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During the summer of 2018, Cindy Yarmal was struck by a Western Diamondback Rattlesnake while working at her organic produce farm in the Animas Creek drainage. The Animas Creek Honey & Herb Farm is normally a tranquil place, but on that morning she experienced something we all hope not to. Here she recounts the event and its aftermath.

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7 - Coati Encounters - Catherine Wanek

During the summer of 2018 the Black Range Lodge hosted its usual array of guests and a family of White-nosed Coatis. In "Coati Encounters", Catherine Wanek, who owns and operates the lodge, describes a summer of experience with these rare creatures from the south.

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In "White-nosed Coati Range Expansion?", Bob Barnes summarizes other Coati sightings in the Black Range during 2018 and discusses some of that species' natural history. Barnes is the editor of this magazine and maintains two websites: The Black Range (www.blackrange3.org), which is dedicated to the cultural and natural history of the Black Range, and www.birdtrips.org, which recounts his birding trips during a lifetime of photography and videography.

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In "Carl Woese", Lloyd Barr reminisces about his colleague at the University of Illinois Urbana-Champaign, Dr. Carl Woese. Woese, according to most learned people in the field, should have received the Nobel Prize for his discovery that the Archaea are a basic life grouping, one of the three domains of life. Dr. Barr is a retired professor of Molecular and Integrative Physiology at Urbana-Champaign. Most recently he has conducted research on pit vipers, with a particular emphasis on physiology. He lives south of Hillsboro, New Mexico.

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17 - Extracts from "Wildfire Impacts on Species of Concern" - Daniela Roth

"Extracts from 'Wildlife Impacts on Species of Concern…'" contains information from Roth's report and supporting correspondence relating to two species of concern in the Black Range. Daniela Roth is the Endangered Plant Program Coordinator for the EMNRD - Forestry Division.

Front Cover: Rufous Hummingbird by Bob Barnes
Back Cover : Calliope Hummingbird by Bob Barnes (note pollen on forehead)

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A Day In My Life - Struck by a Rattlesnake

Cindy Yarmal

I really wasn't quite ready to wake up, but our rooster Teddy thought it was time as he crowed loudly under my bedroom window. I put my sandals on and was really wishing that Dallas was the one getting up to let the chickens out. As I walked out to the coop with Zelda our Australian shepherd, I was noticing all the vivid colors where the dust had been washed away from the light rain we had in the early morning hours. The leftover corn from the chicken scratch was such a bright yellow in contrast to the dirt around it. We have a chain link enclosure at the front of our chicken coop, formerly a greenhouse (12 x 8 fiberglass hoop house).

I opened the enclosure, put a rock to hold the gate open. I noticed that right in the middle of the enclosure there was a freshly dug gopher hole, but what stood out was that it was so clean. There wasn't the usual mounding of dirt. It was a perfect clean-edged hole in the dirt about 2 ½ " in diameter. Something to tell Dallas about …. I then proceeded to the coop door where I first had to move a 4x4 that helps secure the door from skunks, along with a few small boulders. I squatted down to undo the bottom latch, stood up to undo the top latch, secured the door in case we had a windy day to prevent the wind from shutting it. The chickens all came running out, I opened the feed bin to get some chicken scratch, threw some scratch out for our happy little chickens, came back for another scoop and then one more…..As I stepped forward with my left foot I saw something move away from my foot. That something was a snake just pulling its head back from my foot. I quickly glanced to the right and saw a very BIG snake, a diamondback fully stretched out. Quickly I got out of the fenced area and my thoughts were that it must have missed, as I did not feel anything. Unfortunately, when I looked closely there were 3 small raised

bumps, similar to a mosquito bite. The raised bumps were located right above my inner left ankle. I looked towards our house. I wanted to run, but I knew that I had to walk slowly and stay calm. When I got to the top of our porch steps I started to panic and had to calm myself. I have pretty low blood pressure. I remember thinking "ZEN mode, slow your body down to death slow, control". I did really well until I got to our sliding glass door. I threw the door open and screamed "DALLAS, I GOT BIT BY A RATTLESNAKE !!!!" He came flying out of the bedroom and I was starting to panic again. He said "NO you have to stay calm", handed me his phone, said "call 911, I am going to go kill the snake." I called 911. They told me to wash the wound with soapy water and to elevate my foot, but not above my heart, and that an ambulance was on its way. Dallas came back in not having found the snake. The ambulance arrived within 30 minutes…the longest 30 minutes that I have ever experienced. Both of the attendants had experience with snake bites, having been bitten by rattlesnakes. They truly thought that it was a dry bite because there wasn't any swelling and no pain at this point.

On the way to the hospital, Sierra Vista in Truth or Consequences, I was given pain medication. As the swelling started, I was panicking and asking the attendants to make sure that our local hospital had antivenin (antivenom). They assured me that they had checked. When we got on the highway I was panicked and confused as to the direction we were headed. I asked again and as I looked out the back window I could see that Dallas was following the ambulance, and my panic subsided for a moment. I could see him but he could not see me through the privacy glass of the ambulance.

On arrival at the hospital it appeared that I was a novelty. At the hospital I received my first dose of antivenin. They monitor you very carefully to see if you have any negative reactions prior to giving you your next dose. The swelling on my leg was also monitored and actually marked with a sharpie black marker. The pain at this point was unimaginable. My eyes were crying and my entire body was frozen in pain along with my ability to cry out. The good news was that I did not have an allergic reaction. The bad news was that it was painfully clear that it was not a dry bite.

It was determined that I needed to be in a trauma hospital where this could be better dealt with. The decision was to fly me to Mountain View hospital in Las Cruces. The flight to Las Cruces was incredible. I was flown by helicopter and it had been years since I had been in one. This flight was very different than my last as I was in horrendous pain even though shots of fentanyl were being given to me. The drugs were knocking me out, which was good for the pain. The last incredible view I had was that of the Caballo Mountain range before we landed in Las Cruces (or at least that's what I think I remembered).

I was put into the Intensive Care Unit where for the next 3 days I was given a total of 20 vials of antivenin and numerous doses of pain medication. The swelling was monitored, and luckily it never went past my knee. At one point I had severe chest pains and was given nitroglycerine as a precaution. The stress of it all was taking its toll. My back ached due to the way my body was frozen in pain and headaches were a constant. I was released to go home on the 4th day. For the next month I had visiting nurses, physical therapists, and a

walker. Whenever I put my foot down the pain was intense. The feeling of blood rushing to my ankle was horrific. It was easier to crawl on my hands and knees with my left leg raised up than it was to walk. What a sight!!

While I was healing I would put a poultice of Yerba Mansa leaves on the bite area. You could visibly see the difference as the black and blue faded immediately when I did this! I also would put CBD oil on the area every evening. I believe that both of these things helped as my recovery was fairly quick and the visible damage…not so visible!

It has now been 6 months since the "INCIDENT". I am so very lucky…not lucky to have been bitten, but lucky that the after effects are minimal, or at least to me they are. Other than my calf and foot turning black, blue, and yellow, I never had any necrosis or sloughing off of skin. I still have pain at the bite area as well as at different spots on my leg. I believe that some muscles and nerves were damaged. I can hope that it is not permanent. When you look at the bite area, it appears to be a few added little freckles. Below my ankle the skin is a bit darker. All in all, if you didn't know you wouldn't know it had happened.

Definitely a story for my grandkids.

COMMON QUESTIONS ANSWERED

- The snake never rattled
- The snake was not coiled
- There are 3 snake bite marks ..the top 2 are 1" apart
- If I had not seen the movement of the snake I would not have immediately known that I was bitten
- The pain is unlike anything I have ever felt …HORRIFIC
- It did not hurt immediately
- The area where I was bitten is still painful like a bruise
- The area is still slightly discolored
- I believe that the snake was trying to get away from my activity and that in its viewpoint I went back one too many times for chicken scratch
- I still am not fond of snakes
- I now wear Chippewa snake boots, super comfortable
- We live in a great area where the community support after this horrific incident was and is still overwhelming …Thank you always
- Dallas lets the chickens out in the morning

Rattlesnake Venom

See Randy Gray's article about the rattlesnakes of the Black Range in Vol. 1, No. 1 of this magazine.

The venom of a Western Diamondback Rattlesnake is primarily hemotoxic (meaning that it affects the circulatory system primarily), but it also contains cytotoxins and myotoxins which affect cells and muscle. Most of the snakebite fatalities in northern Mexico (10 to 20% of untreated bites result in death), and most snakebites in the United States, are from the Western Diamondback.

If you are struck, seek medical advice and follow it. Do not assume that you have had a dry strike!!

