The Black Range Naturalist

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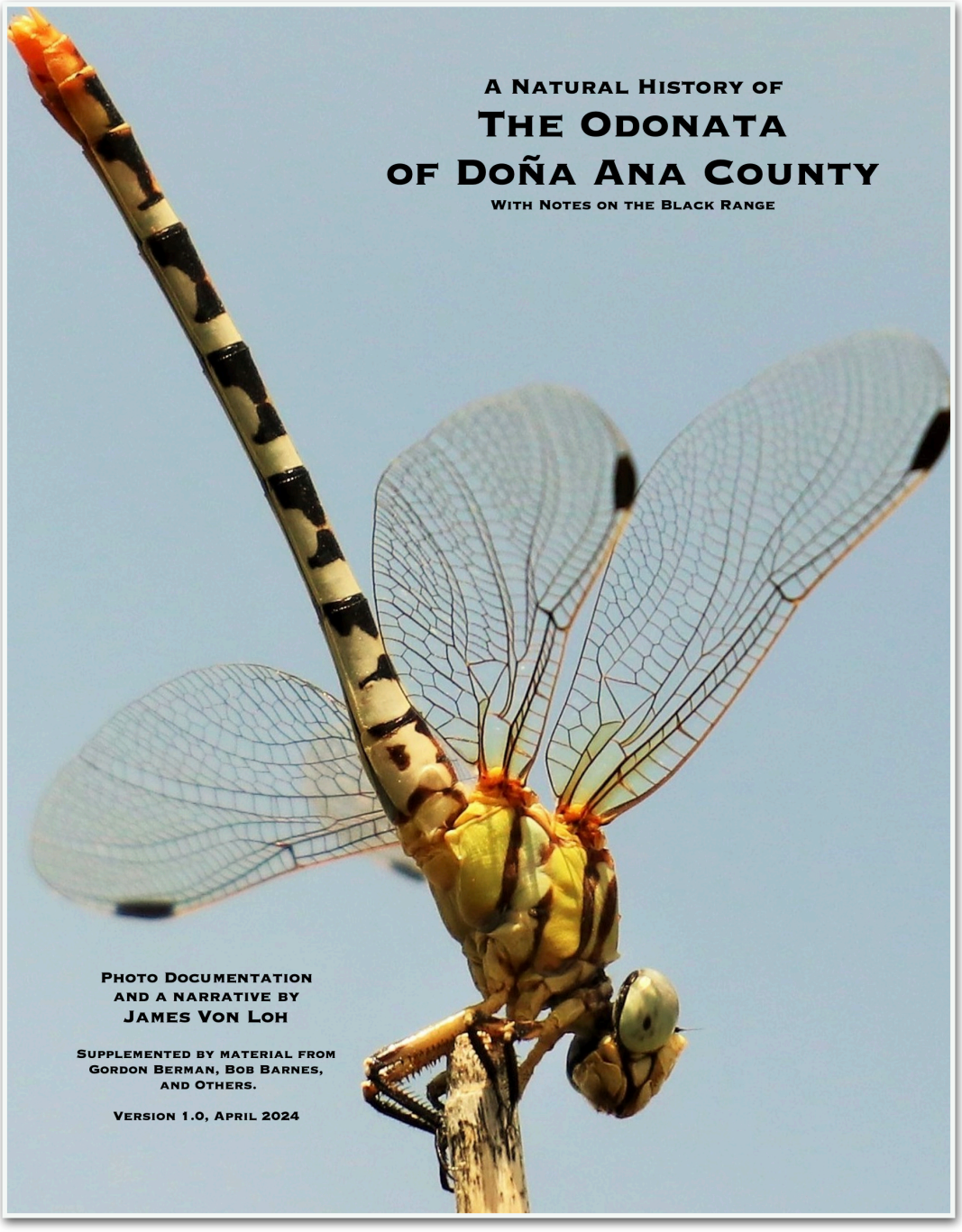
The Odonata of Doña Ana County - With Notes on the Black Range

Our latest book is available as a free download from the Black Range Website. It is available in two .pdf sizes. One is uncompressed (752 MB) and the other is compressed (110 MB).

This survey relies heavily on the work of James Von Loh of Las Cruces, but numerous others have also contributed to the effort. As always, our work is available as a free download for your personal use. Commercial use is prohibited.

We intend to publish future versions of this work. Since it is in a digital format, revisions are easier than if we were a print-only effort. If you would like to share your observations, photographs, or other work with others we would like to enable that wish. When we share our knowledge we all gain. If you have material to share, please send it to Bob Barnes at rabarnes@blackrange.org. In all cases, you retain the copyright to the material that you submit. You are simply giving us permission to publish it in the various non-commercial projects of the Black Range Website.

Reaches of the Rio Grande, cattle tanks, retention ponds, and some of the tributaries of the Rio Grande can all be excellent locations for watching dragonflies and damselflies. Odonata can generally be found in such locations in the summer and during the shoulder seasons.



Reflections on a Prickly Plant While Waiting for a Beagle

By Harley G. Shaw

I wonder if other people find plant field guides and keys boring, or if I'm an isolated case. Plant identification manuals consist of one- or two-page descriptions of species, with pictures of traits that differentiate them from their kin. Keys may have more anatomical detail, but they will swamp the user in terms that only full-time practitioners can retain. Such guides and flora focus upon identification, with little said about behavior or role, ergo niche. Rarely, interesting tidbits may appear about natural history or about economic value that suggest that plants actually are alive. On the whole, once you've captured a name, the usefulness of the key or guide is over.

I spent my employed years studying wildlife – white-winged doves in Arizona, white-tailed deer in Idaho, mule deer, wild turkey, puma, and desert bighorn back in Arizona. Learning about animal species is exciting, until terrain where wild creatures live becomes too difficult to negotiate due to one's age or ailment. In my 70s and early 80s, I narrowed my interest to lagomorphs, especially desert cottontails, using my beloved Beagle, Toasty, as a wildlife tracking tool. I learned a lot about cottontail and jackrabbit habitat, as well as the behavioral adaptations of lagomorphs to predation. I developed respect for their ability to escape wild canids in the Chihuahuan Desert grasslands and acquired some insight into how they might avoid stalking bobcats or diving raptors. I've written about this earlier.

But as I approach 87, with an annoying heart condition, I find that staying with a Beagle pursuing a jackrabbit exceeds my stamina. I now limit myself and Toasty, herself a chubby old lady, to cottontails. Cottontails, I've learned, usually flee in short circles, staying within a small territory, so my forays have been reduced to winding hikes, normally within 40 acres of shrubs. Very often, I just sit, waiting for the bunny and baying hound to come back around. Having a lot of immobile time, while Toasty untangles bunny trails, I began to look at plants, especially our local mimosa catclaw or wait-a-minute bush. I had no choice. It grabs one's attention. I decided that an aging biologist might nurture a curious mind by "tracking" plants. Plants don't move around much, nor do they obviously interact. They don't visibly "behave", so observing them may require immense focus and patience. "Watching grass grow" is an apt and oft-used cliché describing a plant observer's apparent lack of motion. But sitting, looking, and thinking is real important activity in plant study. Unlike many animals, plants don't yield up secrets easily. But they are at least easy to follow.

Early in my career as a biologist, I discovered that my mind wouldn't hold large lists of details for long. It's a disadvantage in a field like botany where nomenclature and terminology hang heavy. When I had a study that required learning plant names for an area, I could do it, and I could retain that knowledge as long as I frequently used it. But move to a new area or finish a study, and within weeks, my brain hit "delete". I have the same problem with watching birds. I just don't retain the imagery required to identify dozens of species year after year. I could recognize their written names, and acknowledge that I might have seen them, but I don't have the advanced birdwatcher's ability to snap ID a sighting or song.

So, in trailing plants, I decided to operate as I had in studying wildlife – learn as much as I could about one species at a time. I could keep that number in my head. Because I had spent the past few years following bunnies and intend to continue that activity as long as I and/or Toasty can, I decided that learning about one of the cottontail's favorite cover components would mesh well with my lagomorphic ramblings. The choice of species was easy. Catclaw, *Mimosa aculeaticarpa* var. *biuncifera*, had regularly required my attention as I scrambled to keep Toasty in view; it also grabbed pieces of my hide and clothing as well.



Wait-a-minute. June 12, 2015. Ready Pay Gulch, east of Hillsboro, New Mexico. (Image by R. A. Barnes)

If you look up catclaw in plant field guides, or do a search online, you will find several other stickery plants with that common name, including a species or two of Acacia or even a grasping vine known variously as cat's claw creeper, funnel creeper, or cat's claw trumpet (*Dolichandra unguis-cati)*. This latter doesn't grow around here, but we do have a some acacias: whitethorn (*Acacia constricta*) and, probably, whiteball (*A. angustitis-sima)*. These grow on slopes above the washes, usually in isolated and fairly open clusters. Unlike the mimosa catclaw, acacia's sparser growth form provides bunnies with little protection from predators. Toasty often follows meandering cottontail trails through acacia groves, her behavior suggesting that the bunnies she trails spend time nibbling low-growing leaves and searching for seed pods. Both of our local acacia species have sharp spines but neither has recurved prickles that retard forward progress like mimosa catclaw, so this will be the species referred to when I write catclaw henceforth in this article.

I don't want this treatise to be another field guide. Printed and online literature abounds with descriptions of the species and its range. The USDA Forest Service plant database is a good place to start looking: https://plants.usda.gov/home/. Another is Sonoran Desert Flora: http://www.arizonensis.org/sonoran/fieldguide/plantae/. Bibliographies supplied on these links will probably provide trails as far into the published literature as you care to go. I'll leave details of species identification and range to them.

Mimosa aculeaticarpa var. *biuncifera* - or if you wish, *Mimosa aculeati-carpa* (Ortega var. *biuncifera* [Benth.] Barneby) - has left a long trail of names, both common and scientific. Regionally, it is called catclaw, mimosa, paired-thorn mimosa, wait-a-bit, wait-a-minute, wait-a-minute bush, gatuño, gatuña, uña de gato, Garruno, and Garruño. The first three Spanish names mean cat-claw; Mimosa derives from the Greek mimos, meaning actor or mime; with the suffix -osa, it says "resembling."

Many species of Mimosa have sensitive leaves that droop or fold reacting to disturbance or touch. The star of the genus is *Mimosa pudica*, variously known as sensitive plant, sleepy plant, action plant, touch-me-not, or shame plant because its leaves droop and fold instantly and dramatically when touched. They also respond throughout the day and night to changing light. *M. pudica* species has been domesticated and has a pharmaceutical history; its literature is massive, but I won't follow its trail further. I'm more interested in what is known about the wild and garrulous catclaw that lives in the desert foothills of the Black Range.





Above: *Mimosa pudica* (or a closely related species) and a place it grows natively - the Choco Cloudforest of northwestern Colombia on January 22, 2024. Follow this link to watch a video of the leaves responding to touch. Images by R. A. Barnes.

The genus *Mimosa* was first named in 1753 by the Swede, Carl Linnaeus. Linnaeus[1] remains the most, maybe the only, famous taxonomist in history and needs no further discussion here. The species, *Mimosa aculeaticarpa*, was first described in 1800 by a less-known Spaniard, Casimiro Gomez Ortega (1741-1818). Ortega studied botany, medicine, pharmacy, and Spanish poetry. He held doctorates in philosophy and medicine. In 1771, he was named Professor of the Royal Botanical Garden of Madrid, a position he held for 30 years. He corresponded with most of the great botanists, especially non-Spanish, of the epoch, whose works he translated to Spanish. He edited a Spanish translation of *Philosophia Botanica* by Carl Linnaeus and acquired expertise in New World botany by organizing and sending botanical expeditions to Peru (1777-1788), the Philippines (1786-1801), and New Spain (1787-1802). [2]

The species epithet *aculeaticarpa* means prickly seed. The sharp appendages of the mimosa are technically prickles; that is, they are not modified leaves or stems, as in the case of thorns or spines. [3] Prickles can be peeled off with the outermost layer of the stem, hence do not grow from the internal wood of the plant. *Biuncifera* refers to paired arrange-ment of prickles growing below the small, paired leaflike appendages (stipules) at the base of the leaf stalk. The species has a long list of synonyms: *Mimosa biuncifera, Mimosa biuncifera* var. *biuncifera, Mimosa biuncifera* var. *glabrescens, Mimosa biuncifera* var. *lindheimeri, Mimosa lindheimeri, Mimosa warnockii, Mimosopsis biuncifera, Mimosopsis flexuos*, and more. The history and rationale behind this list of names is beyond my current interest, unless it factors into the few ecological questions I've formed while waiting for Toasty and her bunny of the day and observing the "behavior" of a nearby plant. I'll stay with *Mimosa aculeaticarpa* var. *biuncifera*, aka catclaw.

Looking at a map of the distribution of this catclaw, I've concluded that it and I have had a long, frequent, and strained acquaintance. Gene Sturla, in Southwest Desert Flora, notes: "*In Arizona it occurs throughout most of the state with few or no records in the southwest corner . . .*" Having grown up in Arizona, hunted and fished during my youth, and worked for the

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1. https://en.wikipedia.org/wiki/Carl_Linnaeus
2. https://en.wikipedia.org/wiki/Casimiro_Gómez_Ortega
3. https://en.wikipedia.org/wiki/Thorns,_spines,_and_prickles



Seedpod load on a Black Range catclaw, October 4, 2022 (Image by Harley G. Shaw.)

state game department variously from 1955 to 1990, a map of my home range within the state closely mimics the range of catclaw mimosa. I'm sure I've released myself from its curved barbs in most of Arizona's counties, but then, many of the southwestern desert and chaparral plants will restrain or redirect one's movements, so I hadn't given catclaw special status. Only after I began following my short-legged houndlet, who was in turn sniffing step by step along the scent of bunnies and hares, did I begin to regularly force my way through catclaw thickets. Such "research" effort was hard on my hide and increased my wardrobe replacement rate.

The natural distribution of catclaw covers a large portion of Arizona, New Mexico, and Texas; it also reaches almost the length of Baja California and through most of Mexico into Puerto Rico. The biological literature for the species reflects this distribution: most of the technical papers are written in or are translated from Spanish. Our catclaw is only one of approximately 100 species of *Mimosa* in Mexico. [4]

How one interprets a wild plant's ecology and behavior may depend upon conditions occurring during the particular year, or even decade, when observations begin. One must not assume that first observations represent normalcy. What you see one year may not be what you get the next, or the next, or the next.

My catclaw watching began during late summer in 2022. An abundance of small reddish-brown pods among the top branches of all of the mature shrubs caught my attention. I had failed to notice a large number of flowers earlier, but they must have been present. Something produced that load of tiny seedpods. A list of questions I'd not previously thought to ask emerged:

1. Is such voluminous seedpod production a normal annual event?
2. When do the pods drop their seeds?
3. Do they open on the plant? Drop whole to the ground?
4. What opens the pods?
5. What disperses the seeds?
6. What stimulates germination?

I began to watch the species more closely during my walks and waits, and I began to browse the literature to see what other people knew. I assumed botanists had addressed all of my questions, and I'd be able to quickly read up on the subject. This was not the case.

As it turned out, such massive seedpod production is not necessarily a regular event. Many of the plants that had produced so many seeds in 2022 produced none in 2023. This made me wonder if this could be considered a masting pattern such as occurs in oaks and pinyon pine? Or was the 2023 low a result of the prolonged drought we are experiencing? The top one-third of most of last year's seed-producing plants failed to leaf out and appeared

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4. Pavón, Numa P. , Jesús Ballato-Santos y Claudia Pérez-Pérez, 2011, "Germinación y establecimiento (Fabaceae-Mimosoideae) de Mimosa aculeaticarpa var. biuncifera", Revista Mexicana de Biodiversidad 82: 653-661, 2011.

to be dead. Following my nose on one simple track had already begun to lead me down branching and twisting trails.

Does the term, masting, apply to our local catclaw? After rummaging through online searches for information regarding masting in Mimosa, I remain unsure. Best I can tell from definitions, masting implies periodicity in seed production. To assure that the extremes in fruit production are true masting, I will need to monitor local plants for at least a decade or two, and even then, such categorization might just be a judgement call. For now, perhaps it's better to acknowledge that extreme variation exists in seed production. I'll check each year as long as I'm around. So now that I've successfully left that question unanswered, let's move on. At least I now know that every catclaw plant doesn't produce great masses of seed every year.





Above: Repeat photograph of the same catclaw plant in October 2022 (top) and September 2023 (bottom). (Images by Harley G. Shaw.

After I noticed the massive seed production in August 2022, I began to wonder when and how so many seeds were dispersed and what might eat them. On this question, I found the literature confusing. In 1988, Powell[5] wrote that catclaw pods split open after ripening, implying, I assumed, that they opened on the plant. Powell acknowledged that seed dispersal agents had not been identified. In addition to Powell's comments, I found a brief note in a gardening page that also said the pods split open when ripe, again presumably on the plant. I've not seen this on our local plants, and I wonder if the statement in both cases might be speculation, or even repetition of Powell.

Grether[6] suggested that natural dropping of the unopened pods is caused mainly by wind and that they are then dispersed downslope or downstream by waterflow during the rainy season. My observations are more closely in keeping with Grether's. The seedpods I watched fell unopened and most of them persisted intact on the ground until washed away by rainstorms or possibly removed by insects or mammals. In the summer and fall of 2022, I had noticed that a few unopened pods dropped from the shrubs each day, apparently as they matured. These were unopened. I wondered why such a small number dropped, rather than a full release of pods. I assumed that those that fell were shaken loose by afternoon winds. A sprinkling of pods would be present late each day under the shrubs. If I checked the same shrubs early the next morning, the pods would be gone, so something was removing them overnight. I still do not know if the pods were taken by an insect, perhaps a nocturnal ant, or by small mammals or all of the above. All I can say is that the few early-dropped pods disappeared after dark.

But the bulk of seed pods stayed on the plant into the winter and finally dropped midwinter, probably as a result of shaking by strong winds or pummeling by rain and hail. After a major winter storm, seedpods would be piled under the shrubs, and these did not quickly disappear. During the cold season, they lay on the ground, moving only when rains created surface flow of water strong and deep enough to float the pods. (Even by late February 2024 I was surprised to find that a few of those pods, still unopened, from the 2022-2023 winter remained in low spots along the wash.)

If insects, birds, or mammals removed portions of these pod piles, I could not detect it. Recent rains couldn't be completely blamed, so I concluded that some bird, mammal, or insect finally found those banks of pods desirable and either consumed them or stashed them away. The fact that they disappeared during midwinter suggests a mammal or bird rather than an insect. I've found no sign to tell me which.

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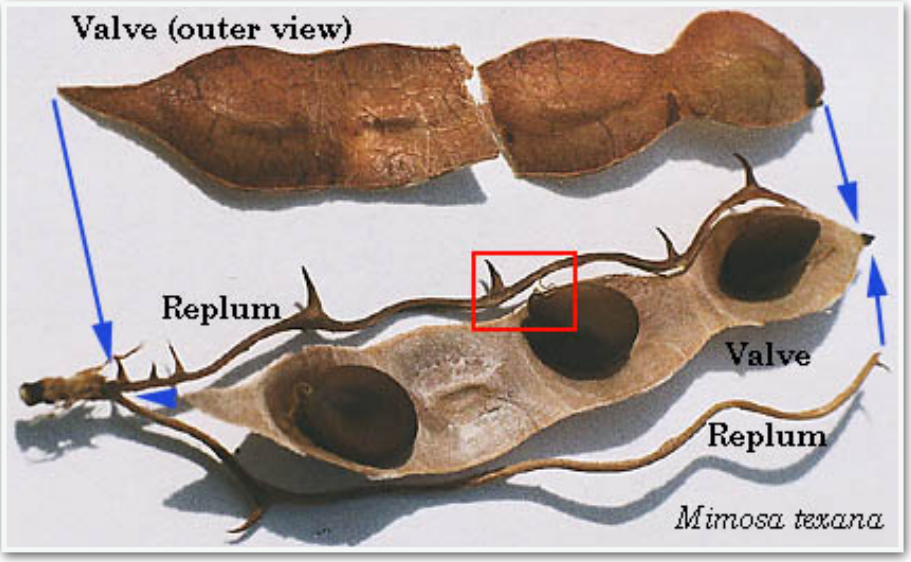
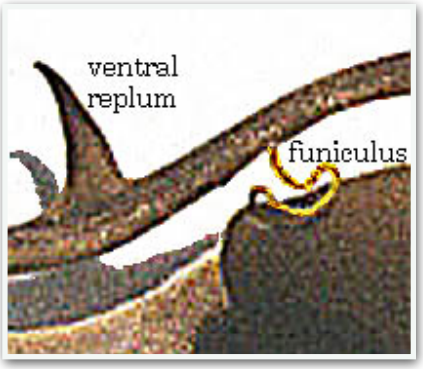
5. Powell, A. Michael. 1988. Trees & shrubs of Trans-Pecos Texas including Big Bend and Guadalupe Mountains National Parks. Big Bend National Park, TX: Big Bend Natural History Association.
6. Grether, Rosaura. 1982. "Aspectos ecológicos de Mimosa biuncifera y Mimosa monancistra en el Noroeste del Estado de Guanajuato." *Botanical Sciences* 43: 43-60.





Above: Enlargement of red area (see left) to show funicular attachment of the seed to the replum. Material developed for the Flora of Texas by Bob Harms.

