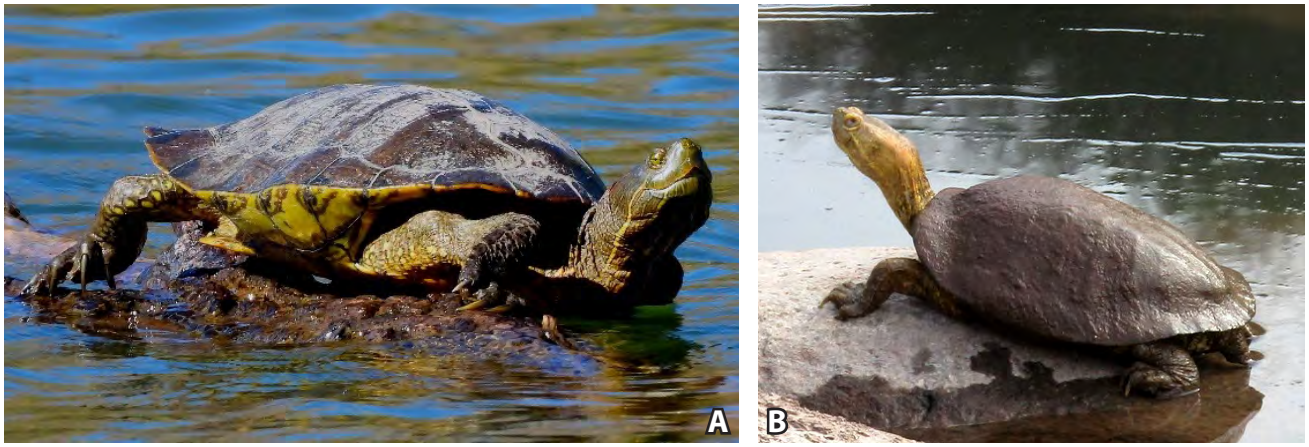


Fig. 2. *Trachemys yaquia*. **A.** Presa Bacerac on Río Bavispe. Photo by J.G. Martínez-Valenzuela. **B.** South-southeast of Tunapa, 46 km (by air) E of Sahuaripa, Río Áros drainage. Possible albino. Photo by J.C. Nieto [iNaturalist].

Municipality of Bacoachi: Bacoachi, Río Sonora, 30.628°N 109.973°W, 1033 m elev., 12 August 2024. Hatchling in stream in cottonwood-willow riparian forest. J.A. Salazar-Martínez (photos in Turner et al. 2025). Municipality of Cucurpe: Ciénega de Saracachi, Rancho Agua Fria, 10.6 km (by air) ENE of Cucurpe, 30.358°N 110.601°W, 945 m elev., 12 March 2022, T. Hare; Municipality of Granados: Rancho El Carricito, 16.5 km (by air) SSE of Granados on Arroyo Bacadéhuachi, 27.717°N 109.227°W, 549 m elev., 14 April 2017, J.M. Galaz-Galaz (wildlife camera photo, Rorabaugh and Van Devender 2020, Van Devender et al. 2024); Rancho El Hoyo 22.5 km (by air) E of Divisaderos on Río Bavispe, 26.642°N 109.240°W, 465 m elev., 17 July 2017, J.M. Galaz-Galaz (wildlife camera photo, Van Devender et al. 2024). Municipality of Hermosillo: Dam on Río Sonora at Hermosillo (now Presa Abelardo L. Rodríguez), 29.071°N 110.911°W, 220 m elev., 1966. R.S. Felger [UAZ 13759]. Municipality of Huásabas: Río Bavispe, 2.1 km (by air) NNW of Huásabas, 29.925°N 109.27°W, 554 m elev., 27 August 2003. T. Burkhardt. Municipality of Sahuaripa: Buena Vista on Río Áros, 4.3 km (by air) NE of Sahuaripa, 29.263°N 108.891°W, 664 m elev., 30 July 2005, S.E. Carrillo-Percástegui, M.D. Bogan, S. Jacobs, E. Wallace (O'Brien et al. 2006); Los Chinos on Río Áros, 40.1 km (by air) ENE of Sahuaripa, 29.175°N 108.831°W, 703 m elev., 12 July 2016. R.A. Villa, S. Jacobs, A.D. Flesch (O'Brien et al. 2006); 7.4 km (by air) SSE of Tunapa, 46.km (by air) E of Sahuaripa, Río Áros drainage, 29.117°N 108.773°W, m elev., February 2021. J.C. Nieto [Fig. 2B; iNaturalist]. Municipality of San Miguel de Horcasitas: 4 mi SW of San Miguel on Río San Miguel, 29.552°N 110.658°W, 424 m elev., June 2010. R.G. Webb [UTEP 3894]. Municipio de Soyopa: La Estrella at Río Yaqui, 28.947°N 109.640°W, 810 m elev., 13 September 2009, P.C. Rosen.

SQUAMATA—LIZARDS

Gekkonidae. *Hemidactylus turcicus* (Linnaeus, 1758) (Mediterranean House Gecko) is native to western India, the Arabian Peninsula, Somalia, and the Mediterranean region, but has spread to eastern Africa, South America, southern and southeastern Eurasia, and many areas in the Americas and the Caribbean (Rorabaugh and Lemos-Espinal 2016). In Sonora, it was reported from Bahía de Kino Nuevo (Peralta-García and Valdez-Villavicencio 2008) and Hermosillo (Lara-Resendiz et al. 2017). Rorabaugh and Lemos-Espinal (2016) also reported it from El Golfo de Santa Clara, Puerto Peñasco, and San Luis Río Colorado. Here, we report the first records from Agua Prieta and Naco, and those Municipalities. Agua Prieta is 359 km northeast of Hermosillo. It has been known from Douglas, Arizona, for a while (Brennan and Holycross 2006), so it is not surprising that it occurs in Agua Prieta.

The animals were found on walls in urban settings.

Selected records: Municipality of Agua Prieta: Agua Prieta, 31.331°N 109.558°W, 1207 m elev., 19 August 2018. M.Y. Pinto-Santana; 31.316°N 109.559°W, 1202 m elev., 30 April 2018. H. Daniel Pinto-Santana; 31.323°N 109.517°W, 1248 m elev., 12 April 2020. H.D. Pinto-Santana; 31.32902°N 109.53772°W, 1228 m elev. 21 September 2022. H.D. Pinto-Santana (ASUHEP 000798, 000708-000710 photo vouchers); 31.327°N 109.553°W, 1210 m elev., 26 September 2021. A. Badilla; 31.308°N 109.515°W, 1251 m elev., 1 October 2023. lopatuco [iNaturalist]; 31.321°N 109.535°W, 1228 m elev., 3 August 2024. guille64890 [iNaturalist]; 31.303°N 109.543°W, 1217 m elev., 11 December 2024. G. Higalid. [iNaturalist]. Municipio de Hermosillo: Colonia Nueva España, Hermosillo, 29.101°N 111.002°W, 210 m elev., 11 July 2021. T.R. Van Devender, A.F. Ballesteros-Reina (Fig. 3A). Municipality of Naco: Naco, 31.323°N

Hemidactylus turcicus (Linnaeus, 1758) (Mediterranean House Gecko) is native to western India, the Arabian Peninsula, Somalia, and the Mediterranean region, but has spread to eastern Africa, South America, southern and southeastern Eurasia, and many areas in the Americas and the Caribbean ...

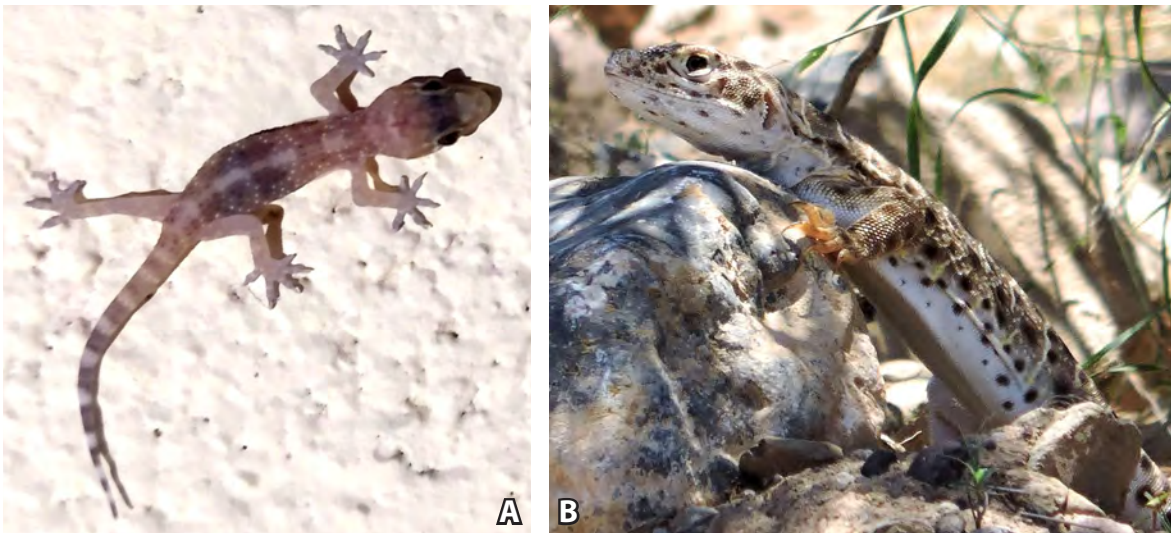


Fig. 3. A. *Hemidactylus turcicus*. Hermosillo. Photo by H. Silva-Kurumiya. **B.** *Gambelia wislizenii*. La Calera, south of Agua Prieta. Photo by H. Daniel Pinto-Santana.

109.939°W), 1421 m elev., 4 December 2022. G. Medina-Quijada, S.D. Dávila-Macías. (ASUHEP 000716 photo voucher). Municipality of Puerto Peñasco: Near Manny's Beach Club, Puerto Peñasco, 31.297°N 113.358°W, 3 m elev., 14 February 2010, J.C. Rorabaugh. Municipality of San Luis Río Colorado: Villas del Sol Hotel, El Golfo de Santa Clara, 31.684°N 114.496°W, 7 m elev., 7 September 2007, E. Soto-M., J.C. Rorabaugh [UAZ 56726-PSV].

Crotaphytidae. *Gambelia wislizenii* Baird and Girard, 1852 (Long-nosed Leopard Lizard) is widespread in the western United States from Oregon and Idaho south to California, Arizona, Baja California, and Sonora. It is in Chihuahuan desertscrub from southeastern Arizona through New Mexico to western Texas and adjacent Chihuahua and Coahuila (Lemos-Espinal and G.R. Smith 2016, Lemos-Espinal and H.M. Smith 2009). The records south of Agua Prieta and north of Fronteras fill a gap between the known distribution in the Sonoran Desert in western Sonora and the Chihuahuan Desert in southeastern Arizona (Rorabaugh and Lemos-Espinal 2016). They are the first records for the Municipalities of Agua Prieta and Fronteras.

Records in Chihuahuan Desertscrub: Municipality of Agua Prieta: Near La Calera, 10 km (by air) SW of Agua Prieta, 31.280°N 109.646°W, 1270 m elev., 17 July 2022. H.D. Pinto-Santana, M.Y. Pinto-Santana, J.G. Martínez-Valenzuela (ASUHEP 000679, photo voucher; Fig. 3B); Río San Bernardino, Rancho San Bernardino, 24.8 km (by air) E of Agua Prieta, Cuenca Los Ojos Foundation Conservation Area, 31.328°N 109.257°W, 1128 m elev., 1 May 2005. R.L. Minckley (ASUHEP 000678, photo voucher). Municipality of Fronteras: 3.8 mi (rd) N of Fronteras, 30.951°N 109.544°W, 1115 m elev., 7 July 1974. M.D. Robinson, D.R. Frost (UAZ 39018).

Phrynosomatidae. *Sceloporus cowlesi* Lowe and Norris, 1956 (Southwestern Fence Lizard) is found from eastern Arizona east through much of New Mexico to western Texas and adjacent Chihuahua and Coahuila, Mexico. In Chihuahua and Coahuila, it is considered a Chihahuan desertscrub species (Lemos-Espinal and G.R. Smith 2016, Lemos-Espinal and H.M. Smith 2009). The Sonoran records here are in the Municipalities of Agua Prieta, Cananea (Rorabaugh et al. 2019b), and Naco. The specimen from Tamosura in Cananea was in the beak of a Greater Roadrunner (*Geococcyx californianus*).

Records: Municipality of Agua Prieta: Ejido Cabullona, 24.9 km (by air) SE of Agua Prieta, 31.157°N 109.524°W, 1107 m elev., 9 July 2022. Chihuahuan desert grassland. J.G. Martínez-Valenzuela, H.D. Pinto-Santana, M. Y. Pinto-Santana (ASUHEP 000660 photo voucher; Fig. 4C); Rancho Llano Blanco, 8.3 km (by air) SSW of Agua Prieta, 31.229°N 109.589°W, 1215 m elev., 14 August 2022. J.G. Martínez-Valenzuela, H.D. Pinto-Santana, M.Y. Pinto-Santana (ASUHEP 000711 photo voucher; Fig. 4B); Río Agua Prieta, Agua Prieta, 31.332°N 109.577°W, 1189 m elev., 24 August 2022. Riparian area in urban area. H.D. Pinto-Santana, M.Y. Pinto-Santana (ASUHEP 000712 photo voucher; Fig. 4A; Van Devender et al. 2017). Municipality of Cananea: Cañón de Evans, 18 km SE, 10 km E by rd of Agua Prieta turnoff from Cananea [ca. 16 km SSE of Cananea on SON 89], 30.943°N 110.378°W, 1435 m elev., 24 April 1950. R.R. Miller (as *Sceloporus undulatus*); Tamosura Shopping Center, NE of Cananea, 30.999°N 110.253°W, 1525 m elev., 12 March 2021. G. Molina-Padilla; Municipality of Naco: 6 mi S of Naco, 31.243°N 109.923°W, 1540 m elev., 7 September 1973. Desert grassland. C.W. Howard [UAZ 365545].

Phrynosomatidae. *Sceloporus slevini* H.M. Smith, 1937 (Slevin's Bunchgrass Lizard) is found in the southwestern United States and adjacent Mexico. In Sonora, it is known from the Yécora area (Enderson et al. 2014) and Mesa Tres Ríos (Rorabaugh et al. 2019a) in the Sierra Madre Occidental and in the Sky Islands Region in the Sierras de los Ajos

Gambelia wislizenii Baird and Girard, 1852 (Long-nosed Leopard Lizard) is widespread in the western United States from Oregon and Idaho south to California, Arizona, Baja California, and Sonora.

Fig. 4. *Sceloporus cowlesi*. **A.** Agua Prieta. **B.** Rancho Llano Blanco, south-southwest of Agua Prieta. **C.** Ejido Cabullona. Photos by H. Daniel Pinto-Santana.

Fig. 5. *Sceloporus slevini.* **A. B.** Male. Sierra Elenita. Photos by A.L. Reina-Guerrero and T.R. Van Devender. **C.** Patternless female. Hoya de Packard, Sierra de los Ajos. Photo by R. W. Van Devender. **D.** Gravid female. Ejido Zapata, east-northeast of Cananea. Photo by G. Molina-Padilla.

and Mariquita. Selected records here are in the Municipalities of Agua Prieta, Bacoachi, Cananea, Fronteras, Nácori Chico, Santa Cruz, and Yécora, including the first records for the Municipality of Agua Prieta and the Sierra Elenita. Patternless color morphs were found in the Sierra de los Ajos, Mesa del Campanero west of Yécora (Enderson et al. 2014), and Arroyo del Macho near Mesa Tres Ríos (Rorabaugh et al. 2019a) in the Sierra Madre Occidental. Most records are from high elevation pine-oak forest. Lowland grassland records were from Rancho Los Fresnos (Rorabaugh et al. 2013), Ejido Zapata near Cananea, and Ranchos San Bernardino and El Valle east of Agua Prieta.

Selected records: Municipality of Agua Prieta: Rancho El Valle, W side of Animas Valley, 31.324°N 108.952°W, 1593 m elev., 18 May 2010. Adult escaped in bunchgrass in plains grassland. T.R. Van Devender; 24.3 km (by air) E of Agua Prieta, Rancho San Bernardino. 31.327°N 109.272°N, 1139 m elev., 11 September 2020. Desert grassland. dcafaggi [iNaturalist]. Municipality of Cananea: Ejido Zapata, 12.0 km (by air) ENE of Cananea, 31.031°N 110.169°W, 1449 m elev., 27 March 2018. Desert grassland. G. Molina-Padilla (Fig. 5D); Sierra Elenita, 9.7 km (by air) W of Cananea, 30.988ºN 110.386ºW, 2419 m elev., 3 May 2016. F. I. Ochoa-Gutiérrez (Figs. 5A, B); Sierra Elenita, 9.8 km (by air) W of Cananea, 30.996ºN 110.386ºW, 2218 m elev., 1 May 2016. Pine-oak forest. J.M. Cirett-Galán; Vicinity of Observatorio Astrofísico Guillermo Haro, Sierra Mariquita, 9.4 km (by air) NNW of Cananea, 31.054ºN 110.383ºW, 2422 m elev., 19 September 2010. Pine-oak forest. T.R. Van Devender. Municipality of Bacoachi: Hoya de Packard, 30.6 km (by air) ESE of Cananea, Sierra de los Ajos, 30.942ºN 109.960ºW, 2323 m elev., 24 August 2014. Pine-oak forest. R.W. Van Devender (Fig. 5C). Municipality of Fronteras: El Chilicote, 36 km (by air) WNW of Fronteras, Sierra de los Ajos, 30.934ºN 109.935ºW, 2149 m elev., 28 June 2017. Pine-oak forest. A.C. Blanco-Gutiérrez. Municipality of Nácori Chico: Arroyo del Macho, 9.7 km (by air) SW of Mesa Tres Ríos, 29.789ºN 108.796ºW, 2142 m elev., 7 August 2018. Pine-oak forest. A.C. Blanco-Gutiérrez. [ASUHEP 000267 photo voucher]. Municipality of Santa Cruz: Just E of Los Fresnos Ciénega, Rancho Los Fresnos, 38.3 km NNW of Cananea, 31.309ºN 110.429ºW, 1533 m elev., 23 May 2006. Plains grassland. J.C. Rorabaugh (Rorabaugh et al. 2013; UAZ 57137-PSV).