Snake bite …the red line is dried blood, at the time it hurt too much to wipe it away.

The Cost of a Snakebite

Doctors Without Borders (Médecins Sans Frontières) reports that roughly 100,000 people a year die from snakebite. The Centers for Disease Control reports that from 7,000 - 8,000 people in the United States are treated for snakebite annually.

With a certain amount of frequency, the inhabitants of the Black Range (humans and their pets) are struck by a rattlesnake. The event can be very traumatic and may involve an air ambulance flight from the Range to Las Cruces or El Paso. In addition to the physical trauma, the financial trauma can also be significant. Many assume that the high cost of antivenom treatment is due to antivenoms' short shelf life, cost of production, and short supply. The cost issue has been investigated by the Viper Institute, which is part of the University of Arizona's College of Medicine.

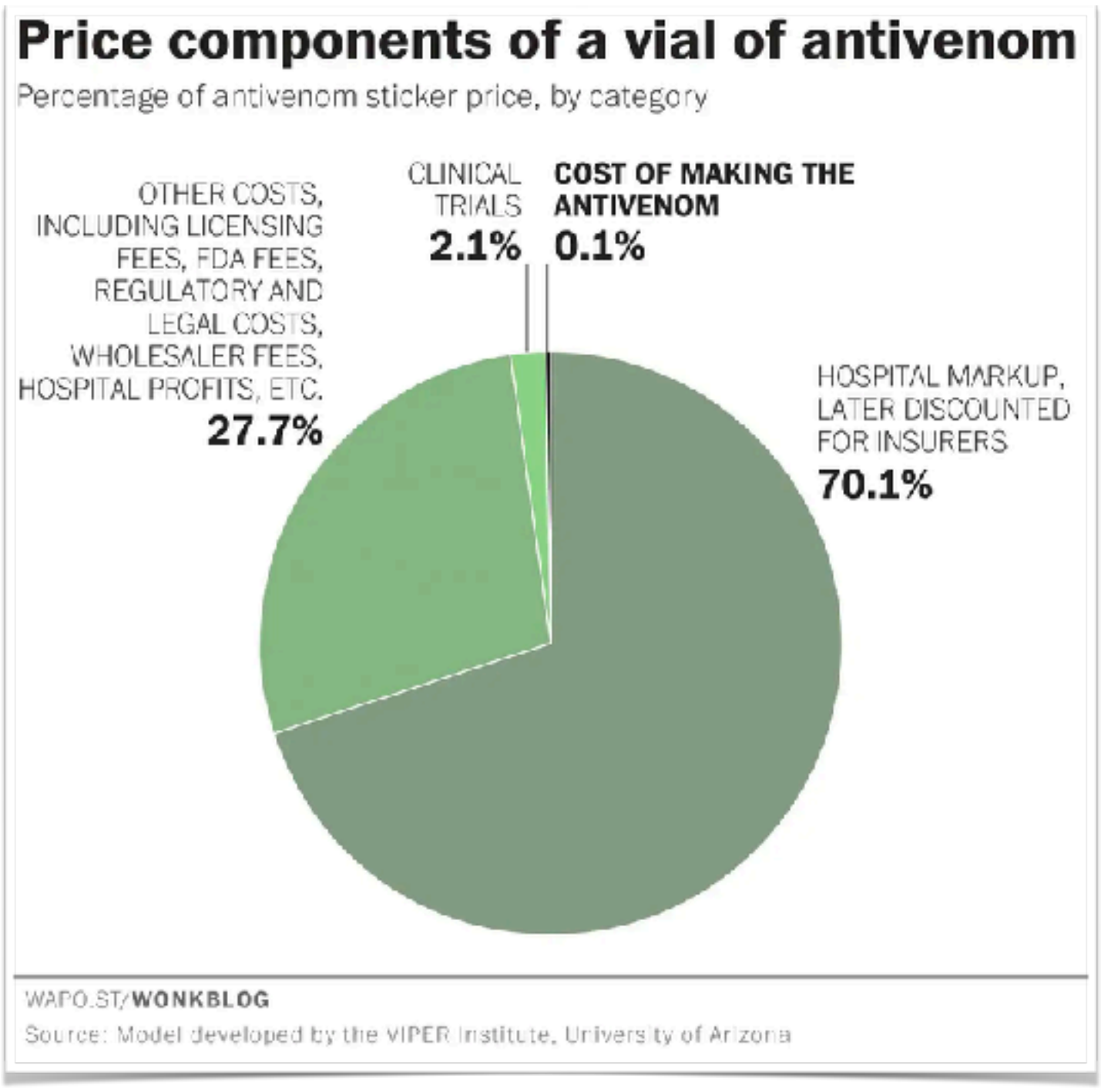
The hospital markup (see below) results in a substantial price difference in the cost of treatment in the United States versus Mexico. An article in The American Journal of Medicine reported that the cost of drugs in the United States is sometimes as much as a thousand times greater than in Mexico. From the article: "We were crestfallen to discover...that the chosen wholesale price for this otherwise excellent drug was set too high to be cost effective, even in the treatment of critically ill children...Somehow, a US drug whose sister product retailed in Mexico at $100 was resulting in bills to Arizona patients of between $7,900 and $39,652 per vial."

You will find assorted information about the cost of a vial of rattlesnake antivenom. Whatever the source, you can be sure that the quoted cost will be high, especially if you consider that numerous vials of anti-venom may be required to treat a snakebite effectively.

Neurotoxic Venom

Historically the Mojave Rattlesnake has been associated with neurotoxic venom, while other rattlesnake species have been associated with hemotoxic venom. There is growing evidence that the venom of several rattlesnake species is shifting in composition to be both hemotoxic and neurotoxic. Not good news for those who are struck.

Some sources attribute the shift to the fact that the prey of many rattlesnake species have evolved more resistance to hemotoxic venom. The rattlesnakes have, in turn, (apparently) begun to develop more complex venoms. In the short term, for humans who have been struck, this means that treatment regimes often involve more vials of antivenom than was previously the case.



Coati Encounters

by Catherine Wanek

From: Mammals of the Southwest, by George Olin, illustrations by Dale Thompson:

"Coati: A medium-sized brown animal with a long tail and piglike snout. Total length about 4 feet, tail about 2 feet. Tail bushy and ringed with some 10 dark and 10 light rings. General body color is honey to rusty brown with a dark mask across the face. Lighter spots above and below the eyes. Nose long and flexible and termination with a piglike pad of gristle. Feet plantigrade, that is the weight is distributed between sole and toes as with the human foot. Front feet armed with powerful, long claws; those on hind feet shorter. The short, rounded ears are close to the skull. Young, three or more, born in early summer. Type of den unknown to this writer, but presumed to be in burrows among the rocks or, in some cases, nests in hollow trees."

White-nosed Coati (Coati, Coatimundi) at the Black Range Lodge - 2018

Crows are active this morning. Noisy, waking me with caw caw caw. Maybe they are ravens? Our neighbor Andy told me that one day he followed their cries to find a mountain lion feasting on a deer carcass. Not that far from his house. He has lost chickens and goats to cougars over the last several years. One snarled at him from a tree and he felt he had to shoot it, to protect his animals and himself. Andy was sad when the deed was done, but he saved the cougar's skin and made a drum from it.

This cougar, near the old pond by what we believe to be the last remaining old-growth ponderosa pine in Kingston, looked up as Andy approached, and bounded away. Andy just grinned with admiration. What a privilege to live in such a place, where wildlife habitat is literally in your backyard. And that's just how I feel, too.

I put on my glasses and watch a raven flying high above the clotheslines, gracefully landing in a dead tree half-way up the Red Hill. We've been eyeing that scraggly tree, thinking about cutting it down; it's dead after all. We've also noticed that ravens and buzzards seem to land in it often -- it must be a good vantage point for surveying the valley, and foliage-free branches offer an unobstructed landing site. So we've decided to leave it alone. The raven caws again, repeatedly, and several more of his brethren join him, perching in the surrounding trees. They return his caws, and for a while it's a cawcawphany on the hill that no creature could sleep through. Finally they reach a decision and take off, flying up the canyon to the west. Following a cougar, perhaps?

The first time I saw the coati was in the early evening in late June 2018 as the sun was getting low in the sky. I spotted it as I glanced out the window of my mother's living room, as the coati was descending Red Hill, in a purposeful amble toward a thicket of bamboo. In thirty-plus years of living in the Gila National Forest, I had never seen one, but I knew immediately what it was. "Coati!" I yelled to my mom. (She's a little hard of hearing.) "It's a coatimundi!"