I have found nothing in the literature regarding how and when, if ever, the pods open and release seeds. According to Barneby[7], mimosa species are not noted for specialized dispersal mechanisms. Flowers of catclaw fall when they wither, leaving the fertilized and developing pod attached to the floral stem. The pods may wash away after heavy rains, or they may be carried away from the plant by insects, small mammals or birds. Barneby notes that the halves of the pods of various *Mimosa* eventually separate or break into separate sections, leaving a persistent rim called a replum, but I've yet to see this happen even in pods obviously left from previous years.

Dr. Walt Whitford (2024, personal communication) stated that as far as he was aware, no one had described exactly when or how the pods of *M. aculeaticarpa* ruptured. Among the very few pods I found remaining under bushes in January, 2024, some had finally opened and released seeds. My guess is that they opened as a result of tortuous existence – stress of tumbling, soaking, drying, warming, cooling during winter nights and days finally forcing the pod valves to separate. I found no evidence that any single physical or seasonal condition, nor any organism, forced the valves apart.

Pavón[4] et al. found that the seeds of catclaw that they extracted from the pod by hand were physically dormant, with hard, impermeable coats and wax surfaces that resist abrasion and that mechanical scarification increased the rate of germination.

Others provided no observation of pods naturally opening and releasing seeds.[8] In natural conditions, the seeds of legumes can lose their hardness and be permeable to water after mechanical abrasion by particles of dirt or after decomposition of the head of the seeds due to the interaction of temperature and microbiotic action (Jozef et al., 2003)[9]. I've found no information regarding effects on catclaw seeds passing through digestive tracks of animals.

Pavón[4] et al. found that catclaw geminated best at higher temperatures. Lowest percentage of germination in their experiments occurred at 59° F. and the highest percentage of germination at 86° F. Unshaded plants survived better than those germinated under shade, and those grown in native, untreated soil grew better than those in soil fertilized with nitrogen. In native soils, root biomass was greater than stem biomass. Plants in native soil and without shade had greatest biomass, better development of roots, and greatest root:stem ratio, as well as being the only plants that developed bacterial nodules. Plants germinating beneath shade were sickly by the second week, failed rapidly, folded, and died, while plants under light lasted through the life of the experiment. The effect of shade was independent of the type of soil. Plants under light grew shorter, but produced more biomass than those under shade.

The above results regarding shading effects seem to be contradicted by McPherson et al.[10], who suggested that redberry juniper (*Juniperus pinchotii*) acted as a nurse plant for catclaw mimosa on the High Plains of west Texas. The closed canopy and heavy mulch layer apparently provided a favorable micro-environment for catclaw mimosa seedling establishment.

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7. Barneby, Rupert, 1991, "SENSITIVAE CENSITAE, A Description of the Genus Mimosa Linnaeus (Mimosaceae) in the New World", *Memoirs of the New York Botanical Garden* 65.
8. Martínez-Pérez, G., A. Orozco-Segovia y C. Mantorell. 2006. "Efectividad de algunos tratamientos pre-germinativos para ocho especies leñosas de la Mixteca Alta Oaxaqueña con características relevantes para la restauración", *Boletín de la Sociedad Botánica de México* 79:9-20.
9. Jozef, A., V. Assche, L. Katrien, A. Debucquoy y A. Rommens. 2003. "Seasonal cycles in the germination capacity of buried seeds of some Leguminosae (Fabaceae)". *New Phytologist* 158:315-323.
10. McPherson, Guy R.; Wright, Henry A.; Wester, David B. 1988. "Patterns of shrub invasion in semiarid Texas grasslands." *American Midland Naturalist*. 120(2): 391-397.

Simon et al.[11] note: "Leaf movement – The sensitivity of *Mimosa* leaves to touch (seismonasty) varies widely across the genus. Some species close their leaflets almost instantly when touched, while others respond very slowly or are insensitive to any stimulus." Seismonasty is defined as a nastic (of, relating to, or constituting a movement of a plant part caused by disproportionate growth or increase of turgor in one surface) movement in plants caused by mechanical shock. I found it curious that all but one of the field guides I read either failed to mention seismonasty or thigmonasty (movement toward touch) for our southwestern catclaw. After a full afternoon searching online and in books, I finally drove down to the dry wash at the edge of town and touched a plant. Leaflets of a leaf cluster folded in about 30 seconds after being stroked. This touch sensitivity is not as dramatic as that which occurs in *M. pudica*. In fact, unless you catch the leaflets fully opened flat, folding may be difficult to detect. The default position of the leaves appears to be about half-folded under most conditions. Response of leaves in this position is so slight that it can hardly be seen. I finally found an online acknowledgement of leaf folding of catclaw on a web site maintained by Michael J. Plagens, wherein he, too, comments that the movement is slow and subtle.[12]

Existence of touch sensitivity, along with the severe, curved thorns of the species, opens up many questions regarding adaptations. Both of these traits may protect the species from browsing by larger herbivores, although the manner that subtle leaf folding might discourage browsing is not clear.

After many hours of following my bunny-trailing beagle, Toasty, I can testify that cottontails use mimosa thickets for cover. Where it lines the edges of the wash, they can move considerable distances up and down without leaving the protection of mimosa shrubs. Normally, they will stay within a thicket, until pushed beyond their normal home range, at which point, they may break and run back along the open wash, returning rapidly to the security of known terrain, often to the point where Toasty began trailing.

I've found no record of, nor have I observed, leporids eating the foliage or pods, but they may certainly do so. In 1931, William Dayton wrote that cattle reportedly "devour the pods"[13], thereby aiding the spread of catclaw mimosa into grasslands, because seeds were probably scarified as they pass through the digestive tract and then deposited in nutrient-rich dung, which aids germination. This is contrary to my observations, wherein, even in presence of cattle, pods are persistent on the plant well into the winter, then fall off en masse when subjected to heavy wind and rain, and lie in piles until washed away by runoff waters. In fact, the close spacing of prickles on the stems and tendency of pods to grow within the canopy, suggest that *M. aculeaticarpa* var. *biuncifera* evolved its growth form as protection from large, broad-nosed herbivores. While small rodents, and even rabbits, might pick among lower growing fruit, and finer-nosed ungulates such as deer or pronghorn might be able to avoid prickles, the small size of the pods, hardness of the seeds, and dry, crusty nature of the pod materials suggest that they are not highly desired food while on the plant. Thick-skinned cattle will push through catclaw, but they rarely browse it. Perhaps it is used lightly if other forage is scarce.[13, 14, 15] In western Texas, the palatability of catclaw mimosa has been rated good for pronghorn but poor for cattle and sheep.[16] As noted, the narrow noses of pronghorns and deer might allow them to better avoid prickles as they feed on foliage or pods, but I have found no observations suggesting that they regularly feed on any parts of the plant. Scaled and Gambel's quail are reported to eat the seeds.[17] If so, no doubt other birds and small mammals do as well. However, tracking the tiny pods and seeds to determine the variety of seed-eating birds and mammals that ultimately consume them would be an immense and time-consuming project. Based upon my first two years of casual observation, I speculate that most of the seedpods remain on the bush into the winter, although a few drop in late summer or early fall. These early-fallers disappear rapidly, apparently taken by nocturnal mammals or insects. The late-fallers disappear more slowly, perhaps moved by running water, birds, or mammals. To confirm any of this will require use of cameras or actual nighttime observation.

Mimosa aculeaticarpa var. *biuncifera* flowers may be visited by butterflies, moths, flies, honeybees, native bees and other insects in search of nectar, food or shelter and protection. It is a host plant for the 'Cecrops Eyed Silkmoth' (*Automeris cecrops*). Four species of beetles of the family *Bruchidae* preyed upon catclaw seeds in central Mexico. I have not identified any Bruchids on our local plants, although some relatively large non-bruchid beetles are present. The process of Bruchid infestation has been worked out in many mimosa species, and I won't cover it

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11. Simon, M. F., R. Grether, L. P. de Queiroz, T. E. Särkinen, V. F. Dutra, and C, E. Hughes 2011. "The evolutionary history of mimosa (leguminosae): Toward a phylogeny of the sensitive plants". *American Journal of Botany* 98(7): 1201–1221.
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15. Vines, Robert A. 1960. Trees, shrubs, and woody vines of the Southwest. Austin, TX: University of Texas Press. 1104 p.
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17. Graham, Edward H. 1941. *Legumes for erosion control and wildlife*. Misc. Publ. 412. Washington, DC: U.S. Department of Agriculture. 153 p

in detail here.[18, 19] However, I do plan to keep looking for Bruchids on the local plants, come warm weather.

Catclaw shrubs are not limited to regeneration by seeds. They will sprout from the root crown following damage to the above-ground portion of the plant – mechanically or by herbicides or fire.[20] Undamaged individual plants may live to be very old.[21]

Everything I've observed in seed-pod dispersal and germination is difficult to interpret in terms of evolutionary adaptation. Prolonged presence on the plant would seem to prevent germination during the year of production, forcing seeds to survive at least until the following spring. By this time, they will have been distributed downhill or down-drainage from the parent shrub, seemingly creating a mass unidirectional dispersion, unless mammals, birds, or insects have moved them up the drainage.

The fact that lagomorphs use *M. a. biuncifera* for cover and might feed on the leaves and pods, makes me wonder if the timing of my observations could be affecting my results: the local lagomorph populations crashed due to a hemorraghic infection 3 years ago and still have not recovered. Could it be that rabbits are an important factor carrying seedpods away from the shrubs? Might the seeds scarify in rabbit intestines? You have to wonder if a linkage exists. However, I've found no published evidence that catclaw seeds are scarified by passing through animal guts. Mechanical scarification, maybe just tumbling along a sandy draw, appears to work best. A lot more looking is needed. So far, the primary value I've found for bunnies is catclaw mimosa's prickly nature causing hungry coyotes, foxes, or bobcats to think twice before initiating all-out pursuit in our local ecotype.

Much of what I've written here is speculation – hypotheses – brought about while I wait for a flushed bunny to circle back so that I can catch my Beagle. No information sticks in the brain so well as that which uncontrovertibly proves one wrong. In flinging my thoughts out over the internet, perhaps I'll flush out someone who knows more than I do about the subject or is at least a better observer.



Catclaw Mimosa is a host plant for the Cecrops Eyed Silkmoth, *Automeris cecrops,* shown above in a photograph by Nichole Trushell.



An Acacia Skipper, *Cogia hippalus* (W.H. Edwards, 1882), nectars on Catclaw Mimosa flowers in a photograph by Gordon Berman (first half of 2023)

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18. Orozco-Almanza, M. S., L. Ponce de Leon-Garcıa, R. Grether, E. Garcıa-Moyac 2003. "Germination of four species of the genus Mimosa (leguminosae) in a semi-arid zone of Central Mexico". *Journal of Arid Environments* 55:75–92.
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20. Hibbert, Alden R.; Davis, Edwin A.; Scholl, David G. 1974. *Chaparral conversion potential in Arizona: Part I: water yield response and effects on other resources.* Res. Pap. RM-126. Fort Collins, CO: U.S. Department of Agriculture, Forest Service, Rocky Mountain Forest and Range Experiment Station. 36 p.
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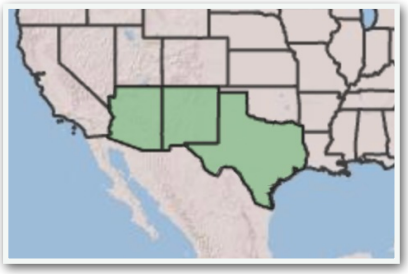
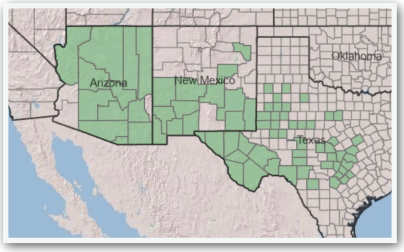
Range Maps

Range maps can often add immensely to our understanding of the natural history of a species, sometimes they can just take up space.

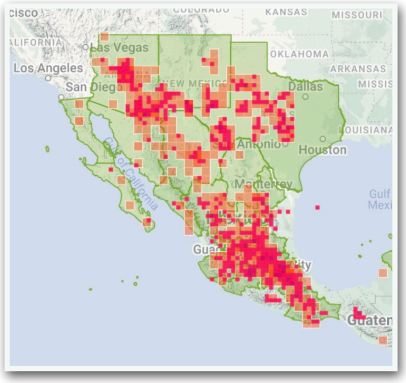






These three USDA range maps of Catclaw Mimosa, *Mimosa aculeaticarpa* var. *biuncifera* demonstrate that well. Range maps, like that at the top, sometimes are used simply to indicate that a species is present in a state. Sometimes they will be color coded to indicate if it is native, introduced, threatened, etc. Although such maps may be useful for political processes, they offer little to the study of natural history.

The middle map is a bit better. Such maps may be especially useful in the eastern United States, but in the west, where a county may be as large as an eastern state, they have limited utility. This map indicates that the Catclaw Mimosa is found in, and is native to, Sierra County. Sierra County has a wide range of habitat, however, and traveling from one side to the other can take up the better part of the day - if you are able to do it. (Are we really to believe that Catclaw Mimosa is not found in Otero County?)



The range map at the bottom of the left column is much more useful for several reasons, all of which are because it is not limited by political boundaries.

The map above is the iNaturalist depiction of the range of the Catclaw Mimosa. It combines the best of all of the other maps. It is based on confirmed observations (including some from Otero County) and shows an expanded "political range" as well.

With some species, a bit of caution should be exercised, however. Sometimes, relatively few observations for a species may be submitted to a database, and sometimes that is due to a lack of observations rather than a lack of "occurrence". A conclusion is often no better than the data it is based on. Ensure that the database you are using has adequate data.

Long-tailed Tadpole Shrimp: An Encore (2023)

By James Von Loh

During the spring and summer months of 2023, three temporary pond events occurred: 1) mid April to early May; 2) mid August to September 3rd; and 3) September 14th to October 1st), when stormwater runoff was collected from the Dripping Springs Visitor Center, Organ Mountains - Desert Peaks National Monument. Temporary ponds occurred when monsoon rain fell in sufficient amounts to fill the bottom of a stormwater runoff basin (covering ~0.07 acre in terms of surface area and at depths of <1"-to-~10").

In the last issue of the Black Range Naturalist James Von Loh shared his experiences with Long-tailed Tadpole Shrimp (Tadpole Shrimp) during the first few months of the summer. Then things dried up. Here we take up the story, when the water returned.

The intervening period and the third ponding event provided answers to the questions he raised in the April issue of this journal. "I now have a better understanding about how Tadpole Shrimp may be introduced from one temporary pond to others. Eggs are numerous (each mature Tadpole Shrimp can produce up to 200 eggs) both in the water column and in the bottom sediments of the pond; and long-lived in diapuse (20+ years). Several species/individuals that visit the pond ingest eggs when they eat live or recently dead Tadpole Shrimp; nearly all visitors that drink water likely ingest eggs (but, do eggs in diapause survive in the digestive tract) and may pass them at another pond in feces; nearly all visitors that carry away mud/muddy water on their feet, legs, feathers, hooves, paws, fur, etc., likely transport eggs and some eggs may be introduced to other ponds locally, or regionally in the case of migratory birds."

Long-tailed Tadpole Shrimp, *Triops longicaudatus* (LeConte, 1846) populations emerged and completed life cycles in both the 2nd and 3rd temporary ponds of 2023. Photo-documentation and observations of each pond and another Tadpole Shrimp emergence event from the summer of 2021, inform this natural history article of this species. Interactions and the presence of other temporary pond users/visitors were also photo-documented using the small pond habitat. Observations of these temporary visitors recorded their interaction with Tadpole Shrimp,

Tadpole Shrimp predators and scavengers, and temporary pond habitat drying times. Noted were animal species visiting the temporary pond, which, at a minimum, reduced the volume by drinking water (e.g., minuscule amounts by insect species, small amounts by birds, and moderate amounts by mammals); their waste products, deposited in the water, also entered the Tadpole Shrimp food chain. Tadpole Shrimp were the focus species, however.

Most water is lost from temporary ponds via: 1) evaporation to the atmosphere (daytime air temperature in the 95-to-105 degree F range, 24-hour exposure to low humidity, breezes, and low-moderate wind); and 2) evapotranspiration via dense emergent and shoreline graminoids, primarily Green Sprangletop, *Disakisperma dubium* ([Kunth] P. M. Peterson and N. Snow) and Switch-grass, *Panicum virgatum* (Linnaeus). In a typical temporary pond of the northern Chihuahuan Desert, percolation of water into the substrate should also be considered an important source for water loss; however this stormwater retention pond includes an impervious liner that impedes most percolation into the local volcanic gravel and rock substrate.

In 2023, there were no Tadpole Shrimp visible during the first temporary pond event. However, they were present on-site as a large number of eggs in diapause (Tadpole Shrimp eggs may remain in diapause and viable for up to 20 years). Many eggs hatched during both the 2nd and 3rd ponding events (September/October 2023) and more eggs were produced and released to replenish future generations of Tadpole Shrimp.

Two avian species were notable predators of Tadpole Shrimp, i.e., the Savannah Sparrow, *Passerculus sandwichensis* (J.F. Gmelin, 1789) during the 2nd ponding event and the Lincolon's Sparrow, *Melospiza lincolnii* (Bechstein, 1798) during the 3rd ponding event. Mule Deer, *Odocoileus hemionus* (Rafinesque, 1877) visits resulted in major bottom substrate disturbance due to dense, deep tracks in the muddy bottom, which likely increased the evaporation rate.

I visited the pond on September 16th and 19th, visually surveying for aquatic life forms; present were egg-laying damselflies and dragonflies. It wasn't until September 24th that surface-feeding adult Tadpole Shrimp were observed (indicating an ~09/22 emergence event). A pleasant surprise was a thin layer on the water (near the eastern pond end) composed of dust, fine sediments in colloidal suspension, algae, rehydrated organic material, etc. This layer allowed surface-foraging Tadpole Shrimp to leave trails and produce an intriguing "art-form" (simple to complex patterns of curved lines forming "symbols").

Upper Center Right: Tadpole Shrimp "foraging art", wandering arced paths with a bubble central element. (09/26/2023)

Lower Center Right: Tiny bubbles, a kind of pond froth, provide the matrix for a complex and swirling, curvilinear "foraging art" piece. (09/26/2023)

Bottom Right: Early 3rd pond users (the third time the pond had refilled), a mated pair of Variegated Meadowhawks, *Sympetrum corruptum* (Hagen, 1861), in tandem linkage (female - L and male - R), deposit eggs (see the white egg emerging near abdomen tip) by her "tapping" on the pond surface to release them (the eggs and young larvae could be used by foraging Tadpole Shrimp as a food source). 09/19/2023

Top Left, Following Page: Early pond users, a mated pair of Common Green Darners, *Anax junius* (Drury, 1773), in tandem linkage (female - R, male - L), deposit eggs along saturated branches under the pond surface (the eggs and young larvae could be used by



***Triops*, the three-eyed shrimp. 09/26/2023**







foraging Tadpole Shrimp as a food source). 09/19/2023





Directly Above: A few days following each pond filling, a surface layer of red forms (which I am assuming is algae) and floats on the eastern end for a short period of time, perhaps 2-3 days. Most close-up images of Tadpole Shrimp surface-foraging (below) show floating, tiny red specks, perhaps of this red algae (many references identify "algae" generally, as food for Tadpole Shrimp).

Below: Tadpole Shrimp surface-foraging near emergent grass stems, exposing its ventral surface. Note the small egg sacs near the posterior carapace. 09/24/2023



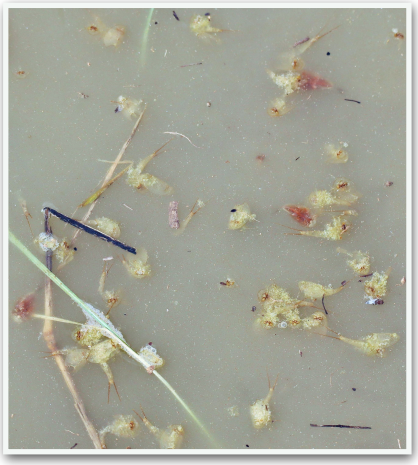
Top Center: A very good representation of the tiny mouth structure at the head of Tadpole Shrimp adult forms, to which small food particles must be directed for ingestion. Note the tiny red particles floating in the water; they may be red algae. 09/24/2023



Below: Lateral (R) and dorsal views of resting/foraging adult Tadpole Shrimp on twigs near the murky pond surface. Note, my intuition suggests there is little time spent resting and that Tadpole Shrimp are "feeding machines". 09/24/2023



A number of yellow-colored Tadpole Shrimp larval molt skins floated on the pond surface during the 3rd ponding; they were constantly visited and fed upon by the living Tadpole Shrimp population, suggesting a valuable nutrient source. Molt skins are discarded by larval Tadpole Shrimp as they discard their old/smaller skins, several times, while growing to the mature/adult size at about 8 days.



Directly Above: Several Tadpole Shrimp molt skins floating on the pond surface, where foraging Tadpole Shrimp feed from them. 09/26/2023

Top Right: Late 3rd ponding population Tadpole Shrimp sees a "ghost" and is likely feeding from it. 09/26/2023





Directly Above: Tadpole Shrimp (late 3rd ponding population), dorsal view/orientation forages from a floating molt skin (early 3rd ponding population). 09/26/2023

Below: Bubbles internal to the molt skin keep it afloat; the dorsal view defines the outline of the nearly transparent carapace, adjacent to a bubble patch and among floating red algae and whitish orbs, perhaps Tadpole Shrimp eggs? 09/24/2023





Directly Above and Below: The Long-tailed Tadpole Shrimp then approaches and begins feeding from the floating molt skin.



