



Beat Sheet

The Newsletter of the Colorado Spider Survey

Denver Museum of Nature and Science, Zoology Department,
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Arachnology Lab Updates

The arachnology lab had a busy field season. As regular readers of the *Beat Sheet* know, Paula Cushing and her colleague Matt Graham (a professor at Eastern Connecticut State University) received a \$1M National Science Foundation grant in 2018 to study camel spiders in the family Eremobatidae (see *Beat Sheet* #30). That funding allowed the DMNS lab to travel to nine states in northern Mexico during the summer of 2019 and allowed Matt Graham and his lab, along with DMNS Master of Science student, Ryan Jones, to travel throughout the Baja Peninsula in search of the elusive camel spiders. Paula and PhD student, Erika Garcia, joined their Mexican colleague, Edmundo Gonzalez-Santillan, and three of his undergraduate students on two expeditions throughout the northern states of Mexico. They drove several thousand miles, arriving at each locality late in the afternoon in time to set up pitfall trap arrays with lights hanging over the pitfalls to attract the camel spiders. As soon as darkness fell, the crew would set out wandering throughout the desert searching for camel spiders out hunting. During the course of the two expeditions, the teams collected over 200 camel spiders. Paula suspects that these specimens represent five to 10 species new to science.

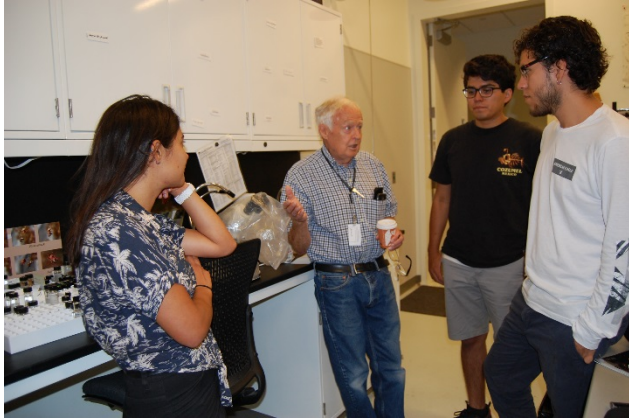


Erika Garcia, Edmundo Gonzalez-Santillan, Jair Castillo, Diana Batista, and Paula in Mexico.



A jar of death – some of the solifuges collected at one site.

In between the field expeditions, Paula flew Edmundo's three students, Diana Batista, Jair Castillo, and Oscar Mendoza to Denver where they received training on solifuge taxonomy from Paula's research associate, Jack Brookhart, one of the foremost experts on this group of arachnids.



Jack Brookhart imparting solifuge wisdom to Diana Batista, Jair Castillo, and Oscar Mendoza in the DMNS Arachnology lab.



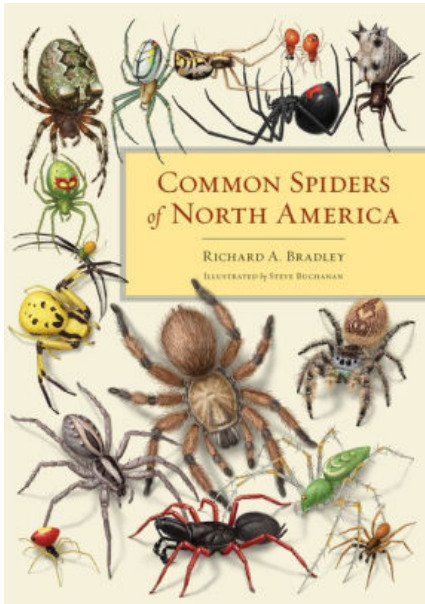
Ryan Jones and postdoc Carlos Santinbanez Lopez in the field in Baja.

Paula, Erika, Ryan, and Jack are now busy sorting and identifying all the arachnids collected throughout Mexico.

Upcoming Events

September 30th through October 9th: Paula will be teaching Spider Biology at the museum. The class will be taught from 6:30 – 8:30 p.m. on the following evenings: September 30th, October 2nd, October 7th, and October 9th. There will be a ½ day fieldtrip on Saturday, October 5th. The class costs \$110 for Museum members and \$140 for non-members. Go to <https://www.dmns.org/visit/events-and-activities/spider-biology/> to register.