Patternless color morphs were found in the Sierra de los Ajos, Mesa del Campanero west of Yécora (Enderson et al. 2014), and Arroyo del Macho near Mesa Tres Ríos (Rorabaugh et al. 2019a) in the Sierra Madre Occidental. Most records are from high elevation pine-oak forest.

Colubridae. *Gyalopion canum* Cope, 1860 (Chihuahuan Hook-nosed Snake) is found from southeastern Arizona east to northwestern Texas and south in the Chihuahuan Desert on the Mexican Plateau to San Luis Potosí and Zacatecas (Degenhardt et al. 1996). In Arizona, it is most common in Cochise and Santa Cruz Counties (Babb 2020). The only previous Sonoran records are from Cananea, Rancho El Valle in the Animas Valley, and near Yécora in the Sierra Madre Occidental. The new Sierra La Púrica record is 71 km southeast of Cananea, 129 km southwest of Rancho El Valle, and 252 km north-northwest of the Yécora localities. Rorabaugh and Lemos-Espinal (2016) postulated that future inventory would document its continuous range between El Valle and Yécora because it has been found in oak woodland in the Santa Rita Mountains in Arizona, and now the Sierra La Púrica. Considering that it's preferred Chihuahuan desertscrub-desert grassland habitat throughout most of its distribution is not typical of the Sky Islands in that area (Van Devender and Reina-Guerrero 2016) and that it has not been reported in subsequent herpetofaunas, it is more likely that the two areas are the separate western limits of the Texas-Arizona and the central Chihuahua populations (Lemos-Espinal and H.M. Smith 2009).

Records: Municipality of Agua Prieta: 21.5 mi (by rd) E of Rancho San Bernardino on MEX 2 [Rancho El Valle, 56 km E of Agua Prieta], 31.324°N 108.937°W, 1600 m elev., 14 August 2007. Plains grassland. E.F. Enderson, R.L. Bezy, K. Bonine. [UAZ 57669-PSV, photo voucher; Fig. 6A]. Municipality of Cananea: Cananea, 30.9895°N 110.256°W, 1534 m elev., 1 December 1957. A.J. Ruff [UAZ 20736]. Municipality of Fronteras: Rancho Los Alisos, 21.4 km (by air) N of Nacozari de García, Sierra La Púrica, 30.565°N 109.715°W, 1448 m elev., 2 November 2025. Desert grassland-oak woodland transition. G. Molina-Padilla, J.A. Salazar-Martínez. [UAZ 57668, photo voucher; Fig 6B]. Municipality of Yécora: 11.9 (by MEX 16) W of Yécora, 28.363°N 109.133°W, 1821 m elev., 6 August 2006. E.F. Enderson, K. Bonine, R.L. Bezy [Enderson et al. 2006; UAZ 56041-PSV; Fig. 6C].

Colubridae. *Heterodon nasicus* Baird and Girard, 1852 subsp. *kennerlyi* Kennicott, 1860 (Mexican Hognose Snake) is found from southeastern Arizona to western Texas and south throughout the Mexican Plateau as far south as Aguascalientes and San Luis Potosí. Cochran (1961) reported that a syntype for *H. n. kenneryli* in the U. S. National Museum (USNM 1282) was collected by Darius Nash Couch (1822-1897) from 'Sonora.' Couch was a career soldier who rose to the rank of Major General in the Union Army in the Civil War. He took a one-year leave of absence from the army in 1853 to conduct a zoological expedition for the Smithsonian Institution, where he collected the types of *Scaphiopus couchii* (Couch's Spadefoot Toad) and *Tyrannus couchii* (Couch's Kingbird) in northeastern Mexico. The Expedition's route was from Brownsville, Texas, west to the Río Nazas in Durango (Conant 1968). He did not reach Sonora. He probably collected the syntype of *H. n. kennerlyi* in the town of Sonora, Texas (30.565°N 100.644°W, 648 m elev.), in route to Brownsville. Smith et al. (2003) elevated the subspecies to full species based on the agygous and loreal scales, although the latter was clinal and not diagnostic. Considering that the two taxa are only differentiated by a single character, their distributions are continuous (Fig. 1 in Smith et al. 2003), and Degenhardt et al. (1996) reported intergradation between *H. n. kennerlyi* and *H. n. nasicus* in southeastern New Mexico, they are best considered subspecies. Lemos-Espinal (2007) and Rorabaugh and Lemos-Espinal (2016) did not include this species in Sonora. The Sonoran records in Enderson et al. (2009, 2010b), Lemos-Espinal et al. (2019), Rorabaugh (2008), and probably Smith et al. (2003) appear to be based on Couch's syntype from Texas. In Sonora, it is found only just south of the Arizona border. Rorabaugh et al. (2013) reported it in plains grassland at Rancho Los Fresnos near the Arizona border. Here, we report records for the Municipalities of Agua Prieta, Cananea, Fronteras, and Santa Cruz, Sonora.

Records: Municipality of Agua Prieta: Rancho Nuevo, 55.5 km (by air) E of Agua Prieta, Cajón Bonito, 31.260°N 108.951°W, 1361 m elev., 25 July 2023. Desert grassland near riparian deciduous forest. A. Verver. [iNaturalist; Fig. 7A]; Municipality of

Gyalopion canum Cope, 1860 (Chihuahuan Hook-nosed Snake) is found from southeastern Arizona east to northwestern Texas and south in the Chihuahuan Desert on the Mexican Plateau to San Luis Potosí and Zacatecas (Degenhardt et al. 1996).

Fig. 6. *Gyalopion canum*. **A.** East of Rancho San Bernardino and Agua Prieta. Photo by E.F. Enderson. **B.** Rancho los Alisos, Sierra la Púrica. Photo by G. Molina-Padilla. **C.** West of Yécora. Photo by Erik F. Enderson (Enderson et al. 2006).

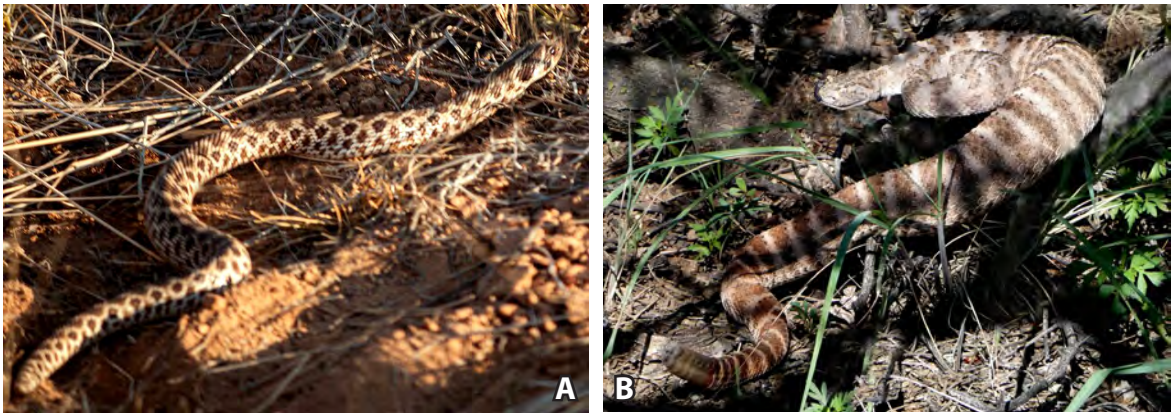


Fig. 7. A. *Heterodon nasicus* subsp. *kennerlyi*. Rancho Nuevo. East of Agua Prieta. Photo by A. Verver. **B.** *Crotalus tigris*. West-northwest of La Galerita. Photo by Ana L. Reina-Guerrero.

Cananea: Cananea and vic., 30.993°N 110.288°W, 1588 m elev., 1 August 1946, A. Taleporos, P. Taleporos, V. Walters, E.A. Williams [AMNH 67260-67261]; Ejido Zapata, 12.0 km (by air) ENE of Cananea, 31.031°N 110.169°W, 1449 m elev., 30 July 2017. Desert grassland. G. Molina-Padilla; Rancho los Álamos, ca. 6 mi E of Cananea, 30.967°N 110.205°W, 1419 m elev., 26 September 1954. Desert grassland. A. Ruff [UAZ 24946]. Municipality of Fronteras: Ca. 1.5 mi N of Esqueda, 30.746°N 109.585°W, 1193 m elev., 29 May 1967. Riparian desert grassland. J.W. Wright [LACM 1088840]. Municipality of Santa Cruz: Rancho Los Fresnos, 15.5 km (by air) NE of Santa Cruz, 31.318°N 110.467°W, 1543 m elev., April 2015. Plains grassland. Universidad de Sonora student (Rorabaugh et al. 2013).

Typhlopidae. *Indotyphlops braminus* (Daudin, 1803) (Braminy Blind Snake) is likely native to southern India but is widely introduced around the world in soil in pots of cultivated plants, including 24 Mexican states and Guatemala (Rorabaugh and Lemos-Espinal 2016, Servoss and Boundy 2020, Wallach 2020). It has been reported from states adjacent to Sonora, including Arizona, California, Baja California, Baja California Sur, and Sinaloa. In Sonora, it is known from Hermosillo (Quijada-Mascareñas and Enderson 2007) and Agua Prieta in those Municipalities. In Arizona, it is known from the Phoenix area, Casa Grande, and possibly Tucson (Servoss and Boundy 2020).

Selected records: Municipality of Agua Prieta, Agua Prieta, 31.314°N 109.565°W, 1190 m elev., 18 July

Indotyphlops braminus (Daudin, 1803) (Braminy Blind Snake) is likely native to southern India but is widely introduced around the world in soil in pots of cultivated plants, including 24 Mexican states and Guatemala (Rorabaugh and Lemos-Espinal 2016, Servoss and Boundy 2020, Wallach 2020).

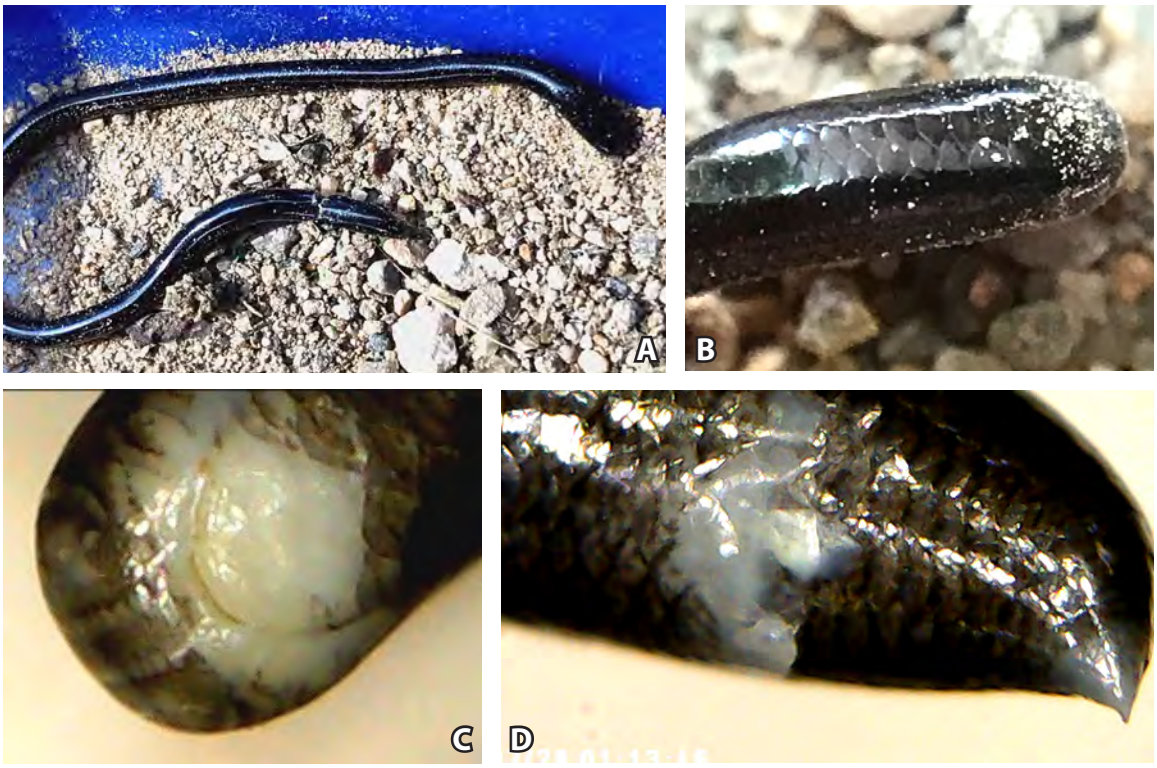


Fig. 8. *Indotyphlops braminus*. **A. B. C. D.** Agua Prieta. Photos by H. Daniel Pinto-Santana.

2022. Urban. H.D. Pinto-Santana (UABC 2619; Figs. 8A, B, C, D). Municipality of Hermosillo: Restaurant Viva Sonora, 11.2 km NE of Hermosillo on Carretera Hermosillo-Ures, 29.177°N 110.875°W, 478 m elev., 31 July 2017. Urban. J.H. Valdez-Villavicencio and A. Peralta-García (CH-UABC 2452).

Viperidae. *Crotalus tigris* Kennicott, 1859 (Tiger Rattlesnake). A 1962 m elevation locality in oak woodland in the Sierra San Luis extends the elevation range for the species above the 1555 record in the Santa Rita Mountains in southern Arizona (Goode and Parker 2020). The records from the Sierra San Luis (108.828ºW), Bavispe (108.946ºW), and Rancho El Valle (108.956ºW) are the easternmost records for the species. Records here are from the Municipalities of Agua Prieta, Bavispe, and Cananea.

Selected records: Municipality of Agua Prieta: Rancho El Valle, 53.8 km (by air) E of Agua Prieta, 31.307ºN 108.956ºW, 1603 m elev., 1 July 2019. Oak woodland along an arroyo in plains grassland. B. Dietrich. [iNaturalist]; Sierra San Luis, 67.8 km (by air) E of Agua Prieta, 31.245°N 108.828°W, 1962 m elev., 1 July 2024. Oak woodland. J. Chacón. [iNaturalist]. Municipality of Bavispe: Bavispe, 30.4675ºN 108.946ºW, 720 m elev., 26 July 2008. Desert grassland. T.R. Van Devender, A.L. Reina-Guerrero; Cañada El Salto, 7.2 km (by air) WSW of Bavispe, 30.459ºN 109.010ºW, 1155 m elev., 16 September 2024. Sycamore riparian vegetation in rocky stream canyon in desert grassland. R. Martinez, L. Ramsey, D.S. Turner (Turner et al. 2025); 8.4 km WNW of La Galerita, 30.446ºN 109.016ºW, 1386 m elev., 30 July 2024. Overgrazed desert grassland. G. Molina-Padilla, T.R. Van Devender, A.L. Reina-Guerrero (Fig. 7B). Municipality of Cananea: Cuitaca, 31.075ºN 110.495ºW, 1254 m elev., 29 September 2018. E. Burrola.

Acknowledgements—M. F. Enríquez-G., J. Chacón, dcafaggi, B. Dietrich, guille64890, G. Higalid, lopatuco, J.C. Nieto, and A. Verver posted their observations in iNaturalist. J.C. Nieto, R. Wayne Van Devender and A. Verver provided photos. Melanie Bucci provided University of Arizona Herpetological Collection photo voucher numbers.

Literature Cited

Babb, R.D. 2020. *Gyalopion canum.* Chihuahuan Hook-nosed Snake. Pp. 149-154 *in*: A.T. Holycross and J.C. Mitchell (eds.). Snakes of Arizona. ECO Publishing, Rodeo, NM.

Brennan, T.C., and A.T. Holycross. 2006. Amphibians and Reptiles of Arizona. Arizona Game and Fish Department, Phoenix.

Cochran, D.M. 1961. Type specimens of reptiles and amphibians in the U. S. National Museum. Bulletin of the U. S. Natural History Museum (22), 291 pp.

Conant, R. 1968. Zoological expedition in Mexico – the route of Lieut. Couch in 1853. American Museum Novitates No. 1350, 14 pp.

Degenhardt, W.G., C.W. Painter, and A.H. Price. 1996. Amphibians and Reptiles of New Mexico. University of New Mexico Press, Albuquerque.

Enderson, E.F., K. Bonine, and R.L. Bezy. 2006. Geographic Distribution. *Gyalopion canum.* Herpetological Review 37:362.

Enderson, E.F., A. Quijada-Mascareñas, D.S. Turner, P.C. Rosen, and R.L. Bezy. 2009. The herpetofauna of Sonora, Mexico, with comparisons to adjoining states. Check List 5:632-672.

Enderson. E.F., A. Quijada-Mascareñas, D.S. Turner, R.L. Bezy, y P.C. Rosen. 2010a. Una sinopsis de la herpetofauna con comentarios sobre las prioridades en investigación y conservación. Pp. 357-383 *in*: F. Molina-F. and T.R. Van Devender (eds.). Diversidad Biológica de Sonora, Universidad Nacional Autónoma de México, Hermosillo.

Enderson. E.F., A. Quijada-Mascareñas, D.S. Turner, R.L. Bezy y P.C. Rosen. 2010b. Una sinopsis de la herpetofauna con comentarios sobre las prioridades en investigación y conservación. Apéndice II *in*: F. Molina-F. and T.R. Van Devender (eds.). Diversidad Biológica de Sonora, Universidad Nacional Autónoma de México, Hermosillo.