Directly Below: Tadpole Shrimp molt skin floating upright against a stem and buoyed by many bubbles under its carapace. 09/26/2023





Directly Above: While a "ghost" carapace from larval skin molting during the early 3rd ponding population appears to observe, a trio of Tadpole Shrimp of the late 3rd ponding population feed from another Tadpole Shrimp molt skin. 09/26/2023

Bottom Left: A Bristle Fly, *Belvosia* sp. (Robineau-Desvoidy, 1830) perches on an emergent stem supporting a floating, bubble-filled, Tadpole Shrimp molt skin. 09/26/2023





Directly Above: Submerged Tadpole Shrimp forage from a Tadpole Shrimp molt skin caught on debris. 09/24/2023

Directly Below: An amazing number of bubbles become trapped or otherwise emanate from larval molt skins. 09/26/2023



Bottom Center: Foraging Tadpole Shrimp gleans from, and feeds on, leaf tissue from an emergent grass plant floating blade; a number of bright white orbs may indicate egg-shedding. 09/24/2023





Directly Above: Foraging Tadpole Shrimp gleans from and surface feeds on root tissue from an emergent grass plant. 09/24/2023

Many invertebrates are drowned in temporary ponds (usually during high-wind/thunderstorm events) and add to the available food supply for Tadpole Shrimp and other scavengers. Not only do the floating molt skins provide nutrients directly (muscle tissue, etc.) they are also colonized by microbes, adding to their nutrient value.

Below: A Variegated Meadowhawk carcass floats on the pond surface and provides a foraging source for several Tadpole Shrimp as its tissues decompose; Tadpole Shrimp also glean from the wing and abdomen surfaces. Note the individual Tadpole Shrimp gleaning from underneath the dragonfly's abdomen. 09/24/2023



Top Left, Following Page: Longhorn Beetle (Family: *Cerambycidae*), likely blown to the pond surface and drowned during a windstorm, provides a potential nutrient source for microbes and Tadpole Shrimp. 09/19/2023



Tadpole Shrimp foraging at the pond's surface is more observable, as is the amount of floating food available (I thought it looked like a nutrient soup), however another form of foraging is more commonly used by this species. Burrowing into the pond sediments, creating a visible slurry of soil and nutrients to feed upon, using the resultant holes and pits as hiding places, and leaving behind an entirely "landscaped" pond



bottom is also an effective and interesting behavior.

Top Center: Surface-foraging with the ventral side exposed seems like it would be relaxing, even a fun way to feed, and many Tadpole Shrimp do so for periods of time. 09/26/2023

Top Right: However, at any time there are more individuals on the pond bottom, scraping and sweeping food



particles up to be consumed. 09/24/2023

Below: Holes and wider burrows are often made by one to several individual Tadpole Shrimp, forcing the sediments into the water column to facilitate feeding.

Following Page, Top Left: A large amount of sediment can be moved into the water column in this manner, as the holes and burrows are made deeper.

Left, Second From Top: I counted three Tadpole Shrimp using this burrow, moving a sediment cloud into the water column. 09/26/2023

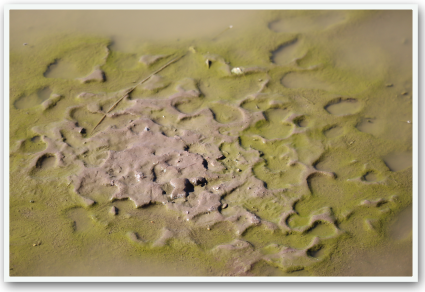












Center Left: Two Tadpole Shrimp have foraged/are foraging by scraping up sediments (small grooves) and by burrowing. 09/272023

Left, Second from Bottom: Foraging Tadpole Shrimp moving quantities of silty/clayey sediment results in a wonderfully "landscaped" pond bottom; shapes range from round pits to large circles/ovals and wandering ridges (highlighted by green algae).

Bottom Left: As the shallow water evaporates to a saturated mud consistency, green algae growth appears to accelerate.



Above: Large area of the pond bottom excavated/landscaped by foraging Tadpole Shrimp, then highlighted by dense, green, algal growth in the saturated mud and shallow water areas.



Above: Hundreds of industrious little crustaceans contribute to another intriguing art form, i.e., "Pond Bottom Landscape Art".



Center Bottom: It seems there is always another mystery to explain. 09/27/2023

The final day, when the surface water evaporates from the pond bottom and the remaining Tadpole Shrimp desiccate, is - sad. For the 3rd ponding event, that day was October 1st, when a patient person could see the surface cracks form/widen in the thick mud as the ambient temperature rose.



Above: In the last hours and minutes before evaporation decided fate, I hoped that as many eggs as possible were deposited by the Tadpole Shrimp. Hundreds of Tadpole Shrimp occupy the final, shallow pool that evaporated overnight to expose the entire pond bottom and the remaining population to the warm air, wind, and sun. 09/30/2023



Above: Game over when the first fly arrives to feed and maybe deposit eggs on a desiccating Tadpole Shrimp carcass.

Following Page, Top: Tadpole Shrimp carapaces and trunks harden as they desiccate and for a while they become a layer of organic material, documenting time. (Will a human-like form find and study the fossils to describe the pond habitat, 40 million years from now?)





Above: Not even the pit excavated into the sediments could provide this Tadpole Shrimp a lasting refugium.

Predators

By far the most efficient and prolific predator of Tadpole Shrimp during the 3rd ponding and drying event was Lincoln's Sparrow, *Melospiza lincolnii* (Audubon, 1834). I spent focused time during sessions at the pond picking out individuals to photo-document their hunting style and was rewarded by also discovering some differences in eating/swallowing styles!





Directly Above: Lincoln's Sparrow perching on a small rock surrounded by water. This individual balances by spreading its wings, and with eyes closed, captures the Tadpole Shrimp. 09/28/2023

Top Right: Then it swings the Tadpole Shrimp, captured by the trunk segment, to the higher portion of the rock.

Center Right: Lays the Tadpole Shrimp on the rock and seems to straighten out the long tail with its beak.

Bottom Right: Then picks up the Tadpole Shrimp, with the point of its beak holding its head and carapace prior to swallowing.

Bottom Left: With the surface water evaporated, the highly-tracked bottom (mostly deep Mule Deer tracks) indicates the progression of drying from light-colored, dry sediments to the still moist, dark mud. 10/01/2023













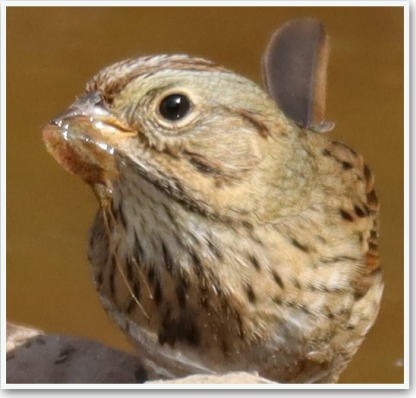
Top Left: The swallowing process begins as the sparrow raises its head and extends its neck. Tadpole Shrimp appendages for sweeping/collecting food are extended on either side.

Center Left: The sparrow's beak is clamped tightly, and I wondered if it needed to kill or stun the Tadpole Shrimp to control its movements before swallowing.

Bottom Left: After swallowing all but the tip of the Tadpole Shrimp tail, this sparrow rolls its head upside down (perhaps to position its throat?). This individual is the only bird I saw do this.

Top Center: This captured Tadpole Shrimp hangs limply from the sparrow's beak.

Center: The Lincoln's Sparrow then repositions to continue scanning the water and hunting Tadpole Shrimp.





Another successful Tadpole Shrimp hunter, but at a much lower level of attempts and success, was the Chipping Sparrow, *Spizella passerina* (Bechstein, 1798). I was only able to photo-document one hunting series, but mostly under low-light conditions on a cloudy day.

Directly Below: No, the Chipping Sparrow is not whistling, it has a beak full of pond water to swallow; this





image was collected under bright sunshine before the clouds moved over. 09/26/2023

Bottom Center: This Chipping Sparrow began the hunt bathing behind a downed limb as clouds darkened the sky.

Two Below: Spying Tadpole Shrimp in the shallow shoreline water, it drives its beak into the saturated mud and comes up with a beak-full of mud and a squirming Tadpole Shrimp which it begins to position and possibly squeezing it to stop the squirming, so that it can be swallowed.



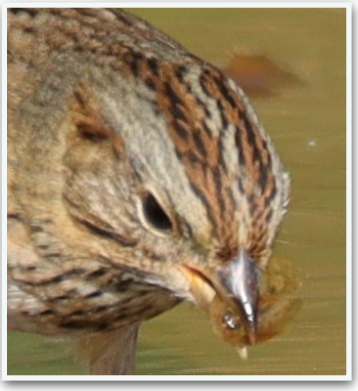


Directly Below: It is a challenge for some individual birds to complete the swallowing process either because of the long Tadpole Shrimp tail or perhaps the foraging/sweeping appendages which extend at some length. The most dramatic response to swallowing difficulties was expressed by this Chipping Sparrow. Perhaps a gagging or choking response upon swallowing the entire Tadpole Shrimp or perhaps its dinner wasn't entirely stunned or a portion became snagged as the bird swallowed. Additional images of Lincoln's Sparrow predation are shown on the following page.



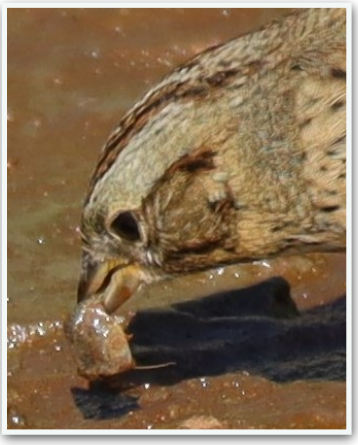






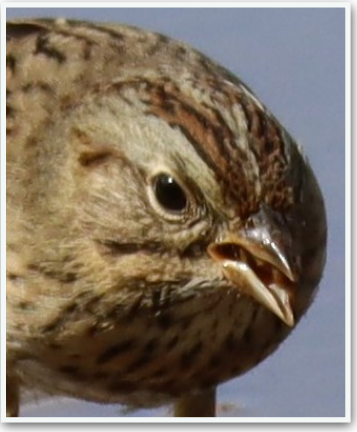












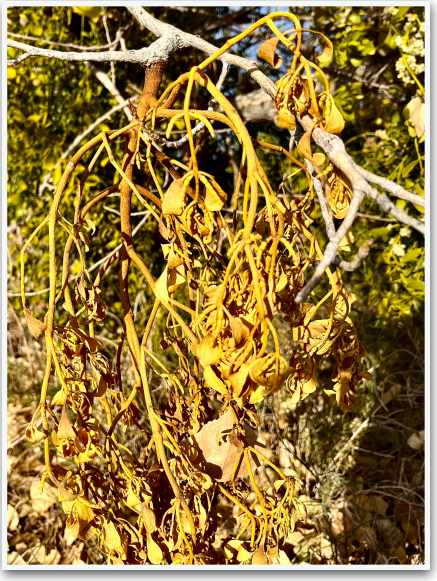




In our next issue we will focus on some of the other predators at this pond.







Rio Grande Cottonwoods, Mistletoe, and a Host of Animals

by Gordon Berman

Rio Grande Cottonwoods, *Populus deltoides wislizeni*, scatter in ones and twos and threes in the floodplain east of the Rio Grande in the Las Cruces area. Many of the trees host mistletoe, (*Phoradendron* sp.), vibrant over winter, withered by summer heat - as the photographs above depict.

A life threatening parasite for the tree, a nurturing haven for Mourning Doves, Phainopepla, *Phainopepla nitens*, (female [left] and male [right]) in the center photo and male in the photograph immediately to the right) followed by mockingbirds, Cooper's Hawks, the Great Purple Hairstreak *Atlides halesus* (bottom center) - among others. The Western Bluebird, *Sialia mexicana* (bottom right), is a frequent visitor to mistletoe clumps.

Broadleaf Mistletoe, *Phoradendron macrophyllum*, envelops a cottonwood (bottom left on the following page), weakening its branches and dragging them to the ground while mistletoe crash test dummies falter on nearby coyote willow, *Salix exigua* (photos on the following page, bottom center and right).

(Ed. note: iNaturalist uses Broadleaf Mistletoe for the species being discussed here and Big Leaf Mistletoe to refer to the nominate subspecies. Wikipedia uses Bigleaf Mistletoe as the common name for the species. U.S.D.A refers to the subspecies as *Phoradendron macrophyllum* ([Engelm.] Cockerell) ssp. *macrophyllum*, Colorado Desert Mistletoe.)









Attached by bird poop, bird beak rubbing, and bursting berry propulsion, sticky mistletoe seeds attach to cottonwood branches. The tiny seed roots burrow into the wood until they penetrate the vascular system to carry water and nutrients to developing stems and leaves. Stems and leaves of the hemiparasitic Broadleaf Mistletoe photosynthesize, giving the Broadleaf Mistletoe both internal and external means of growth.















Rio Grande Cottonwood, Willow, and Mistletoe Habitat Supporting Obligate Bird and Insect Species

by James Von Loh

Bigleaf Mistletoe, *Phoradendron macrophyllum* ([Engelm.] Cockerell), is hemiparasitic; it is able to synthesize energy via chlorophyll in its green leaves and stems while the tree provides it with water, minerals, and other nutrients. It uses numerous hardwood plants as its host. 2024 observations on two sites along the Rio Grande included Screwbean Mesquite, *Prosopis pubescens* (Benth.) of the Pea Family (*Fabaceae*) as a host.

Bigleaf Mistletoe is common among Rio Grande Cottonwood, *Populus deltoides* (W. Bartram [ex Marshall] ssp. *wislizeni* [S. Watson] Eckenwalder) trees, and is slowly becoming established on nearby Coyote Willow, *Salix exigua* (Nutt.) tall shrubs. The transfer of Bigleaf Mistletoe from Rio Grande Cottonwood to shrubby willows is, in my opinion, rare, and these instances are my first observations in the field.

Bigleaf Mistletoe produces fruits/seeds that are extremely viscous/sticky and attach easily to a bird's beaks, feet, and feathers; when eaten, seeds may pass through the digestive tract and be deposited as excrement. When the birds fly to different Rio Grande Cottonwood branches/trees, or to Coyote Willow shrubs, the seeds are scraped onto the branches or deposited in droppings.



Unless otherwise noted, photographs are by James Von Loh.

Bottom Left: Gordon Berman collected this detailed Bigleaf Mistletoe plant image; the parasite is growing from an older Coyote Willow trunk near the Rio Grande Trail.

This Coyote Willow stand (below - photo by Gordon Berman) has supported a large clump of Bigleaf Mistletoe for many years, nearly a decade from my field observation. There is a correlation between the location of infested Rio Grande Cottonwood trees and adjacent,



relatively new Coyote Willow infestations, typically 10-25m away.



Above: Bigleaf Mistletoe with fruits, growing from a Rio Grande Cottonwood tree (01/20/23). Note the green leaves and stems.

Below: I took the photograph of Bigleaf Mistletoe established on a Coyote Willow on January 30, 2024. Reports of like occurrences are strongly encouraged.



Right: Bigleaf Mistletoe has become established on this Screwbean Mesquite tree growing on the Rio Grande bank in Leasburg Dam State Park (03/14/24). The same host/parasite relationship occurs at the La Mancha Restoration Wetland site west of Las Cruces.

Center Right: Bigleaf Mistletoe is becoming established on this Screwbean Mesquite tree growing at the La Mancha Restoration Wetland site (02/18/24).

Both Phainopepla, *Phainopepla nitens* (Swainson, 1838) and Northern Mockingbirds, *Mimus polyglottos* (Linnaeus, 1758), use Bigleaf Mistletoe for nesting sites and likely forage on the fruits and seeds. (See later.)

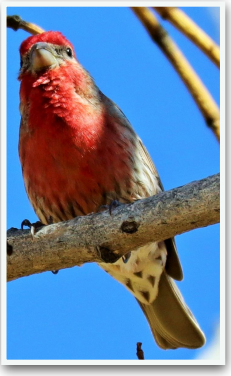
In addition to a male Phainopepla (an obligate Bigleaf Mistletoe nester) perched in a nearby tree, a male House Finch (*Haemorphus mexicanus* Muller, 1776) (a generalist nester using many sites) selected a large clump of Bigleaf Mistletoe within a Rio Grande Cottonwood tree canopy for a potential nest site. This location is within Leasburg Dam State Park, which spans a reach of the Rio Grande and borders Radium Springs, NM (visited 03/14/24).

Bottom Row: The male perched within a large Bigleaf Mistletoe clump, a potential nest site, and flew around/within the tree canopy perching and singing. He flew near me and may be used to gleaning from picnicking humans. He then retreated to a higher perch and began calling and singing.













Above and two photographs below: These Phainopeplas have several Bigleaf Mistletoe fruits attached to their feet and adjacent feathers. 02/03/23





Grande Cottonwood tree canopies, around the tree canopies, and into the Coyote Willow tall shrubs along the Rio Grande.

Editor's Note: This same behavior, aggressive interaction between two bird species at Bigleaf Mistletoe clumps, has been observed in Hillsboro - only between Phainopepla and Woodhouse's Scrub Jay (name change on the way?)





Northern Mockingbirds, *Mimus polyglottos* (Linnaeus, 1758) (below and right), compete with Phainopeplas for Bigleaf Mistletoe nesting sites. When males are defending territories during the winter season, Northern Mockingbirds incessantly chase Phainopeplas through the Rio





The plant shown at the bottom right of page 21 (smaller image above) is protected from drying by shade, and the willow shrub is rooted near a permanent stream. The relationship between the health of the host plant and that of the mistletoe is worthy of more study. In all, this is an interesting subject because local cottonwoods along the Rio are often engulfed by mistletoe and many people notice and ask about it. Also, both negative and beneficial effects result from this hemiparasitic presence.

In the previous article, Gordon Berman noted an important local and beneficial use of mistletoe by Great Purple Hairstreak, *Atlides halesus,* butterflies; their larvae (caterpillars) feed only upon Mistletoe host-plant species. Great Purple Hairstreaks are occasionally observed along the Rio Grande, typically nectaring from Horsetail Milkweed, *Asclepias subverticillata* (Gray) Vail, flowers in the vicinity of Rio Grande Cottonwoods invaded by Bigleaf Mistletoe.

Below: Great Purple Hairstreak nectaring from Horsetail Milkweed along the Rio Grande. Note the abdomen size suggests a gravid female. 07/20/2020

The photographs at the right (on Horsetail Milkweed) and immediately below may also be gravid females. The image to the right was captured on 08/16/2022 and the one immediately below (on Spiny Chloracantha, *Chloracantha spinosa* ([Benth.] G.L. Nesom) was taken on 09/12/22.

The photograph at the bottom right, of a Great Purple Hairstreak on Horsetail Milkweed, was taken on 08/29/2019. All of these photographs were taken along the Rio Grande.









Javelinas (and other animals) in Robinson's Cave

by Steve Peerman

Robinson's Cave is a well known cave in the Black Range. It has been visited by miners, locals and cavers since at least the 1890's. Members of the organized caving community, embodied by the Southwestern Region (SWR) of the National Speleological Society (NSS) have visited the cave since the 1960's. Cavers from the Mesilla Valley Grotto (MVG) of the NSS mapped the cave in the 1970's. Their map shows a little over a kilometer (3400 feet) of passages.

Members of the SWR and MVG regularly visited the cave over the last 50 years. It was normal to see occasional scat deposits in the cave. Most of the time, the cavers attributed the scat to ringtails, as they are common users of caves in the southwest.

However, in 2019, the MVG cavers began to note a great deal more scat in one particular area of the cave. It was also noted that there were unusual tracks in the dust in the entrance area of the cave. The amount and nature of the scat and the tracks indicated some new users.

At this point, as a long-time member of the MVG and SWR, I took an active interest in this new phenomenon. In order to determine what sort of animal was using the cave, I purchased a trail camera and fellow caver Rob Wood and I installed it in the cave. In short order we discovered that the new users were a band of javelina. We contacted the Black Range District of the US Forest Service, and an agreement was made to conduct a 5-year monitoring project to determine how the javelina use the cave and what issues there may be from that usage.

The Tasco trail camera records 10-second videos or still photos triggered when a warm blooded animal moves in its field of view. It has infrared LED lights so that it can function in the complete darkness of the cave, but the images are low resolution and monochrome (black and white). The camera takes a few seconds to begin after movement is detected and takes 5 seconds to operate again after finishing one 10-second video. Observing hundreds of these short videos allowed me to get a pretty good feeling for how the cave was being used by the band of javelina.



Above: Rob Wood, examining the new scat in an alcove of Robinson's Cave. Photograph by Val Hildrith-Werker.

Below: Tasco Trail (or Game) Camera in place near the entrance of Robinson's Cave. Photograph by Steve Peerman.



Javelina, or "collared peccary", (*Tayassu tajacu*) are primarily thought of as desert dwellers and their range has been thought to be the deserts of southwestern New Mexico. They are fairly common in the desert, and are becoming more common in the foothills and mountains of the Black Range. Javelina superficially resemble pigs but are not closely related to them. They are primarily

herbivores, but will eat small prey such as lizards and mice, and will eat human food as well. They are not typically dangerous to humans as they avoid contact with people. However, they will attack dogs and can defend themselves effectively with 2" long tusks, when cornered. Javelina do not sweat, nor do they pant, so they must find some way to remain cool during the heat of the day. The coolness of a cave offers the perfect respite from the summer heat of New Mexico.