Arachno-Links & Resources



Great News! Thanks to the letter writing campaign by you arachnophiles, the publishing house of Rich Bradley's fabulous field guide, *Common Spiders of North America* agreed to publish this beautifully illustrated guide as a much more affordable paper-back! Instead of \$95, it can now be purchased for \$30 - \$35 from any major bookseller. This is the premier field guide to over 400 species of spiders found in North America.

The following are some fun links to scientist interviews about their arachnology research or to interesting online arachnology-related videos:

Interview with Alexis Dodson on Science Friday. Alexis studies ant mimicking spiders and how they avoid predation through their mimicry: <https://www.sciencefriday.com/segments/how-jumping-spiders-avoid-becoming-a-tasty-snack/>

Various BBC clips about spiders, including pieces by David Attenborough: <http://www.bbc.com/earth/tags/spider>

A great lecture about love of spiders by our own arachnophile, Gini Philipp, who spoke at an “Ignite Boulder” event. You can hear her lecture at:

<https://www.facebook.com/igniteboulder/videos/478211969428981/>

In February, Paula was interviewed by two CU-Boulder graduate students who publish their own science podcast called “Buffs Talk Science.” You can hear their interview with Paula at:

<https://buffstalkscience.com/2019/02/20/>

In 2017, the Field Museum of Natural History’s own Curator of Curiosity, Emily Graslie, the host of the wonderful online series called “Brain Scoop” visited Denver and interviewed Paula about her research on camel spiders. In August of this year, Emily sent an email saying: “I wanted to write and let you know that the video we made with you back in 2017 has seen a recent surge in views. To date, it has more than 584,900 + views, with a watch time of 2.5 million minutes (!). Pretty good for something we did a few years ago! We don’t often see our past videos make such a strong comeback, but really, how could you not love camel spiders?! It’s the 5th most-watched video on our channel, ever.” If you haven’t seen this Brain Scoop episode, you can see it at:

<https://www.youtube.com/watch?v=4a9o6j0S570>

The online SCAN Symbiota database that the DMNS Arachnology lab uses to publish its collections data has now entered 41,000 database records! Not bad for a collection that is only 21 years old. You can search the DMNS arachnology data at: <https://scan-bugs.org/portal/>

Another website that would be of interest to readers of this newsletter is the World Spider Catalog – a continually updated taxonomic catalog of all 48,000 + species of spiders on earth!

Visit: <https://wsc.nmbe.ch/>

In Memoriam

Barbara York Main, Australia’s spider woman, author, and poet died in May of this year. Barbara was an expert on trapdoor spiders (mygalomorphs) and published on the life history of the oldest known spider – a 43 year old trapdoor spider in the species *Gaius villosus* whose demise in 2016 made news headlines worldwide. In an obituary about Barbara, Ann Jones said, “She wrote about and fought for the environment at a time when both the environment and women were given no fighting chance.” In her long lifetime as an arachnologist, Barbara published over 90 scientific research papers and four books about the spiders of Australia, not retiring until 2017 when she was 88 years old. Her influence on the careers of Australian arachnologists and scientists throughout the world is immeasurable.

Arachnids in the News

Sticky flatworms kill armored harvestmen. In October 2018, Rodrigo Willemart and colleagues published a paper in the *Journal of Zoology* (London) documenting the effective defensive strategies employed by a harvestman (order Opiliones) *Mischonyx cuspidatus*, against the predatory flatworm, *Cephaloflexa bergi*. The authors demonstrated that, although the flatworm was a formidable predator against the harvestman, the arachnid could sometimes fend off the attack with its own spiny body and defensive secretions leading the authors to hypothesize that “different predators exert different selective pressures culminating in the array of defenses exhibited by the prey.”