Enderson, E.F., T.R. Van Devender, and R.L. Bezy. 2014. Amphibians and reptiles of Yécora, Sonora and the Madrean Tropical Zone of the Sierra Madre Occidental in northwestern Mexico. Check List 10:913-926.

Goode, M., and M.R. Parker 2020. *Crotalus tigris.* Tiger Rattlesnake. Pp. 612-625 *in*: A.T. Holycross and J.C. Mitchell (eds.). Snakes of Arizona. ECO Publishing, Rodeo, NM.

Heringhi, H.L. 1969. An ecological survey of the herpetofauna of Alamos, Sonora, Mexico. Master's thesis, Arizona State University, Tempe.

Lara-Resendiz, R.A., B.C. Larraín-Barrios, and J.H. Valdez-Villavicencio. 2017. *Hemidactylus turcicus* (Linnaeus, 1758), Mexico, Sonora. Mesoamerican Herpetology 4:198-199.

Legler, J.M., and R.G. Webb. 1970. A new slider (*Pseudemys scripta*) from Sonora, Mexico. Herpetologica 26:159-168.

Lemos-Espinal, J.A. 2007. Anfibios y reptiles del estado de Sonora. Universidad Nacional Autónoma de México. Informe final SNIB-CONABIO proyecto No. CE001, México, D.F.

Lemos-Espinal, J.A. 2015. Amphibians and Reptiles of the US Mexico Border States. Texas A and M University Press, College Station, TX.

Lemos-Espinal, J.A., and G.R. Smith. 2016. Amphibians and reptiles of the state of Coahuila, Mexico, with comparison with adjoining states.

Crotalus tigris Kennicott, 1859 (Tiger Rattlesnake). A 1962 m elevation locality in oak woodland in the Sierra San Luis extends the elevation range for the species above the 1555 record in the Santa Rita Mountains in southern Arizona (Goode and Parker 2020).

ZooKeys 593:117-137.
Lemos-Espinal, J.A., G.R. Smith, J.C. Rorabaugh. 2019. A conservation checklist of the amphibians and reptiles of Sonora, Mexico, with updated species lists. ZooKeys 829:131-160.
Lemos-Espinal, J.A., and H.M. Smith. 2009. Anfibios y Reptiles de Chihuahua, México. Universidad Autónoma de México, Tlalnepantla.
O'Brien, C., A.D. Flesch, E. Wallace, M.D. Bogan, S.E. Carrillo-Percástegui, S. Jacobs, and C. van Riper III. 2006. Biological inventory of the Río Áros, Sonora, Mexico: A river unknown. Final Report to T and E, Inc.
Peralta-García, A., and J.H. Valdez-Villavicencio. 2008. Geographic Distribution: *Hemidactylus turcicus* (Mediterranean Gecko). Herpetological Review 39:367.
Quijada-Mascareñas, A., and E.F. Enderson. 2007. Geographic Distribution, *Ramphlotyphlops braminus* (Braminy Blind Snake). Herpetological Review 38:490.
Rorabaugh, J.C. 2008. An introduction to the herpetofauna of mainland Sonora, with comments on conservation and management. Journal of the Arizona-Nevada Academy of Science 40:2-65.
Rorabaugh, J.C., and J.A. Lemos-Espinal. 2016. A Field Guide to the Amphibians and Reptiles of Sonora, Mexico. ECO Publishing and Distribution, Rodeo, NM.
Rorabaugh, J.C., and T.R. Van Devender. 2020. Amphibians and reptiles in wildlife cameras. Sonoran Herpetologist 33:40-48.
Rorabaugh, J.C., J.M. Servoss, V.L. Boyarski, E. Fernandez, D. Duncan, C. Robles-Elías, and K.E. Bonine. 2013. A comparison of the herpetofaunas of Ranchos Los Fresnos and El Aribabi in northern Sonora. Pp. 103-109 *in*: G.J. Gottfried, P.F. Ffolliott, B.S. Gebow, L.G. Eskew, and L.C. Collins (compilers), Merging Science and Management in a Rapidly Changing World: Biodiversity and Management of the Madrean Archipelago III and 7th Conference on Research and Resource Management in the Southwestern Deserts; 2012 May 1-5; Tucson, AZ, Proceedings RMRS-P-67, Fort Collins, CO: U. S. Department of Agriculture, Forest Service, Rocky Mountain Research Station.
Rorabaugh, J.C., D.S. García Turner, T.R. Van Devender, V.H. Cabrera, R.J. Maynard, R.W. Van Devender, R.A. Villa, P. Hamilton, S.F. Hale, C. Aguilar-Morales, A.C. Blanco-Gutiérrez, E. Wallace, and C. Hedgcock. 2019a. Herpetofauna of the Mesa Tres Ríos area in the northern Sierra Madre Occidental of Sonora, Mexico. Herpetological Review 50:251-259.
Rorabaugh, J.C., T.R. Van Devender, and G. Molina-Padilla. 2019b. *Sceloporus cowlesi* (Southwestern Fence Lizard). Geographic Distribution: Squamata – Lizards. Herpetological Review 50:329.
Servoss, J.M., and J. Boundy. 2020. *Indotyphlops braminus.* Brahminy Blindsnake. Pp. 672-677 *in*: A.T. Holycross and J.C. Mitchell (eds.). Snakes of Arizona. ECO Publishing, Rodeo, NM.
Smith, H.M., D. Chiszar, C.M. Eckerman, and H.D. Wallace. 2003. The taxonomic status of the Mexican hognosed snake *Heterodon kennerlyi* Kennicott (1860). Journal of the Kansas Herpetological Society 5:17-20.
Turner, D.S., J.C. Rorabaugh, T.R. Van Devender, and S.F. Hale. 2025. Amphibians and reptiles of the Sierra El Tigre Region, Sonora, Mexico. Sonoran Herpetologist 38:81-95.
Van Devender, T.R., and A.L. Reina-Guerrero. 2016. The tropical Madrean flora of Yécora, Sonora, Mexico. Phytoneuron 7:1-23.
Van Devender, T.R., A.M. Rea, and M.L. Smith. 1985. The Sangamon interglacial vertebrate fauna from Rancho La Brisca, Sonora, Mexico. Transactions of the San Diego Natural History Museum 21:23-56.
Van Devender, T.R., A.L. Reina-Guerrero, and J.M. Galaz-Galaz. 2024. Wildlife camera records in the lower Río Bavispe Valley and the core mammal fauna of eastern Sonora, Mexico. Journal of the Arizona-Nevada Academy of Science 50:44-54.
Wallach, V. 2020. First appearance of the Brahminy Blindsnake, *Virgotyphlops braminus* (Daudin 1803) (Squamata: Typhlopidae), in North America, with reference to the states of Mexico and the USA. Reptiles and Amphibians 27:326-330.

RESEARCH ARTICLE

Reflections on Beaded Lizards and Gila Monsters in Sonora, Mexico

Thomas R. Van Devender, University of Arizona Desert Laboratory on Tumamoc Hill and Greater Good Charities, Tucson, AZ; *yecora4@comcast.net*

Jim I. Mead, The Mammoth Site, 1800 Hwy 18 ByPass, Hot Springs, SD, and University of Arizona Desert Laboratory on Tumamoc Hill, Tucson, AZ; *jmead@mammothsite.org*

Erik F. Enderson, 5131 S. Hannah Heather Pl., Tucson, AZ; *erikenderson@icloud.com*

Abstract—*Heloderma horridum* subsp. *exasperatum* (Río Fuerte Beaded Lizard) is found in tropical deciduous forest from the Álamos area in southern Sonora north to the Yécora area. It has been found in foothills thornscrub near Ónavas and Cajón de Onapa south of Sahuaripa. Recently, it has been observed in tropical deciduous forest-oak woodland ecotone near Santa Rosa and Santa Ana; temperate oak woodland at Rancho Horquetudo south of Yécora near the Chihuahua border; and pine-oak forest on slopes of Mesa del Campanero west of Yécora. *Heloderma suspectum* (Gila Monster) is widespread in Sonoran desertscrub and desert grassland in Sonora. Surprisingly, *H. suspectum* has a larger distribution in tropical vegetation (thornscrub) in Sonora than *H. horridum*. The southernmost *H. suspectum* are in coastal thornscrub in southern Sonora. The two species have not been recorded in the same area but are potentially sympatric south of Sahuaripa and in the coastal thornscrub-tropical deciduous forest transition east of Navojoa and possibly in the Yocogigua area south of the Sierra de Álamos.

Heloderma evolved in tropical deciduous forest prior to the vulcanism that formed the Sierra Madre Occidental in the late Oligocene-middle Miocene (30 to15 million years ago = mya), modernizing the physiography, vegetation, fauna, flora, and climate of North America. It likely dispersed northward on the Mexican Plateau. *Heloderma texana* was a small early Miocene (25 to 20 mya) species in the Big Bend of Texas possibly related to *H. horridum*. Other fossil records are cf. *Heloderma* from the early-middle Miocene of Florida, *Heloderma* in Tennessee and Florida in the Miocene, and southwestern Oklahoma in the Pleistocene. As the mid-continent was uplifted, cooled, and dried, *H. horridum* was restricted to tropical areas to the south. Northern *Heloderma* moved into temperate grasslands west to Arizona and Nevada, evolving into the modern *H. suspectum*. *Heloderma suspectum* has a Pliocene-Pleistocene (2.7 to 2.4 mya) fossil record in Arizona. It became the iconic desertscrub species as the Sonoran Desert formed as tropical deciduous forest west of the Sierra Madre Occidental dried out in the middle Miocene (15 to 8 mya) and the Mohave Desert formed in the last two million years with the final uplift of the Sierra Nevada in the Pleistocene (2 to 1 mya). *Heloderma suspectum* in the Mohave Desert is probably the only *Heloderma* to ever live in a winter rainfall climate. The range of the derived *H. suspectum* expanded south to reenter the tropics (= thornscrub) in Sonora close to its deep historical tropical deciduous forest ancestor *H. horridum*.

Resumen—*Heloderma horridum* subsp. *exasperatum* (escorpión tropical) se encuentra en la selva baja caducifolia desde el área de Álamos en el sur de Sonora y llega en el norte hasta el área de Yécora. Se encuentra en matorral espinoso de piedemonte cerca de Ónavas y Cajón de Onapa al sur de Sahuaripa. Recientemente se observó en el ecotono de la selva baja caducifolia y el encinal cerca de Santa Rosa y Santa Ana; bosque de encino templado en Rancho Horquetudo al sur de Yécora cerca de la frontera con Chihuahua; y bosque de pino-encino en las laderas de la Mesa del Campanero al oeste de Yécora. *Heloderma suspectum* (escorpión del desierto) tiene una distribución amplia en el matorral desértico sonorense y el pastizal desértico de Sonora. Es muy interesante que *H. suspectum* tiene una distribución más grande en la vegetación tropical (matorral espinoso) en Sonora que *H. horridum*. Los *H. suspectum* más al sur se encuentran en el matorral espinoso costero en el sur de Sonora. Las dos especies no han sido registradas en la misma área, pero son potencialmente simpátricas al sur de Sahuaripa y en la transición matorral espinoso costero-selva baja caducifolia al este de Navojoa y posiblemente en el área de Yocogigua al sur de la Sierra de Álamos.

Heloderma evolucionó en la selva baja caducifolia antes del vulcanismo que formó la Sierra Madre Occidental a finales del Oligoceno-Mioceno medio (hace 30 a 15 millones de años), modernizando la fisiografía, la vegetación, la fauna, la flora y el clima de Norteamérica. Probablemente se dispersó hacia el norte en la meseta mexicana. *Heloderma texana* fue una pequeña especie del Mioceno temprano (hace 25 a 20 millones de años) en el Big Bend de Texas, posiblemente relacionada con *H. horridum*. Otros registros fósiles conocidos son el cf. *Heloderma* del Mioceno temprano-medio de Florida, *Heloderma* en Tennessee y Florida en el Mioceno, y el suroeste de Oklahoma en el Pleistoceno. A medida que el centro del continente se elevaba, enfriaba y secaba, *H. horridum* se restringió a las áreas tropicales del sur. El *Heloderma* del norte se trasladó a pastizales templados al oeste de Arizona y Nevada, evolucionando hasta el moderno *H. suspectum*. *Heloderma suspectum* tiene un registro fósil del Plioceno-Pleistoceno (2.7 a 2.4 millones de años) en Arizona. Se convirtió en la especie emblemática del matorral desértico a medida que el Desierto Sonorense se formó como resultado de que la selva baja caducifolia al oeste de la Sierra Madre Occidental se secó en el Mioceno medio (15 a 8 millones de años) y el Desierto Mojavense se formó en los últimos dos millones de años con el levantamiento final de la Sierra Nevada en el Pleistoceno (2 a 1 millones de años). *Heloderma suspectum* en el Desierto Mojavense es probablemente el único *Heloderma* que ha vivido en un clima de lluvia invernal. El rango del derivado *H. suspectum* se expandió hacia el sur para reingresar a los trópicos (= matorral espinoso) en Sonora cerca de su pariente ancestral de la selva baja caducifolia, *H. horridum*.

Introduction

In the Oligocene, tropical dry forests were continuous across the continent in Mexico. The vulcanism that formed the Sierra Madre Occidental in the late Oligocene-middle Miocene (30 to 15 million years ago = mya) modernized the physiography, vegetation, fauna, flora, and climate of North America (the Miocene Revolution; Axelrod 1979). The uplifts of the Sierra Madres Occidental and Oriental restricted tropical vegetation to the lowlands along the more southern coasts of the continent and in lower areas on the Mexican Plateau. For the first time, vegetation was segregated into elevational zones along climatic gradients, forming montane oak woodland and pine-oak forests from tropical species pre-adapted to cold. The fauna and flora were modernizing at the same time in the families Colubridae, Phrynosomatidae, Asteraceae, and Poaceae (Van Devender 2001).

Today, the New World tropics reaches its northern limit in Sonora, not as often stated at the Tropic of Cancer (23.37°N) just north of Mazatlán, Sinaloa. The northernmost tropical deciduous forest is in Sonora in the Sierra San Javier (28.6°N), 680 km north-northwest of Mazatlán and 300 km south of the Arizona border (Fig. 1). Thornscrub is the tropical vegetation type transitional between tropical deciduous forest and other vegetation types in

In the Oligocene, tropical dry forests were continuous across the continent in Mexico. The vulcanism that formed the Sierra Madre Occidental in the late Oligocene-middle Miocene (30 to 15 million years ago = mya) modernized the physiography, vegetation, fauna, flora, and climate of North America (the Miocene Revolution; Axelrod 1979).

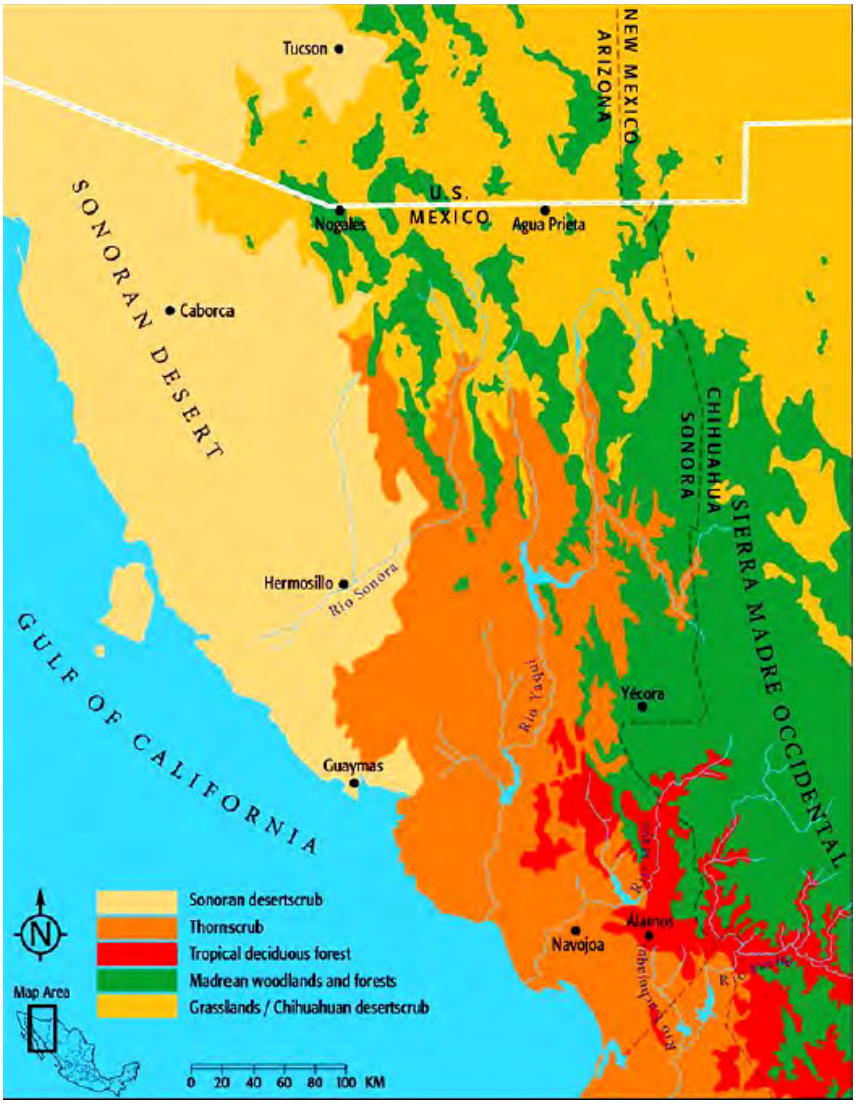


Fig. 1. Map of the vegetation of Sonora. From Van Devender and Reina-Guerrero (2021). Vegetation modified from Brown and Lowe (1982).