From observing the videos captured by the game camera, we determined that the band of javelina use Robinson's Cave to escape the summer heat from around mid May through mid October. They typically enter the cave at around 6:30 am to 8:30 am and travel to a particular denning area to spend the day. Then they will leave somewhere around 6-9 pm to spend the night feeding. They do not use the cave every day, so they must have other places in the area where they spend the day. Their pattern of usage varies considerably and does not seem to depend on the actual temperatures.

For the first 4 seasons, we removed the game camera from the cave during the winter, assuming that the javelina were not using the cave at that time. This year, we left the camera in place near the entrance. We were surprised to find that the javelina still used the cave periodically through late November. (The camera was disturbed by an animal at that point and ended up pointing at the floor of the passage, preventing it from further captures. It has since been redeployed in an appropriate fashion.) It may be that they have found the safety afforded by the den in the cave has made it a year-round refuge.

The band of javelina varies from year to year and day to day. Sometimes only a few individuals use the cave and sometimes it seems to be the entire band. The highest number of individuals in the cave at one time has been 11, and this included a couple of babies (or "reds" as baby javelina are called). Javelina can bear young any time of the year.

The trail camera has captured other animals occasionally using the cave; some of these were expected, others were a surprise. Expected are ringtails, bats, squirrels, skunks, chipmunks, mice, and rats. These animals have been observed in other caves in New Mexico. Unexpected captures include a black bear and bobcat.







Top Right: A screen capture from the Tasco trail camera shows a group of javelina entering the cave on September 4, 2020.

Prior Page Center Right: Another screen capture shows a female and two babies exiting the cave in the afternoon of May 26, 2023. The camera was jostled by the javelina and was tilted off-level.

Prior Page Bottom: A Ringtail exiting the cave.

We have identified three main issues with the presence of the javelina in the cave. First, the javelina pose a danger to visitors to the cave. Javelina will normally avoid contact with humans, but in the cave, in their denning area, they are cornered, and just like any other animal, they will defend themselves. They may also have their young with them, which may give them extra incentive to aggressively defend their territory.

Second, the javelina's sanitary habits leave a lot to be desired. They foul the cave (including their den) with feces and urine, and bring fleas into the cave. In the spring of 2023, the MVG gathered 4 trash bags full of scat and removed it from the cave.

Finally, the impact from their hooves has caused a great deal of erosion to the entrance slope of the cave. Indeed, it appears that they have modified the entrance slope in the last 5 years of usage more than the previous 130 years of human usage.

For those who may visit Robinson's Cave, it is important to realize that they may be present in the cave at any time during the year. It is likely that during the time that most people would be in the cave, the javelina will be in their denning area and not really pose any danger to visitors, as long as they avoid entering that den. The segment of the Robinsons' Cave map (right) shows where this denning area is located (in red) and the alcove where scat is often present (in yellow.)

Our 5-year monitoring project with the USFS is nearing its end. At the conclusion of the project, we will be making recommendations to the USFS about what to do, if anything, about this new user of the cave. We are likely to recommend that we try and coexist with the band of javelina. However, to reduce the possibility of human/javelina interaction, we will recommend that the USFS install signage at the alcove before the javelina den that warns human visitors that they may be present.

Right Center: This black bear definitely noticed the camera.

Bottom: This bobcat was probably looking for a meal.

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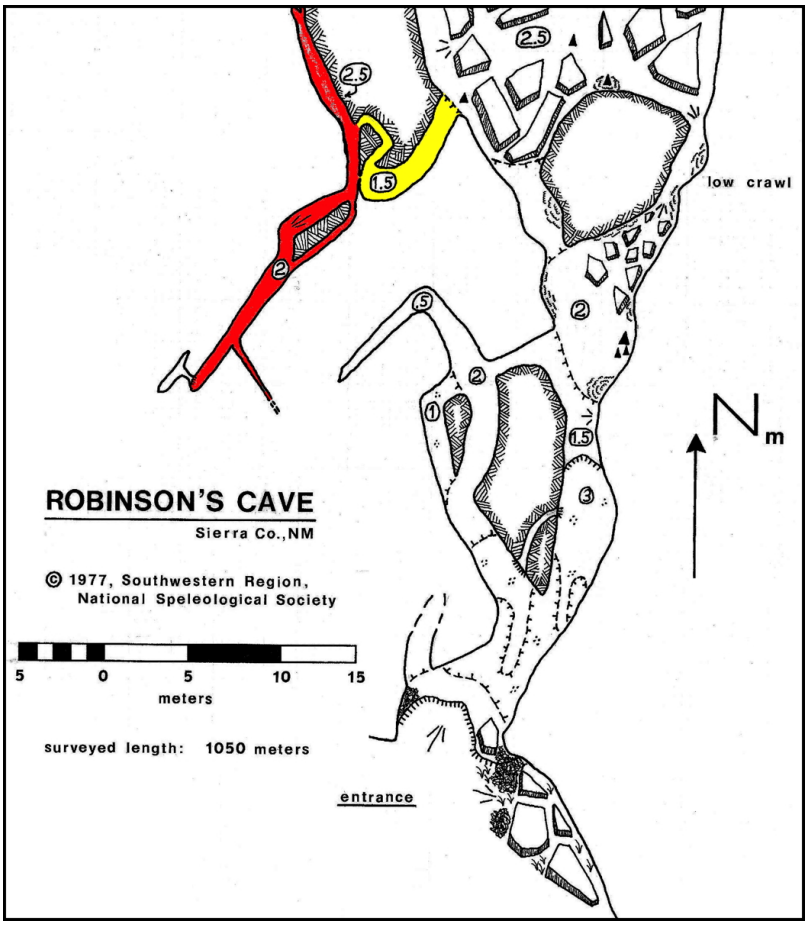
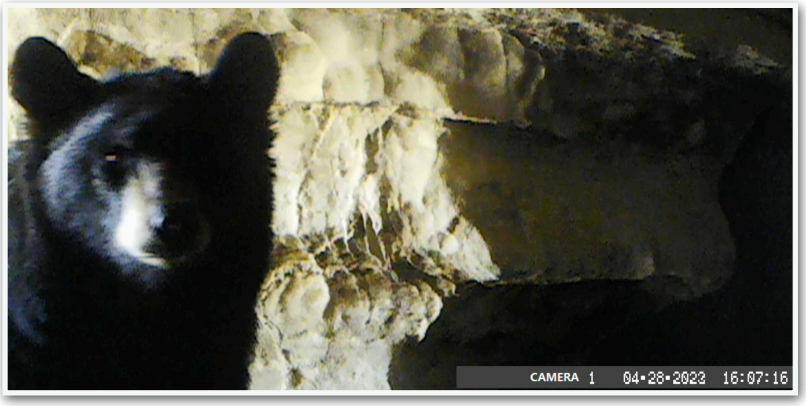






The Echinocereus of the Black Range and Doña Ana County

The genus *Echinocereus* is found in the western United States, a few of the states of the Great Plains (South Dakota south to Texas), and Mexico (to the central states). Wikipedia has a nice listing of species and range. There are roughly 70 species in this genus, with exact taxonomic determinations differing by authority. Several of these species are native to the Black Range and Doña Ana County.

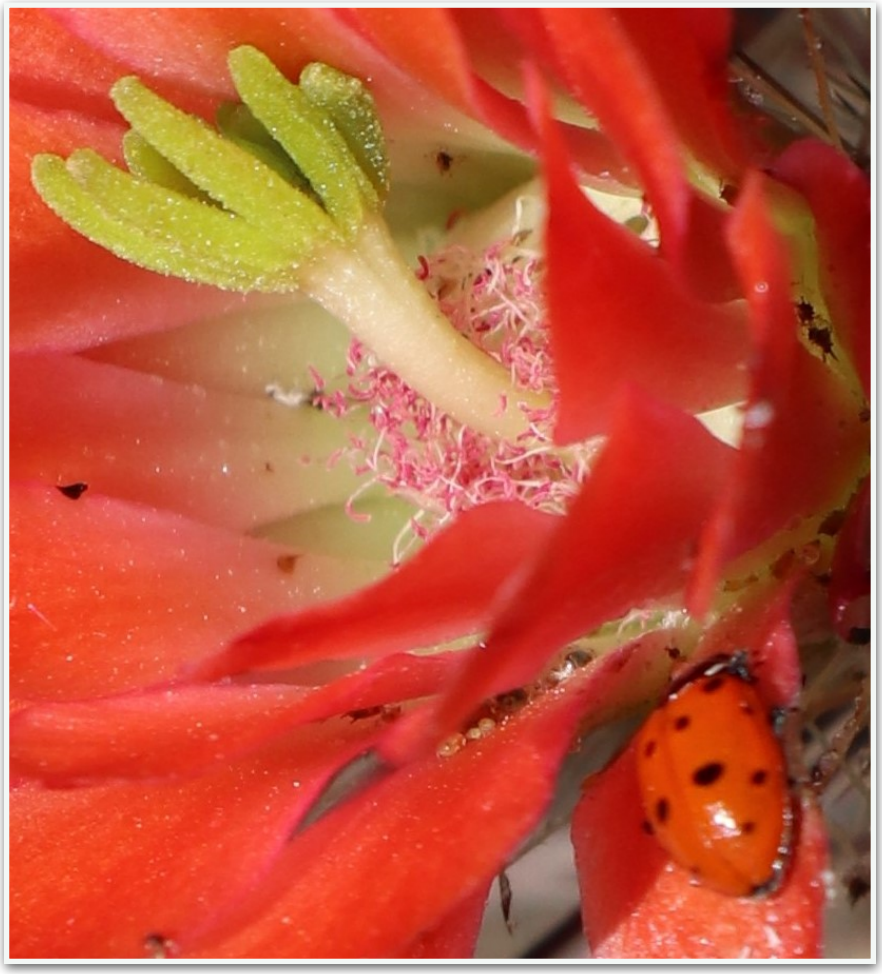
A Bit of Natural History

Wikipedia notes that "*Echinocereus* floral color is variable because perianth color reflects pollinator specificity. Red flowers are generally associated with hummingbird pollination, while pink flowers tend to correspond to moth pollination." Observations by the editor would not dispute this statement but do find it lacking in the range of inclusiveness. It would appear that pollination in this genus is performed by many species which are neither hummingbird nor moth. The following, however, is not meant to make a statement about the diversity of pollinators.

James Von Loh has documented many species visiting the flowers of the species in this genus. Here we present his photographs of the visitors to *Echinocereus coccineus*. Von Loh provided the photographs and citations in this, our opening discussion of the genus. It is followed by material covering various species found in our area (which we define here as the Black Range and Doña Ana county).



Top Right: Greenbottle Fly (*Lucilia* sp.) perched on a Claret Cup flower growing on the east-facing low slope of Tortugas Mountain on April 30, 2020.



Bottom Right: Convergent Lady Beetle, *Hippodamia convergens* (Guerin-Meneville,1842) perched/foraging on the petal of a Claret Cup flower growing on the west-facing midslope of Tortugas Mountain on April 18, 2020.







Left Column

Top: A Leafcutter Bee (*Megachile* sp.) foraging within a Claret Cup flower growing on the east-facing lower slope of Tortugas Mountain on April 3, 2020.

Middle and Bottom: Mating - Members of the Leafcutter, Mortar, and Resin Bees (*Ashmeadiella* sp.) perched within a Claret Cup flower growing on the southeast-facing lower slope of Tortugas Mountain on April 9, 2020.

Right Column

Top: Unknown Hummingbird (ed: probably a Black-chinned Hummingbird) hovering over and nectaring from Claret Cup flowers growing on the east-facing mid slope of Tortugas Mountain on April 21, 2020.

Two Central Photographs: Dury's Metalmark, *Apodemia duryi* (W.H. Edwards, 1882), nectaring from a Claret Cup flower growing on the southwest-facing slope of Tortugas Mountain. Tortugas Mountain is assumed to be the type locality for this butterfly species. Photos from April 10, 2023.

Two Photos at the Bottom: Pipevine Swallowtail, *Battus philenor* (Linnaeus, 1771), nectaring from a Claret Cup flower growing on the west-facing mid slope of Tortugas Mountain. These photographs were taken on April 10, 2023.













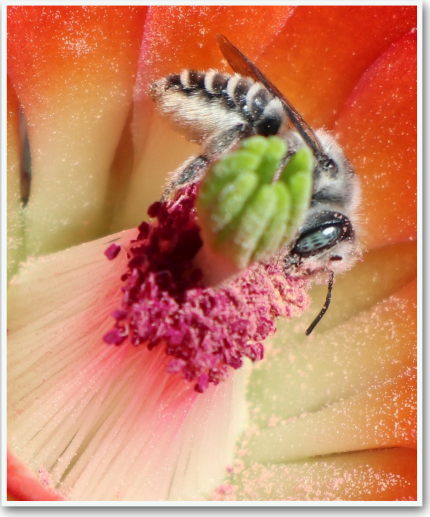




Left Column: Leafcutter Bee (*Megachile* sp.) foraging within a Claret Cup flower growing on the southeast-facing lower slope of the Doña Ana Mountains on May 7, 2022. In the middle photo the bee is joined by numerous unidentified ant species.

Top Center: A bee of the Leafcutter, Mortar, and Resin Bees (*Ashmeadiella* sp.) foraging within a Claret Cup flower growing on the southeast-facing lower slope of Tortugas Mountain in April 2019.

Middle Center: Pallid-winged Grasshopper, *Trimerotopus pallidipennis* (Burmeister, 1838), instar perched inside a Claret Cup flower growing within Soledad Canyon, near the canyon mouth, on April 8, 2022.







Bottom Center: Tachinid Fly (Family: *Tachinidae*) perches on a Claret Cup flower bud growing on the west-facing mid slope of Tortugas Mountain on April 20, 2020.

Identifying *Echinocereus*

Echinocereus exhibit many characteristics which are far from distinctive. Wikipedia notes that the species in the genus may: Grow solitary stems or branched; have upright shoots or be prostrate; be spherical or cylindrical; have fibrous or bulbous roots; vary in height from ⅓ of an inch to 2 feet. (But note the *Echinocereus stramineus,* Strawberry Hedgehog Cactus, observation on a ridge east of Bishop Cap, about 15 miles south of Tortugas. "Some of these mounds reach 4' in diameter, and 3' in height". See species discussion.) The species in this genus may have from 4 to 26 ribs and the number of ribs may vary within a species. The ridge lines of the ribs (sometimes these ribs are composed of distinct 'lumps') are adorned with areoles which may have differently shaped spines, and the spine shape may be variable within a species. Fruits are spherical to ovoid, may be green to red, and most have spines. The fruits are generally juicy and sometimes are fragrant. Their seeds are oval and black and roughly the same size (.8 to 2 mm).

Apparently a distinctive characteristic of the genus is the erumpent flowers which each species has. This characteristic is most likely synapomorphic - meaning that it has been retained from a relatively recent common ancestor (not covergently evolved, for instance). Wikipedia describes this process thusly: "The floral buds develop internally and break through the epidermis of the stem. This flower morphology is likely an adaptation to protect the developing buds from low temperatures."

Echinocereus evolved into a separate genus sometime between 6 million years ago (mya) and 3 mya.

Polyploidy

If you hang around the cactus world for long you will hear terms like diploid, tetraploid, etc. Diploid means having two sets of chromosomes within a cell; humans and many other creatures are diploid. Polyploidy is a term used to describe more than two sets of chromosomes within a cell. Cacti "normally" have 22 chromosomes in two sets of 11. But some species have double that number and are called tetraploid (44 in four sets of 11). Some species even have 66 (six sets of 11) and others 88 (8 sets of 11) chromosomes.

Sometimes polyploidy happens within an individual plant, that is, for some reason, the plant creates two copies of its own chromosomes. In other cases polyploidy occurs when hybridization occurs but the offspring is fertile and has a full set of chromosomes from each parent.

Polyploidy does not occur frequently. It is, however, an important process in the evolution of species, generally increasing speciation: The individual which has more than 2 sets of chromosomes through hybridization is effectively a new species. It may be a) fertile and b) able to reproduce successfully. These two concepts are different. When polyploidy occurs, the individual with more than two sets of chromosomes is not able to breed successfully with either of the species which it originated from. Polyploidy is an effective barrier to fertilization. To be tetraploid, for instance, you must breed with another tetraploid individual to have fertile offspring. (Sometimes hybrids occur which may breed and produce offspring with one or both of the species which they sprang from - further complicating the genetic mix.) That brings us back to the earlier point that being fertile and being able to reproduce are different concepts.

This doubling of the chromosomes may have morphological consequences, and the offspring may appear quite different from the species which created them. Sometimes the doubling of chromosomes can create greater "capability". It is thought that cacti were able to create the ability to make sugars at night (without the presence of the sun's immediate energy) by utilizing gene sets on chromosomes which were freed up because they were no longer needed for something else - there was another full set which was taking care of that.

Sometimes cacti do not look very different from their parent stock. In such cases the only way to tell them apart (definitively) is by counting the number of chromosomes. This is not something that is easy to do in the field - a hand lens will not be helpful. There are times, however, when you can be pretty sure that you are dealing with a particular species because someone with expertise and something stronger than a hand lens has determined the geographic distribution of a particular species, that is, because they have counted the number of chromosomes. Determining a species by range may not be very satisfying.

Species Discussed Here

- Echinocereus arizonicus, Arizona Hedgehog Cactus
- *Echinocereus coccineus*, Scarlet Beehive Cactus
- *Echinocereus coccineus rosei*, Scarlet Hedgehog Cactus
- *Echinocereus chloranthus chloranthus*, Nylon Cactus/New Mexico Rainbow
- *Echinocereus dasyacanthus*, Texas Rainbow Cactus
- *Echinocereus fendleri*, Fendler's Hedgehog Cactus
- *Echinocereus rhyolithensis* (probably a subspecies of *E. chloranthus*)
- *Echinocereus santaritensis*, Santa Rita Hedgehog Cactus
- *Echinocereus stramineus*, Strawberry Hedgehog Cactus
- *Echinocereus triglochidiatus*, Kingcup Hedgehog Cactus
- *Echinocereus viridiflorus, Nylon Cactus*

The most frequently reported species of *Echinocereus* in the Black Range appears to be the nominate subspecies of Fendler's Hedgehog Cactus, *Echinocereus fendleri*. Casual observation would indicate that it is not, however, the most common species in the area.

Sorting *Echinocereus,* indeed any cactus, can be difficult, and authoritative sources may disagree. Grounding yourself in the genus is a good first step; from there you can decide which taxonomic treatment you are most comfortable with. A good start in the grounding process is The Echinocereus Special Issue of the Cactus International Society, which they provide as a free download and which we provide at this link. Our reference to it does not indicate that it is "up-to-date", the world's most authoritative source, or that we necessarily agree with its taxonomic determinations. It only means that is where we start.

If you have any particular insights about this genus in the Black Range and Doña Ana County, please pass them on to us so that we can share with others.

Echinocereus arizonicus Arizona Hedgehog Cactus

This species is also known as the Arizona Claret-Cup Cactus. It is found in Chihuahua, southwestern New Mexico, and southeastern Arizona. There are three (maybe four) recognized subspecies. The one shown here is *E. a.* subsp. *oldachiorum* (W. Blum & PP, B. Breslin). This photograph is provided by Patrick Alexander under a Creative Commons license via iNaturalist. It was taken just north of Winston on August 31, 2018. Steven A. Lovelace reported a sighing on iNaturalist at the Ladder Ranch (east slope of the Black Range) on June 17, 2023.





Echinocereus coccineus
Scarlet Hedgehog Cactus

The nominate subspecies is discussed here, see later for *E. c. rosei*. This species generally has between 5 and 12 ribs which are made up of a series of lumps. The thorns range in color from yellow to black, the central spines number up to 4 but may be missing.

This subspecies is found in New Mexico and Colorado.

Above and to the right: Hillsboro Peak Trail, Black Range, July 10, 2019.

Below: Ready Pay Gulch, East of Hillsboro, New Mexico, March 30, 2017.







Left column on following page: Hillsboro Peak Trail, Black Range, July 10, 2019.





Above: Sawyer Peak Trail, Black Range, New Mexico - June 30, 2019

Below: April 27, 2020 - East of Hillsboro, New Mexico







Above: Apache Peak N. of Lake Valley, Black Range, New Mexico April 14, 2020

Photographs on pages 32-36 are by R. A. Barnes.





Above and at Left: Apache Peak N. of Lake Valley, Black Range, New Mexico, April 14, 2020

The images on the following page (taken in Ready Pay Gulch, east of Hillsboro in the Black Range on March 7, 2015) were originally misidentified as *Echinocereus triglochidiatus*. In correspondence of September 27, 2022, David Ferguson noted "very few people still follow the brief lumping of the two that was prevalent following Benson's publications. As far as I am aware, there are no populations of *E. trichlochidiatus* west of the Rio Grande this far south, though they reach south into the Sacramento Mountains (fairly high up) and into the Tularosa Basin (on gypsum). Some of the plants on the east slope of the Black Range resemble true *E. trichochidiatus*, but they represent the same few-ribbed variant of *E. coccineus* that occurs in the Trans-Pecos and in the Guadalupe and on the east side of the Sacramento Mountains (the name is debated - var. *gurneyi* is the oldest varietal name for these, but some say that is a hybrid and now there is a newer name - ssp. *transpecosensis*). In most of the rest of the Black Range the plants fit the rather weakly discriminated var. *roseus* or var. *coccineus* best. *E. coccineus* is tetraploid and mostly dioecious, while *E. trichochidiatus* is diploid and monoiecious. *E. trichodiatus* has generally sharper ribs, usually not over 7 in number, and stout spines that are usually angular in cross-section. *E. coccineus* usually has 7 or more (in most varieties 9 or more) ribs that tend to be more rounded, and spines are usually round in cross-section (they may be rather flattened though)."