Shiny eyes in ancient spiders. In February 2019, paleoarachnologist, Paul Selden, and colleagues documented the first known incidence of a shiny tapetum in the eyes of an extinct spider family Lagonomegopidae from the Lower Cretaceous Jinju Formation in Korean shale (110 – 113 million years old). Many readers of this newsletter may know that one can find wolf spiders hunting at night by shining a flashlight down on the ground where the light reflects off a crystalline structure in the back of the eyes called a “tapetum” that maximizes the amount of light in the evening that hits the retina, allowing night active spiders to have pretty good night vision. Selden’s study demonstrated that this tapetum evolved a very long time ago indeed!

Horseshoe crabs are relatives of spiders. In a study published in March 2019, Jesús Ballesteros and Prashant Sharma used a genetic analysis to demonstrate that horseshoe crabs are in the class Arachnida. Horseshoe crabs have long been known to be chelicerates, broadly related to organisms in the class Arachnida. Ballesteros and Sharma's study demonstrates that they are more closely related to other orders in the class Arachnida than previously thought.

Giant sea spiders may be able to adapt to the warming ocean temperatures. In a study published in April 2019 in the *Proceedings of the Royal Society B* by Caitlin Shishido and colleagues, they tested the resilience of giant sea spiders (chelicerates in the class Pycnogonida) that live in the Antarctic Ocean (and whose leg spans can be more than two feet) under extreme conditions. The scientists wanted to find if these weird arachnids could withstand the warming temperatures of the oceans. These aquatic chelicerates have no respiratory organs and pick up all the oxygen they need through pores in their exoskeletons. The giant sea spiders living in the sub-zero waters of the Antarctic have very porous exoskeletons indeed and are well adapted to maximizing oxygen uptake even as sea water temperatures warm and oxygen levels change.

Love is in the air. In April 2019, Andreas Fischer published a review article in the *Journal of Arachnology* summarizing what is known about the chemical signals spiders use to attract mates, warn off competitors, attract prey, and repel predators. Fischer discussed not only the chemistry behind the signals released by spiders but also how important they are in the day to day lives of these animals. Some spiders use their silken webs not only to catch prey but also as platforms to broadcast their sex pheromones to as wide an audience of potential mates as possible. Some male spiders release an aphrodisiac pheromone that makes them irresistible to their lady loves. Other males cut and reduce the size of the webs made by the female of choice in order to reduce the sex pheromones released to the environment and, therefore, to reduce the number of competing consorts attracted to that female. In at least one species, as the male approaches a female, he releases a pheromone that induces catalepsy, making it impossible for the female to eat him as he mates with her. Just think, in the spring, as you breathe in the cool sweet smells of spring flowers, you may also be breathing in the subtle sex pheromones of spiders searching for love.

A tick in the ear is worth two in the...nevermind. In May 2019, it was reported that a 9 year old boy was admitted to the pediatric clinic in Connecticut with a "foreign body" in his right ear and complaining of buzzing noises. Turns out that a tick, *Dermacentor variabilis*, had crawled inside and attached itself to his tympanic membrane. The doctors managed to remove the tick and, besides being completely icked out (and probably very popular with other 9 year old boys at school), the boy suffered no consequences from the tick.

Peacock spider's bright colors enhanced by superblack spots. In a study published in May in the *Proceedings of the Royal Society B*, Dakota McCoy and colleagues demonstrated that the rainbow colors of the Peacock spider appear brighter and more garish than they really are through an optical illusion. Dark spots found in the midst of the colorful patterns are covered with bumps that manipulate incoming light in such a way that the black spots look darker than they really are, and making the colorful patches "pop" out in contrast.

We are not alone. In May, Michelle Trautwein, an entomologist at the California Academy of Sciences in San Francisco, reported on a study she had carried out in which she found that, of 2,000 worldwide visitors to the CAS, 100% of them had face mites living in the pores of their faces. Yes, that's right, we are not alone. We all have face mites living in our pores. These microscopic mites in the genus *Demodex* eat sebum, the greasy oil your skin makes to keep the skin from drying out. The sebum is produced by sebaceous glands, which coat hair follicles. The miniscule mites spend most of their time living inside these pores but, when we sleep, they crawl out onto the surface of our faces to mate before heading back into the pores to lay eggs. The mites are innocuous and only cause problems in those with compromised immune systems.