Sonora (Van Devender and Reina-Guerrero 2016). It is shorter in stature and more open than tropical deciduous forest. Coastal thornscrub is on the coastal plain of the Gulf of California from the Sinaloa border north to Guaymas and inland from Empalme to the San José de Pimas area. Foothills thornscrub is found inland on rocky slopes as far north as Arizpe and Angostura (30.4˚N, 104 km south of the Arizona border; Van Devender and Reina-Guerrero 2016), where it merges into temperate desert grassland as winters become colder.

The only venomous lizards in the Western Hemisphere are two species of *Heloderma. Heloderma horridum* (Wiegmann, 1834) (Mexican Beaded Lizard) is found in tropical deciduous forest from Chiapas and eastern Guatemala on the Atlantic slopes and southwestern Guatemala on the Pacific slopes north to southern Sonora south. *Heloderma suspectum* Cope, 1869 (Gila Monster) is found from western Sinaloa through Sonora, Mexico, to southwestern New Mexico, southern and northwestern Arizona, and southwestern California north to southern Nevada and southwestern Utah (Rorabaugh and Lemos-Espinal 2016). Here, we discuss the deep history and distribution and habitats where both species occur in Sonora. All locality records and images are in the Madrean Discovery Expeditions database (madreandiscovery.org).

Taxonomy

Reiserer et al. (2013) reassessed the taxonomy of *Heloderma horridum* following the molecular study of Douglas et al. (2010) with the addition of morphological characters. They verified that the four subspecies are different and recognized southern (*alvarezi* and *charlesbogerti*) and northern (*exasperatum* and *horridum*) groups. Although the same results support subspecies, they raised them to full species because the "outdated subspecies concept obscured the true genetic diversity and encumbered understanding of true diversity in the species." We view subspecies as

Reiserer et al. (2013) reassessed the taxonomy of *Heloderma horridum* following the molecular study of Douglas et al. (2010) with the addition of morphological characters. They verified that the four subspecies are different and recognized southern (*alvarezi* and *charlesbogerti*) and northern (*exasperatum* and *horridum*) groups.

Fig. 2. *Heloderma horridum* subsp. *exasperatum* in tropical deciduous forest. **A.** East of Los Camotes, south-southeast of San Bernardo. Photo by Doug Danforth, **B.** East-northeast of Álamos. Photo by Michael Chamberland. **C.** Near Tepoca. Photo by J.M. Bearce.

Van Devender et al. (2025a) presented an evolutionary scenario for *Heloderma* evolving in the tropics and dispersing north on the Mexican Plateau on the east side of the Sierra Madre Occidental.

a very useful concept that reflects natural selection and molecular data as a separate methodology based on random mutations. To us, two species, one with four closely related subspecies, is a better reflection of the diversity in *Heloderma*.

Deep History of *Heloderma*

Van Devender et al. (2025a) presented an evolutionary scenario for *Heloderma* evolving in the tropics and dispersing north on the Mexican Plateau on the east side of the Sierra Madre Occidental. *Heloderma texana* was a small early Miocene (25 to 20 mya) species in the Big Bend of Texas (Stevens 1977) possibly related to *H. horridum* (Mead et al. 2012). Bhullar and Smith (2008) reported fossils of cf. *Heloderma* from the early-middle Miocene of Florida. *Heloderma* appeared in Tennessee and Florida in the Miocene (Mead et al. 2012) and southwestern Oklahoma in the Pleistocene (Mead et al. 2021). As the mid-continent uplifted and the climate cooled and dried, the first true grasslands developed in the middle-late Miocene (10 to 8 mya, Axelrod 1985, Leopold and MacGinitie 1972, Martin 1975, Van Devender 1995). *Heloderma horridum* was restricted to tropical areas to the south. Northern *Heloderma* moved into temperate grassland west across Continental Divide to Arizona and Nevada, evolving into the modern *H. suspectum.* Reiserer et al. (2013) reported a molecular estimate of 30 mya for the separation of *H. horridum* and *H. suspectum.* It has a Pliocene-Pleistocene (2.7 to 2.4 mya) fossil record in Arizona (Mead et al.

Fig. 3. *Heloderma horridum* subsp. *exasperatum*. **A.** Southeast of Santa Rosa. Oak woodland-tropical deciduous forest ecotone. Photo by C. Grünwald. **B.** Northeast of Ónavas. Photo by J. V. Ortiz-V. **C.** West of Yécora. Pine-oak forest. Photo by Teresa Lasso.

2015). Today, it is an iconic species in the Mohave and Sonoran Deserts. Axelrod (1979) inferred that the Sonoran Desert with biseasonal rainfall formed as tropical deciduous forest west of the Sierra Madre Occidental and dried out in the middle Miocene (15 to 8 mya; Van Devender 2001). The Mohave Desert formed when the final uplift of the Sierra Nevada in the last two million years in the Pleistocene blocked moisture from the Pacific Ocean. *Heloderma suspectum* in the Mohave Desert is probably the only *Heloderma* to ever live in a winter rainfall climate. The range of the derived *H. suspectum* expanded south to reenter the tropics (= thornscrub) in Sonora close to its deep historical tropical deciduous forest ancestor *H. horridum.*

Sonoran Biogeography

Heloderma horridum subsp. *exasperatum* Bogert and Martín del Campo, 1956 (Río Fuerte Beaded Lizard) is found in tropical deciduous forest in southwestern Chihuahua (Lemos-Espinal and H.M. Smith 2009), northern Sinaloa (Lemos-Espinal and G.R. Smith 2020), and southern Sonora. It intergrades with *H. h*. subsp. *horridum* north of Mazatlán, Sinaloa (Fig. 6A; Beck 2005). In Sonora, it is known in the Municipalities of Álamos, Navojoa, Ónavas, Rosario, Sahuaripa, and Yécora as far north as Cajón de Onapa south of Sahuaripa (Rorabaugh and Lemos-Espinal 2016). It is expected to occur in the Municipality of Quiriego. The Ónavas record here is a range extension of 48 kilometers southwest of Agua Amarilla in the Municipality of Yécora and the first record in the Municipality of Ónavas (Fig. 3B). Cajón de Onapa and Ónavas are the first records in thornscrub.

Beaded lizards are in tropical deciduous forest in Municipality of Yécora near Tepoca on the western flanks of the Sierra Madre Occidental in eastern Sonora (Fig. 2C; Enderson et al. 2014). Surprisingly, it also occurs in temperate oak woodland on Oligocene basalt at Rancho Horquetudo south of Yécora near the Chihuahua border; in pine-oak forest west of Yécora on slopes of Mesa del Campanero (Fig. 3C); and in oak woodland-tropical deciduous forest ecotone near Santa Rosa (Fig. 3A) and Santa Ana. It was found at Agua Amarilla, an unusual area where low-elevation (900 m) pine-oak forest on hydrothermally altered soils is surrounded by tropical deciduous forest (Van Devender and Reina-Guerrero 2016). Elevations of 1857 and 1906 meters are higher than the range of 35 to 1560 meters in Rorabaugh and Lemos-Espinal (2016).

González-Elizondo et al. (2012) defined the floristic divisions of the Sierra Madre Occidental. The Yécora area in the Madrean Tropical subdivision on the northwestern crest of the Sierra Madre Occidental is strongly influenced by tropical vegetation on the Pacific slopes and precipitation from the Gulf of California. Other records of tropical animals in montane forests in Municipality of Yécora are *Dasypus novemcinctus* (Nine-banded Armadillo) in oak woodland at Los Pilares (1281 m elev.; Gallo-Reynoso et al. 2018); *Panthera onca* (Jaguar) in oak woodland near Restaurant La Palmita (1442 m elev.; Van Devender et al. 2024); *Gyalopion quadrangulare* (Thornscrub Hook-nosed Snake) in oak woodland

Heloderma horridum subsp. *exasperatum* Bogert and Martín del Campo, 1956 (Río Fuerte Beaded Lizard) is found in tropical deciduous forest in southwestern Chihuahua (Lemos-Espinal and H.M. Smith 2009), northern Sinaloa (Lemos-Espinal and G. R. Smith 2020), and southern Sonora.

Fig. 4. *Heloderma suspectum.* **A.** Rancho Los Ojos Calientes east of Agua Prieta. Desert grassland. Photo by Charles Hedgcock (Van Devender et al. 2017). **B.** Near Los Hoyos on Río Moctezuma (Silva-Kurumya et al. 2023). Foothills thornscrub. Photo by Gertrudis Yanes-Arvayo.

west of Restaurant La Palmita (1520 m elev.); *Leptodeira splendida* (Splendid Cat-eyed Snake) in oak woodland-tropical deciduous forest ecotone east-northeast of Santa Ana (1393 m elev.); *Masticophis mentovarius* (Neotropical Whipsnake) in pine-oak forest at Arroyo Mazatán near Agua Blanca (1618 m elev.), Los Vallecitos (1405 m elev.), and La Otra Banda in Yécora (1618 m elev.); and *Trimorphodon tau* (Mexican Lyresnake) at Vallecitos (1400 m elev.; Enderson et al. 2014). Tropical deciduous forest extends into the Municipality of Yécora on the west in the Río Yaqui drainage as a northern extension from the tropical western coast of Mexico (Fig. 1; Van Devender and Reina-Guerrero 2016, 2021). But tropical deciduous forest also occurs below 1000 m elevation near Moris, Chihuahua 41 km east-southeast of Yécora in the Río Mayo drainage. These tropical species are likely to occur there.

Heloderma horridum is a tropical deciduous forest species reaching its northern limits in southern Sonora (Schalbe and Lowe 2000). *H. suspectum* is mostly known as a desertscrub species in the Mohave and Sonoran Deserts but is also found in adjacent higher oak woodland. In southeastern Arizona and northeastern Sonora, it is common in desert grassland (Fig. 4A; Van Devender et al. 2017). However, *H. suspectum* has a larger range in tropical vegetation (thornscrub) in Sonora (Figs. 4B, 5A, B) than *H. horridum. Heloderma suspectum* is widespread in foothills thornscrub. Records here are in the Municipalities of Arizpe, Bacanora, La Colorada, Cumpas, Divisaderos, Granados, Mazatán, Moctezuma, Nácori Chico, Sahuaripa, San Javier, and Ures. Addition thornscrub records are in or expected to occur in a dozen other municipalities. It is present in foothills thornscrub-desert grassland transition on Rancho las Playitas near near Bacoachi (Turner et al. 2022). Its southern limits are in coastal thornscrub in the Municipalities of Guaymas and Navojoa and but is expected to occur in Cajeme and Empalme. The two species have not been found sympatric nor are hybrids known although their known distributions are close south of Sahuaripa where *H. horridum* is in a riparian habitat with foothills thornscrub on slopes above at Cajón de Onapa; and east of Navojoa and possibly in the Yocogigua area south of the Sierra de Álamos where coastal thornscrub merges into tropical deciduous forest. The northernmost tropical deciduous forest is between the thornscrub record of *H. horridum* near Ónavas and *H. suspectum* west of San Javier (Van Devender, Reina-Guerrero et al. 2025).

***Heloderma horridum* subsp. *exasperatum*:**
Selected records: Sinaloa: Municipality of San Ignacio: Arroyo los Otates, 8.0 km (by air) SE of Dimas, Meseta de Cacaxtla Área de Protección de Flora y Fauna, 23.682°N 106.713°W, 80 m elev., 9 May 2006. Tropical deciduous forest. A. van der Heiden (Fig. 6A). **Sonora:** Municipality of Álamos: 4.2 km (by air) E of Los Camotes, 14.8 km (by air)

Heloderma horridum is a tropical deciduous forest species reaching its northern limits in southern Sonora (Schalbe and Lowe 2000). *H. suspectum* is mostly known as a desertscrub species in the Mohave and Sonoran Deserts but is also found in adjacent higher oak woodland.

Fig. 5. *Heloderma suspectum* in foothills thornscrub. **A.** Los Lobos on Río Áros, north-northeast of Sahuaripa. Photo by Robert A. Villa. **B.** Near Nácori Chico (Rorabaugh et al. 2019). Photo by Paul S. Hamilton.

Fig. 6. A. *Heloderma horridum* subsp. *horridum*. Meseta de Cacaxtla north of Mazatlán, Sinaloa. Tropical deciduous forest. Photo by Albert van der Heiden. **B.** Potential new giant *Heloderma*. Rancho El Trigo Moreno, southwest of Maycoba, Sonora. Photo by T.R. Van Devender.

SSE of San Bernardo, 27.270ºN 108.793ºW, 333 m elev., 31 August 2006. Tropical deciduous forest. D. Danforth (Fig. 2A); Quebrada Limón, Arroyo San Pablo, Rancho Las Lajas, 31.2 km (by rd) E of Álamos, 27.064ºN 108.721ºW, 465 m elev., 9 October 2006. Tropical deciduous forest. M.A. Dimmitt, T.R. Van Devender (Fig. 2B); 17.0 km (by air) ENE of Álamos, 27.051ºN 108.766ºW, 510 m elev., 8 September 2013. Tropical deciduous forest. M. Chamberland; 1.6 mi E of Yocojigua on rd to Tojibampo, 26.810ºN 109.005ºW, 273 m elev., 1 November 1993. Coastal thornscrub-tropical deciduous forest transition. R.C. Averill-Murray [UAZ 57214-PSV]. Municipality of Navojoa: 17 mi (rd) E of Navojoa on rd to Álamos, 27.099ºN 109.169ºW, 242 m elev., 1 October 1986. Coastal thornscrub. J.V. Salmon, K. Larson [JVS 86-428, UAZ 46936); Municipality of Ónavas: 10.8 km (by air) NNE of Ónavas, 28.524°N 109.440°W, 601 m elev., 2 October 2022. J.F. Ortiz-V. [iNaturalist]. Municipality of Rosario:15.2 km (by air) NNE of El Rosario. 27.972ºN 109.321ºW, 580 m elev., 9 August 2023. Tropical deciduous forest. E. Hough [iNaturalist]. Municipality of Yécora: Agua Amarilla, 9.0 km (by air WNW Tepoca, 43.6 km W of Yécora on MEX 16, 28.467ºN 109.342ºW, 929 m elev., 7 September 2005. Tropical deciduous forest-pine-oak forest. E.F. Enderson, R.L. Bezy; 0.9 km (by air) ESE of Tepoca. 28.433ºN 109.245ºWW, 661 m elev., 9 August 2018. Tropical deciduous forest. J.M. Bearce [Fig. 2C; iNaturalist]; 3 km N of Curea on San Nicolás-Tesopaco highway, 28.329°N 109.267°W, 498 m elev., 29 September 2000. T.R. Van Devender, A.L. Reina-Guerrero; 0.6 mi (rd) W of Sahuaripa jct. (SON 12) on MEX 16 [2.1 km (by air) W of San Nicolás, 28.343°N 109.294°W, 720 m elev., 31 August 1986. Tropical deciduous forest. J.V. Salmon; Near jct. of rd to Sahuaripa on MEX 16 [6.4 km (by air) E of Tepoca], 28.432°N 109.195°W, 702 m elev., 24 July 2010. Tropical deciduous forest. J. Scheer; junction of Santa Ana and Santa Rosa roads on MEX 16, 3.4 km (by air) NW of Santa Ana, 28.413°N 109.126°W, 1034 m elev., 9 September 1996. Tropical Deciduous forest-oak woodland transition. T.R. Van Devender, A.L. Reina-Guerrero (Enderson et al. 2014); 5.2 km (by air) SE of Santa Rosa, 28.437ºN 109.076ºW, 1100 m elev., 1 September 2020. Oak woodland-tropical deciduous forest transition. C. Grünwald [Fig. 3A; iNaturalist]; 1.3 km (by air) W of Arroyo el Toro, Yécora, 28.364ºN 108.932ºW, 1549 m elev., 30 August 2025. Urban. Oak woodland-grassland. P. Churchill [iNaturalist]; 8.8 km (by air) W of Yécora, 28.371ºN 109.023ºW, 1906 m elev., 10 June 2020. Pine-oak forest. T. Lasso [Fig. 3C; iNaturalist]; 5.9 km (by air) WNW of Yécora, 28.362ºN 108.989ºW, 1857 m elev., 4 September 2021. Pine-oak forest. K. Kertell [iNaturalist]; Rancho El Horquetudo,11.7 km (by air) S of Yécora near Chihuahua border, 28.260ºN 108.944ºW, 1487 m elev., 10 June 2025. Oak woodland. F. Sotelo [iNaturalist].