Ready Pay Gulch, East of Hillsboro, NM, March 30, 2017.







Photographs and captions on this page by Gordon Berman from Picacho Peak, Doña Ana County.

Top Left: 3/31/23 looking east toward The Organ Mountains.

Center Left: 3/31/23, partially backlit.

Bottom: 3/31/23 looking over the Mesilla Valley toward The Doña Ana Mountains and The San Andres Mountains beyond.

Top Right: 4/9/23, a corsage



Echinocereus coccineus rosei
Scarlet Hedgehog Cactus

***Echinocereus coccineus rosei*, commonly known as scarlet hedgehogs or claret cups, abound on Doña Ana County's Picacho Peak from lower elevations nearly to the summit. In bright pinks, oranges, and dominant signature reds, flowering season normally runs from mid March to mid April. The photographs on the following page were taken on the southern and eastern slopes looking roughly NW to NE toward the peak.**

The photographs on this page, of *Echinocereus coccineus rosei,* were taken on April 12, 2021 in Soledad and Bar Canyons. At this location they present in large isolated hemispheric mounds. They remain hidden among tall grasses until they scarlet slam the hillsides. At this location they are much less densely populated than on Picacho Peak. Photographs and captions in this species account are by Gordon Berman.

Following Page

Top: March 31, 2023

Center Left: March 20, 2023

Center: March 27, 2023

Center Right: March 31, 2023. In addition to the plants visible in this frame, many more are obscured by distance and shrubbery.

Bottom: March 31, 2023.

(Ed.: Sometimes referred to as *E. c. roseus*.)

















Photographs of *E. coccineus rosei* taken on 4/12/21 in Soledad and Bar Canyons by Gordon Berman.









Photographs of *E. coccineus rosei* taken in Soledad and Bar Canyons by Gordon Berman.



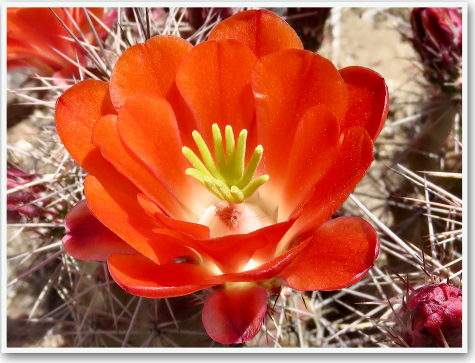


Photographs of *E. coccineus rosei* by Gordon Berman.









Echinocereus chloranthus chloranthus - Echinocereus viridiflorus - Echinocereus rhyolithensis
Nylon Cactus/New Mexico Rainbow

These 2 (1 to 3) species are often referred to as nylon cactus for no widely-accepted reason or New Mexico rainbow for their colorful spines. They are hard to differentiate. They are frequently seen among grasses in Achenbach Canyon and Soledad/Bar Canyons south of the Dripping Springs Visitor Center. Shot on 2/17/20 (right) and 2/19/24 (below), these specimens display vibrant colors and nascent buds as they emerge from winter dormancy.









Gordon Berman, who took the photographs on this page, noted that "these cactus range in stem growth from 1 to 15, but never as multi stemmed as the more common *E. coccineus* and *E. stramineus*". His photographs on the following two pages show the colorful radial spines of this species. The plant on the next page with the green-colored flowers was photographed on April 5, 2019, while the plant with the brown-colored flowers was photographed on April 28, 2019.

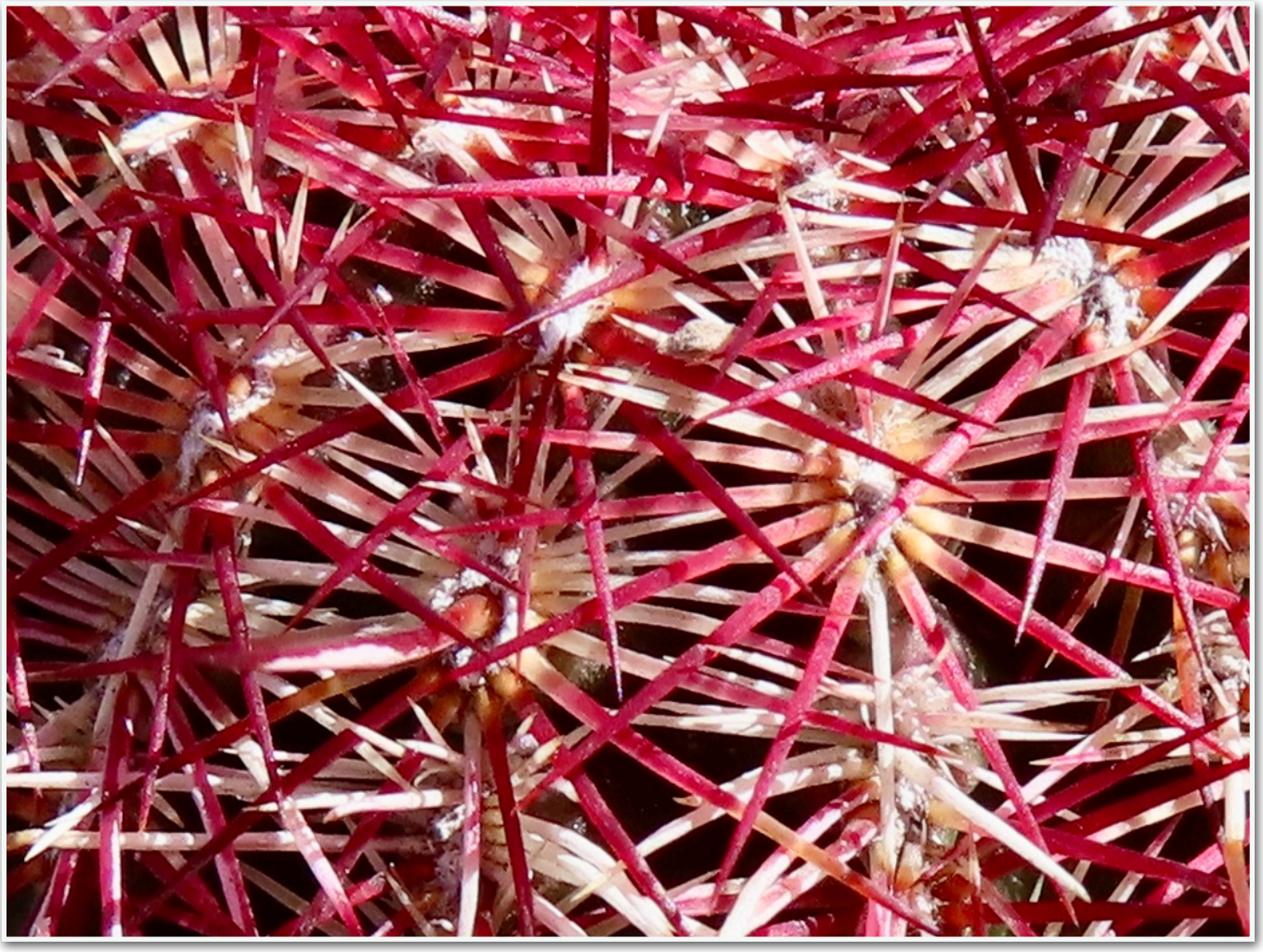
























James Von Loh took the photograph to the left on May 22, 2022, noting that "Ants, nearly the same color as the petals, climb onto the Texas Nylon flowers to forage." On April 28, 2019, he took the photograph below, noting that "Occasionally, Assassin Bugs (Family: *Reduviidae*) perch near the flower clusters of cacti to hunt visiting arthropods."



Echinocereus viridiflorus

Other English common names for this species include Small-flowered Hedgehog Cactus, Green-flowered Hedgehog Cactus and Green Pitaya.

It was originally described by George Englemann (as *Cereus viridiflorus)* in 1849. Because of the taxonomic uncertainty associated with the species the Latin binomials are just as varied as the common names.

In one taxonomic structure, *E. v.* subsp. *chloranthus* is said to have a range from Arizona east to west Texas and south into Chihuahua. *E. v.* subsp. *cylindricus* is said to have a range which extends from New Mexico and west Texas south into Coahuila. NatureServe does not recognize either of these subspecies.

This species may grow to a foot high and 4" in diameter. It has from 6 to 18 ribs which are rows of clear

bumps. Generally it is unbranched but may cluster. *Wikipedia* notes that its spines "may be red, yellow, white, purplish, or bicolored, sometimes with darker tips and are up to 2.5 centimeters long. The 8 to 24 marginal spines are also red, cream or brown and up to 1.8 centimeters long." The spines give the plant a rainbow array of color.

Echinocereus chloranthus

E. chloranthus is considered a subspecies of *E. v.* by many sources (Wikipedia and The Encyclopedia of Cactus).

Sources like NatureServe and The American Southwest website consider it a full species. NatureServe recognizes *E. c.* var. *chloranthus,* with a synonym of *E. russanthus* (which Wikipedia recognizes as a full species).

It was originally described as a full species by Englemann (*Cereus choranthus*).

It is known by several English common names including Varied Hedgehog Cactus, Green Flowered Torch Cactus, and Brown-Spine Hedgehog.

The American Southwest website states that *E. c.* can be distinguished from *E. v.* "in having denser spines, longer central spines, color banding of spines, taller stems, and flowers appearing lower down the stem."

Echinocereus rhyolithensis

But wait, there's more.

The Encyclopedia of Cacti considers this species to be a subspecies of *E. chloranthus*; others consider it to be a subspecies of *E. viridiflorus*. The latter sources state that these plants look like northern versions of *E. russanthus* but are more cold hardy, tend to be more yellow or red spined, and are found in the Red Rock area of New Mexico. These sources characterize this population as a full species.

Blum and Lange (1998) described *E. c.* subsp. *rhyolithensis* as having 5 or more central spines which were usually reddish. Flowers are brown. The holotype was collected by Pierce in Lake Valley (Sierra County, New Mexico) in 1961 (see UNM 253361).

Michelle A. Cloud-Hughes notes that "*Echinocereus chloranthus* is distinguished from other taxa in the *Echinocereus viridiflorus* (Engelm.) complex mainly by flowers that do not fully open, are not fragrant, and contain substantial orange, brown, and red pigmentation (Taylor 1985). *Echinocereus chloranthus* and its subspecies are also the only taxa in this complex to produce trichomes on the spines (Blum, personal communication). The subspecies of *Echinocereus chloranthus* are distinguished by differing numbers of central and radial spines, as well as differences in habitat and seed structure (Blum and Lange 1998, Blum et al. 2012). *Echinocereus chloranthus* subsp. *rhyolithensis* has more numerous central and radial spines than either *E. chloranthus* subsp. *chloranthus* or *E. chloranthus* subsp. *cylindricus* N.P. Taylor." (Cloud-Hughes, Michelle A. et al., "Noteworthy Collection", *Madroño*, vol. 62, no. 3, 2015, pp. 181–83. JSTOR, http://www.jstor.org/stable/44578518. Accessed 18 Mar. 2024.)



E. c. chloranthus/E. viridiflorus/E. rhyolithensis





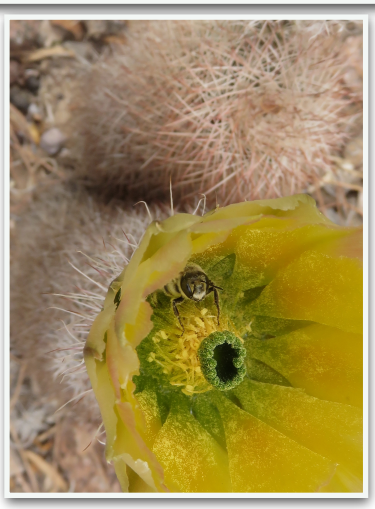
Bob Barnes photographed plants he identified as *E. rhyolithensis* at Frying Pan Canyon south of Cooke's Peak on June 17, 2018. His photographs of those plants are shown above and on the previous page

Echinocereus dasyacanthus Texas Rainbow Cactus

The photographs at the right and on the next two pages were taken by Gordon Berman in Doña Ana County.

E. dasyacanthus is a tetraploid with mostly yellow flowers with a green interior. It is also known as the Spiny Hedgehog Cactus, Golden Rainbow Hedgehog Cactus, and Yellow Pitaya. It does not always have the colored bands on its stems.

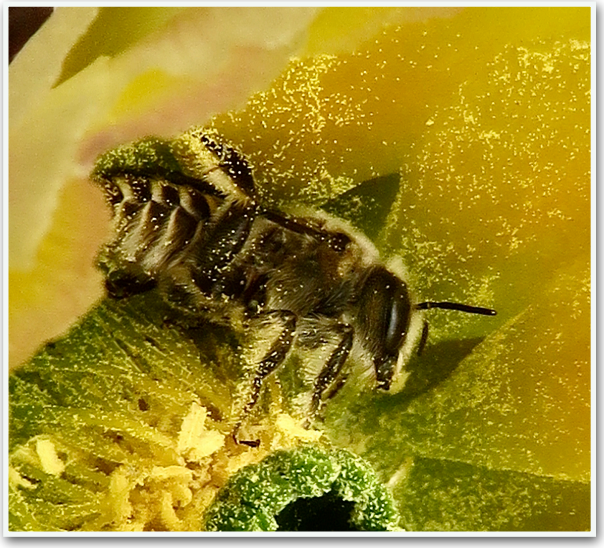
The nominate subspecies is sometimes known as New Mexico Rainbow Cactus.

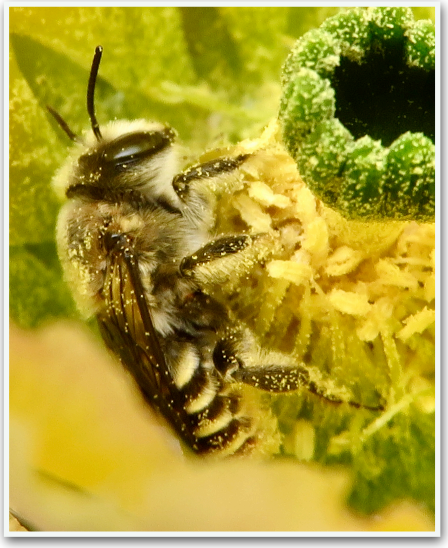




The photographs on the next page document a native bee, probably *Lithurgopsis* (*apicalis*?), covered in pollen as it crawled all over an *E. dasyacanthus* flower.













The photographs on this and the following page show a progression of buds opening over a 6 day period in mid April, 2021. This species does well in my naturally sandy yard without augmented watering or feeding. Flowers often reach 4" in diameter.

- Gordon Berman





Echinocereus fendleri
Fendler's Hedgehog Cactus

Named in honor of Augustus Fendler, known commonly as Fendler's hedgehog and pink flower hedgehog, *Echinocereus fendleri* is often overlooked because it resembles but is far less common than the heavily populated *E. coccineus*, claret cup hedgehog. Its smaller size, spines in shades of brown and white, and unmatched shades of pink distinguish it from its generic cousin. The Fendler's on this page, among 7 or 8 spotted, were widely scattered in exposed, rocky terrain on the Organ Mountain's Upper Bar Canyon Trail on May 13, 2019. Seeing Fendler's in flower is like chancing upon an unannounced opening of artistic treasure at a secret location, gone a day later. – The note above and the photographs (images from about 5 miles west of the Rio Grande in Doña Ana County) on this page are by Gordon Berman.

James Von Loh has been able to photo-document bee species gathering pollen from *E. fendleri* over the years and provided the photographs and caption notes of that activity on the following page.

Following Page, Top Left: A pollen-covered bee, possibly a Leafcutter Bee, forages among anthers and stamens of Fendler's flowers growing along the Sierra Vista Trail near Soledad Canyon on April 3, 2021. Note the amount of pollen dusting the petal bases.

Additional photographs of this species may be viewed starting with the page at this link (blackrange.org).











Middle Photographs: A Leafcutter Bee (*Megachile* sp.), forages among anthers and stamens of Fendler's flowers growing along Bar Canyon Trail. April 26, 2019 (L) and May 9, 2019 (R).

Bottom: Sometimes cactus flower petals/sepals/ tepals and stigma/style are grazed to the base, perhaps by small mammals, as occurred to this Fendler's flower growing along Bar Canyon Trail on April 2, 2019.







The photographs and notes on this and the following two pages are from Bob Barnes.



On March 7, 2015, we found Fendler's Hedgehog Cactus (photo top right) on the west ridge in Ready Pay Gulch, east of Hillsboro. *Echinocereus fendleri* tends to grow at higher elevations than species like the Fishhook.

The specimen in the bottom right image was photographed on the road to the Snake Mine, east of Hillsboro, on July 14, 2014.

Cactus have adapted to the harsh environment found in the deserts of the Americas by developing a number of interesting features. We all know, for instance, that the surface of a cactus is waxy and hard. But not until recently did I discover that it is thicker on the "sunny side" of the plant, increasing its protective value. And the spines: we all know they are to be avoided, but in some species they are thick enough to provide shading to the surface of the cactus.



The most interesting feature of cacti, for me, is that they open their stomata at night so that oxygen and carbon dioxide can be exchanged. Carbon dioxide is required for photosynthesis and oxygen is a by-product of the process. The exchange of raw material occurs at night when there is less loss of water from the open stomata. During the day, when photosynthesis occurs, the stomata are closed.

This species was first described by Engelmann in 1849 as *Cereus fendleri*. In 1860, Sencke redescribed it as *Echinocereus fendleri*. There are two recognized subspecies, the nominate form and *E. f. rectispinus* (which has been described as *E. rectispinus* and *E. hempelii,* in the past). It is also known as Pinkflower Hedgehog Cactus.

This species is listed in CITES Appendix II, its "trade controlled to avoid use incompatible with species survival". The type specimen (shown on the following page) for this species was collected by Fendler on June 9, 1847 (or 1846?), in New Mexico.

Next Page - Top Right and Bottom: May 5, 2019. Hillsboro.


MISSOURI BOTANICAL GARDEN
2016525
HERBARIUM
copyright reserved
IDENTIFIED AT THE HERBARIUM OF
POMONA COLLEGE
CLAREMONT, CALIFORNIA
Echinocereus Fendleri Engelm.
VAR.
BY. Lyman Benson DATE. 1967
TYPE COLLECTION
TYPE OF
Echinocereus Fendleri Engelm.
TROPICOS
Image
TYPE SPECIMEN
Missouri Botanical Garden (MO)
Holotype C. fendleri E. SSW85
Cer. Fendleri
Santa Fe
A. Fendler
1846
MISSOURI BOTANICAL GARDEN





Immediately Below, Top and Middle Right:
South of Hillsboro on May 3, 2014.
Others: East of Hillsboro on May 3, 2021.













Echinocereus santaritensis Santa Rita Hedgehog Cactus

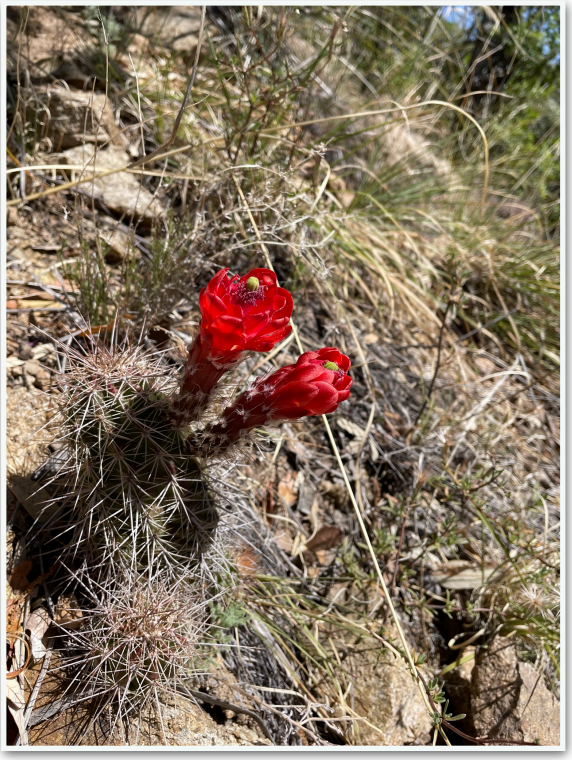
As compelling as it is to assume that the Santa Rita Hedgehog Cactus is named after the Santa Rita mine east of Silver City, that it not the case. It was first found in the Santa Rita Mountains of Arizona.

The image to the right, of a Santa Rita Hedgehog Cactus, was posted to iNaturalist by "dataecologist" on June 18, 2021. The location given was Lat: 33.386768 Lon: -107.847504, which is along the Grand Enchantment Trail in the northern Black Range (south of NM-59). It is shown here under a Creative Commons License. Other iNaturalist reports include one from "Konnoriddle" at Lat: 33.036672 Lon: -107.856796 on December 5, 2019 (between McKnight Peak and McKnight Cabin) and one from Kaysie Cox of a plant near Rocky Canyon Campground on the west side of the Black Range on June 18, 2023. There are no iNaturalist reports of the species southeast of the Black Range.

"blank21" provided the photograph at the bottom right from the Santa Rita Mountains in Arizona. It is shown here under a Creative Commons License via iNaturalist. The observation was made on May 14, 2023. David Baake provided the photograph below left under a Creative Commons license via iNaturalist. The image was taken on May 13, 2023 near Datil, New Mexico.