A fungus with spider powers kills the malarial parasite. In a May issue of the journal *Science*, researchers Brian Lovett and Raymond St. Leger published results of a study in which they inserted spider venom genes into a fungus, *Metarhizium pingshaense*, known to infect and kill mosquitoes. They found that inserting the

spider venom genes into this species of fungus made the fungus even more effective in killing *Anopheles* mosquitoes, known to be a vector of malaria. However, the experiment was carried out in a controlled environment so the researchers are uncertain how effective this would be in wild populations of mosquitoes.

Follow the other guys to true love. In a July study in the *Proceedings of the Royal Society B* journal, Catherine Scott demonstrated that male black widow spiders find females faster by following silk trails left behind by rival males.

Ancient Cambrian arthropod represents one of the earliest known chelicerates. In a September study published in *Nature*, Cédric Aria and Jean-Bernard Caron published on a Cambrian Burgess Shale arthropod fossil, *Mollisonia plenovenatrix*, that has characteristics suggesting it represents one of the most ancient lineages of chelicerate arthropods (the subphylum Chelicerata includes spiders and their relatives).

Participant News

Janis Weisbrot wrote in September 2018: “You’re probably familiar with it; but, just in case you’re not, an excerpt from *For Love of Insects* by Thomas Eisner: ‘Fresh out of graduate school, David Hill was an expert on spiders. I have wondered often why there are so few spider experts, given that spiders are so incredibly interesting. The answer, I think, lies in the fact that spiders have eight legs rather than six, and therefore don’t qualify for study by entomologists. Arachnologists are scarce because they must come into being on their own. There are no arachnological equivalents of entomology departments to churn them out in numbers. Just as well, I suppose. An arachnologist is thus more likely to be an original.’”

Jill Weigel, in December 2018, sent Paula a lovely photo of a tarantula, *Aphonopelma hentzi*, and wrote, “We enjoyed seeing this handsome fellow while driving along a remote road in the Organ Pipe National Park in southern Arizona, on a cool morning in late October of this year. They are sooooo cute!” In how many other newsletters do readers refer to tarantulas as cute, the editor asks?!

Bob and Sue Armstrong wrote in December 2018 about their own tarantula encounter: “Sue and I took your course in the spring and have enjoyed it many times over. We are taking a pre-Christmas trip to Texas and came across this friendly fellow [tarantula] in the parking lot at Amistad National Park just north of Del Rio. A Texas brown tarantula it appears. What a joy to see it ambling along and for us to know something about it – and of course have much more curiosity than fear, as most would have. We talk of you a lot as we find our spiders.”

Also in December 2018, Beckthetech wrote about an orbweaver spider she was trying to keep alive. Beck write, “Believe it or not, my orb weaver is still alive! She is in the basement. I put her in a small reptile carrier from Petsmart, along with some sticks and leaves she was used to. I’m not sure how old she is now, but by the time I discovered her over the garage door, she was nearly as big as a quarter, and that was August 16th. After I brought her inside, she hardly moved, she wouldn’t do anything, she stayed in the corner. In less than one week, I saw a most amazing sight – spider wrapped around a pale silk ball, nearly the size of a cotton ball, and her hugging it with all eight legs and not let go. She was now half the size she had been. Well, who knew she was a momma?! Since then I have put crickets and non-flying gnats [in with her] but she didn’t eat them. I’ve never had any luck with crickets and the other spider either. If only I could get a fly or a moth! I put her cage atop my indoor worm bin...I figured she was pretty much over her life span so I didn’t look for a few weeks. Along comes early December, and it’s time to aerate and feed/clean the vermiculture... And there’s Spider! Trucking around inside her cage, still alive, swinging from her sticks. She is still able to spin floss but not a web per se. I put some fresh water in there: a lot of flying gnats came in with the last harvest. I don’t know if she’s been eating those gnats, but the fact she’s still alive is amazing. And that she managed to survive to get that big to August 16th from whenever she hatched in May – with all these birds around here...clever beastie.”