***Heloderma suspectum*: Foothills thornscrub records:** Municipality of Agua Prieta: Ojo Caliente, Rancho Los Ojos Calientes, ca. 50 km (by air) ESE of Agua Prieta, 31.284ºN 108.990ºW, 1382 m elev., 24 April 2017. Desert Grassland. A.L. Reina-Guerrero, T.R. Van Devender, M. Brummerman (Fig. 4A): Municipality of Arizpe: Arizpe, 30.334ºN 110.166ºW, 827 m elev., 28 August 1958. C.H. Lowe [CHL 4177, UAZ 07229]; 1.3 mi W of Sinoquipe on Cucurpe Rd., 30.158ºN 110.260ºW, 789 m elev., 19 September 1982. S.F. Hale, T.B. Johnson, B. Spicer, F.W. Reichenbacher. Municipality of Bacanora: Rancho Toribusi, 11.5 km (by air) WSW of Bacanora, Sierra Murrieta, 28.940ºN 109.507ºW, 1220 m elev., 2 August 2014. E.F. Enderson [ASUHEP 000675, photo voucher, Van Devender and Turner 2023). Municipality of La Colorada: Rancho el Sahuarito, between San José de Pimas and Tecoripa, 28.608ºN 110.129ºW, 450 m elev., 17 February 2005. D. Morales. [UAZ059-PSV]; Rancho San Francisco, 33 km W of Tecoripa [29.5 km (by air) WNW of Tecoripa], 28.689ºN 110.243ºW, 474 m elev., 31 May 2008. A. Peralta-García APG 235, J.H. Valdez-Villavicencio; 3.7 mi E of Tecoripa on MEX 16, 28.617ºN 109.900ºW, 414 m elev., 28 August 1984. P.A. Holm, B.E. Martin [UAZ 46437]. Municipality

In southeastern Arizona and northeastern Sonora, it [*Heloderma horridum*] is common in desert grassland (Fig. 4A; Van Devender et al. 2017). However, *H. suspectum* has a larger range in tropical vegetation (thornscrub) in Sonora (Figs. 4B, 5A, B) than *H. horridum*.

of Cumpas: 11.3 km (by air) ESE of Cumpas, western side of Sierra de la Madera (Oposura), 29.958ºN 109.594ºW, 1107 m elev., 1 August 2010. D. Delgado, S. González-Elizondo, J. Sánchez-Escalante; 0.6 km (by air) SE of Los Hoyos, Río Los Hoyos (Río Moctezuma), 30.124ºN 109.788ºW, 807 m elev., 12 September 2018. G. Yanes-Arvayo (Fig. 4B; Silva-Kurumiya et al. 2023). Municipality of Divisaderos: Rancho Las Gallinas, 17.1 km (by air) ESE of Divisaderos, 29.573ºN 109.299ºW, 1283 m elev., 16 August 2016. J.M. Galaz-Galaz [wildlife camera image, Rorabaugh and Van Devender 2020]. Municipality of Granados: Rancho el Carricito, 16.4 km (by air) SSE of Granados, 29.721ºN 109.266ºW, 594 m elev., 18 August 2016. J.M. Galaz-Galaz (wildlife camera image). Municipality of Mazatán:18.3 mi E of Mazatán [17.4 km (by air) ESE of Mazatán], 28.894ºN 109.884ºW, 635 m elev., 8 August 1963. J.W. Wright [UAZ 09500]. Municipality of Moctezuma: Arroyo Tonibabi,11.3 km (by air) ENE of Moctezuma, Sierra de la Madera, 29.833ºN 109.564ºW, 763 m elev., 20 September 23. D.S. Turner, E.F. Enderson, S.F. Hale, R.L. Bezy; Rancho la Loba-El Básura, 24.6 km (by air) NE of Mazocahui, 29.611ºN 109.881ºW, 880 m elev., 11 September 2011. M.P. Montañez-Armenta, A.L. Hernández-Rodríguez. Municipality of Nácori Chico: 3.7 km (by air) NE of Nácori Chico, 29.713ºN 108.952ºW, 867 m elev., 5 August 2016. S.F. Hale, P.S. Hamilton (Fig. 5B; Rorabaugh et al. 2019). Municipality of Sahuaripa: 0.6 mi (rd) W of Sahuaripa, 29.040ºN 109.240ºW, 488 elev., 31 August 1986. J.V. Salmon, P.A. Holm [UAZ 46990]; Los Lobos on Río Áros, 40.0 km (by air) NNE of Sahuaripa, 29.367ºN 109.015ºW, 580 m elev., 18 July 2012. R.A. Villa, A.D. Flesch, S. Jacobs (Fig. 5A); Los Taraices, 28.0 km (by air) NNW of Sahuaripa, 29.286ºN 109.357ºW, 555 m elev., 13 September 2004. D. Danforth; Rancho Dubaral, 43 km (by air) NNE of Sahuaripa, Northern Jaguar Reserve, 29.441ºN 109.154ºW, 587 m elev. M.A. Gómez-Ramírez, C.E. Gutiérrez-González (Rorabaugh et al. 2011); Río Yaqui, 17.1 km (by air) NNW of Sahuaripa, 29.206ºN 109.276ºW, 389 m elev., 3 August 2005. S.E. Carrillo-Percástegui, M.D. Bogan. S. Jacobs, J.E. Wallace (O'Brien et al. 2006). Municipality of San Javier: 5.2 km (by air) W of San Javier, 28.592ºN 109.794ºW, 495 m elev., 17 July 1997. T.R. Van Devender, A.L. Reina-Guerrero; 5.4 km (by air) S of San Javier, 28.546ºN 109.738ºW, 510 m elev., 17 July 1997. T.R. Van Devender, A.L. Reina-Guerrero. Municipality of Ures: Arroyo El Bamuco, Rancho Los Yaquis, 12.0 km (by air) N of Pueblo de Álamos, 29.313ºN 110.136ºW, 688 m elev., 24 July 2019. N.L. Villanueva-Gutiérrez, J.M. Cirett-Galán; Rancho Los Yaquis, 12.4 km (by air) N of Pueblo de Álamos, 29.321ºN 110.133ºW, 697 m elev., 27 September 2019. J.M. Cirett-Galán, N.L. Villanueva-Gutiérrez.

***Heloderma suspectum*: Coastal thornscrub records:** Municipality of Guaymas: 11.5 mi (by MEX 15) S of Vícam, 27.602ºN 110.111ºW, 23 m elev., 21 August 1973. D.R. Frost [UAZ 36449]. Municipality of Navojoa: 2 mi S of Navojoa on MEX 15, 27.057ºN 109.439ºW, 45 m elev., 22 June 1968. C.H. Lowe, O.H. Soule [UAZ 25233]; 10 mi E of MEX 16 (in Navojoa) on Álamos rd, 27.079ºN 109.280ºW, 124 m elev., 22 July 1977. T.R. Van Devender, G. Whitely.

***Acknowledgments*—**J.M. Bearce, Paul Churchill, C. Grünwald, Eric Hugh, K. Kertell, Teresa Lasso, J.V. Ortiz-V., and F. Sotelo posted their observations and images in iNaturalist. Images in the figures are by Michael Chamberland, Doug Danforth, C. Grünwald, Paul S. Hamilton, Charles Hedgcock, Teresa Lasso, J.V. Ortiz-V., Robert A. Villa, Albert van der Heiden, and Gertrudis Yanes-Arvayo. Melanie Bucci provided information about specimens in the University of Arizona Herpetological collection. Ana Lilia Reina-Guerrero translated the *Resumen*. Dennis Caldwell drafted the map in Fig. 1.

Literature Cited

Axelrod, D.I. 1979. Age and origin of Sonoran Desert vegetation. Occasional Papers of the California Academy of Science 132:1-74.

Axelrod, D.I. 1985. Rise of the grassland biome, central North America. Botanical Review 51:163-200.

Beck, D.D. 2005. Biology of Gila Monsters and Beaded Lizards. University of California Press, Berkeley, CA.

Bhullar, B.-A., and K.T. Smith. 2008. Helodermatid lizard from the Miocene of Florida, the evolution of the dentary in Helodermatidae, and comments on dentary evolution in Varanoidea. Journal of Herpetology 42:286-302.

Brown, D.E., and C.H. Lowe. 1982. Biotic communities of the Southwest [map]. Scale 1:1,000,000: General Technical Report RM-78. U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fort Collins, CO.

Douglas, M.E., M.R. Douglas, G.W. Schuett, D.D. Beck, and B.K. Sullivan. 2010. Conservation phylogenetics of helodermatid lizards using multiple molecular markers and a supertree approach. Molecular Phylogenetics and Evolution 55:153-167.

Enderson, E.F., T.R. Van Devender, and R.L. Bezy. 2014. Amphibians and reptiles of Yécora, Sonora and the Madrean Tropical Zone of the Sierra Madre Occidental in northwestern Mexico. Check List 10:913-926.

Gallo-Reynoso, J.P., T.R. Van Devender, H. Cabrera-S., G. Suárez-G., J. Égido-V., L. Armenta-M., I.-D. Barba-A., and R.A. Castillo-G. 2018. Nine-banded armadillo (*Dasypus novemcinctus*) new records, distribution, and habitat in Sonora, Mexico.

Distribution and habitat. The Southwestern Naturalist 63:64-67.
González-E., M.S., M. González-E., J.A. Tena-F., L. Ruacho-G., and I.L. López-E. 2012. Vegetación de la Sierra Madre Occidental. Una síntesis. Acta Botanica Mexicana 100:351-403.
Lemos-E., J.A., and G.R. Smith. 2020. A checklist of the amphibians and reptiles of Sinaloa, Mexico, with a conservation status summary and comparisons with neighboring states. ZooKeys 931:85-114.
Lemos-E., J.A., and H.M. Smith. 2009. Anfibios y Reptiles de Chihuahua, México. Universidad Autónoma de México, Tlalnepantla.
Leopold, E.B., and H.D. MacGinitie. 1972. Development and affinities of Tertiary floras in the Rocky Mountains. Pp. 147-200 *in*: A. Graham (ed.). Floristics and Paleoclimates in Asia and eastern North America. Elsevier, Amsterdam. Netherlands.
Martin, P.S. 1975. Vanishings and future of the prairie. Geoscience and Man 10:39-49.
Mead, J.I., B.W. Schubert, S.C. Wallace, and S.L. Swift. 2012. Helodermatid lizard from the Mio-Pliocene oak-hickory forest of Tennessee, eastern USA, and a review of monstersaurian osteoderms. Acta Palaeontologica Polonica 57:111-121.
Mead, J.I., S. Holte, R.S. White, and R. McCord. 2015. Early Pleistocene (Blancan) helodermatid lizard from Arizona, USA. Journal of Herpetology 49:295-301.
Mead, J.I., N.J. Czaplewski, and K.S. Smith. 2021. *Heloderma* (Helodermatidae: Squamata) from the Apache Local Fauna, Pleistocene, southwestern Oklahoma. Journal of Herpetology 55:70-76.
Reiserer, R.A., G.W. Schuett, and D.D. Beck. 2013. Taxonomic reassessment and conservation status of the beaded lizard, *Heloderma horridum* (Squamata: Helodermatidae). Amphibian and Reptile Conservation 7:74-96.
Rorabaugh, J.C., and J.A. Lemos-E. 2016. A Field Guide to the Amphibians and Reptiles of Sonora, Mexico. ECO Herpetological Publishing and Distribution, Rodeo, NM.
Rorabaugh, J.C., and T.R. Van Devender. 2020. Amphibians and reptiles in wildlife cameras. Sonoran Herpetologist 33:40-48.
Rorabaugh, J.C., M.A. Gómez-R., C.E. Gutiérrez-G., J.E. Wallace, and T.R. Van Devender. 2011. Amphibians and reptiles of the Northern Jaguar Reserve and vicinity, Sonora, Mexico: A preliminary evaluation. Sonoran Herpetologist 24:123-131.
Rorabaugh, J.C., D.S. Turner, T.R. Van Devender, V.H. Cabrera, R.J. Maynard, R.W. Van Devender, R.A. Villa, P.S. Hamilton, S.F. Hale, C. Aguilar-M., A.C. Blanco-G., E. Wallace, and C. Hedgcock. 2019. Herpetofauna of the Mesa Tres Ríos area in the northern Sierra Madre Occidental of Sonora, Mexico. Herpetological Review 50:251-259.
Schwalbe, C.R., and C.H. Lowe. 2000. Amphibians and reptiles of the Sierra de Alamos. Pp. 183-199 *in*: R.H. Robichaux and D.A. Yetman (eds.). The Tropical Deciduous Forest of Alamos: Biodiversity of a Threatened Ecosystem in Mexico, University of Arizona Press, Tucson, AZ.
Silva-K., H., M.P. Montañez-A., G. Yanes-A., T.R. Van Devender, and A. Romero-R. 2023. Amphibians and reptiles of the Río Moctezuma Basin, Sonora, México. Sonoran Herpetologist 36:31-39.
Stevens, M.S. 1977. Further study of Castolon local fauna (Early Miocene), Big Bend National Park, Texas. Pearce-Sellards Series, Texas Memorial Museum 28:1-69.
Turner, D.S., T.R. Van Devender, S.F. Hale, R. Zach, R. Martínez, R.W. Van Devender, J.A. Salazar-M., G. Molina-P., W.C. Sherbrooke, C.A. Aguilar-M., J.H. Valdez-V., A. Peralta-G., S.L. Minter, H. Silva-K., R.A. Villa, G. Yanes-A., and M.P. Montañez-A. 2022. Amphibians and reptiles of Rancho Las Playitas, Sonora, Mexico. Sonoran Herpetologist 35:50-59.
Van Devender, T.R. 1995. Deep grassland history: Changing climates, evolution, biogeography, and community dynamics. Pp. 68-99 *in*: M.P. McClaran and T.R. Van Devender (eds.). The Desert Grassland. University of Arizona Press, Tucson.
Van Devender, T.R. 2001. Deep history and biogeography of La Frontera. Pp. 56-83 *in*: G.L. Webster and C.J. Bahre (eds.). Vegetation and Flora of La Frontera: Changing Plant Life of La Frontera: Observations on Vegetation in the United States/Mexico Borderlands, University of New Mexico Press, Albuquerque, NM.
Van Devender, T.R., and A.L. Reina-G. 2016. The tropical Madrean flora of Yécora, Sonora, Mexico. Phytoneuron 7-1-23.
Van Devender, T.R., and A.L. Reina-G. 2021. The vegetation of Sonora, Mexico. Phytoneuron 2021:67:1-22.
Van Devender, T.R., and D.S. Turner. 2023. The herpetofauna of the Municipality of Bacanora and the biogeography of the amphibians and reptiles of Sonora, Mexico. Herpetological Review 54:550-560.
Van Devender, T.R., J.C. Rorabaugh, F.I. Ochoa-G., and A.L. Reina-G. 2017. The Gila Monsters (*Heloderma suspectum*) of Cajón Bonito and the southern Four Corners area. Sonoran Herpetologist 30:43-46.
Van Devender, T.R., A.L. Reina-G., H. Silva-K., M.P. Montañez-A., G. Yanes-A. and G. Molina-P. 2024. Distribution and habitat of the jaguar (*Panthera onca*) in the Madrean Archipelago in northeastern, Sonora, Mexico. Journal of the Arizona-Nevada Academy of Science 50:35-43.
Van Devender, T.R., G.M. Ferguson, J.I. Mead, R.W. Van Devender, R.A. Villa, R.D. McCord, and D.S. Turner. 2025a. Deep history and evolution of the Ornata Group of box turtles (*Terrapene*: Emydidae: Emydinae). Sonoran Herpetologist 38:129-140.
Van Devender, T.R, A.L. Reina-G., and G.M. Ferguson. 2025b. Flora and history of the Tónichi area, Municipality of Sonora, Mexico. Plant Press Arizona. Winter 2025:22-39.

NATURAL HISTORY NOTE

Longevity in a Brooding Female Western Slimy Salamander (*Plethodon albagula*) from an Arkansas Mineshaft

Stanley E. Trauth, 13 Woodland Loop, Morrilton, AR; *trauthse@outlook.com*

In the fall of 1999, and with the assistance and initial funding from the U.S. Forest Service, I began a 19-year-long study of brooding female Western Slimy Salamanders (*Plethodon albagula*) in an abandoned mineshaft in the vicinity of Blakely Mountain Dam, which is located near Hot Springs in Garland County. The investigation was discontinued in 2017 upon my academic retirement as well as due to the spread of white-nose syndrome affecting some of the bats species that overwintered in the mineshaft. The focus of this natural history note is to reveal a unique method for estimating age in females of this species. Notable life history information published during this long-term project can be found in Konvalinka and Trauth (2003), Milanovich and Trauth (2005), Milanovich et al. (2005, 2006, 2007), Trauth et al. (2004, 2006), and McCallum et al. (2024).

Spillway Mine (Fig. 1A) is a linear shaft measuring ca. 2 m in height and 1.5 m in width. The shaft extends ca. 149 m into an east-facing and moderately sloping, rocky hillside. A gated entrance leads to a narrow sloping crawlspace which opens onto the mine floor. The first 30-50 m of the shaft floor contained water at various depths nearly year-round. The linear distance of the mineshaft had been previously laid out in by U.S. Forest Service personnel by staking metal spikes along the left wall/floor interface (Fig. 1A). Consequently, a numerical location for each nesting site could be recorded as being on the left or the right wall (e.g., L70 or R200). Initially, in order to avoid altering the behavior of brooding females as well as disrupting attachments of their egg clutches, no females were handled during the first four years; however, it was eventually determined that manipulation of females did not affect their ability to recognize their own egg clutch or nest site (McCallum et al. 2024). Also, normally only adult females reside in the mineshaft during the nesting season that can extend from mid-August to mid-January (Milanovich et al. 2006).

I used a photographic method to identify brooding females during the entire study. And because females may, at times, alter their brooding postures during incubation of an egg clutch, I chose to recognize individual salamanders by any unique spotting pattern residing on their tails (Trauth et al. 2006). Patterns on tails are normally easily discernible, because tails can be the most exposed body part of brooding females.

Overall, numerous brooding females have exhibited nest site fidelity at Spillway Mine (Milanovich et al. 2006, Trauth et al. 2006, McCallum et al. 2024). In addition, females of some large *Plethodon* species have biennial reproductive cycles (Highton 1962, Semlitsch 1980, Trauth 1984); therefore, it was possible that not all females would be expected to be found at their usual nesting sites every year. During off-years, a different female may occupy a nesting site of another female. For the present investigation, I examined photographs of several of the 61 brooding females from 2017 in an effort to match images with those at their nesting sites from previous years. This approach not only documented nest site fidelity but also provided a method to estimate minimal female age.