Echinocereus stramineus Strawberry Hedgehog Cactus

In the January issue of this year James Von Loh shared photographs of Strawberry Hedgehog Cactus, *Echinocereus stramineus*, with anomalous flowers. Here he shares some more-typical flowers (right column) and additional photos of the atypical flowers (below). All are from Tortugas Mountain (Las Cruces) and all from June 2023.

In the top left photo a clump of the anomalous flowers is in bloom with a bud showing to the left. The middle photograph shows one of the flowers and a bud in more detail. The bottom photo shows what becomes of these flowers - as opposed to successful fruiting shown on the following page.







The plants with these anomalous flowers have been blooming for at least five years, apparently without reproducing.











Fruiting Strawberry Hedgehog Cactus by James Von Loh (August 30, 2023, at the top and July 8, 2019, immediately above and to the right). He noted "I always wondered how the name strawberry cactus came about until I saw a mature fruit." (Pers. correspondence 11/25/23)

This species blooms from late April to early July - all at one time. Its range extends from Coahuila, Nuevo León, Chihuahua, and New Mexico into west Texas. It apparently has very specific habitat requirements and is noted from Doña Ana County.

***Echinocereus stramineus* ([Engelm.] F. Seitz) is the scientific reference used in naming this species. It hides a bit of scientific controversy. The original description of a plant in this genetic population was made by Carl Friedrich Förster (C. F. Först) 1817-1901. His description (*E. conglomeratus*) was dismissed, apparently because it did not meet descriptive standards.**

The photographs on this page (both from Tortugas Mountain) and the following note are by Gordon Berman.

***Echinocereus stramineus* is known more commonly as haystack cactus, strawberry cactus, or porcupine hedgehog. In Mexico it is often called pitaya. *Stramineus* in Latin means straw - denoting the spine coloration which helps distinguish it from other *Echinocereus* species. The flowering season runs the month of May, enthusiastic after timely rainfall, reticent in drought.**

Tortugas Mountain is, perhaps, the Doña Ana County site most heavily populated by *E. stramineus*. Rich in limestone deposits, Tortugas Mountain supports hundreds of *Echinocereus stramineus*, where these hemispheric plants may be 3' in diameter. They are numerous from the bottom to the crest on the west side, scattered on the east side.

Limestone rich deposits, such as those on Tortugas and portions of nearby Sierra Vista Trail, are generally considered favored habitats for *E. stramineus*, but a significant colony was found 3 or 4 years ago on Picacho Peak amid rhyolitic extrusions from the volcanic eruption 35,000,000 years ago.

The top photograph (below - May 6, 2019) shows the characteristic multi stemmed (perhaps 100 or more) hemispheric growth pattern and the starkly contrasting floral brilliance. When I took the photograph at the bottom (May 25, 2018), I was left wondering if this flower was the sole remaining bloom from an earlier display, or a portent of what was to come? Absent all but a couple of dry/withering flower stems and absent ripening buds still furled, this appears to be a solitary jewel in the crown.









Above: One of a population of more than 100+ haystacks on Picacho Peak, north of Las Cruces. Photograph by Daniel Fox.

Left: Strawberry Hedgehog Cactus by Daniel Fox (Las Cruces) on a ridge east of Bishop Cap, about 15 miles south of Tortugas. Some of these mounds reach 4' in diameter and 3' in height.

Below: On the summit of Tortugas Mt., Organ Mountains in the background. May 12, 2021. Gordon Berman











All of the images on this and the preceding page are by Gordon Berman from Tortugas Mountain.

Preceding Page

Top Left: NMSU observatory on May 12, 2021

Center Left: May 28, 2023

Bottom: May 6, 2019

Top Right: May 6, 2019

This Page

Top and Center Right and Top Left: Examples of hillside habitat of Strawberry Hedgehog Cactus (Haystack). Both the cactus and ocotillo were blooming at this time. May 6, 2019

Bottom Left: Global flowering. May 12, 2021.

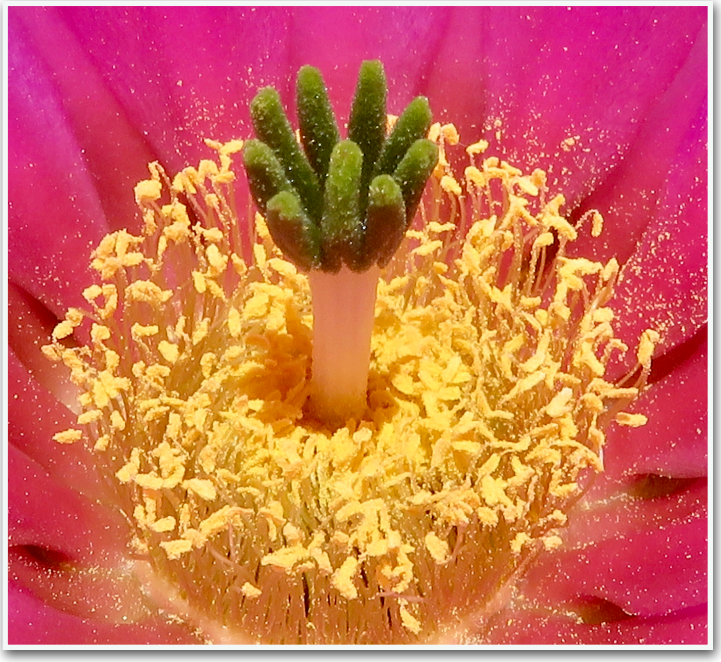
Bottom Right: Typical cactus flower architecture. May 12, 2021











Echinocereus triglochidiatus Kingcup Hedgehog Cactus

We are going a bit afield here but the trip "feels right". If you are interested in a discussion of the *Echinocereus* you will undoubtedly be willing to travel a bit farther - to the entrance of White Sands National Park. Jim Von Loh provides the following narrative and photographs.

"Kingcup Hedgehog Cactus are along the entry road into White Sands National Park In Otero County. Morphologically, they bear little resemblance to typical populations in Doña Ana County. It is unique, growing in saline/alkaline soils, but is still identified to *Echinocereus triglochidiatus* (however, I have seen the varietal epithet *E. t.* var. *gonacanthus* discussed in some references (e.g., Flora North America, et al.) These large plants likely receive maximum water as sand dunes receive and percolate rain to the ground underneath effectively." Jim Von Loh, February 16, 2024.

The National Park website lists Claret Cup Cactus and Strawberry Hedgehog Cactus as English common names for this species.

Jim continued, "The claret cup cactus, also known as strawberry hedgehog, is primarily found north of the dunes in the Tularosa Basin. The claret cup cactus blooms in late spring with gorgeous crimson chalice-shaped flowers that give the plant its name. These bright flowers cover large clumps of the cactus, making it easy to spot. The cactus can reach huge sizes with older individual plants growing up to five feet in diameter with more than 75 stems. The fruits of the claret cup cactus are some of the sweetest of any desert plant. The fruits are covered with spines as they develop but shed the spines as the fruit ripens."

Flora of North America notes that at one time several populations of what are now considered separate species were lumped as *E. triglochidiatus* (L. D. Benson, 1969, 1982). This group of plants consisted of both diploid and polyploid taxa. The tetraploids in the population are now called *Echinocereus coccineus*. The diploids are divided into *E. triglochidiatus* and *E. arizonicus*. The plants at White Sands "have been called *E. t.* var. *gonacanthus*". A name which (according to *Flora*...) has been "carelessly applied to miscellaneous plants throughout the range of var. *triglochidiatus*." Make what you will of that but note that *Flora* . . . goes on to state that "the unusually large, southernmost plants at White Sands, New Mexico, shrink to the same size as northern plants when grown together in a common garden." D. Weniger 1970). This species entry was created by Allan D. Zimmerman and Bruce D. Parfitt.

Some of Von Loh's photographs of the population at White Sands, from May 2, 2022, are shown on this page.

















Von Loh's photographs of the population at White Sands, from May 5, 2021, are shown on this page.



A few more of Von Loh's photographs of the population at White Sands are shown on this page. The cactus in bud (below) was photographed on April 29, 2019. The Other photographs in this column were taken on May 2, 2022.















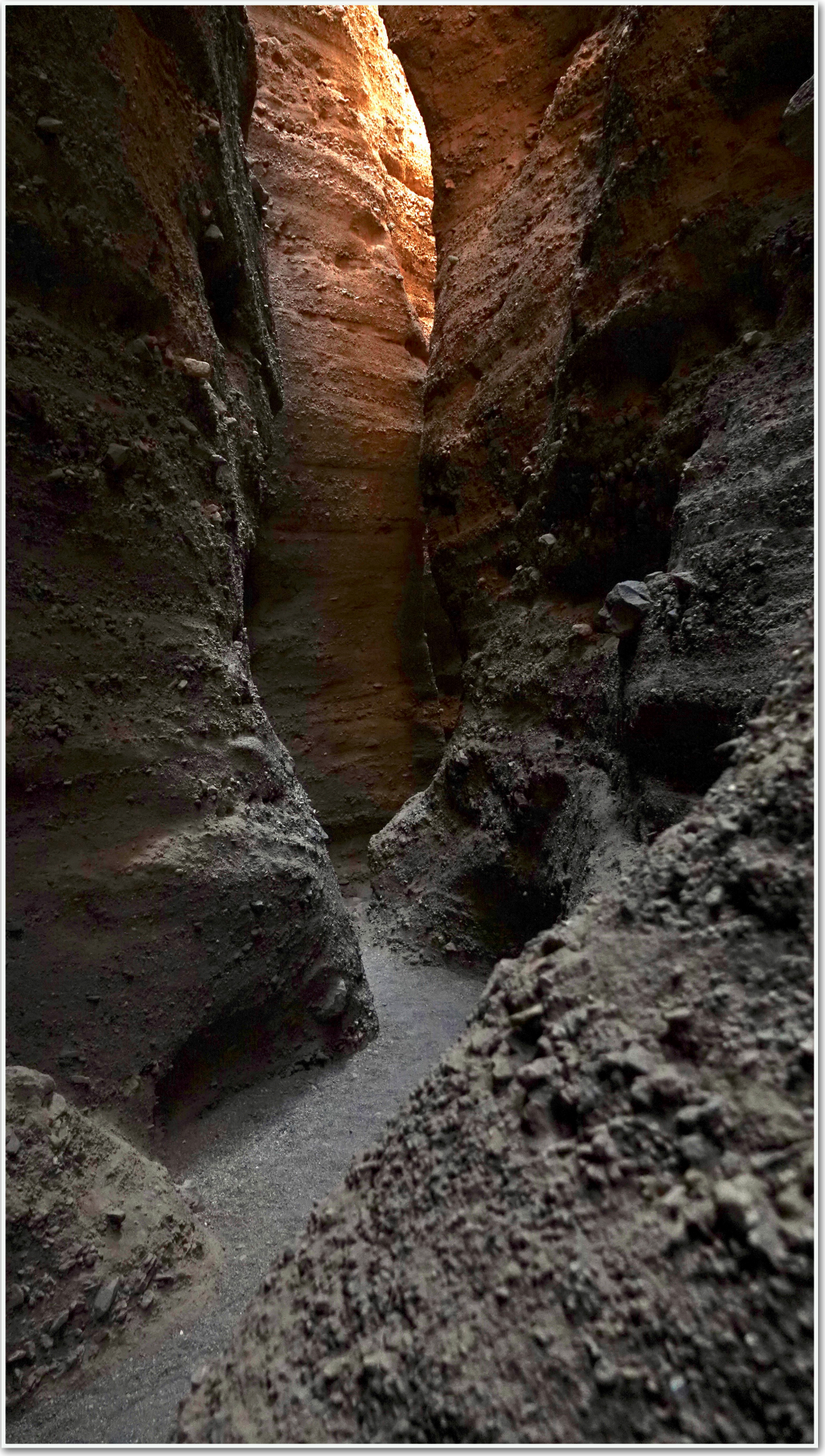
Photographs in this column were taken on May 1, 2023 at White Sands.

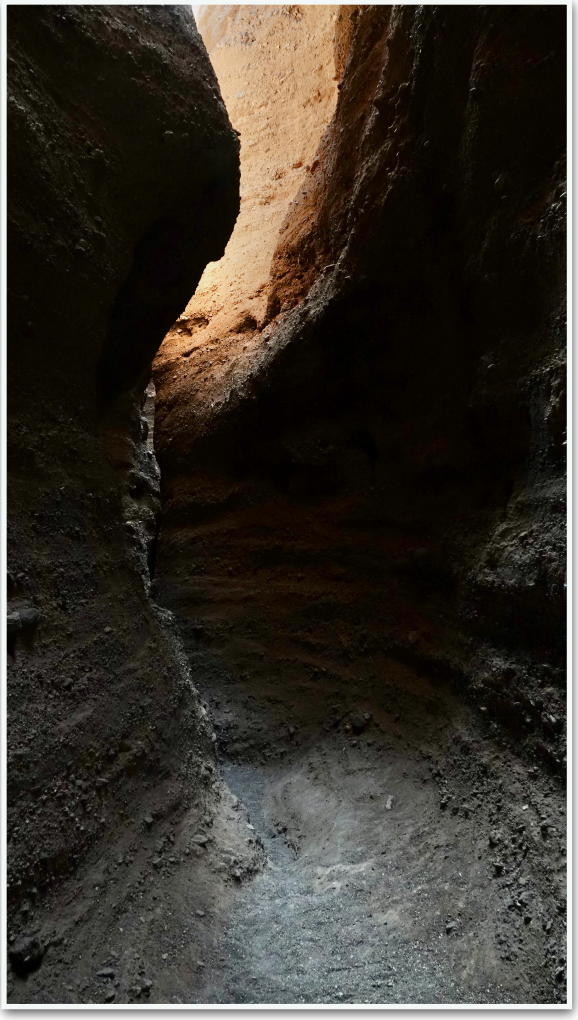
Two Slots

Two slot canyons in our area offer quite different experiences. Like most slot canyons in our region these canyons cut through conglomerate strata. Given that, a walk through one of these slots is visually distinct from that you might experience in the red rock country of northern Arizona where the slots cut through sandstone and glow in the sun.

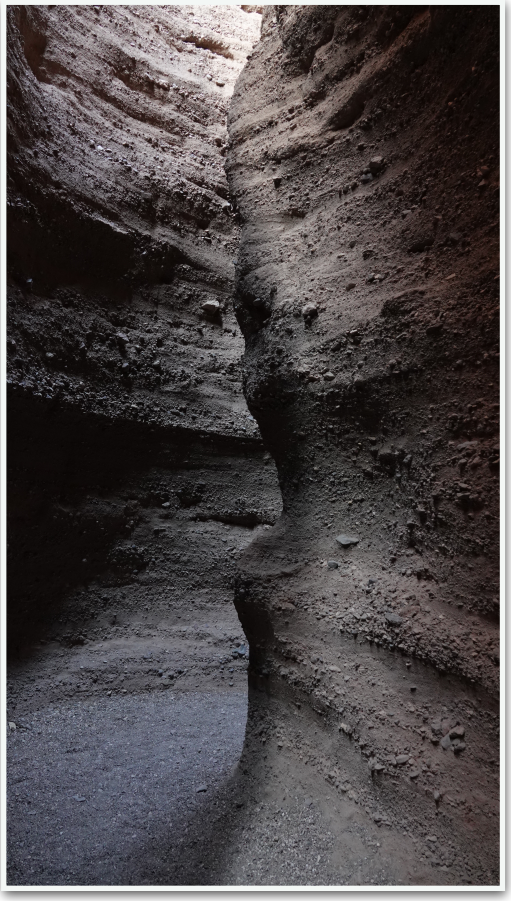
When clasts (larger pebbles, stones, and cobbles) are held together by hardened clay or cemented together with material like calcium carbonate, the resulting strata are called conglomerates (see the photos on this and the following pages). In the strata we find in these slots, this mishmash of material is solidified into hard (relatively speaking) strata.

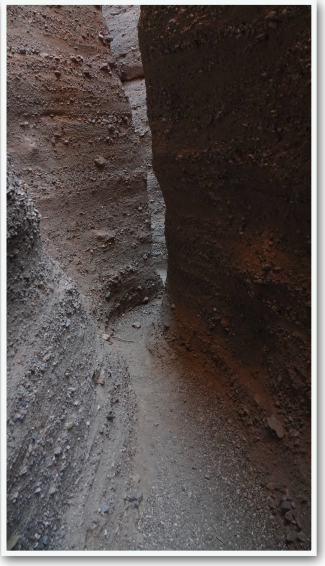
The photographs on this and the following page are from the slot canyon which is just south of Broad Canyon on the east slope of the Sierra de las Uvas Mountains (known as the Cedar Hills Slot Canyon by many; we call it by that name). Note that it is characterized by a matrix with larger material, and a higher density of larger material, than that found in the strata of the second slot we discuss, which is at the confluence of Wicks Gulch and Percha Creek in the lowlands east of the Black Range.



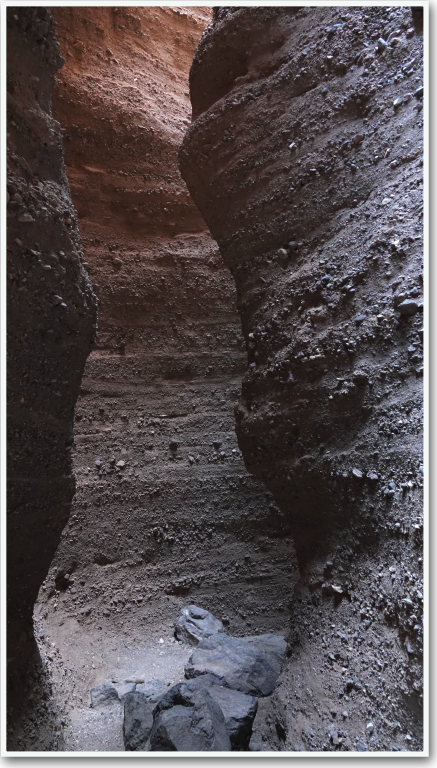
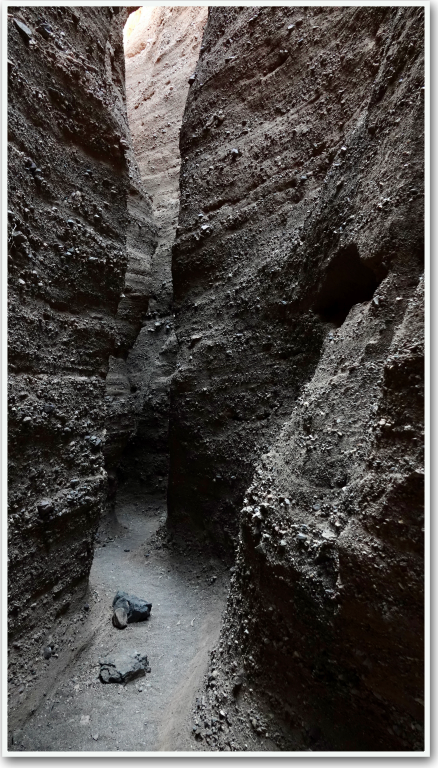
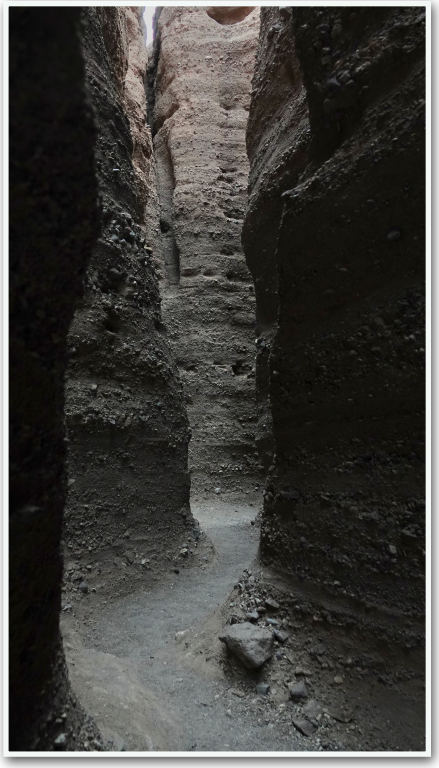


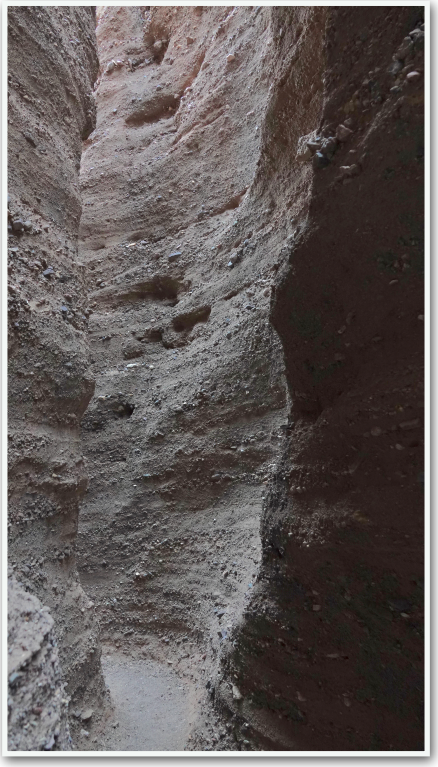


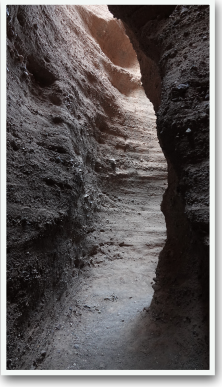






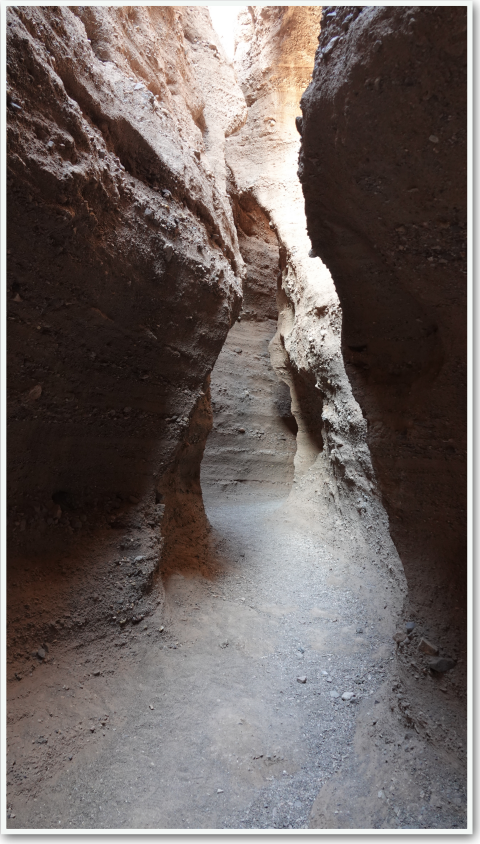




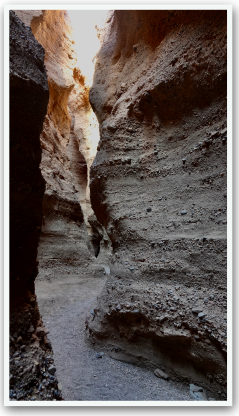



This and the next page: The slot canyon south of Cedar Hills is longer than the one at Wicks/Percha. It is also less challenging to navigate and is popular. Since it is easier to get to, easier to navigate, and closer to population centers, you are more likely to encounter other people in this slot. The rockfall which you will encounter along the slot trail is from overhead or has been washed downstream.