David A. Leatherman wrote in January 2019: “I have put together a talk extolling the biodiversity of southeastern Colorado. I gave it last night to Fort Collins Audubon and will give a similar version of it again to Denver Field Ornithologists on January 28th. It includes brief mention of a few spiders, a scorpion

and a solifuge, and it includes photos by my long-distance lady friend, Janeal Thompson of Lamar. Janeal has become a fanatic about photographing spiders and during visits last year, my job when not birding or collecting insects for Boris [Kondratieff, of CSU] was finding spiders, chilling them in the fridge, and making them smile for the camera. You have maybe seen her [Janeal's] contributions to the Arthropods of Colorado listserv and elsewhere. We found one spider that is perhaps a new species of *Sassacus*, according to Wayne Maddison. It came from the outside wall of the Wellness Center at Lamar Community College, of all places. The specimen was let go after the photo session, unfortunately. We will look for more next summer."

Kelley Stevenson wrote in January 2019: "The Colorado Arachnid Club has become pretty well known now, which is exciting! We do everything from fairs and festivals, expos, educational programs, phobia programs, I teach a couple of college classes, I take our members on a yearly hunt, we go to schools of all levels, personal parties, we breed, we buy and sell and it has all been extremely exciting." You can find out more about this group at: <https://www.facebook.com/groups/380343932143412/>

Carissa Homme wrote in January: "I'm proud to say I'm doing arachno-outreach through Nature's Educators. Just Saturday I did a talk in Windsor and spent a good portion of the talk on arachnids and the important role they play in the ecosystem."

In April 2019, David Leatherman sent photos of a nursery web spider (family Pisauridae) found impaled by a loggerhead shrike in Weld County.

Brent Hendrixson, tarantula expert and colleague of Paula's, wrote an email June 2019 in response to an arachnophile with questions about the annual male tarantula movements seen in southeastern Colorado. Brent wrote: "Let me first say that 'mass migration' [of tarantulas in the late summer and fall] is a bit misleading. For one, the spiders are not technically migrating. In the United States (and I presume elsewhere), tarantulas have a fairly defined mating season when the males undergo their final molt, reach sexual maturity, and abandon their retreats in search of females. It is not uncommon to see numerous males



A male tarantula out wandering.

on rural roads during this time but I would never consider it a 'mass' emergence. You will not see hundreds on the roads in any given area despite stories to the contrary. I have observed perhaps 20 or so specimens on a highway in northern New Mexico but this was over a stretch of about 25 miles... The tarantulas in the United States do exhibit courtship behaviors but they are fairly simplistic and not entirely fantastic in my opinion. We still do not understand how males find the females but it probably starts with a random walk until the male detects female pheromones. He will begin to tap his pedipalps and legs on the ground near the female's retreat and will sometimes enter the retreat if she does not come up to the surface. She will show interest by tapping back. Mating usually takes place outside the burrow which is convenient if you want to

capture footage of the act itself. In the US (and many other locations), the males use hooks on their first pair of legs to secure the female's fangs (not necessarily to prevent predation but to gain leverage) and bend her backwards, making her genital opening more accessible to his pedipalps quickly but the female will occasionally capture him beforehand and make a meal of him. There are no nuptial gifts as in some other spiders."

In June 2019, arachnophile Jose Lujano wrote: "a female *Agelenopsis* [family Agelenidae]...has taken up residence on the windowsill above my desk in Hemet, California. We've had a surge in the number of fat houseflies around here recently, and the spider has been a great help in reducing their numbers. I've been casually observing the spider every day as I work, and noticed an interesting behavior – it appears she 'cleans' her web every night. Initially, I thought the dead flies on the windowsill under her web were just the normal dead flies that one finds between the curtains/blinds and the window pane, and not the spider's



Agelenopsis at the entrance to the funnel.

meals, since she also had one or two dead flies tangled in her web. But after a few days, I noticed that the dead flies were accumulating on the windowsill at the edge of the web rather than in the spots where I had seen them get tangled and eaten by the spider. The spider's steady diet of houseflies resulted in rapid growth, and she molted this week. I observed the molted skin at the back of her funnel. The next morning, the old skin had been moved out to the edge of the web! Has this 'cleaning' behavior been studied much?... I'm also curious if there's much information out there about territorial behaviors in *Agelenopsis*; another *Agelenopsis* has recently taken up residence in a different that kinds of interactions might be typical."