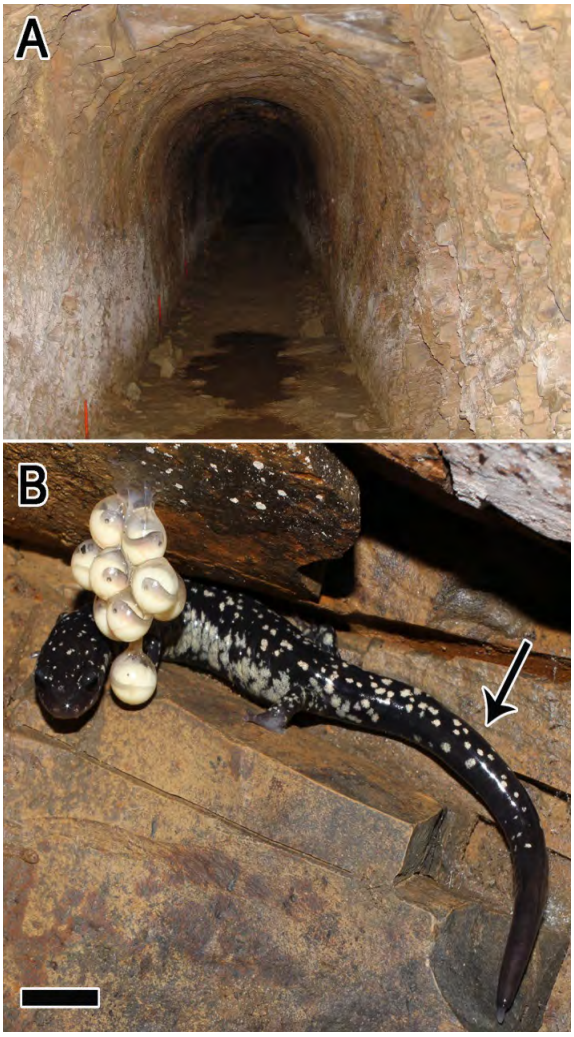


Fig. 1. A. Spillway Mine on 21 October 2003. Red metal stakes along the lower left side of the mine floor demark 10-foot intervals. **B.** Brooding female photographed at nesting site R283 on 3 November 2017. Arrow points to tail spotting pattern as shown in Figure 2. Scale bar equals ca. 10 mm.

In the fall of 1999, and with the assistance and initial funding from the U.S. Forest Service, I began a 19-year-long study of brooding female Western Slimy Salamanders (*Plethodon albagula*) in an abandoned mineshaft in the vicinity of Blakely Mountain Dam, which is located near Hot Springs in Garland County.

One particular female at nesting site R283 yielded the greatest time span (13 yrs) between her first observed nest and her last observed nest (Figs. 1 and 2).

Semlitsch (1980) determined that age at first reproduction in female *Plethodon glutinosus* at his study sites in Maryland and Pennsylvania was 5 yrs. Moreover, he found that the smallest mature female was 62 mm in snout-vent length (SVL). Likewise, I found that a minimum SVL of 62 mm was the smallest size of reproductively-active females in Alabama populations of *P. glutinosus* (Trauth 1984). Milanovich et al. (2006) recorded nesting females with SVLs from 58 to 72 mm at Spillway Mine. Interestingly, Taylor et al. (2015) found a somewhat smaller mature female body size (49.6 mm SVL) in one of their populations of *P. albagula* in central Texas. Also, their growth models predicted sexual maturity being reached sooner (ca. 2-4 yrs.) as compared to the assumed 5 yrs. of females brooding in Spillway Mine. Finally, they stated that a minimum life span could not be reliably estimated based upon modeling methods for salamanders in any of their populations.

Snider and Bowler (1992) documented a life span of at least 20 yrs for *P. glutinosus* (gender unknown) in captivity at a zoo. My finding with respect to one brooding female at Spillway Mine, therefore, supports a minimal life span for female *P. albagula* of 18 yrs, at the very least, which corresponds closely with that of captive *P. glutinosus*, a species of comparable body size.

Acknowledgments—I am grateful to the many colleagues, students, and one family member who accompanied me over the years on my visits to the mine. The list includes the following individuals by year: Ben Wheeler, Malcolm McCallum (1999-2000); Robyn (Konvalinka) Jordan (2001); Joy Trauth (2003); Joe Milanovich, Brian Caldwell, Michelle Mary (2004); Josh Engelbert, Jonathan Stanley (2006);

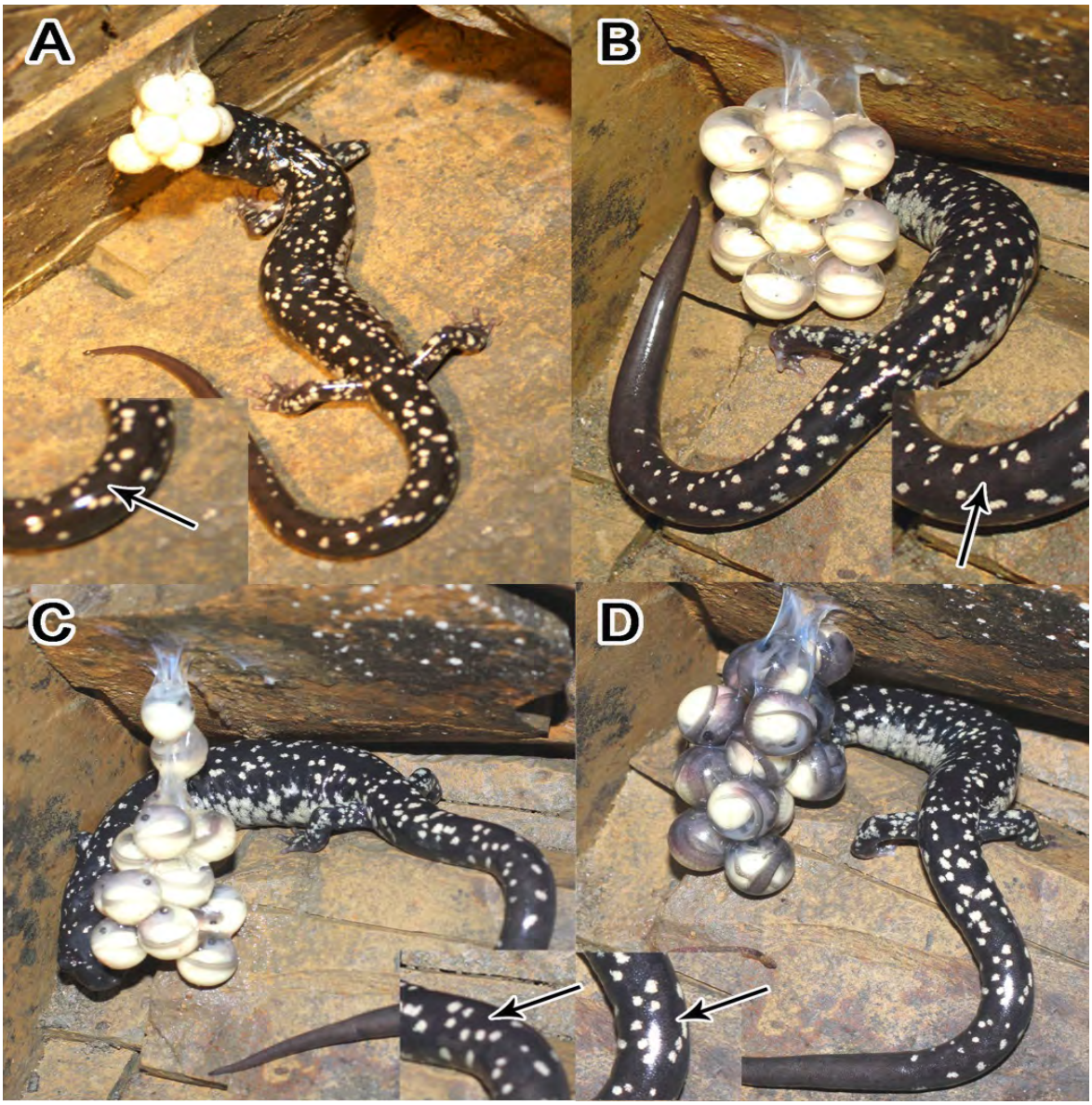


Fig. 2. Photographic record of a brooding female at nesting site R283 on 16 September 2005 **(A)**, 10 October 2009 **(B)**, 3 October 20014 **(C)**, and 24 November 2015 **(D)**. Photo insets contain guide to spotting pattern.

Semlitsch (1980) determined that age at first reproduction in female *Plethodon glutinosus* at his study sites in Maryland and Pennsylvania was 5 yrs. Moreover, he found that the smallest mature female was 62 mm in snout-vent length (SVL).

Chuck Vaughan (2007); Greg Robinson, Corey Schaffer (2009); David Saugey (2011); David Saugey, Dustin Siegel, Justin Rheubert, Abbigail Nicholson (2012); Matt Gifford, Johnny Konvalina, Don Shepard (2014), and Karl Studenroth (2015-2017). A special thank goes to David Saugey and Betty Crump for arranging early funding for this research through Challenge-Cost Share Agreements with the U.S. Forest Service and to Karl Studenroth, U.S. Army Corps of Engineers, for providing mine access and data gathering assistance.

Literature Cited

Highton, R. 1962. Geographic variation in the life history of the slimy salamander. Copeia 1962:597-613.

Konvalinka, R.R., and S.E. Trauth. 2003. *Thamnophis sirtalis sirtalis* (Eastern Garter Snake) and *Plethodon albagula* (Western Slimy Salamander). Predation. Herpetological Review 34:378.

McCallum, M.L., R.R. Jordan, J.R. Milanovich, and S.E. Trauth. 2024. Homing and egg discrimination in the Western Slimy Salamander, *Plethodon albagula* (Caudata: Plethodontidae). Journal of North American Herpetology 2024:120-124.

Milanovich, J.R., and S.E. Trauth. 2005. *Plethodon albagula* (Western Slimy Salamander). Vocalization. Herpetological Review 36:295-296.

Milanovich, J.R., S.E. Trauth, and M.N. Mary. 2005. *Diadophis punctatus stictogenys* (Mississippi Ring-necked Snake). Diet. Herpetological Review 36:323-324.

Milanovich, J.R., S.E. Trauth, R.R. Jordan, and D.A. Saugey. 2006. Fecundity, reproductive ecology, and influence of precipitation on clutch size in the western slimy salamander (*Plethodon albagula*). Herpetologica 62:292-301.

Milanovich, J.R., S.E. Trauth, and D.A. Saugey. 2007. *Plethodon albagula* (Western Slimy Salamander). Brooding defense behavior and oophagy. Herpetological Review 38:67.

Semlitsch, R.D. 1980. Geographic and local variation in population parameters of the slimy salamander *Plethodon glutinosus*. Herpetologica 36:6-16.

Snider, A.T., and J.K. Bowler. 1992. Longevity of reptiles and amphibians in North American collections. 2nd edition. SSAR Herpetological Circular 21:1-40.

Taylor, S.J., J.K. Krejca, M.L. Niemiller, M.J. Dreslik, and C.A. Phillips. 2015. Life history and demographic differences between cave and surface populations of the Western Slimy Salamander, *Plethodon albagula* (Caudata: Plethodontidae), in central Texas. Herpetological Conservation and Biology 10:740-752.

Trauth, S.E. 1984. Spermathecal anatomy and the onset of mating in the slimy salamander (*Plethodon glutinosus*) in Alabama. Herpetologica 40:314-321.

Trauth, S.E., H.W. Robison, and M.V. Plummer. 2004. The Amphibians and Reptiles of Arkansas. University of Arkansas Press, Fayetteville. xviii + 421 pp.

Trauth, S.E., M.L. McCallum, R.R. Jordan, and D.A. Saugey. 2006. Brooding postures and nest site fidelity in the western slimy salamander, *Plethodon albagula* (Caudata: Plethodontidae), from an abandoned mine shaft in Arkansas. Herpetological Natural History 9:141-149.

Sonoran Herpetologist Natural History Observations

The Tucson Herpetological Society invites your contributions to our Natural History Notes section. We are particularly interested in photographs and descriptions of amphibians and reptiles involved in noteworthy or unusual behaviors in the field. Notes can feature information such as diet, predation, community structure, interspecific behavior, or unusual locations or habitat use. Please submit your observations to Howard Clark, *editor.sonoran.herp@gmail.com*. Submissions should be brief and in electronic form.

Local Research News

The *Sonoran Herpetologist* welcomes short reports for our Local Research News. We are interested in articles that can update our readers on research about amphibians and reptiles in the Sonoran Desert region. These articles need be only a few paragraphs long and do not need to include data, specific localities, or other details. The emphasis should be on how science is being applied to herpetological questions. Please submit your materials to Howard Clark, *editor.sonoran.herp@gmail.com*. Submissions should be brief and in electronic form.

NATURAL HISTORY NOTE

Loggerhead Shrike Predation on a Juvenile Common Chuckwalla

Gordon Karre, Avian and Nature Enthusiast, Mesa, AZ (*https://desertwing.blogspot.com/); karhop1@msn.com*

In February 2021, I encountered a Loggerhead Shrike (*Lanius ludovicianus*) in South Mountain Park, Maricopa County, AZ. It had captured and presumably already impaled its prey on a nearby thorn. Being an avian enthusiast, I am always excited to observe the behaviors of many of the birds that I encounter, including their prey species. I am by no means an expert in herpetology, and I was quick to assume the prey item was most likely a Zebra-tailed Lizard (*Callisaurus draconoides*) or perhaps a Greater Earless Lizard (*Cophosaurus texanus*), both of which are common in South Mountain Park. The striped tail was the only thing that led me to think of those two species.

In January 2026, I posted one of my photos (Fig. 1) on my Facebook page thinking it was an unusual photograph of a Loggerhead Shrike and one of its behaviors. Someone on Facebook noticed the photo and commented that the lizard was a juvenile Common Chuckwalla (*Sauromalus ater*), which is a resident lizard species in South Mountain Park. That led me to do a little research on juvenile Chuckwallas and found out that juveniles have striped tails as well, but the stripes are different than my first impression back in 2021. The same person that posted on my Facebook page identifying the Chuckwalla then contacted other herpetologists to inquire if there had ever been any documentation of a Loggerhead Shrike capturing a Common Chuckwalla. Apparently, it had not yet been documented, so this article might be about 5 years later than the encounter, but is still relevant. Another Chuckwalla species, the Spiny Chuckwalla (*Sauromalus hispidus*), was documented by Grismer (2002) in a predation event, where he found the remains of a 90 mm juvenile impaled on a shrub by a shrike (see Rorabaugh 2003).

I realized another interesting point: lizards are not often active during cold weather, and since my observation took place on 2 February 2021, it may have been cold that day. However, when I checked the weather on that date, Phoenix, AZ, had a high of 81° F. So I suppose it is possible that a young lizard (probably hatched the year before) might have wandered out of its shelter to capture some warmth.

Literature Cited

Grismer, L.L. 2002. Amphibians and reptiles of Baja California, including its Pacific Islands and the Islands of the Gulf of California. University of California Press, Berkeley, CA.

Rorabaugh, J. 2003. Apparent Accidental Death: Chuckwalla Meets Agave. Sonoran Herpetologist 16:44.

In February 2021, I encountered a Loggerhead Shrike (*Lanius ludovicianus*) in South Mountain Park, Maricopa County, AZ. It had captured and presumably already impaled its prey on a nearby thorn.

Fig. 1. Juvenile Common Chuckwalla (*Sauromalus ater*) being predated upon by a Loggerhead Shrike (*Lanius ludovicianus*) in South Mountain Park, Maricopa County, AZ, on 2 February 2021. Photo by author.

BOOK REVIEW

A Field Guide to the Reptiles of Borneo

Review by Howard O. Clark, Jr., CWB®, CSE, Editor, Tucson Herpetological Society, Tucson, AZ; *editor.sonoran.herp@gmail.com*

During the Fall 2000 semester at Fresno State, while completing my master's degree in biology, I took a biogeography course (BIOL 275) taught by Dr. Steve Ervin. The class focused on island biogeography, covering topics such as island formation, colonization by plants and animals, and the use of islands as models for understanding evolutionary forces acting on wildlife. Dr. Ervin lectured on the Galápagos and Hawaiian Islands, highlighting how plants and animals adapt to the unique—and often challenging—conditions of island life.

Following these lectures, each student was assigned an island archipelago or island group to research and present to the class, with an emphasis on the biogeographical principles discussed throughout the course. I was assigned Borneo and, by random selection, was the first student to present. I thoroughly enjoyed researching Borneo and its remarkable wildlife, identifying key biogeographical themes and sharing with the class just how unique and fascinating the island is. My PowerPoint presentation lasted approximately 45 minutes and, unintentionally, set a high bar for those who followed. Coincidentally, the October 2000 issue of *National Geographic* featured a major article on Borneo, highlighting the island's wildlife, biodiversity, and environmental challenges (Laman 2000). I used the magazine as a prop during my presentation, drawing on its striking photographs of Borneo's wildlife and landscapes.

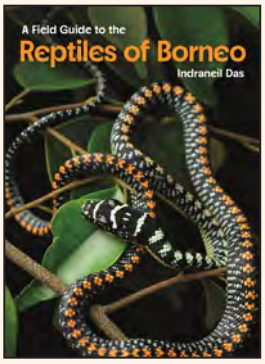
Coming full circle 25 years later, I had the privilege of reviewing a field guide on the reptiles of Borneo, authored by Indraneil Das. Dr. Das is a conservation biologist and professor at the Universiti Malaysia Sarawak's Institute of Biodiversity and Environmental Conservation, with primary research interests in reptiles and amphibians. His field guide fills a major knowledge gap by providing a comprehensive treatment of the 321 reptile species currently known from Borneo, with many more likely to be discovered in the future (see the **Appendix** for a breakdown of the reptile families covered in the guide).

The book opens with essential introductory material, including sections on geology and landscape, climate, vegetation, reptile fauna, snakebite management, and instructions on how to use the guide. In the "How to Use This Book" section, the author explains the structure of the guide, including species descriptions, abbreviations, conventions, and threat categories. Pages 13-14 feature topographical diagrams of the major reptile groups covered—turtles, lizards, and snakes—followed by a glossary of reptile-related terms used throughout the text.

A Field Guide to the Reptiles of Borneo

By Indraneil Das

Hardcover
Price: $45.00
ISBN: 9780691281223
Published: Feb 3, 2026
Pages: 376
Size: 6 x 8.25 in
Illus: 400 color photos; 300 maps



Book cover and other information.