Fascinated, I followed it with my eyes as it disappeared down the hill. Somehow I knew what that strange-looking creature was from the descriptions I'd read long ago in a book. Its dark reddish fur shone like copper in the light of the fading sun. My eyes devoured it even while it was hard to see clearly through the window as it moved. I got the impression of a very furry body with longer back legs than front legs, a long nose like an anteater, and a very long tail. It didn't seem to be aware of me as I dashed to the bedroom window for a better look. In another few steps of its lumbering gate, it disappeared into the thicket. Gone, and I'd barely got a glimpse.

But I was elated. The image lingered in my mind's eye of the coati's lumbering movement as I said the name again. Coatimundi. Is that coat-a-mundi? Or co-a-ti-mundi? Mundi or just coati? I knew we were within its potential range, but I had never heard of coatis being seen in the neighborhood, much less seen one myself. I wondered, "Where did it come from? Will I see it again?" Somehow I thought I would.

And see it we did, a number of times over the next three or four weeks. We came to realize there were two coatis, a male and a female. With babies! Nesting in a tall fir tree wrapped in a protective jumble of ivy, that towered over the roof of our 3-story building, the historic Black Range Lodge in Kingston, NM. Living as we do on the eastern edge of the Gila National Forest, along the middle Percha Creek, we keep a green landscape with many fruit trees – including a prolific mulberry, cherries, grapes, plums, peaches, pears, apples, etc. – and we often see wildlife come right through the yard:

Wild Turkey join the guests at the Black Range Lodge - 2018

grazing White-tailed Deer, fox, flocks of Wild Turkeys, herds of Javelina, and even the occasional bear eating the late season apples. But we'd never sighted the secretive coati.

A couple days later, though, in the middle of the afternoon, I followed an impulse, crossing the yard to where summer apples were dropping in profusion in a fenced off orchard area where we also raise chickens. As I approached I caught a glimpse of a furry animal moving among the hens and roosters. I had googled "coati" on the Internet and seen some great video of a band of coatis, who are in the raccoon family, foraging in a riparian stream in Arizona, and also one unfortunate coati in a cage, in Albuquerque, blamed for devouring an entire flock of chickens and ducks. But as they are considered endangered in New Mexico this captured coati was pardoned, and released into the wild. Naturally the story instilled in me an immediate concern for our flock of chickens. But I heard no alarms from the roosters, just fairly typical browsing noises. And this coati seemed uninterested in our chickens. She appeared to be eating apples.

Knowing enough not to tangle with raccoons, I maneuvered myself in the chicken pen to separate the flock from the coati and also shut a gate between myself and the sharp-toothed varmint, replete with digging claws. Finally, I relaxed enough to stop and observe. To my surprise the coati seemed very relaxed itself, and with the fence between us it nonchalantly foraged through the straw-covered ground of the chicken pen with its long nose. Though clearly a coati, this one seemed different than the first one I saw -- smaller, more chocolate brown than cinnamon colored, with smoother fur, delicate ears and a shorter nose, tipped in white. The distinctive long tail of the coati seemed to be used for balance; sometimes it was held straight up, but mostly it curved gracefully, punctuating the body's movement, in the manner of an extra-furry cat's tail. It seemed to be as long, or longer than the body itself. Incredibly cute! I thought. If there's not a coati stuffed animal on the market, there should be!

Fascinated, I pulled out the iPod that I often carry around with me, and started taking photos. With the 6-foot fence between us, I had to hold it over my head and aim. I watched the coati investigate the chicken coop for several minutes, while hoping someone would come by with whom I could share this magical moment. Spotting a neighbor walking towards the front door, I slipped over to fetch him. But in the minute or two it took to return, the coati had itself slipped away.

Naively I had thought that I had her trapped in the fenced coop, but I was later to discover how agile the coati are in trees and how quickly it could scramble up a tree, or along the top of the wall, deftly evading pursuit. Strangely I felt a great affection for it. I had an impulse to hug it, well, if it was a stuffed toy, that is.

Coatis nest in trees and climb easily up trees, fences, ... Black Range Lodge - 2018

About a half hour later, up in my third-floor bedroom, I heard the scratching of claws on the metal roof outside. A glance out the window, and there she was again, roaming across the roof twenty feet off the ground, then scrambling up into the aforementioned tall fir tree overhanging the roof, less than

30 feet from a balcony door leading into the bedroom. A minute later the coati scrambled back out of the tree onto the roof, then down another tree to the ground. This was apparently a scouting expedition, because a couple days later she started carrying her new-born young up into this tree, where they would be nesting for the next three weeks or so.

We started excitedly telling our neighbors; some also recently had coati sightings along the middle Percha Creek between Kingston and Hillsboro. And down in Animas Creek, one was spotted loping along in front of a car. Another unfortunate coati we heard about was struck by a car and killed along NM152, near Hillsboro, and the body ended up in wildlife biologist Harley Shaw's freezer. The consensus: Coatis had migrated into our neighborhood, which is considered to be more or less the northern limit of their range.

A day or so later, my partner Gary reported seeing a coati carrying what he thought was a squirrel in its mouth, descending the Red Hill into the back yard, then scrambling up a tree, onto the roof and into the tall fir tree, presumably there to consume it in private safety. That got us worried about the hens again, though there had been no sign of predation up till now.

The next morning we get a call: the coati was again seen on the hill by my mother's house. I dashed outside with my iPod and stood, looking around. Suddenly I noticed the female near the Lodge, at the foot of an apricot tree with branches reaching up to the roof. She dashed determinedly up the Red Hill, heading back towards my mother's house. Maybe 10 minutes later I was up in the bedroom telling Gary about it, when he pointed out the window. There she was, now scrambling down the hill, back toward the Lodge. Gary notices something in her mouth. Not a squirrel, a dark floppy shape, I couldn't see it clearly, but he could. "It's a baby!" With speed and purpose, she clambered up the apricot tree, dashed across the roof, climbed up into the tall fir with her baby, and disappeared. Gary and I stared at each other in amazement, aware that we had just witnessed a special moment.

But that was the last glimpse of the babies we would get. The next morning it seemed like a dream, as I stepped outside onto the deck, looking up at that tall fir tree wrapped in a thick coat of ivy, swaying slightly in the breeze. Not a sign. Then I became aware of a faint mewing sound, very much like the sound of new-born kittens. Still there!

Over the next few weeks we spotted both the female and male a number of times, but never together. Several sightings were in the chicken coop - but the coati never seemed interested in pursuing the flock, content with nibbling apples and rooting around for bugs in the compost pile. A few days later, though, as I stepped out of our third floor deck door, I encountered - what? A sloppy, runny pile... of poop! The only solids in it I recognized as about 2 dozen plum pits. Sure enough, the plum tree, was laden heavy with ripe fruit. And the placement of this diarrhetic discharge was all to clear.

It does not get much more natural...

I turned to Gary with a crooked smile, "Gary, this is an eviction notice!" Clearly the coatis were letting us know that we were a little too close to their nest, and that we should keep our distance.

We washed the mess off with a bucket of water, but the next day there was another similar slightly smelling smear across the deck, filled with plum pits. We decided it was time to pick the plum tree, figuring it wouldn't take too many days before this fruit-loving coati might strip the tree bare. After that, the morning piles of scat became more distinct, and there were often two of them. One coati clearly was feasting on plums, and the other on apples.

We decided to limit our forays out onto our deck, to offer them more security. Our cats still came and went out onto the deck, but we noticed what we interpreted as some wariness on their part, as they gazed up at that towering fir tree. I became really curious about this pattern of scat at the doorstep, and set up a night vision trail camera to see if I could get some photos and video of it happening. But I must have mis-read the instructions, as nothing came out.

The last time I spotted the coati, the female, was out the window of the kitchen, to the west. She was climbing into our large mulberry tree, prolific with sweet purple berries. Quickly I readied my camera and started shooting through the window as she settled onto a branch about 15 feet up. Then she spotted one of our cats on the windowsill outside the window I was looking through. Her demeanor changed, from nonchalant, to focused, as she noticed the cat. Our cat froze, too. A staring match ensued - the cat and the coati staring each other down. The coati's long tail now twitched menacingly, and her look was of a predator -- not unlike how a cat hunts.