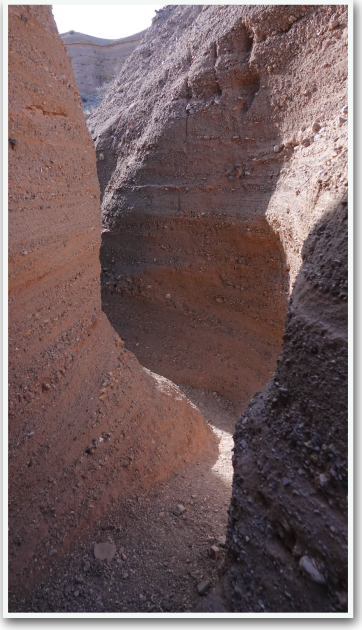


The Cedar Hills Slot is roughly a third of a mile from the road and is a hundred yards or so long. The central part of the slot is the most dramatic, and although it is narrow (you can touch both walls at once), it is not as narrow as that found at the end of Wicks Gulch.









The photographs of the Cedar Hills Slot Canyon shown on this page were taken at the point where the slot starts, that is, at the upstream end. In the top photograph note that it would be easy to miss the slot entirely if you were not on the trail or were walking across country and encountered it from the side. The entrance to the slot at this end provides some significant clues about the formation of the canyon. As water rushed from the highlands to the Rio Grande it encountered some type of fracture in the strata (most likely a fault line), a fracture that the water enlarged over time.

A video of a walk through this slot canyon may be viewed at this link.





The entrance to the Cedar Hills Slot closest to the road (the downstream entrance) is not terribly dramatic. (Images on this page.) In fact, it could be any desert canyon and it offers no clue to the dramatic scene to follow.

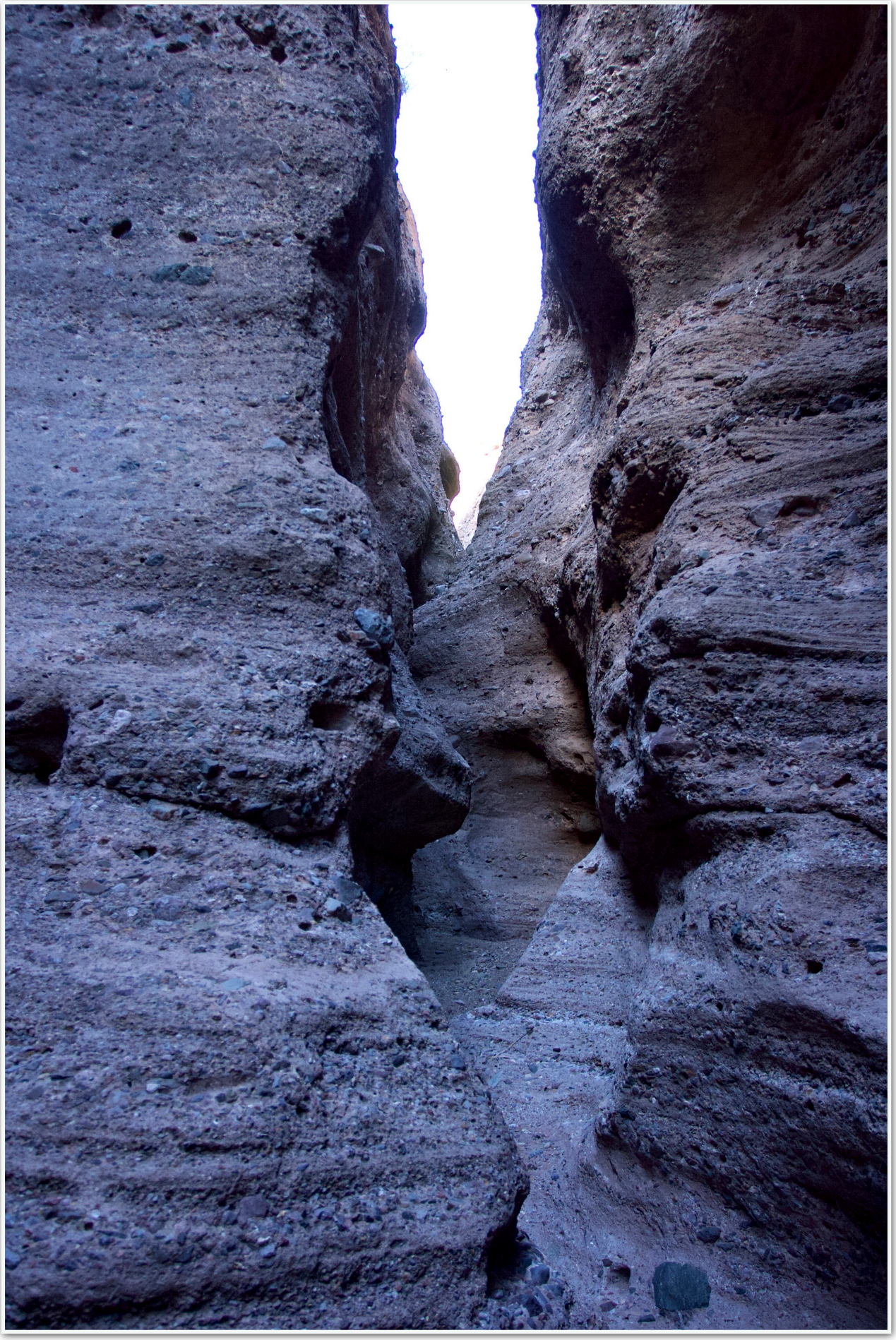
The Wick's Gulch Slot Canyon - At the Confluence With Percha Creek

The conglomerate stratum that the Wicks Gulch/Percha Creek Slot Canyon (Wick's Slot) cuts through is known as the Santa Fe Group Basin Fill - Lower Unit of pre-Palomas Formation Basin Fill (geologic abbreviation: Tslc). The Santa Fe Group is dated to 20 - 15 million years ago and is differentiated, as are other conglomerates, on the basis of the degree of cementation, the clast lithology, and the texture of the rock (rounded, angular, etc.).

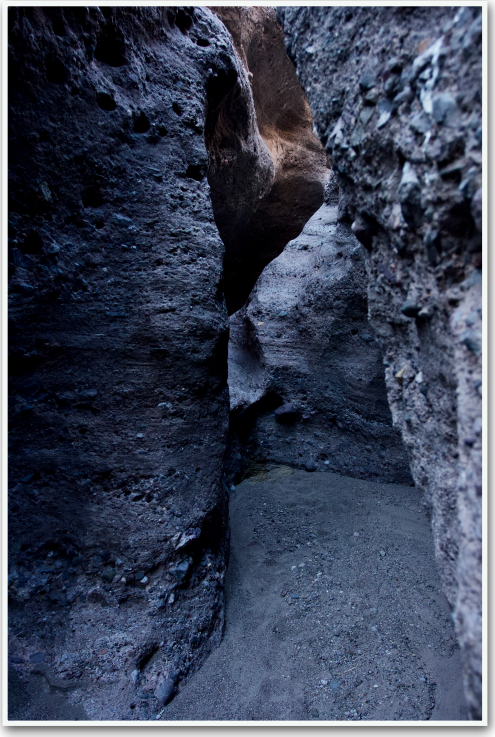
The next few pages depict this slot canyon, ending with a discussion of the geology of the canyon. This slot is very different from the one described previously, even though they cut through similar strata. Wick's Slot:

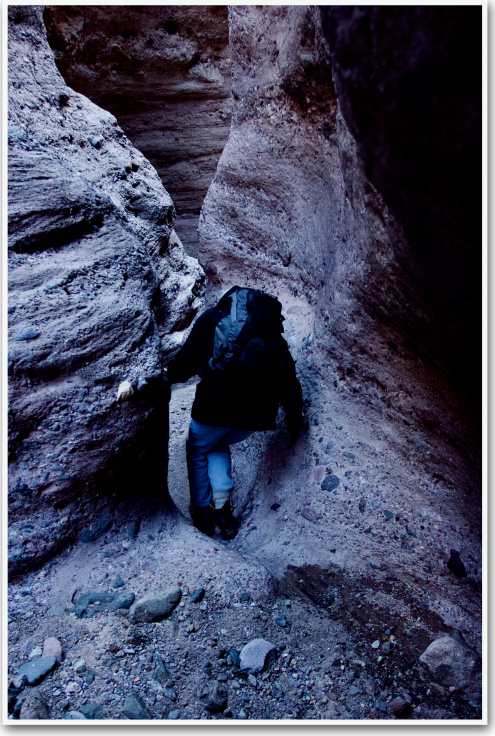
- Wick's Slot is much shorter, only 100 feet or so long;
- Wick's Slot has drops of 8' or so;
- The walls are over 30' and closer together than in the slot previously described;
- The cementation seems to be finer and the rock inclusions are generally smaller and very rounded, making for a smooth surface; and
- When there has been rain, pools of water form at the base of the drops.

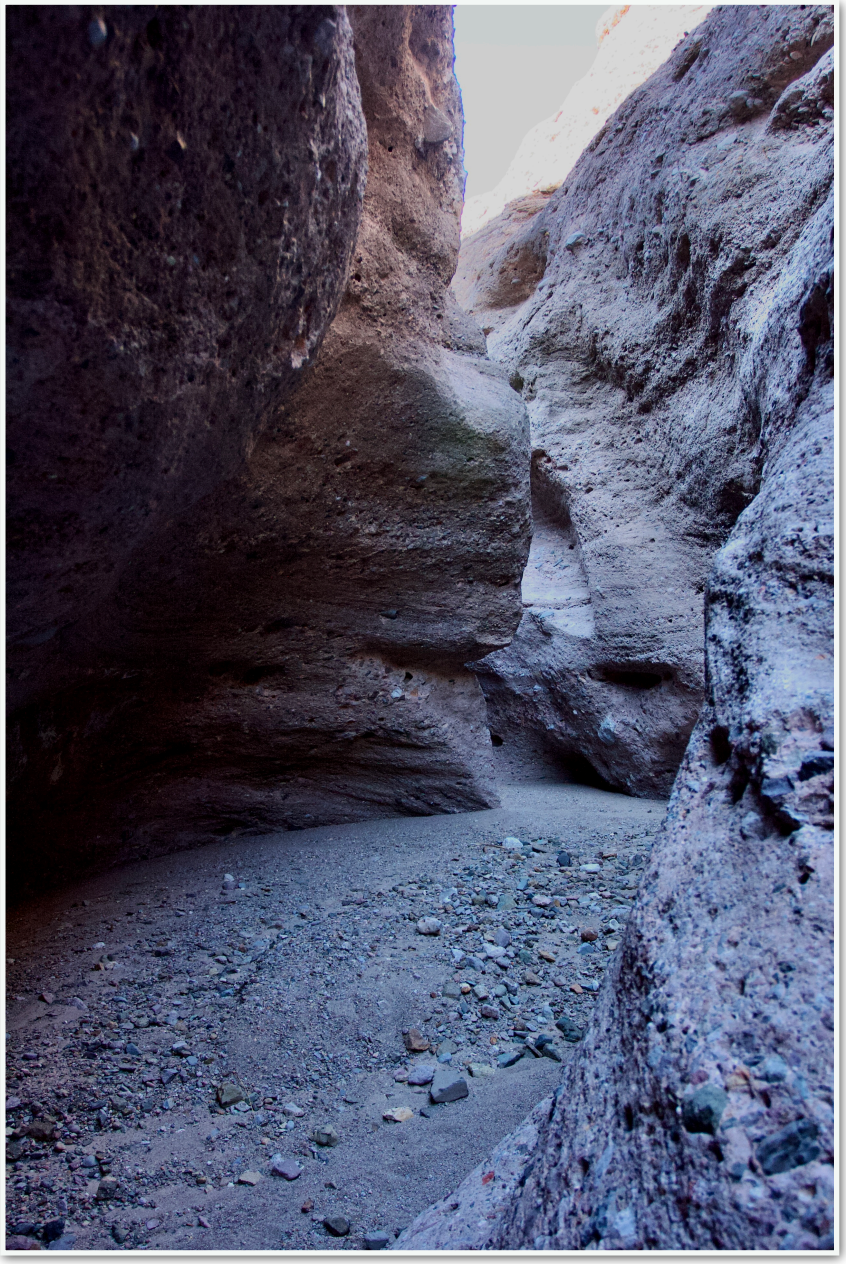
Although shorter than the Cedar Hills Slot, the Wick's Slot can be more strenuous to navigate. Because strong water flow often scours the bottom of the slot, it is not always easy to gage the depth of the pools of water which may be encountered. When this is paired with very smooth rock, returning up the slot can be difficult.

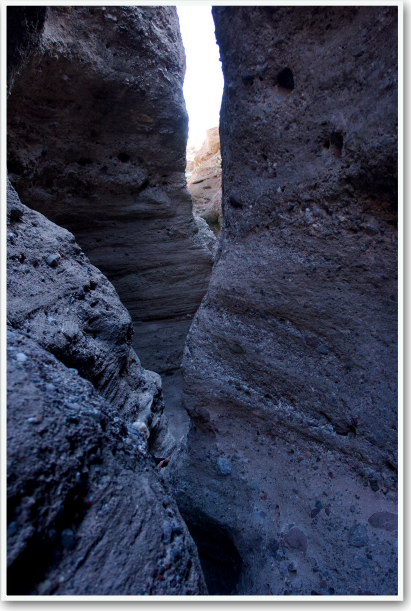


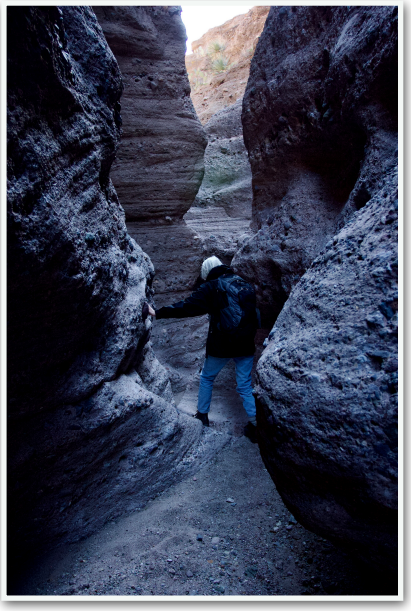












Photographs on this, the previous, and the following page are from March 10, 2010.

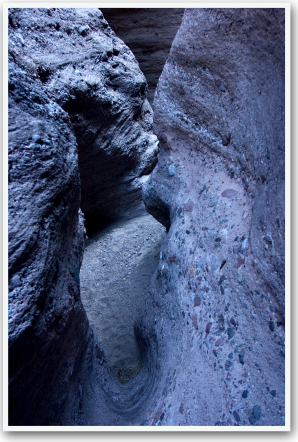










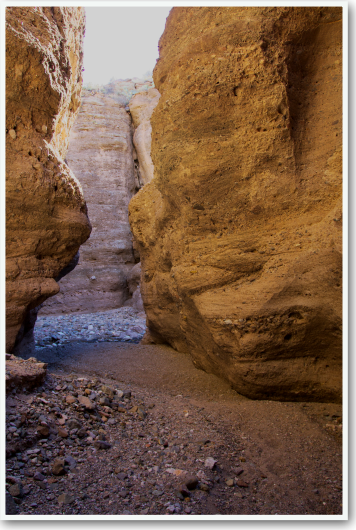


The confluence of Wick's Gulch and Percha Creek can be dramatically beautiful because the Percha is often flowing in this reach of the stream. The fit in the slot can be tight and, even when it is dry, the drops along the route can require effort to navigate.

On January 11, 2014 (this and the following page) the bed of the slot was a bit different. Larger cobbles had washed downstream and into the slot, creating a significantly different feel.

The confluence with Percha Creek (right) was also different because the creek was running bank to bank.

The slot meanders in and out of overhangs, varies in width and height, and is the home - on occasion - of a Barn Owl.















The most frequently used approach to the Wick's Slot is from NM-152 and is very different from that at the Cedar Hills Slot and more dramatic as you approach it (on March 7, 2015, bottom left and September 4, 2016, bottom center). There was a bit of running water in the "pre-slot" in 2016 (see right).

The photograph at the bottom right was taken in the Percha Box just east of Hillsboro on January 25, 2014. It serves as a good stepping point along the way to understanding the terminology of the west. Until I moved to Hillsboro I had always used the term "box" to refer to a canyon which was walled on three sides. This is, indeed, the definition you will find in most dictionaries. Not so in this part of the southwest. Here a "box" can refer to any narrow canyon with steep sides. In the case of Percha Creek and the Percha Box the canyon is narrow and in many places along the stream the walls are quite high, but there is definitely a way through. But these reaches are not narrow enough to be a slot canyon. I know of no really good definition of a slot canyon. A good working definition is a canyon in which you can reach out and touch both sides at the same time and which has high walls. Slot canyons can be difficult to navigate and they can be quite dangerous if you are not watching the weather. Because they are narrow and deep they can funnel deep fast flows of water into anyone who has not been paying attention. And because most slots are quite smooth it is often not possible to climb up the sides when you realize that there is an issue.