Paula forwarded Jose's questions on to her colleague, [Susan Riechert](#), whose research largely focuses on species in the genus *Agelenopsis*. Susan responded: "Hi Jose: I have done most of my field observational work on *Agelenopsis aperta*, which is a western grasslands species. Cleaning of the web is commonly observed and individuals even tend to take the same path in dumping prey off the edge. I expect the behavior has to do with the fact that it requires much energy to produce this silk sheet and attached funnel with layers of [silk] added daily to it. You could do that experiment yourself. I can say that I rarely see any *Agelenopsis* web of any species of the genus that has eaten prey left on the sheet." Susan did not mention it, but a lot of her cool research has focused on the territorial and aggressive behaviors of these spiders.

In July 2019, arachnophile [Hugh Yeman](#), sent Paula some great questions about the behavior of the spider *Uloborus glomus* (family Uloboridae), found out east. He wrote: "I'm most fascinated with web-shaking behavior, because I've spent so much time over the years observing it in *Cyclosa*. For years I've had questions bouncing around in my head which I doubt could ever be addressed in a research study. Does body shape correlate with web-shaking? Do trash lines correlate with web-shaking? When I first saw *U. glomus* a week or two ago, I thought I was looking at a species of *Cyclosa* I'd never seen before. When someone in the BugGuide group identified the specimens in my shots as *Uloborus*, those questions came rushing back to my mind. The *Uloborus* egg sac chain and the *Cyclosa* trash line are so functionally different, yet so structurally similar, that I was naturally curious about whether *Uloborus* displayed similar web-shaking behavior. The answer to that question might indicate whether the mere structural aspect of a weighted line on the web makes the web-shaking strategy more effective.

"I tried a few times to induce the web-shaking behavior in *U. glomus* with puffs of air and with gentle touches, but the only response I got was of the specimen dropping from the web. Not wanting to bother them anymore, I stopped trying to induce the behavior and surmised that *Uloborus* doesn't display the behavior – or if it does, it's not remotely as pronounced as it is in *Cyclosa*. Then I found your 1990 study on the effect of time and temperature on disturbance behaviors in *U. glomus*, and I was pleasantly surprised to see your numbers on web-shaking. Right now I'm refreshing my knowledge of heterogeneity tests and etc. because I like to understand the math when I read research articles, but I was never good at stats. Once I finish that article, I'll probably have some questions on the web-shaking. But for now, please give me your recommendations for any articles you know of about the adaptive advantages of web-shaking in general.

"Now, about *Uloborus* egg sacs. My questions boil down to this: What the heck am I looking at? They look like meringue! What are they made of? How does the spider make them spiky like that? Are they spiked in the same way that a meringue is spiked? In that case, is the spider making a frothy material similar to what a spittlebug makes? Or are those spikes the result of some sort of structural members poking out? Does she use insect remains in the egg sacs, the same way *Cyclosa* uses them in a trash line? Does she use bits of substrate? Presumably not, because I saw specimens on very different substrates, but all the egg sacs looked the same.

“I’ve included four photographs that piqued my interest in these questions. They’re not the greatest shots, but they’re not bad considering that I had my four-month-old daughter strapped to my chest.

“Specimen 1 has four egg sacs, and I think she’s making a fifth. It’s got a distinct greenish tint, which piqued my curiosity about the building material. Is there mulched substrate in there? Do spiders even have mouth structures that are capable of mulching the substrate? Theoretically any labidognathous spider should be able to do that, but I have no idea whether it’s practicable. Is there a leafhopper in there? You can see the little pointy bits, but they’re not as pronounced as they are in the dry sacs. My guess is that there are some sort of ‘struts’ present, and that when the sac dries, it gets ‘shrink-wrapped’ so that those members poke out more.

“Specimen 2 has a whopping seven egg sacs already--the most I’ve seen so far. And she’s working on... something. An eighth egg sac? Again, I see some pointy bits. But this time the object is pink. So again... what am I looking at?