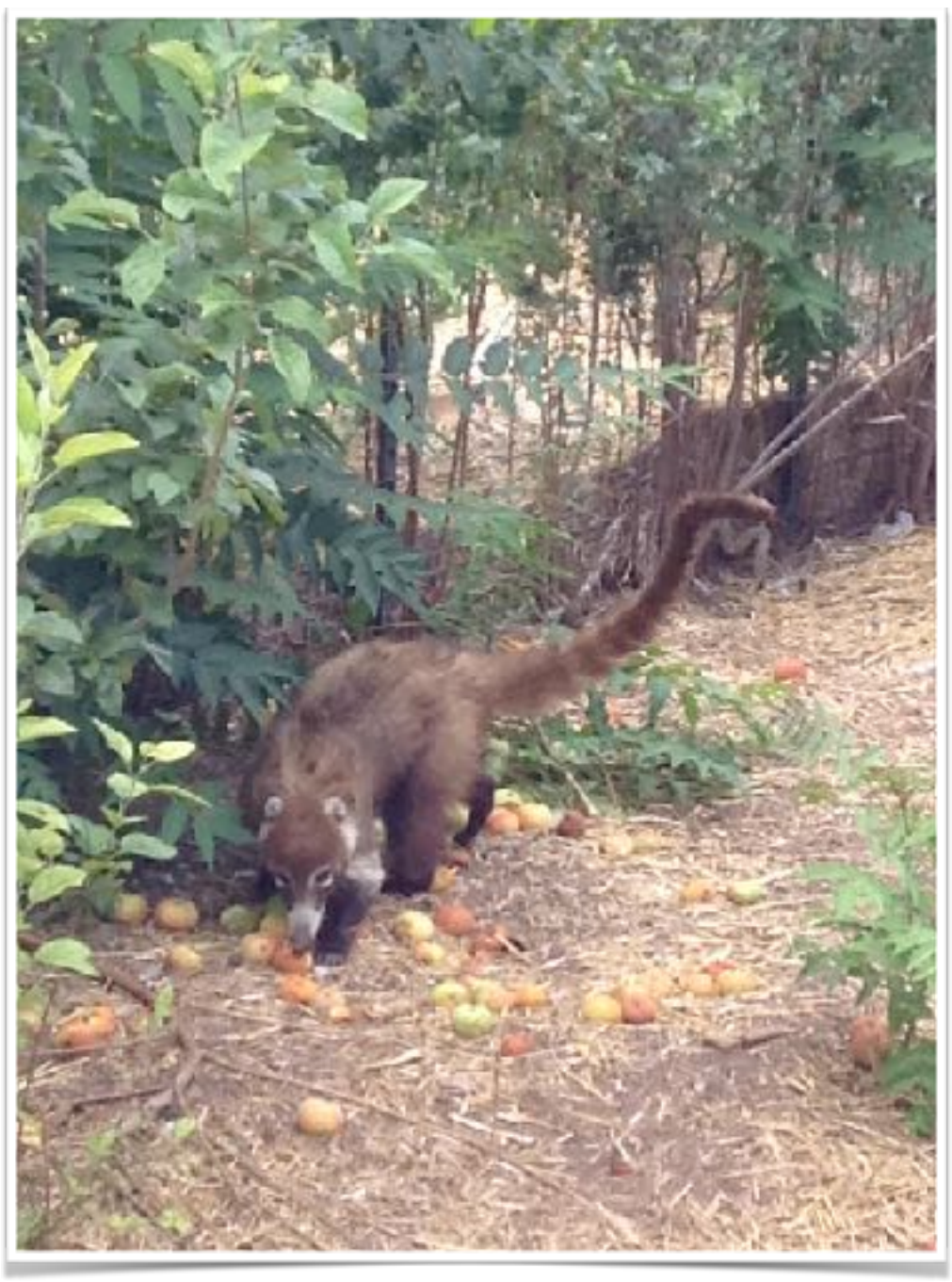
After several moments of watching this seeming standoff, I moved quickly to the door, stepped outside, and around the corner into the coati's view. This seemed to break up the stare-down. The ccat jumped off the windsill, and snuck away, and the coati descended to the ground and casually resumed consuming fallen mulberries*. After several minutes of munching mulberries and exploring the ground for bugs, the

coati moved off to the west. And since we had an appointment in town, I decided not to follow.

We guess that they moved on, as coatis are known to do. No more scat appeared on our doorstep, and looking up at the tall fir tree it seemed devoid of their presecence. By then it was late July, still mid summer, and the rains were good. The Percha Creek was flowing, and an abundance of apples were also available a block away in the Kingston orchard, where people were only occasional visitors. Still, we missed our furry friends, and wondered if they would stick around the neighborhood.

Several months later, in October, during an evening of music-making, several people were gathered around a campfire, when two dark forms with long tails dashed by and scrambled up into a nearby apple tree, laden with late season fruit. To the observers, they seemed to be chasing one another, frolicking. One identified them - definitely coati! I like to think these were the youngsters, now mostly grown, returning to the yard where they were once nursed and nurtured.

*We learned later from biologists that cougars are the primary predator of coatis. So perhaps our domestic cat actually triggered a defensive response from the coati (and vice versa!)



White-nosed Coati Range Expansion?

by Bob Barnes - photos by Catherine Wanek

Locally they are simply called Coati; elsewhere they are also called White-nosed Coati and/or Coatimundi. Whatever you call them, there were more observations of them in the Black Range this past season than in the past.

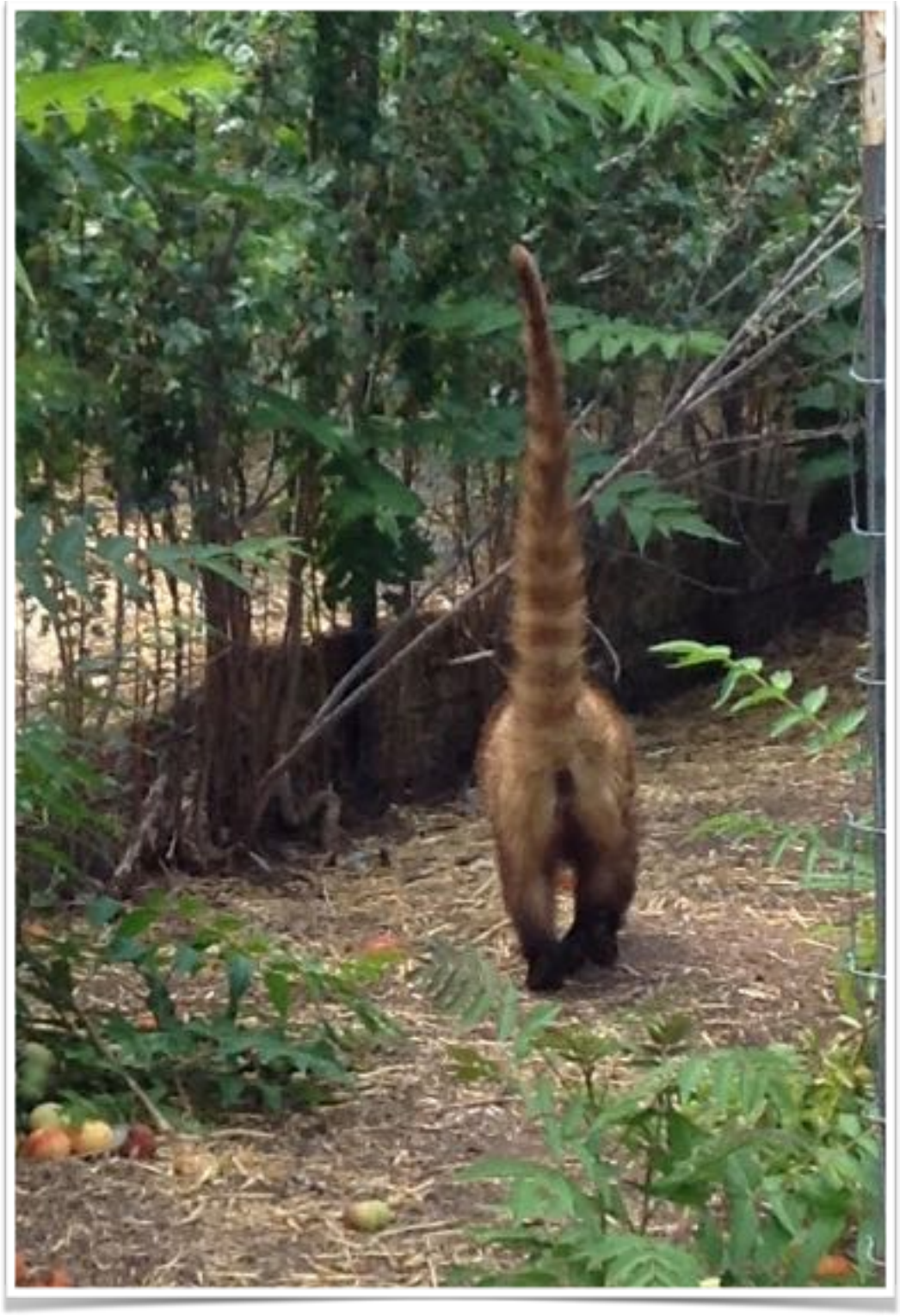
They were observed along Animas Creek (where they have been seen in the past), in the Percha Creek drainage (in Hillsboro on several occasions - including a road kill; in

Kingston where they became fairly regular at the Black Range Lodge - see Catherine Wanek's photos in this article and the previous article; on NM-152 roughly a mile above Kingston as late as January 20, 2019 (two Coatis); and near MP 35 on NM-152 on several occasions during the fall of 2018); and in San Lorenzo. Undoubtedly there were other sightings that we are not aware of at this time.