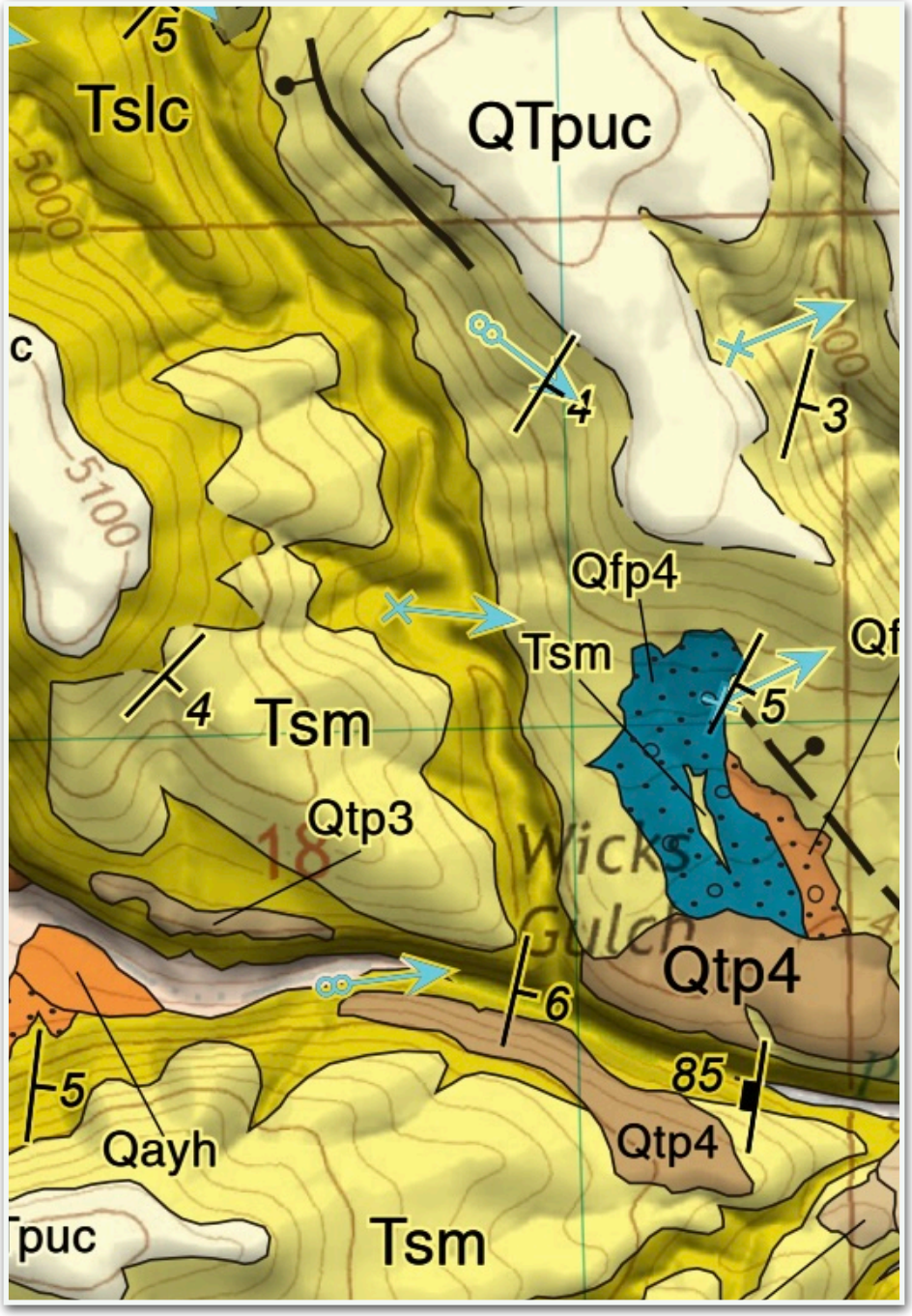


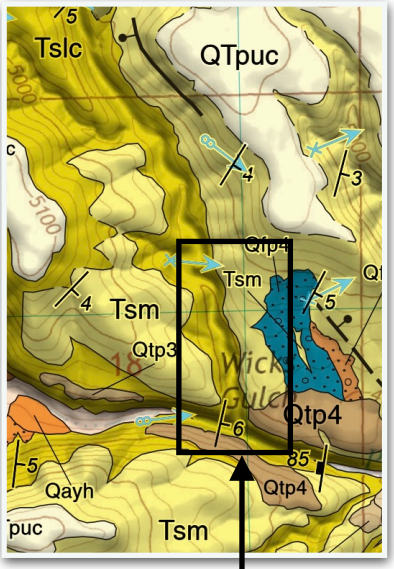
In 2018 we found that the floor of Wick's Slot was submerged in water - January 12 at the right and March 30 below. On these occasions the water was clear, but shortly after a rain these pools are often muddy (opaque). The amount of water found in these pools is unlikely to be dangerous for a seasoned slot walker but it can make for a certain discomfort. Cold water on a cool day is not that pleasant. Even when the water is clear, however, it is not always possible to see the bottom because of glare, shadow, or the curvature of the rock. Because of the manner of navigating the drops, usually facing out and controlling the downward slide, you are committed to the pool of water once you begin. Hopefully it will not be too deep and cobbles will not be present at your landing spot. All of that said, it is a very striking and beautiful place and very different from anything which can be experienced in the Cedar Hills Slot.





Both of these slot canyons are often done as in-and-out walks. Walk to the slot, walk through the slot, turn around and walk back. However, both slots can be incorporated into longer walks. In the case of the Cedar Hills Slot, the loop trail is about two and a half miles; along the way there are nice flora displays and good scenery. At any time it is possible to turn around and return the way you came, should you desire. In the case of the Wick's Slot, the route at the exit of the slot turns right, upstream in the Percha, and you will most likely be getting wet. The Percha can have significant flows at times and walking upstream could be dangerous. Turning around and returning up the slot involves navigating the drops which might involve using your partner as a ladder with various parts of their body being the rungs. This may elicit comments like "could you at least take off your boots?"





Location of the slot at Wicks Gulch confluence with Percha Creek is near the bottom of the rectangle at "6".



The slot canyon is located roughly 2.6 miles south of NM-152 (shown at the top of the map above). The elevation drop from the wash below the road to Percha Creek is about 425 feet. The wash walk which is depicted above is mostly through sand.

Geology of the Wicks Gulch Slot Canyon

"Santa Fe Group, lower unit of pre-Palomas Formation basin fill – Strongly silica-cemented sandy conglomerate and pebbly sandstone comprising the base of the Santa Fe Group; forms prominent ledges. Mapped only in western Percha Creek. Gravel composition is dominated by basaltic andesite and other volcanic types (=5% each of chert and volcaniclastic lithologies). Unit is likely correlative to Hayner Ranch Formation of Seager et al. (1971). 75-300 m thick."

The geologic map detail shown above and the geologic unit description to the left are taken from "Open-file Geologic Map - 252 Geologic Map of the Skute Stone Arroyo 7.5-Minute Quadrangle, Sierra County, New Mexico" by Daniel J. Koning, Andrew P. Jochems, and Colin T. Cikosk; 2015 (last revised: 15-May-2023). The scale of the original map is 1:24,000; map details shown here are enlargements.

The Santa Fe Group is dated from 20 - 15 million years ago. It is the oldest rock on the detail above, geologically speaking. However, the stratum and the formations are fairly young.

Follow-ups and Tidbits

Brown and Black Rats

The information in Dr. John P. Hubbard's "The Historical Introduction, Spread, and Establishment of Old World Mice and Rats in New Mexico and Adjacent Areas" (*Black Range Naturalist*, October 2021) has been augmented by "The ratting of North America: A 350-year retrospective on Rattus species compositions and competition" by Guiry et al, *Science Advances*, Vol. 10, No. 14. Quoting from the Abstract: "We use isotopic and ZooMS analysis of archaeological (1550s–1900 CE) rat remains from eastern North America to provide a large-scale framework for species arrival, interspecific competition, and dietary ecology. Brown rats arrived earlier than expected and rapidly outcompeted black rats in coastal urban areas. This replacement happened despite evidence that the two species occupy different trophic positions." We have underlined the last phrase to draw attention to it, because it is a point which goes well beyond Brown and Black Rats.

Red velvet Ant

In the April 2024 issue of this journal (Vol. 7, No. 2) we discussed Red Velvet Mites and noted that they should not be confused with Red Velvet Ants. A species of Red Velvet Ant once stung me, leading to a melodramatic rendition of that event. Turns out, there are close to 100 velvet ant species (*Dasymutilla* sp.) in the Americas north of Mexico. The one shown here was photographed roughly a mile east of Hillsboro on July 21, 2014. It could be any one of several species, including *arenivaga, waco, clotho, gorgon, klugii, magnifica,* and *nogalensis. Dasymutilla* are wasps in the family *Mutillidae;* they are not ants. To make identification to species even more difficult, several species in the genus engage in Müllerian mimicry - forgetting for a moment the natural history that describes, they really look alike. Some *Dasymutilla* do not have such a treacherously awful sting as those of my intimate encounters. Other species in the genus, which have less potent venom, apparently mimic the appearance of those with treacherously awful stings (the mimicry). (Did I mention that I had a personal experience with one with a treacherously awful sting when I was much younger? I do not seem to have forgotten the event. - RB) Other images of the individual shown below can be found in the Black Range website photo gallery on the genus.

Of particular interest at the moment is the fact that some species of *Dasymutilla* are reported to make loud squeaking noises. I have not observed this.

Ants and the Dangers of Sameness

In "Non-native ants are breaking down biogeographic boundaries and homogenizing community assemblages" L. Aulus-Giacosa, S. Ollier, and C. Bertelsmeier, C. (*Nat Commun* 15, 2266 (2024). https://doi.org/10.1038/s41467-024-46359-9) report on their study of the distribution of ant species, how the human species has changed that distribution, how those changes have affected native species where non-natives have been introduced, and the resulting homogenization of ant populations.

Sounds geeky but the bottom line is that the paper describes a basic process in which the world becomes less diverse and "more the same". More diverse ecosystems have historically been more resilient than those which are less diverse.

From their abstract: "we show that historical biogeographic patterns have already broken down into tropical versus non-tropical regions. Importantly, we demonstrate that these profound changes are not limited to the distribution patterns of non-native ants but fundamentally alter biogeographic boundaries of all ant biodiversity (13,774 species). In total, 52% of ant assemblages have become more similar, supporting a global trend of biotic homogenization . . . impacts on biodiversity override biogeographic patterns resulting from millions of years of evolution, and disproportionally affect particular regions."

Daddy-Longlegs/Harvestmen

Whatever you call them, the species of *Arachnida, "Opiliones"* are not spiders. And, apparently, they once had more than the two eyes that we see when we look at one now. This finding has implications for the evolutionary taxonomy of this line of creatures. However, mostly it causes me to mull the reasons and processes through which organs would simply fade away. What would be the competitive advantage of losing some sensory capability? Arguments about resource and energy utilization are not very persuasive. See "Vestigial organs alter fossil placements in an ancient group of terrestrial chelicerates", Gainett et al., *Current Biology*, Volume 34, Issue 6, pp. 1258-1270, March 26, 2024.



Our Faults

The US National Seismic Hazard Model has been updated, affirming our general lack of risk. As I write this, the New York City area, which has a similar threat assessment to our own, has experienced an earthquake measured at an intensity of 4.8.

Unsurprisingly, many earthquakes are associated with faults and the points of intersection between continental plates (the issues being very similar), but not always. The graphics on this page are from the cited report. Note that we are in the "green" vs. the lower "blue" threat level depicted in the top graphic and that the green in our area is correlated with the fault zones shown in blue in the middle graphic.

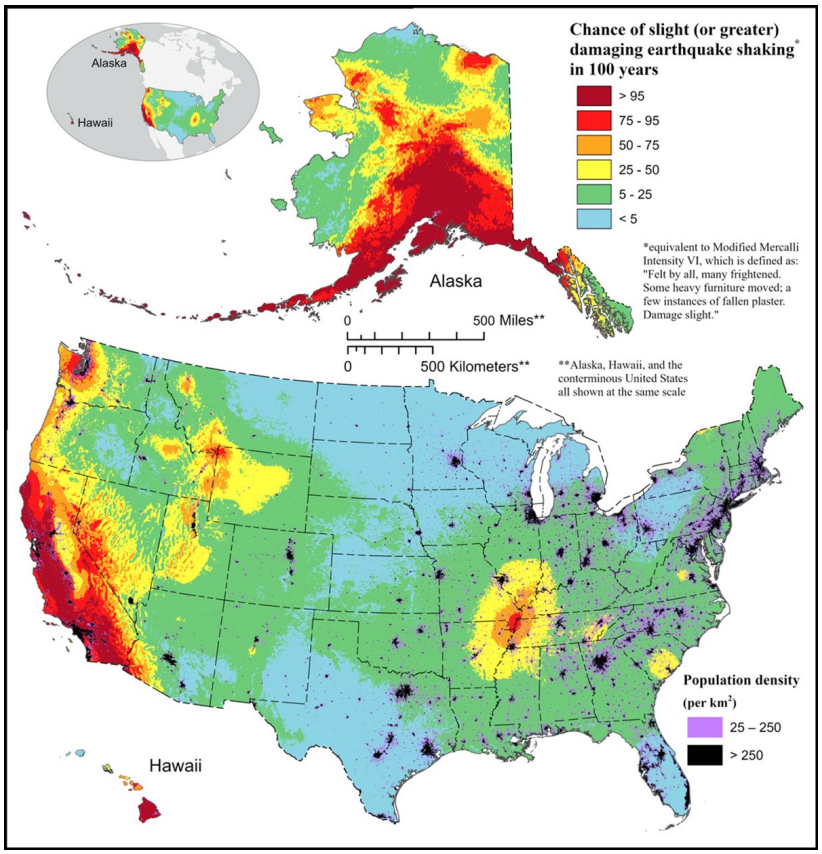
The stars in the middle graphic mark damaging earthquakes and in some cases, like those in Oklahoma, those earthquakes are associated with extensive fracking rather than the presence of established fault zones.

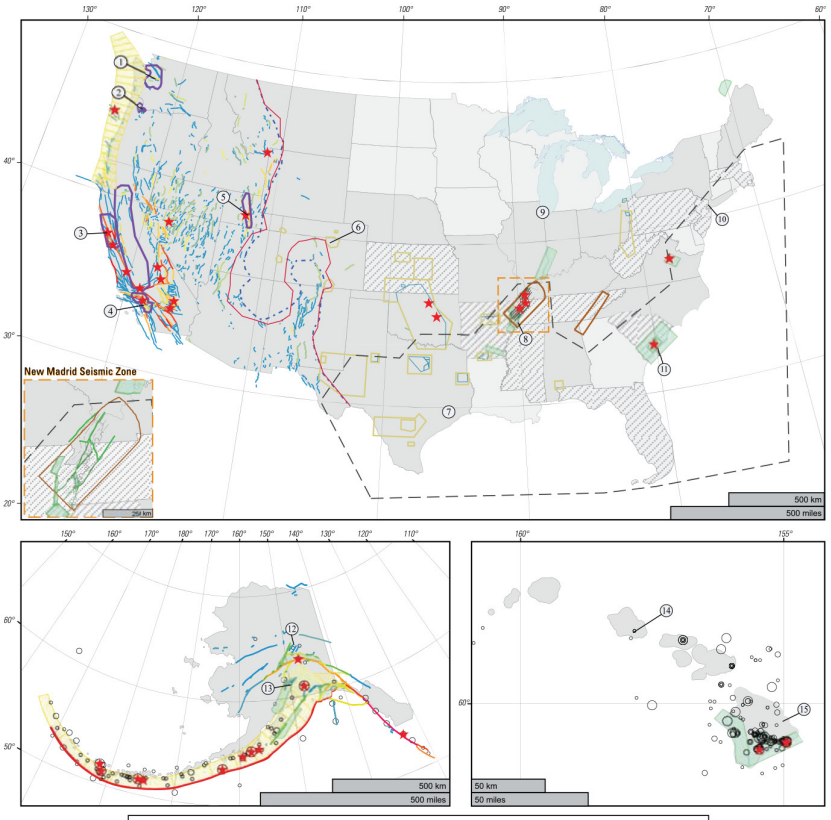
White-collared Turkey Vultures

In the April 2023 (Vol. 6, No. 2) we reported on the sightings of "white-collared" Turkey Vultures in this area. Here we note that additional sightings since those reports have not occurred. In this case, a null report does not enhance our understanding of the species/markings. The photograph below (of a Turkey Vulture without a white-collar) was taken west of Kingston on May 16, 2024 (other photographs are shown at this link.)

The Turkey Vultures which roost in Hillsboro seem to be dispersing into several smaller roosts during the 2024 season.







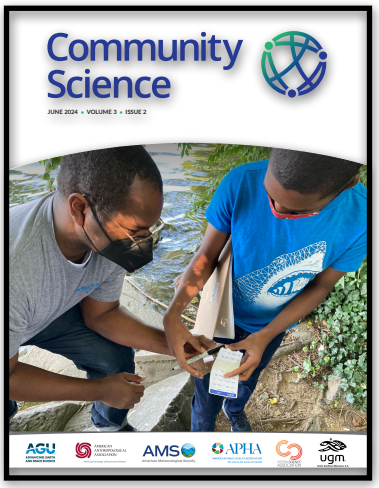
Citizen Science

Early this year the 10th Natural History of the Gila Symposium hosted a panel on Citizen Science, and for the last few symposia a Citizen Science award has been given by the Symposium.

Bonney, Cooper, and Ballard in "The Theory and Practice of Citizen Science: Launching a New Journal" (*Citizen Science: Theory and Practice*, Vol. 1, Issue 1, May 20, 2016) described their effort as "CSTP is an online, open access, interdisciplinary and international journal sponsored by the CSA in cooperation with ECSA and ACSA. As a global venue for scholarly exchange about citizen science, the journal's focus is to explore and better understand citizen science in all its facets – for example, lessons from successes and failures in the development and implementation of citizen science tools and projects; techniques for the communication and visualization of project results and measurement of outcomes; and critical examination of the many ways that citizen science can yield a range of scientific, educational, and social outcomes." (The acronymns: CSA [Citizen Science Association] is now the Association for Advancing Participatory Sciences; ECSA [European Citizen Science Association]; and ACSA [Australian Citizen Science Association].) The referenced journal, and others of its ilk, are full of information which is of special interest to the citizen scientist. That first issue of CSTP included "Strategies Employed by Citizen Science Programs to Increase the Credibility of Their Data", for instance. In this article, Freitag, Meyer, and Whiteman noted that "While government-based natural resources monitoring is notoriously hard to fund and implement owing to a variety of political and practical challenges . . . recent reviews suggest that citizen science has great potential to meet monitoring needs cost effectively . . . Consequently, increasing numbers of citizen science programs and projects are striving to meet agency needs for monitoring data." The authors follow up with specific strategies for achieving those goals.

In the April 2024 issue Deitsch, Chuang, Nelsen, Sitvarin, and Coyle tackled the perpetual issue of observer bias and drabness ("Quantifying How Natural History Traits Contribute to Bias in Community Science Engagement: A Case Study Using Orbweaver Spiders").

Another citizen science open-access journal is *Community Science*. In April 2024 it featured an article by Cleveland et al. entitled "Guiding Fuzzy Cognitive Mapping With Structured Decision Making to Inform Complex Natural Resource Management Problems in Wai'anae Hawai'i". The case study described an effort to "develop a community-based wildfire management plan".



Increasingly, there are many resources available to anyone who wishes to engage in "citizen science", either as an initiator or a contributor. And, there are many organizations engaged in such efforts which would appreciate your assistance.

Ecological Acoustics

When I read An Immense World by Ed Yong I was really impressed with leaf hopper sounds. The study of acoustics which exist outside the human range of perception (wavelength, magnitude, etc.) is leading to some significant insights. In some areas the questions are just now being articulated. "Does Soil Sound Different After It's Burned" is an Eos audio presentation written and produced by Emily Dieckman. It describes work being performed in the Amazon but its applicability to the Black Range is obvious.

CALL FOR SUBMITTALS IMAGERY IN NATURAL HISTORY

The Black Range Naturalist regularly attempts to show how we, as a community, use images (photography, painting, drawing, tables and graphs, etc.) to demonstrate scientific nuance, describe the relationships which form natural history, and explore the general ecology which surrounds us. We like to demonstrate how we enhance our understanding of the world through the use of imagery.

To that end, we are initiating a series of one-page articles based on a simple concept: take a graphic which "speaks" to you and tell us what it says. We are inviting our readers to submit images which have provided insight for them. We will turn the submitted material into something like that found on the following page. Submittals should "fit" on one page and are limited to two per person per issue. Each submittal must include an image and a description (up to 500 words or so) of why that image is meaningful. We will handle the formatting, so there are no other requirements. (This can be a collaborative effort, like the example shown to the right in which Véronique de Jaegher provided the image and Bob Barnes described the significance of the image for him.)

This is not a beauty contest. We are in search of how imagery enhances our understanding - beauty may be part of that process, but for our purposes it is not the end goal.

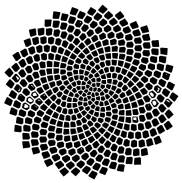
This is not an exercise in expansive research or an in-depth discussion of a specific topic. We are looking for nuggets, little pieces of insight.

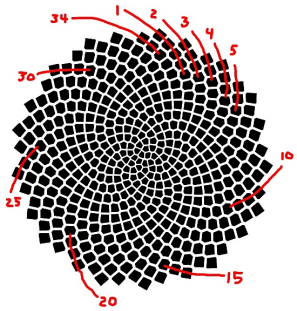


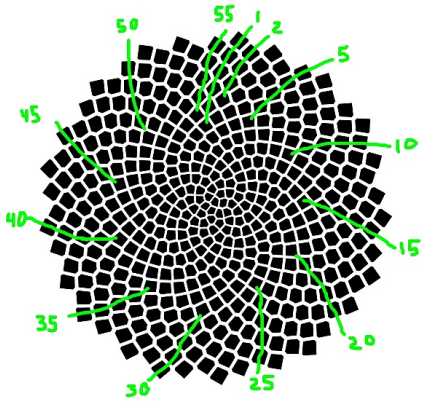
Véronique De Jaegher
Bees on Sunflower
July 2023

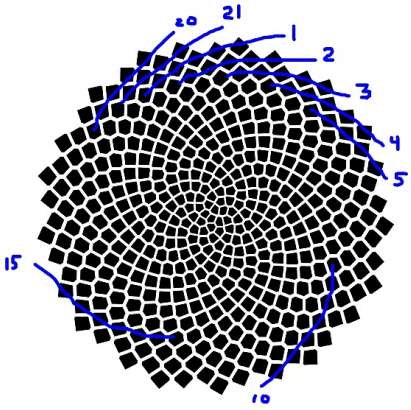
DISCUSSION (Bob Barnes): This photograph works on several different levels; for instance, there is the obvious plants being pollinated by bees theme, and there might be an introduced vs. native species theme. But what entranced me was how clearly the image shows the pattern of seeds.

There are several things to note in this pattern. First of all, the spiral of seeds in a sunflower follows the Fibonacci sequence, which is 1, 2, 3, 5, 8, 13, 21, 34, 55, 89, 144, and so on. In this sequence, each number is the sum of the previous two numbers. The National Museum of Mathematics has a series of graphics which also show how varied (or robust) the Fibonacci sequence is in a sunflower. They start with the basic depiction of the seed pattern (bottom left) which they use in their modeling. The number of rows in the seed head is dependent on the angle of approach you use to define a row. But the number of rows will always be a number in the Fibonacci sequence.









The earliest known description of the sequence is by the Indian mathematician Pingala, in about 200 BCE. He is also credited with the first use of the concept of zero. The Fibonacci sequence is used to describe many aspects of natural history.



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