The bulk of the guide consists of species accounts arranged in taxonomic order, beginning with crocodiles, followed by turtles, lizards, and snakes. Each major taxonomic section (i.e., family) opens with a dichotomous key that allows readers to quickly identify specimens. For example, page 22 provides a key for the Geoemydidae (Asian Hard-shelled Turtles), guiding the reader through diagnostic traits to one of the eight species found on Borneo, with page numbers directing the reader to the appropriate species account.

Species accounts begin with a callout box describing general diagnostic features of the genus, followed by individual species treatments. Each account includes common and scientific names (with author and year of description), size, identification features, coloration, habitat and behavior, distribution, and International Union for Conservation of Nature (IUCN) threat status. Every species is illustrated with one or more high-quality color photographs that clearly depict the animal without visual obstructions, along with a range map. Each species account is concise and presented on a single page.

Following the species accounts is a checklist of Borneo's reptiles, current as of October 2024, as well as sections for further reading, acknowledgements, and an index. Overall, the guide is exceptionally user-friendly and represents a significant resource for the study of Borneo's reptiles. Unlike some other field guides, however, it does not include a dedicated conservation section or broader discussion of Borneo's environmental future.

When I presented my biogeography research on Borneo years ago, I concluded with images documenting habitat loss and environmental degradation—already a major concern at the time, particularly regarding the fate of the Bornean Orangutan (*Pongo pygmaeus*). Today, reptile diversity on Borneo remains extraordinarily high, with more than 320 species, and continued conservation efforts

The book opens with essential introductory material, including sections on geology and landscape, climate, vegetation, reptile fauna, snakebite management, and instructions on how to use the guide.

are essential to ensure their long-term survival. This field guide is a must-have for anyone studying reptiles on Borneo and has the potential to serve as an important educational tool for advancing reptile conservation in the future.

Literature Cited

Laman, T. 2000. Wild Gliders: The Creatures of Borneo's Rain Forest go Airborne. National Geographic 198:69-85.

Appendix. Orders and Families covered in the guide and the number of species covered under each Order / Family.

Order and Family / Subfamily	Number of species covered
Order CROCODYLIA	
Family CROCODYLIDAE—True Crocodiles	3
Family GAVIALIIDAE—Gharials	1
Order CHELONIA	
Family GEOEMYDIDAE—Asian Hard-shelled Turtles	8
Family CHELONIIDAE—Sea Turtles	4
Family DERMOCHELYIDAE—Leatherback Sea Turtles	1
Family EMYDIDAE—New World Hard-shelled Turtles	1
Family TESTUDINIDAE—Land Tortoises	1
Family TRIONYCHIDAE—Softshell Turtles	5
Order SQUAMATA—SAURIA	
Family AGAMIDAE—Dragon Lizards	30
Family ANGUIDAE—Glass Snakes	1
Family DIBAMIDAE—Worm Lizards	3
Family EUBLEPHARIDAE—Eyelid Geckos	1
Family GEKKONIDAE—True Geckos	41
Family LACERTIDAE—Eurasian Lizards	1
Family LANTHANOTIDAE—Earless Monitors	1
Family SCINCIDAE—Skinks	48
Family VARANIDAE—Monitor Lizards	3
Order SQUAMATA—SERPENTES	
Family ACROCHORDIDAE—Wart Snakes	2
Family ANOMOCHILIDAE—Giant Blind Snakes	3
Family CYLINDROPHIIDAE—Pipe Snakes	3
Family PYTHONIDAE—Pythons	2
Family XENOPELTIDAE—Sunbeam Snakes	1
Family COLUBRIDAE—'Typical' Snakes	74
Family NATRICIDAE—Water Snakes	18
Family PSEUDOXENODONTIDAE—False Cobras	1
Family ELAPIDAE—Cobras, Kraits, Coral and Sea Snakes	
Subfamily ELAPINAE—Cobras, Kraits and Coral Snakes	8
Subfamily HYDROPHIINAE—Sea Snakes	20
Subfamily LATICAUDINAE—Sea Kraits	2
Family HOMALOPSIDAE—Puff-faced Water Snakes	10
Family PAREIDAE—Slug-eating Snakes	8
Family VIPERIDAE—Vipers and Pit Vipers	7
Family XENODERMATIDAE—Strange-skinned Snakes	2
Family TYPHLOPIDAE—Blind Snakes	6
Family XENOPHIDIIDAE—Spine-jawed Snakes	1
total	321

BOOK REVIEW

California Amphibians and How to Find Them

Review by Howard O. Clark, Jr., CWB®, CSE, Editor, Tucson Herpetological Society, Tucson, AZ; *editor.sonoran.herp@gmail.com*

Continuing the theme of discovering California's herpetofauna, Dr. Emily Taylor has produced an excellent instructional volume on California amphibians (see Taylor 2024, 2025, and reviews by Clark 2025a, b). The book addresses nearly 80 amphibian species occurring in the state, including frogs, toads, salamanders, and newts. Taylor notes that this work is not a traditional field guide; rather, consistent with her previous publications, its purpose is to introduce Californians and visitors to the rich and often overlooked natural history of amphibians.

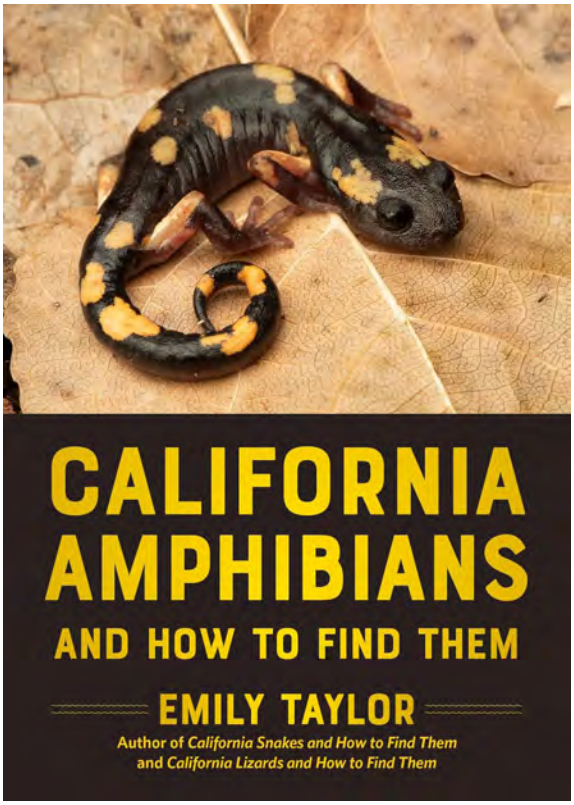
The Preface outlines Taylor's perspective on amphibians and articulates her vision for the book. Her fascination with California's amphibians began early in life, and her lifelong engagement uniquely positions her to inspire others to appreciate these critters. She also emphasizes the global decline of amphibian populations and the urgent need for conservation action to prevent further extinctions.

The Introduction contains several essential sections that frame key ecological concepts and conservation issues. Topics include California: *Amphibians' Wild Water Park, What Are Amphibians?*, *Some California Amphibians Are in Trouble*, *What Can We Do to Help California Amphibians?*, and *To Have and Hold Amphibians*. These sections are further subdivided and collectively provide a strong foundation for understanding amphibian ecology and stewardship.

Species accounts begin on page 29 with salamanders. Each account opens with a personal narrative, followed by standardized sections on appearance, natural history, distribution and variation, how to locate the species, and legal protections where applicable. For example, the California Tiger Salamander (*Ambystoma californiense*) is listed under both state and federal Endangered Species Acts, and the book appropriately cautions readers that handling or approaching these special status species may require permits.

Each species account includes one or more high-quality photographs depicting amphibians in their natural habitats, contributed by numerous accomplished California photographers. Non-native species are also included, with discussion of their origins and potential ecological impacts. Although individual range maps are not provided for each species, a map on page 80 illustrates the distribution of the seven *Ensatina* subspecies occurring in California. A comprehensive species list is provided in the Appendix.

The book concludes with acknowledgments, a further reading section, and an author biography. Overall, Dr. Taylor's volume is a strong addition to her "How to Find" series and represents a valuable resource for aspiring naturalists—particularly young readers interested in learning more about California's amphibian fauna.



California Amphibians and How to Find Them

By Emily Taylor

California Herping Guides
Paperback $24.00 | Print length: 240 pages | Publisher: Heyday
Publication date: February 3, 2026
Dimensions 5 x 2 x 7 inches | ISBN-13978-1597146999

Book cover and other information.

Overall, Dr. Taylor's volume is a strong addition to her "How to Find" series and represents a valuable resource for aspiring naturalists—particularly young readers interested in learning more about California's amphibian fauna.

Literature Cited

Clark, H.O., Jr. 2025a. Book Review—California Snakes and How to Find Them. Sonoran Herpetologist 28(1):44-45.

Clark, H.O., Jr. 2025b. Book Review—California Lizards and How to Find Them. Sonoran Herpetologist 28(2):118-119.

Taylor, E. 2024. California Snakes and How to Find Them. Heyday Books, Berkeley, CA. 208 pp.

Taylor, E. 2025. California Lizards and How to Find Them. Heyday Books, Berkeley, CA. 208 pp.

Appendix. California amphibian species covered in the book.

Amphibians Covered	Page Number
THE SALAMANDERS	
Family Ambystomatidae	
California Tiger Salamander (*Ambystoma californiense*)	30
Northwestern Salamander (*Ambystoma gracile*)	35
Long-toed Salamander (*Ambystoma macrodactylum*)	40
Western Tiger Salamander (*Ambystoma mavortium*)	45
Family Dicamptodontidae	
Giant Salamanders (*Dicamptodon ensatus* and *D. tenebrosus*)	49
Family Plethodontidae	
Clouded and Wandering Salamanders (*Aneides ferreus* and *A. vagrans*)	54
Black Salamanders (*Aneides flavipunctatus*, *A. iecanus*, *A. klamathensis*, and *A. niger*)	59
Arboreal Salamander (*Aneides lugubris*)	63
Greenhorn Mountains Slender Salamander (*Batrachoseps altasierrae*)	72
Desert Slender Salamander (*Batrachoseps aridus*)	73
California Slender Salamander (*Batrachoseps attenuatus*)	73
Fairview Slender Salamander (*Batrachoseps bramei*)	73
Inyo Mountains Salamander (*Batrachoseps campi*)	73
Hell Hollow Slender Salamander (*Batrachoseps diabolicus*)	73
San Gabriel Mountains Slender Salamander (*Batrachoseps gabrieli*)	73
Gabilan Mountains Slender Salamander (*Batrachoseps gavilanensis*)	73
Gregarious Slender Salamander (*Batrachoseps gregarius*)	73
San Simeon Slender Salamander (*Batrachoseps incognitus*)	73
Sequoia Slender Salamander (*Batrachoseps kawia*)	73
Santa Lucia Mountains Slender Salamander (*Batrachoseps lucide*)	74
Southern California Slender Salamander (*Batrachoseps major*)	74
Lesser Slender Salamander (*Batrachoseps minor*)	74
Black-bellied Slender Salamander (*Batrachoseps nigriventris*)	74
Channel Islands Slender Salamander (*Batrachoseps pacificus*)	74
Kings River Slender Salamander (*Batrachoseps regius*)	74
Recital Slender Salamander (*Batrachoseps relictus*)	74
Kern Plateau Salamander (*Batrachoseps robustus*)	74
Kern Canyon Slender Salamander (*Batrachoseps simatus*)	74
Tehachapi Slender Salamander (*Batrachoseps stebbinsi*)	75
Arguello Slender Salamander (*Batrachoseps wakei*)	75
Ensatina (*Ensatina eschscholtzii*)	77
Web-toed Salamanders (*Hydromantes brunus* and *H. platycephalus*)	83
Shasta Salamanders (*Hydromantes samweli*, *H. shastae*, and *H. wintu*)	89
Woodland Salamanders (*Plethodon asupak*, *P. dunni*, *P. elongatus*, and *P. stormi*)	94
Family Rhyacotritonidae	
Southern Torrent Salamander (*Rhyacotriton variegatus*)	100
Family Salamandridae	
Rough-skinned Newt (*Taricha granulosa*)	105
Red-bellied Newt (*Taricha rivularis*)	110
Sierra and California Newts (*Taricha sierrae* and *T. torosa*)	114
THE FROGS	
Family Ascaphidae	
Coastal Tailed Frog (*Ascaphus truei*)	122

Appendix (continued). California amphibian species covered in the book.

Amphibians Covered	Page Number
Family Bufonidae	
Western Toad (*Anaxyrus boreas*)	126
Arroyo Toad (*Anaxyrus californicus*)	131
Yosemite Toad (*Anaxyrus canorus*)	136
Great Plains Toad (*Anaxyrus cognatus*)	140
Black Toad (*Anaxyrus exsul*)	144
Red-spotted Toad (*Anaxyrus punctatus*)	148
Woodhouse's Toad (*Anaxyrus woodhousii*)	152
Family Eleutherodactylidae	
Common Coquí (*Eleutherodactylus coqui*)	156
Family Hylidae	
California Chorus Frog (*Pseudacris cadaverina*)	159
Pacific Chorus Frog (*Pseudacris regilla*)	164
Family Pipidae	
African Clawed Frog (*Xenopus laevis*)	170
Family Ranidae	
Red-legged Frogs (*Rana aurora* and *R. draytonii*)	175
Rio Grande Leopard Frog (*Rana berlandieri*)	181
Foothill Yellow-legged Frog (*Rana boylii*)	185
Cascades Frog (*Rana cascadae*)	190
American Bullfrog (*Rana catesbeiana*)	194
Mountain Yellow-legged Frogs (*Rana muscosa* and *R. sierrae*)	198
Northern and Southern Leopard Frogs (*Rana pipiens* and *R. sphenocephala*)	204
Family Scaphiopodidae	
Couch's Spadefoot (*Scaphiopus couchii*)	209
Western Spadefoot (*Spea hammondii*)	213
Great Basin Spadefoot (*Spea intermontana*)	218

CREATIVE WRITING

When the Desert Speaks

Howard O. Clark, Jr., CWB®, CSE, Editor, Tucson Herpetological Society, Tucson, AZ; *editor.sonoran.herp@gmail.com*

A slow walk across the desert pavement, each step marked by a delicate crunch underfoot. In the distance, the Cactus Wren calls—*char-char-char-char, rar-rar-rar-rar*. A mild breeze stirs the stillness, then a rustle in a nearby Joshua Tree draws my attention. Scraping and scratching sounds spark my curiosity. A dark blur darts behind the trunk. I circle the tree, and again the black form slips from view. Moving slowly, I try to catch it off guard. With a cautious stare and a flash of blue on its belly, we make eye contact—a Desert Spiny Lizard doing its best to remain unseen. The moment is brief; it vanishes into the canopy.

At my feet lie broken limbs, half-buried and cratering into the sand. Wildflowers bloom in scattered patches nearby. I gently roll one limb aside, and within the decaying bracts of accumulated debris, a slender, dark resident is revealed—a Desert Night Lizard. As I reach to cup it in my hands, it slips deeper into the brittle vegetation, perfectly matched to its surroundings.

In this brief desert journey, I realize the desert is speaking to me—I only need to listen.

Mojave Desert landcape. Photo by author.

In this brief desert journey, I realize the desert is speaking to me—I only need to listen.

Herpetofauna of Frederick Rindge's Historic Malibu Oasis

Howard O. Clark, Jr., CWB®, CSE, Editor, Tucson Herpetological Society, Tucson, AZ; *editor.sonoran.herp@gmail.com*

Frederick Hastings Rindge (1857-1905) was a wealthy New England-born businessman who moved to Los Angeles and later purchased the vast Rancho Topanga Malibu Sequit (the future Malibu) in the 1890s. His book *Happy Days in Southern California* Rindge 1898; reprinted in 1972, from which the quotations herein are sourced) is a nostalgic, semi-autobiographical account celebrating the region's natural beauty, climate, and lifestyle during the late 19th century.

Rindge portrays Southern California as a near-paradise, emphasizing its mild climate, dramatic coastlines, mountains, and fertile valleys. He contrasts the region favorably with New England, highlighting cool ocean breezes, picturesque sunsets, and the therapeutic qualities of the environment.

The book describes multiple lifestyles in the region, including coastal recreation at places like Santa Monica, Redondo, and Catalina Island, as well as ranch life on the Malibu estate. Rindge writes about horseback riding, hiking, farming, and encounters with wildlife, presenting the area as a place of wholesome outdoor living and family harmony.

Rindge includes observations of marine life, birds, reptiles, amphibians, plants, and geological features, blending amateur natural history with personal reflection. His tone is that of a Victorian gentleman naturalist, combining curiosity, religious reflection, and romantic admiration of nature.

The narrative often turns educational, expressing moral lessons, religious faith, and reflections on family life, and virtue. Rindge saw the land as divinely inspired and a refuge from the perceived excesses of urban life. The book contributes to the late-19th-century myth of California as an Edenic frontier. It served partly as promotional literature, encouraging settlement and investment by presenting Southern California as healthful, prosperous, and culturally uplifting.

His natural history observations are noteworthy, especially the interactions between wildlife species. Herein, I provide quotes from the book emphasizing his herpetofaunal wildlife notes, hinting at the rich wilderness the Malibu region once was.

A portrait of Frederick Hastings Rindge from his book *Happy Days in Southern California*, circa 1898. Photo courtesy Cambridge Historical Commission (*http://bit.ly/4cB5CfU*).

Rindge portrays Southern California as a near-paradise, emphasizing its mild climate, dramatic coastlines, mountains, and fertile valleys.

Salamander references

Taricha torosa

"Come up to the fern pool," our host said; and we walked there, two hundred yards from his house. Here was a sweet spring basin in a nest of ferns, with fresh green shrubs. Its beauty was marred by a water dog gliding across its waters. This water lizard seems out of place in beautiful Southern California, but of course he is not; in some way he has a mission. All loveliness has a lack in it somewhere. The repulsive water dog proves the rule that perfection is not found in earth's nature kingdom. It awaits us above" (p. 138).