Coatimundis are typically found at elevations between 4,500' and 7,500' so these sightings were all within the elevational range. And as noted above they have been observed in the Animas Creek drainage in the past. The observations do not appear to be the result of the "Patagonia picnic table effect" (increase in observers results in increased observations) since the number of observers has not changed dramatically in the cited areas. Given the number of observations and the geographic settings, it is possible that the observations were of a few small family groups, so the number of individuals observed may be quite small. All of the sightings were in areas where there is regular human presence.

The range of this species is shown on the map, on the next page, from the IUCN. There are at least four subspecies. The subspecies found in Arizona and southwestern New Mexico is the nominate form, *Nasua n. narica*. Note that the Black Range is not shown to be within the range of this species.

My personal experience with this species is limited to casual observations throughout its range.



Notes of interest (see the IUCN listing for this species, for the specifics behind this listing):

- **Coatis are generally found in family groups of up to 30, especially after the young are born, when females and young band together to ward off predators and male Coatis. (See "Anti-predator benefits of group living in white nosed coatis (Nasua narica)" by Christine C. Hass and David Valenzuela, 2002.)**

- **Females leave the band to give birth, rejoining it after a month to five weeks.**

- **Population density (as opposed to group size) is greater in the tropics than in the southwestern United States.**

- **In the United States Coatis are rare and in Mexico White-nosed Coati are believed to be extirpated in many areas. In general, the population is believed to be decreasing at a fairly significant rate. (Note, however, the discussion in "Out of Range" in the Winter 2018 issue of New Mexico Wildlife - see below.)**

- **Year-to-year fluctuations in population occur because of disease and/or food availability. A population in the Burro Mountains is believed to have been extirpated during a Coyote poisoning campaign.**

- **In New Mexico this species is classified as an endangered species.**

- **Its diet consists mainly of fruit and insects.**

- **The species generally prefers pine-oak woodlands and oak and hardwood riparian canyons.**

The New Mexico Game and Fish Department has a new online magazine (well, the "online" part is new; it has been published in hard copy and .pdf for many years). The Winter 2018 issue has an article about White-nosed Coatis in New Mexico and possible range expansion. They have been reported at the Bosque del Apache National Wildlife Refuge, at the La Joya Wildlife Management Area, and as far north as Corrales. There are also reports from Las Cruces, Hatch, and San Acacia. (By following the previous link you can not only access the subject article but the entire issue, including links to the .pdf archives of the magazine.)

In the article, Jennifer Frey, a professor in the Department of Fish, Wildlife and Conservation Ecology at New Mexico State University is quoted:

"Our historical record is based on a landscape that already changed. We don't have information about conditions before New Mexico was influenced by Europeans. What people may see as a range expansion may be the species returning to a historical range that had been impacted by humans. Just because we're seeing something in an unusual place today doesn't mean it's unusual for the species."

In fact, she said, coatis may have been more abundant in the past. One hypothesis is that extensive predator control activities that occurred in the 20th century could have decreased the abundance and distribution of coatis in the state. "It seems as though there has been a range expansion when in fact it is probably representing what their natural distribution is…"

Frey, who has conducted research on the geographic range of the coati and is currently writing a chapter on coatis for a book about carnivores in New Mexico, is a pioneer in Conservation Biogeography. See the "Dr. Jennifer Frey - Mammalian Diversity and Conservation Laboratory" website for more details.

Carl Woese

An interview with Lloyd Barr

The world can often be seen as full of injustice. The wrong and evil can succeed, the right and true can fail, and the valiant efforts of the brave and brilliant go unrewarded while the leaches revel in glory. Against the events of world history, the fact that Dr. Carl Woese (1928 - 2012) did not receive a Nobel Prize may not measure up to say, World War Three, the cutting of the Amazon Rainforest, or - in the eyes of some - whether Hillsboro's Eleanor Street gets paved or remains in its pristine rocky self. But it is a fact that fewer and fewer people dispute: Carl Woese should have received the Nobel Prize. The fact that he did not can be blamed on the bias of the Nobel Committee toward the physical sciences versus the biological sciences (there is no Nobel Prize for Biology, for instance), the fact that there are many efforts worthy of recognition - which means that some fail to be recognized, or to the petty twisting of academic politics. Whatever the reason, Carl Woese did not receive the Nobel Prize.

By this time, some of you may be wondering who Carl Woese was, what he did, what his connection with the Black Range is, and why you are reading this rant. Good questions all.

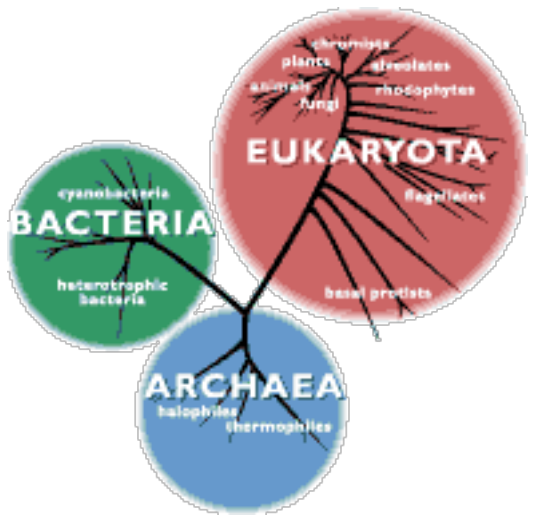
Carl Woese received his Ph.D. in biophysics at Yale, studied medicine at the University of Rochester, did post-doc research at Yale, worked as a biophysicist at the General Electric Research Lab, and finally, in 1964, joined the microbiology faculty of the University of Illinois at Urbana-Champaign.

In 1977, he discovered that the 16S ribosomal RNA in what is now known as Archaea was fundamentally different from the RNA in all other forms of life. Prior to Woese's work many of these species were recognized, but their fundamental difference from other forms of life was not understood. His work defined Archaea, based on these differences, and in so doing recognized it as a new domain of life. Although some will argue about where to draw the lines, it was generally accepted before that time that there were five categories of life; the prokaryotic category (bacteria), and the eukaryotic category (plants, animals, fungi, and protists). Woese and his research group were able to determine that within the prokaryotes there were two fundamental divisions - what was traditionally known as bacteria and what became known as Archaea. Based on those findings, Woese proposed that life should be divided into three domains - Eukaryota (plants, animals, fungi, etc.), Bacteria, and Archaea.*

This was a discovery and analysis of great significance, a foundational achievement in the biological sciences. (More about this discovery, its significance, and the discussion of evolutionary science and how its findings are depicted can be found in The Tangled Tree: A Radical New History of Life by David Quammen.)

Now that we know who Carl Woese was and what he did, what is his connection with the Black Range? As was noted in the last issue of this magazine, some of the early samples of Archaea were taken from a mine settling pond in the Black Range. From a toxic environment, toxic to just about all life, but not to some species of Archaea. But no, the fact that bacteria and archaea are all around us and worthy of discussion as part of our natural history is not the connection to the Black Range discussed in this article.

We are particularly well situated to get some insight into Carl Woese as a person, not as a famed scientist of mythic proportions, but as someone who could be a friend. In this case as a friend and colleague of Dr. Lloyd Barr for more than 30 years. Before moving to the Black Range, Lloyd taught and did research at the University of Michigan, the Medical College of Pennsylvania, and from 1970 to 2000 at the University of Illinois - Urbana-Champaign. Both Barr and Woese were in the School of Life Sciences at UIUC, Woese in the Department of Microbiology and Barr in the Department of Physiology and Biophysics. We (Black Range Naturalist - BRN) had a chance to talk to Lloyd about Woese in January of this year.



Graphic courtesy of the University of California at Berkley

BRN: How would you characterize your relationship with Carl Woese?