“Oh, one last simple question: After observing the same one or two dozen webs over the span of a week or two, I’ve noticed a high percentage of webs with egg sacs but no spider. Does *U. glomosus* abandon her egg sacs to start new webs? The abandoned webs did not have a high number of sacs, so I’m leaning toward thinking this was predation.”

Paula wrote back: “I can answer a few of your questions. First, the weird objects that the spiders are ‘working’ on [in photos Hugh sent] are wrapped prey items that they are feeding on. The spider typically rests in the web with the front legs appressed together such that it would be difficult for a predator to ‘see’ the spider’s body as anything different from the line of eggsacs. The fact that the spider in your photo has the front legs splayed apart with some mysterious object placed in the center toward the mouth of the spider indicates that the spider is feeding on a wrapped insect. The color of the object has to do with what the insect is inside that wrapping. As for how the spider makes the eggsacs, the eggsacs are made entirely of silk. Spiders (in general, not just *U. glomosus*) lay a silken platform, or cup; then lay the eggs; as the eggs are leaving the spider’s body, she also releases sperm from the spermathecae (thus, the eggs are fertilized just before they are laid); she deposits the eggs in the silken cup; then she covers the eggs with another layer or two (or more) of silk. The silken eggsac protects the eggs from desiccation, from predators...and from other environmental perturbations.”

Kelley Stevenson wrote in August 2019: “This year I moved to a new house. I found two *Geolycosa rafaelena* [Lycosidae] adult females – so exciting! One has a bunch of babies in her burrow with her almost to juvie stage. There are a bunch of them! The one in the front yard is the one with all of them in the same burrow and is around 2.5” in diagonal leg span.” Later that month, Kelley wrote that she collected one of the spiders and found that “She is either a juvenile or sub-adult. I put her in a temporary enclosure with deep substrate about 6 – 7”. Her natural environment was in soil that was pretty sandy. So her substrate has sand added to it. The bottom of her burrow was a little damp so I’m making sure to mimic the same humidity level. Her burrow was a total of 1 and ½ - 2 feet straight down. She has yet to make a new burrow, so I may just start one for her.” In September, Kelley sent an update: “Despite my carefully thought out burrow design, she decided that it wasn’t up to her standards and made her own right next to it! LoL. She has a voracious appetite and eats young Madagascar hissing cockroaches like candy. I keep her around 75° and there is about 30% humidity in my critter room most of the time. Happy keeping to all my fellow arachnophiles out there!”

In August, Chris Story, former employee at Bluff Lake Park wrote: “I enjoyed the piece on NPR this morning [a re-broadcast of a story first recorded last year about male tarantulas in southeastern Colorado]. I captured one of those tarantulas in the lava flows on a road trip with my parents when I was little. It also reminded me that when I lived in Boulder, a friend of mine lived in Spanish acres – it’s the development on that plateau as you’re driving into Boulder before descending into town. There’s a population of very large burrowing wolf spiders on that plateau – much larger than anything else I’ve seen in this part of the state.”

Felix Channiago – former Teen Science Scholar and teen intern with Paula – wrote in September 2019: “I just wanted to update you regarding the one solifuge that I have been keeping alive as well as some notes regarding behavior. If I recall correctly, this solifuge dug, made a retreat, and was dormant from last Thanksgiving (2018) until 5 September 2019. It did not eat for almost a year and just recently molted (5 September 2019). At first, I thought the camel spider was dead, because of the molting posture and the whitening in its eyes. However, when I returned home to help my parents, I checked to make sure it is dead but discovered the molt on one side of the retreat and a fairly large specimen on the other. From these observations, I have a simple hypothesis. During our trip to the desert, we collected a good amount of beetles in our temporary and permanent traps. Could the younger specimen include beetle larvae in their diet when underground? I believe that most beetle larvae reside deep under the ground and could potentially pass a solifuge’s burrow. I am currently letting the camel spider harden its exoskeleton and would like to perform this experiment next weekend. Hopefully my current husbandry methods would allow me to grow this juvenile solifuge into an adult!”