Larval tiger salamanders are sometimes referred to colloquially as "water dogs," but the larval salamanders most likely encountered by casual natural history observers in the historical Malibu region would have been California Newts (*Taricha torosa*), as tiger salamanders probably did not occur there historically (see range maps in Hansen and Shedd 2025). Salamanders were frequently referred to as "lizards" in older literature because of their superficially similar body plans (Baum 2008). The quoted passage above suggests that the author held an unfavorable view of the "water dog."

Frog references

"One April day, in a roadside rain-water pool we saw a merry company of wriggling pollywogs, that were just changing into frogs. It was laughable to see them, half one, half the other. Soon the pollywog tail and skin will drop off, and, feet coming out, he

will graduate from the swimming school and become henceforth a hopper and a croaker. It is one of the many miracles of nature's mysteries" (p. 164).

Frog species mentioned here could be frogs or toads, such as the Western Toad (*Anaxyrus boreas*), Pacific Chorus Frog (*Pseudacris regilla*), or the California Chorus Frog (*Pseudacris cadaverina*).

Lizard references

Aspidoscelis tigris stejnegeri

"The long pipe-stem lizards sunned themselves near by, but they are not very harmful; they are so called because, if struck by a stick, their tails fly into as many pieces as a pipe stem when broken on the pavement. The common little lizards are harmless, sometimes being even used for pets. I do not like to recall the remembrance of a lady in Saint Augustine, Florida, I once knew, who had such a creature for a pet, feeding it regularly and taking it in her hand. A Californian I have known who would catch them, put them on his shoulder, and let them run at will over his back. These things are told to ward off fears of poison. The big pipe-stem fellows, however, I will not vouch for" (p. 138).

The lizard species mentioned in this passage most likely refers to the Coastal Whiptail (*Aspidoscelis tigris stejnegeri*; Hansen and Shedd 2025) which was a common resident in Malibu during the 1890s (See Guldimann 2016; *https://bit.ly/3OuBsRD*).

Phrynosoma blainvillii

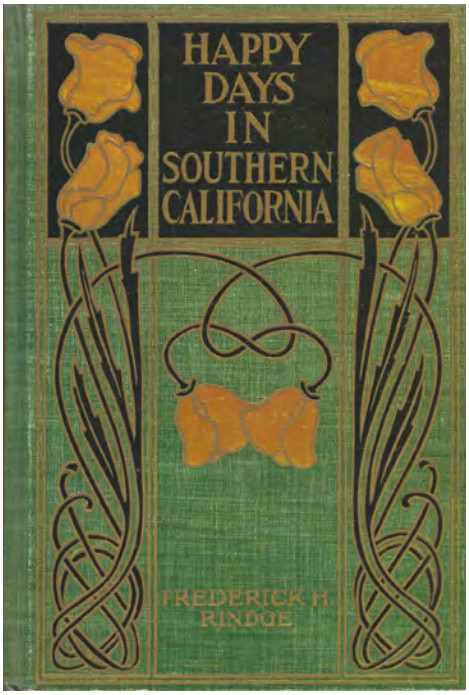
"The son began, saying that, as his subject was given him, he was at the mercy of circumstances, and would have to say that something was ludicrous in Southern California even if it was only to mention the odd little bow of a ground owl, the queerness of a baby horned-toad, or the remarkable assertion of a tenderfoot in the Pullman that Southern California was noted for its real-estate liars and its small stoves" (p. 181).

The lizard here, "horned-toad," refers to the Coast Horned or Blainville's Horned Lizard (*Phrynosoma blainvillii*; Hansen and Shedd 2025), with an extra bonus mention of a "ground owl," referring to the Burrowing Owl (*Athene cunicularia*; Sibley 2014).

Snake references

Crotalus helleri* and *Pituophis catenifer annectens

"Driving over the hard sand by the side of the sea is so exhilarating, inhaling the life-giving ozone as we go along! Hear the cracking and popping of the kelp pods as the wheels break them! Now the road leaves the beach and takes up on to the mesa. Mesas are elevated level lands; flat hills, if you will. Rolling along over



Nouveau book cover of *Happy Days in Southern California* (1972 Reprint edition), by Frederick H. Rindge.

the mesa through the alfilaria, the air is redolent with the musk this precious grass exhales when in bloom. Suddenly a road-runner, head down, darts out from some bushes, and taking to the road ahead of us the bird proves his name. How he can run! They are great snake-killers" (pp. 109-110).

"That day the conversation turned to rattlesnakes, and the old mountaineer told us this winterfearing reptile's trail was always curved, while a gopher snake makes a straight track. He knew the rattlesnake weed, of which the Mexicans make a pulp to bind on to snake-bite wounds. He told us how the road-runner offers battle to the rattler; how 'with caution he approaches his enemy, stretching one wing down as a shield and waits for the snake to strike. The wing is thrown to catch the bite, and, as quick as a flash and before the snake can recover, the runner with unerring aim sends his long beak, hard as ivory, through the head of his antagonist.' This language is not mine, but Captain Lapeyre's."

"For eight months and over the rattlesnake will live without food. How good of God to have made this venomous serpent of a different color from the grass! The non-poisonous gopher snake is, on the other hand, not easily seen, owing to his color. Providence!" (pp. 137-138).

Both rattlesnakes and gopher snakes are mentioned, with the rattler most likely the Southern Pacific Rattlesnake (*Crotalus helleri*) and the gopher snake the San Diego Gophersnake (*Pituophis catenifer annectens*; Hansen and Shedd 2025). The passage also includes a natural history account of the hunting behavior of the Greater Roadrunner (*Geococcyx*

"That day the conversation turned to rattlesnakes, and the old mountaineer told us this winterfearing reptile's trail was always curved, while a gopher snake makes a straight track. He knew the rattlesnake weed, of which the Mexicans make a pulp to bind on to snake-bite wounds."

californianus), which is particularly noteworthy given the age of the source and remains behaviorally accurate by modern standards (Sherbrooke and Westphal 2006).

Discussion

Tracing reptile and amphibian references from the 1890s proved intriguing. Terms such as "water lizard" and "water dog" were unfamiliar to me, but I discovered that they are common expressions in the fishing trade. Similarly, the term "horned-toad" remains in common vernacular today.

Several taxa mentioned in the text had only recently been described at the time of publication. For instance, the whiptail subspecies cited (*A. t. stejnegeri*) had been described just four years earlier, in 1894 (Van Denburgh 1894). Other taxonomic histories were more complex. The rattlesnake now recognized as *Crotalus helleri* was previously classified as a subspecies of the Prairie Rattlesnake (*Crotalus viridis*), designated *C. v. helleri* in 1905 (Meek 1905), whereas *C. viridis* itself was described in 1818 (Rafinesque 1818; see Holycross et al. 2008). *Taricha torosa* was first described in 1833 (Rathke, in Eschscholtz 1833), followed shortly by *Pituophis catenifer* (Blainville 1835), with the subspecies *P. c. annectens* described in 1853 (Baird and Girard 1853).

Rindge's book offers a rare and valuable window into a California landscape that has largely vanished. In the century following his journal, urban and agricultural development transformed the region into a landscape now generally devoid of wildlife—especially species currently in decline, such as the Burrowing Owl and Coast Horned Lizard. When I first read the book in 2007, I noted Rindge's mention of foxes, but concluded that, in context, he was likely referring to the Gray Fox (*Urocyon cinereoargenteus*), rather than the Long-eared Kit Fox (*Vulpes macrotis macrotis*), which still occupied the Los Angeles Basin during his lifetime (Merriam 1888). The book is a humbling read, and also a saddening reminder of how much has been lost.

Literature Cited

Baird, S.F., and C.F. Girard. 1853. Catalogue of North American reptiles in the Museum of the Smithsonian institution. Part I. Serpents. Pp. 1-172 *in*: Catalogue of North American reptiles in the Museum of the Smithsonian institution. Part I. Serpents. Smithsonian Institution, Washington, DC.

Baum, D. 2008. Trait evolution on a phylogenetic tree: Relatedness, similarity, and the myth of evolutionary advancement. Nature Education 1:191-197.

Blainville, H.-M. D. de. 1835. Description de quelques espèces de reptiles de la Californie, précédée de l'analyse d'un système général d'erpétologie et d'amphibiologie. Nouvelles Annales du Muséum d'Histoire Naturelle, Paris 4:233-296.

Eschscholtz, E. 1833. Zoologischer Atlas. Teil 5. Berlin. 28 p.

Hansen, R.W., and J.D. Shedd. 2025. California Amphibians and Reptiles. Princeton Field Guides. Princeton University Press, Princeton, NJ.

Holycross, A.T., T.G. Anton, M.E. Douglas, and D.R. Frost. 2008. The type localities of *Sistrurus catenatus* and *Crotalus viridis* (Serpentes: Viperidae), with the unraveling of a most unfortunate tangle of names. Copeia 2008:421-424.

Guldimann, S. 2016. The Malibu Post. *https://bit.ly/3OuBsRD* [Accessed 14 February 2026].

Meek, S.E. 1905. An annotated list of a collection of reptiles from southern California and northern lower California. Field Columbian Museum Publication Zoological Series 7:1-19.

Merriam, C.H. 1888. Description of a new fox from southern California. Proceedings of the Biological Society of Washington 4:135-138.

Rafinesque, C.S. 1818. Further discoveries in natural history, made during a journey through the western region of the United States. American Monthly Magazine and Critical Review 4:39-42.

Rindge, F.H. 1898 [1972]. Happy Days in Southern California. Anderson, Ritchie and Simon, Los Angeles, CA.

Sherbrooke, W.C., and M.F. Westphal. 2006. Responses of greater roadrunners during attacks on sympatric venomous and nonvenomous snakes. The Southwestern Naturalist 51:41-47.

Sibley, D.A. 2014. Sibley Guide to Birds (2nd ed.). Alfred A. Knopf, New York, NY.

Van Denburgh, J. 1894. Descriptions of three new lizards from California and Lower California, with a note on *Phrynosoma blainvillii*. Proceedings of the California Academy of Sciences, Series 2, 4:296-301.

Juvenile Coast Horned or Blainville's Horned Lizard (*Phrynosoma blainvillii*) hiding under vinegar weed (*Trichostema lanceolatum*), circa 2011, Carrizo Plain, San Luis Obispo County, CA. Photo by author.

Tracing reptile and amphibian references from the 1890s proved challenging, as period terminology often diverges from modern usage. Terms such as "water lizard" and "water dog" were unfamiliar and required interpretation, whereas "horny toad" remains in common vernacular today.

MEETING MINUTES

BOD minutes can be found here:
http://bit.ly/2m9tXiI

MEMBERSHIP

Membership Information

Individual	$20	Sustaining	$30
Family	$25	Contributing	$50
Student	$14	Life	$500

The Tucson Herpetological Society would like to thank existing members and new members for renewing their membership. We appreciate your support and are always looking for members to actively participate in THS activities and volunteer opportunities. It is a great way to be involved with the conservation of amphibians and reptiles in the Sonoran Desert.

Including the THS in your will is an excellent way to support the value of this organization and the conservation of the herpetofauna of the Sonoran Desert. We would like to recognize and thank anyone who has included the THS in their will. Please contact us so we can express our appreciation. For information about designating the THS in your will, please contact Ryan Perry, Treasurer, Tucson Herpetological Society, at *tucsonherps@gmail.com*.

What is Wild Apricot, Why is THS using it, and How can you use it?

The Board of Directors, Tucson Herpetological Society, Tucson, AZ; *tucsonherps@gmail.com*

Wild Apricot (WA) is a commercial data management service. We pay a fee and they take care of our data, our financial transactions, and our messaging. They use a payment system, AffiniPay, that is similar to PayPal but free to use for us as WA users.

We are using it because our former system for managing our data is broken and unfixable. With WA (after we make some corrections to data as we imported them) we will have a professionally managed system that we can trust. Using it will make the job of reporting on our member, non-member contact, and donation data accurate, precise and easy. If you are a member or have contacted THS in the past, you are in our contact database. We imported all of you into WA.

First you need to reply to the email you received and click the link to set a password for yourself. You should then check your information, add your address, and note if there are any errors. Email *tucsonherps@gmail.com* if you find anything wrong. Also email us if you did not receive or you lost the link and we will resend.

All Contacts will receive our general emails from WA and the link to our quarterly Newsletter-Journal, the *Sonoran Herpetologist*, which is an excellent publication on herpetological topics.

If you are a Member you will have access to all the past issues of the *Sonoran Herpetologist*. WA will automatically notify you when your membership is due for renewal. You have choices. You can renew at the same level or change your level. You can renew for one year at a time or select one of the auto-renew levels for a small discount (because we are grateful to you for making it easier for us all).

You can pay right away, online, by signing on to the WA payment system, which is very similar to PayPal (We are using it because using PayPal would result in additional charges to THS). It is entirely trustworthy.

If you do not pay right away the WA system will generate an invoice. Then you can return and pay the invoice online or print it out and mail us a check, in which case we will update your membership manually.

If your membership is already lapsed, you can renew it as per the instructions above. We will send out an email via WA to all lapsed members, asking them to renew. If you are a non-member Contact, we hope you will join as a member. If you want to make a donation, you can do that from our website or from WA. If you have a problem, email *tucsonherps@gmail.com* and we will help you. We can send you a hard copy form for memberships and donations to send by regular mail if you prefer.

Sonoran Herpetologist Natural History Observations

The Tucson Herpetological Society invites your contributions to our Natural History Notes section. We are particularly interested in photographs and descriptions of amphibians and reptiles involved in noteworthy or unusual behaviors in the field. Notes can feature information such as diet, predation, community structure, interspecific behavior, or unusual locations or habitat use. Please submit your observations to Howard Clark, *editor.sonoran.herp@gmail.com*. Submissions should be brief and in electronic form.

Local Research News

The *Sonoran Herpetologist* welcomes short reports on Local Research News in our journal. We are interested in articles that can update our readers on research about amphibians and reptiles in the Sonoran Desert region. These articles need be only a few paragraphs long and do not need to include data, specific localities, or other details. The emphasis should be on how science is being applied to herpetological questions. Please submit your materials to Howard Clark, *editor.sonoran.herp@gmail.com*. Submissions should be brief and in electronic form.

SONORAN HERPETOLOGIST
Newsletter-Journal of the Tucson Herpetological Society

Sonoran Herpetologist (ISSN 2333-8075 [online] 2577-9370 [print]) is the newsletter-journal of the Tucson Herpetological Society, and is Copyright © 1988-2026 (see Attribution License below). The contents of *Sonoran Herpetologist* may be reproduced for inclusion in the newsletters of other herpetological societies provided the material is reproduced without change and with appropriate credit, and a copy of the publication is sent to the Tucson Herpetological Society. Occasional exceptions to this policy will be noted. Contents are indexed in Zoological Record. A complete set of back issues are available in the Special Collections area of the University of Arizona library. They are accompanied by a copy of *The Collected Papers of the Tucson Herpetological Society, 1988-1991.*

Editor-in-Chief
Howard Clark, Jr., *editor.sonoran.herp@gmail.com*

Associate and Copy Editors
Dennis Caldwell | Anthony Pawlicki
Suman Pratihar | Lee Oler
Don Swann | Hill Johnson

Art Editor
Dennis Caldwell, *dennis@caldwell-design.com*

Book Review Editor
Philip Brown, *prbrownnaturalist@gmail.com*

Information for Contributors

Authors should submit original articles, notes, book reviews to the Editor, either via email using an attached word processed manuscript or by mail to the Society's address. The manuscript style should follow the guidelines currently posted on the website: *https://tinyurl.com/SonHerpGuidelines2025*

For further information, please contact the editor at: *editor.sonoran.herp@gmail.com*

https://portal.issn.org/resource/ISSN/2333-8075
https://portal.issn.org/resource/ISSN/2577-9370

The Tucson Herpetological Society is dedicated to conservation, education, and research concerning the amphibians and reptiles of Arizona and México.

Tucson Herpetological Society is a registered 501(c)(3) non-profit organization

The Tucson Herpetological Society does not discriminate against any person on the basis of gender, sexual orientation, marital status, creed, religion, race, color, national origin, age, economic status, disability, organizational affiliation, or any other physical, social, or economic factors.

TUCSON HERPETOLOGICAL SOCIETY
P.O. Box 709 Tucson, AZ 85702-0709

Officers

President Robert Villa

Vice President Patrick Brown

Secretary Open

Treasurer Ryan Perry

Directors (2026)
Howard Clark | Margaret Fusari | John Ginter
Karina Hilliard | Hill Johnson | Cassidy Lee | Lee Oler
Anthony Pawlicki | Michael Ruff | Dale Turner

Program Coordinator Open

Conservation Chair Dale Turner

Membership Ryan Perry , *tucsonherps@gmail.com*

Society Activities

Member's Meetings
We meet on the last Mon of every month at 7 PM with the exception of May, which is one week before Memorial Day, Nov, which is our annual meeting, and Dec when there's no meeting

Board of Directors Meetings
Quarterly as feasible, contact *tucsonherps@gmail.com* for more information

Speakers Bureau (scheduled presentations)
Patrick Brown, *phhbrown@gmail.com*

Herpetological Information Hotline
Bob Brandner, (520) 760-0574

Jarchow Conservation Award
Don Swann

Sonoran Desert Toad Fund
Robert Villa

C.H. Lowe Herpetological Research Fund
John Ginter

Publications:
Sonoran Herpetologist ("THS Newsletter", Feb '88 - Apr '90); Backyard Ponds brochure*; Living with Venomous Reptiles* brochure*; THS Herp Coloring Book; THS Collected Papers (1988-1991);* and *Native Plants for Desert Tortoises*

THS Webpage
http://tucsonherpsociety.org
Patrick Brown, Webmaster, *phhbrown@gmail.com*