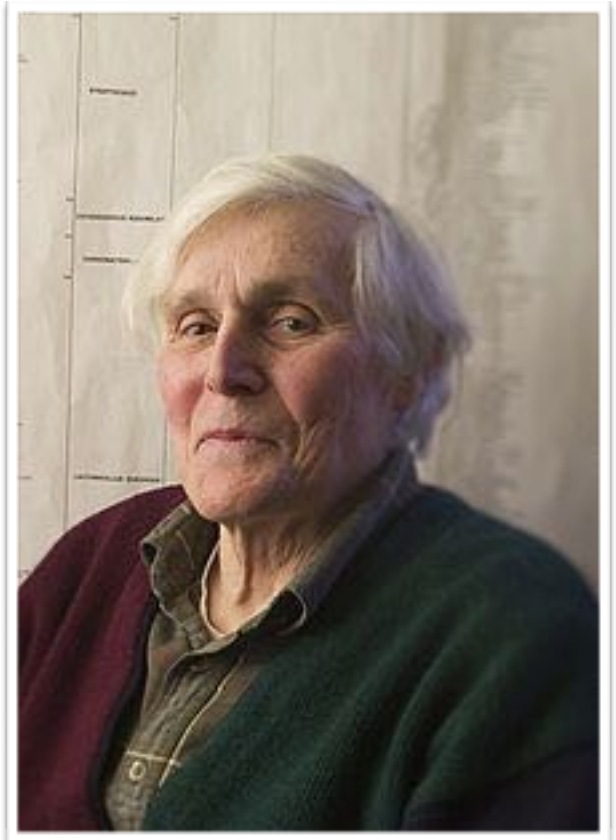
Barr: He was a personal friend, more than a scientific colleague. Although we were both scientists working in the same building, we rarely discussed our science with each other.

BRN: What did you discuss?

Barr: To answer that fully let me describe Woese's personality. He was interesting to be around because his mind was always jumping from one thing to another, he was always wondering, always questioning - and he had a great sense of humor. So whenever he ran into something that he thought he might be interested in and that he thought I would know something about he would give me a call. Because he was so open to new concepts, always willing to question, some of those inquiries could be kind of weird.

BRN: Weird? Some examples?

Barr: On one occasion a cult spokesman approached Woese about sponsoring a lecture at the University. Woese called me to ask if it was a good idea and could I look into the cult's beliefs (which included the belief that nutrition was sent to them, by the leader, through the ether). I contacted a professor in the School of Nutrition and asked him. He was very skeptical of the cult's practices from what he knew. The three of us (the nutrition professor, Woese, and I) met this guy, who brought his two kids with him. When I saw them, I thought the kids were 10 or 11 years old. Turns out they



Carl Woese in 2004
Photo by Don Hamerman

were 14 and 16, totally emaciated, just skin and bones. Turns out they were allowed to drink all the orange juice they wanted and a small amount of food. It was child abuse. It was a sham and a travesty. We were all horrified. The cult spokesman did not get to lecture.

BRN: What did that tell you about Woese?

Barr: He was a person who was willing to consider ideas that were odd, or worse, at the surface. A person who wanted to know if there was substance, unwilling to dismiss some things just because they seemed absurd. But always, wanting to test such concepts rigorously.

BRN: Another example?

Barr: Once he called me up to tell me that he had discovered this new thing "that makes me feel great". Cupping. I was not sure what cupping was but based on his description I told him not to do that.

BRN: Some people still do that.

Barr: Yeah.....

BRN: Did the calls all go one way?

Barr: Of course not. I set up a Symposium on Origins in the early 1980's. Carl was a great help in developing the concept and helping obtain funding for the speaker honoraria. It was a lot of work.

BRN: You said that he had a good sense of humor. What form did that take?

Barr: I think that a great example of his sense of humor occurred when a friend threw a party for Tom Lehrer. Lehrer was at the top of his satirical form at that time.**. Woese and I pigeonholed him and wanted to know why he didn't write about the genetic revolution - all that would change as we discovered more and more about our genetic legacy. We tried to get him to right this terrible oversight. We failed.

To try to convince someone to poke fun at the field of science that you have dedicated your life to takes a special type of personality.

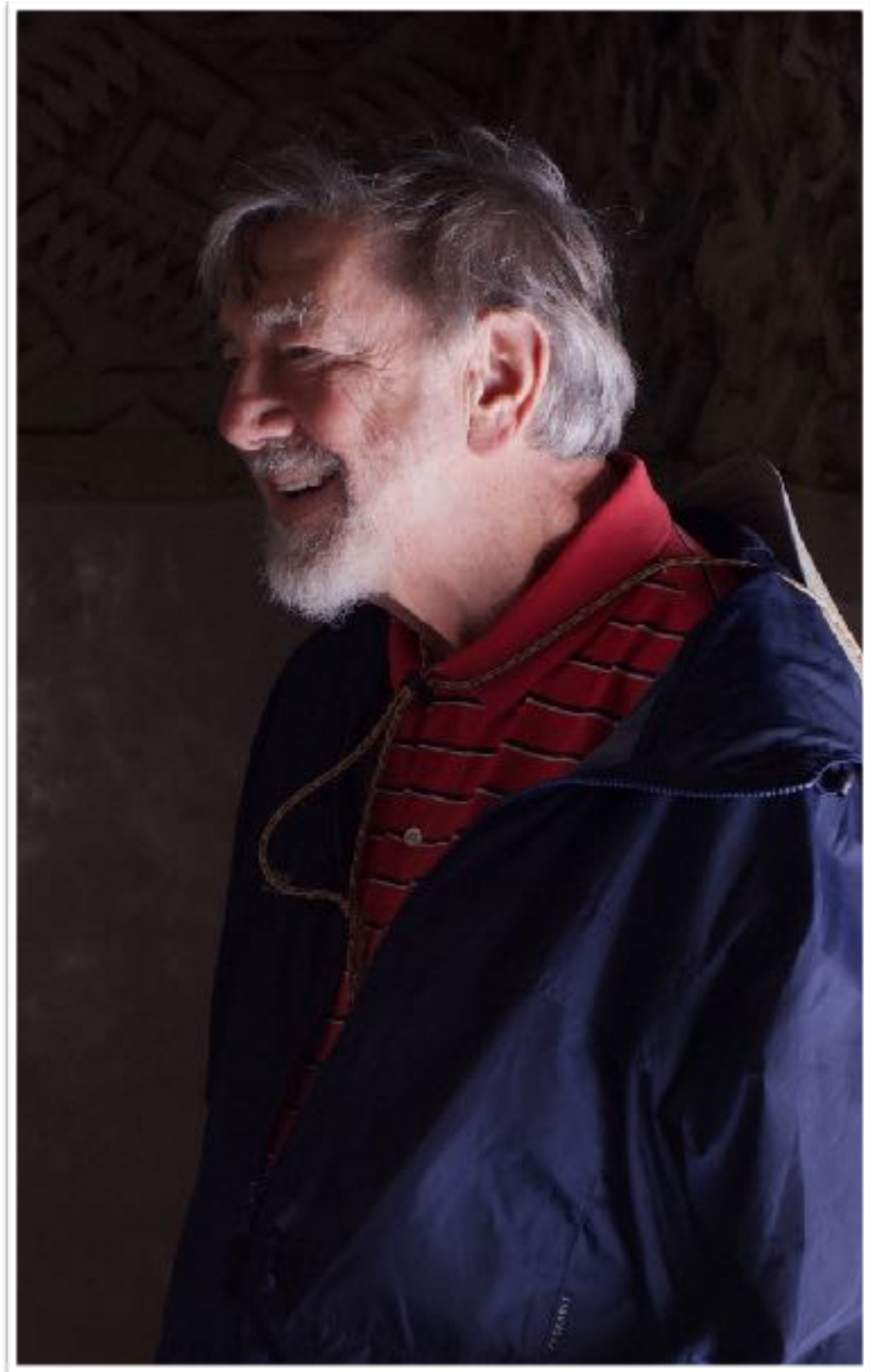
That party gave me a great insight into knowledge transfer. Go to a party and share ideas.

BRN: And you never discussed science?

Barr: Well, not each other's. Although I never delved into his field of inquiry I was aware of what he was up to. For instance, he was very good at organizing a lab, to getting things done by a lot of people. And, personally, he was a tireless worker.

BRN: The formal recognition of his work did not come until fairly late in his career. He did not get the Nobel, he was elected to the National Academy of Sciences in 1988, years after his major breakthrough, etc. How did he take that?

Barr: He was basically raped. Given that, I think he took it remarkably well. Recently, I have thought about the fact that he did not get the Nobel and why he did not. There were issues, of course. The Nobel Committee does not have a prize for Biology, for instance, but they have gotten around that in the past. Look at Watson and Crick for DNA, for instance. As far as academic politics, it can be petty and there many not have been enough champions for his cause. But I think that the most likely reason is that it was so groundbreaking, so fundamentally revolutionary, it really



Lloyd Barr - November 2012 - Photo by Bob Barnes

turned the study of life on its head, and the established scientific community simply could not grasp what that meant.

BRN: There are some who have a different perspective on that point. They argue that his prickly personality made him too much of an outsider.

Barr: I know, but I never saw him arguing with anyone - but it must have happened. I never saw that prickly personality that others claimed to have seen. We were friends.

BRN: Do you remember the period when the news about Archaea broke?

Barr: Yes. I remember walking into a class being taught by one of my post-docs. In front of the class he asked me what the concept of a new form of life would have to be based on, the twerp. I noted that it would require something fundamentally different in the structure of RNA or DNA. It quickly became apparent that this discovery of Woese's was fundamental. What was so important was how different Archaea was from everything else.

BRN: Everyone jump on board right away?

Barr: Some people found it quite threatening, it really upset the apple cart. Me, I thought how wonderful this is, it makes the evolution of life so much richer.

BRN: Anything else?

Barr: Woese had this crazy openness, a willingness to consider, he wanted to do good, to help humanity. That is what I remember most about Carl Woese.

***Over the years there have been other (failed) delineations of life - 5 domains, 2 domains, etc. Humans like to draw boxes and lines to help them understand the world and to explain the world to others. This fits in this box, so it is a species, this does not fit into the box so it is something else. On this side of a graph of evidence it is "x", on that side it is "y". Boxes and lines are a significant source of conflict in this world. Some of the fights over where to draw the domain lines were bitter, but as of today, the Woese definition dominates.*

***Lehrer, in addition to being a mathematician, was a famous song-writer and performer. Among other things he wrote for "That Was The Week That Was (TW3)", a very popular television series in the early 1960's.*

During the interview, Lloyd Barr noted that the difference between a Ph. D. and a medical doctor is that Ph. D.'s are not remembered for their failures. Doubly funny given that he spent his academic years teaching medical doctors.

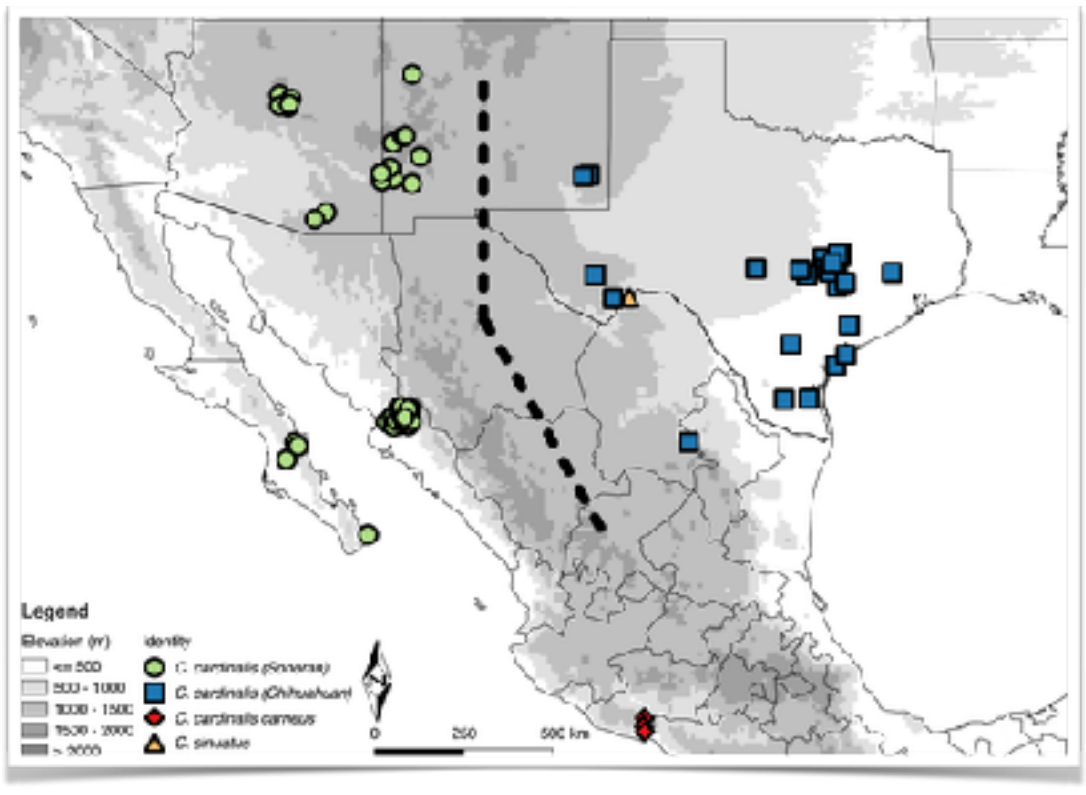
The IOC currently recognizes 19 Northern Cardinal subspecies. In 2014 there was a (rejected) proposal to divided the Northern Cardinal into six full species. The following study should be viewed in this context.

Northern Cardinal Update

by Bob Barnes

In Northern Cardinal Range Extension, pp 8-10 of the first issue of this newsletter, I discussed the apparent range extension of the Arizona Cardinal subspecies (*Cardinalis cardinalis superbus*) of the Northern Cardinal eastward to the east side of the Black Range. That article, which drew heavily on the research of Dr. John Hubbard - and included significant comments made by him - noted the distinctive differences which separate *C. c. superbus* from the more easterly subspecies.

A study published on 11 December 2018 in *Ecology and Evolution*, Genomic divergence in allopatric Northern Cardinals of the North American warm deserts is linked to behavioral differentiation, by Kaiya L. Provost, William M. Mauck III, and Brian Tilston Smith provides more data on the differences noted in "Northern Cardinal Range Extension" and why/how they developed. This new study provides additional support to those who argue that C. c. superbus should be described as a full species.



Location of vouchered Cardinalis cardinalis genetic samples. Points are jittered slightly to avoid overlap. Note that Chihuahuan group includes all samples east of the Cochise Filter Barrier, including individuals collected outside the Chihuahuan Desert proper. Black dotted line shows the approximate region of the Cochise Filter Barrier. (Figure 2 of the referenced study.)

This is an extensive study which is best read directly (see link above) rather than in summary. In part, the study concludes, "All in all, the Cochise Filter Barrier structures Northern Cardinal populations both genetically, phenotypically, and behaviorally. Given our findings, the barrier appears to be facilitated, at least in part, by strong dialect differences that have evolved between the Sonoran and Chihuahuan deserts. These dialect differences affect song discrimination in male Northern Cardinals more potently than would be expected from geographic distance alone."

Mountain Lion Video

The A-Spear Ranch trailcam monitoring effort administered by J. R. Absher continues to enjoy significant success. During the first part of March 2019 the trailcams recorded Mountain Lion activity on several occasions. Video clips from the webcams have been edited and are available for your viewing at this link: A-Spear Mountain Lions.

2018 Southern New Mexico Hummingbird Location Summary

by Ned and Gigi Batchelder

The summary found on the following page represents only a sliver of the hummingbird population that frequents the south central New Mexico region. The Black-chinned species was found in large numbers both as a northern/southern migrant, and as a local breeder with confirmed gravid females. But there are also other migrant and vagrant species wandering or exploring that can be encountered in southern New Mexico as demonstrated. We are very interested in confirming and documenting any of these uncommon species with our capture, banding, and safe release. This is especially true during the off season but also during the regular time of year hummingbirds are observed in the area. A Rufous hatch year male was banded and released at the Rick Cassetter location 12-16-18. Another hummingbird enthusiast who is currently maintaining five feeders has reported to us 5-6 Rufous and Anna's hummingbird species visiting during late December.

During the beginning of the annual southern migration surge during late July, the mass movement of hummingbird species roams the Rocky Mountain corridor and other western U.S. regions heading to central Mexico for the winter months. During our daily morning banding sessions we recognized many species: the flashy Rufous, tiny Calliope, and other common western species including Broad-tailed. Our research indicated that the southern migrating hummingbird surge this season peaked between mid July and October at higher elevations, like Aguirre Springs.

Our first documented young, or hatched this year hummingbird, was a Black-chinned male at the A-Spear Ranch during early June.

Hatch year ONLY hummingbirds banded this season with our study were about 65% of the total, possibly indicating to us a good productive hummer nesting success this season in western North America.

The percentage of total banded hummingbirds represented by hatch year ONLY hummers by each species was: Black-chinned 55%, Broad-tailed 74%, Rufous 59%, and Calliope 74%. All three of the Ruby-throated Hummingbirds we banded were hatch year birds as well, one male and two females. Again these are just numbers of hummers we had in hand while confirming the sex, age, and species, and thus are just an indication of total numbers. We have found that numbers like this can always vary for many reasons each year.

Total "recaptured again individuals by us" this season was 11.5% , involving 400 individuals recaptured and released again of four species. Many were recaptured at least once, and some of the others a couple months later and 15 miles away. Recaptures were confirmed by the band numbers and only recorded after at least one day when originally captured and banded by us. Most of the recaptures, of course, were at the Aguirre Springs area. A few of the birds were recaptured multiple times (two or three times) and one young Broad-tailed male even eight times during the summer months.

All data is reported annually, as required, to the New Mexico Department of Game and Fish and the North American Bird Banding Laboratory in Laurel, Maryland (USGS database that issues the light weight aluminum alloy leg bands). A copy is also available to any other hummingbird enthusiasts interested.

Thanks again to those of you make the efforts of maintaining feeders and allowing us access to study and all learn more about the hummingbirds on your property. Looking forward to a 2019 season and what the hummingbirds will tell us.

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Banding Locations listed on the following chart:

- A-Spear Ranch is located in west Sierra County
- Pollination Garden is located at the White Sands Missile Range townsite
- Rose is in east Las Cruces
- Aquirre Springs is on BLM land in the Organ Mountains
- Anderson is in west downtown Las Cruces
- Phelps is in east Las Cruces
- Castetter is in north Las Cruces
- Batchelder is in east Las Cruces

Between March and November (inclusive) 2018, 217 banding sessions were held at these locations. 3,467 hummingbirds were banded during this time.

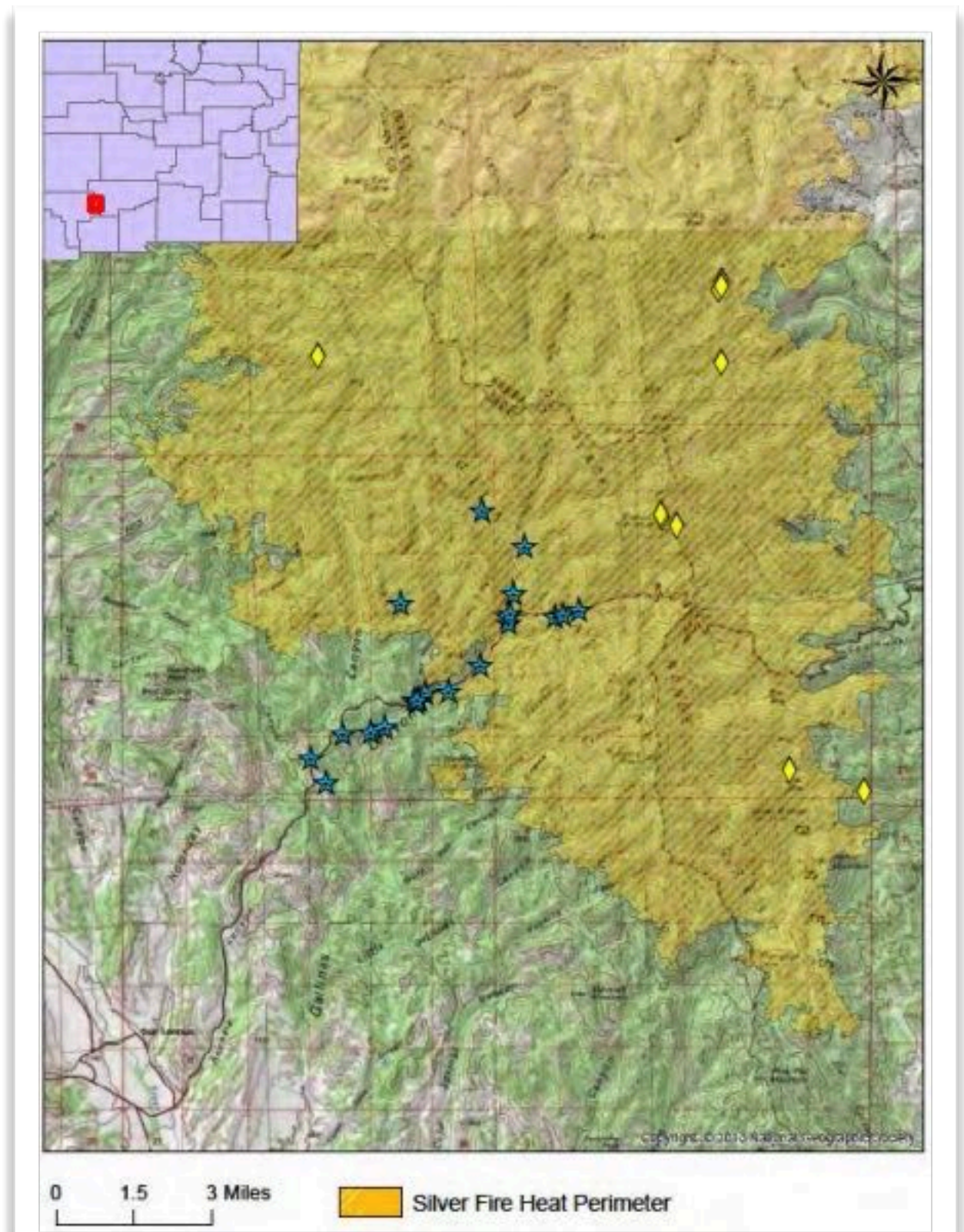
2018 Southern New Mexico Hummingbird Banding Location Summary
by Ned and Gigi Batchelder
(March - November)

LOCATION NAME	TOTAL BANDED	NUMBER OF BANDING SESSIONS	CALLIOPE	RUFOUS	BLACK-CHINNED	BROAD-TAILED	OTHER
A-Spear Ranch	279	10	21	29	219	9	1 (Broad-billed)
Pollination Garden	83	10	1	2	79	1	-
Rose	8	4	-	1	7	-	-
Aguirre Springs	2654	107	413	604	1242	391	1 (Lucifer) 3 (Ruby-throated)
Anderson	46	8	-	-	46	-	-
Phelps	20	4	-	5	15	-	-
Castetter	290	40	2	86	197	4	1 (Broad-billed)
Batchelder	87	34	3	8	76	-	-
Totals	3467	217	440	735	1881	405	6

Extracts from "Wildfire Impacts on Species of Concern..."

by Daniela Roth

A link to Roth's study of the Silver and Whitewater-Baldy fires on a limited number of plant species which are "species of concern" was first published in this newsletter in the last issue. In her introduction to the study she provides excellent context for the situation we find ourselves in at the moment: "The Gila National Forest lists 21 plant species a Forest Sensitive, which have been documented from 158 sites (Figure 1). Thirty-one percent of these 158 known rare plant sites occur within the Whitewater-Baldy fire perimeter, including a significant portion of the known range of several highly endemic plant species (Figure 1). In addition, a significant portion of the known range of several rare plant species burned in the 2013 Silver Fire and the 2006 Bear Fire, resulting in the burning of 68% of all 158 known sites of Forest Sensitive plants since 2006. For some of these species, it is estimated that their entire known range might have burned, potentially putting them at risk of extinction and therefore possibly requiring protection under the federal Endangered Species Act. Although it is generally assumed that native plant species are adapted to natural fire cycles and will therefore experience a natural recovery, the response of these sensitive species to wildfire and potential associated habitat alterations has not been studied. "



Blue stars indicate locations of Scrophularia macrantha while yellow diamonds indicate the locations of Penstemon metcalfei.

At page 33 she notes that "the Silver Fire burned 138,698 acres of the Black Range in 2013, including the entire known range for Metcalfe's penstemon (Penstemon metcalfei) and a significant portion of the known range of Mimbres figwort (Scrophularia macrantha)." Portions of her assessment of these two species is reprinted here.

At page 34 she summarizes the findings for these two species: "Although both plant Species of Concern were documented to be extant after the 2013 Silver Fire, both species appeared to be in decline and were documented from fewer sites and contained fewer plants than previously reported. Metcalfe's penstemon was not located at the type locality from where it was previously documented in the thousands. Another site could not be relocated due to limited locational information. Severe burns and post-fire conditions appeared to have significantly impacted the persistence of the species. Pre-fire documentation of Mimbres figwort came primarily from a very old specimen record, providing largely only general locational information and little information on the number of plants present prior to the fire. Plants were not found in most unburned sites from where they were previously documented for unknown reasons. Impacts of fire severity and post-fire habitat conditions on extant populations are unclear."

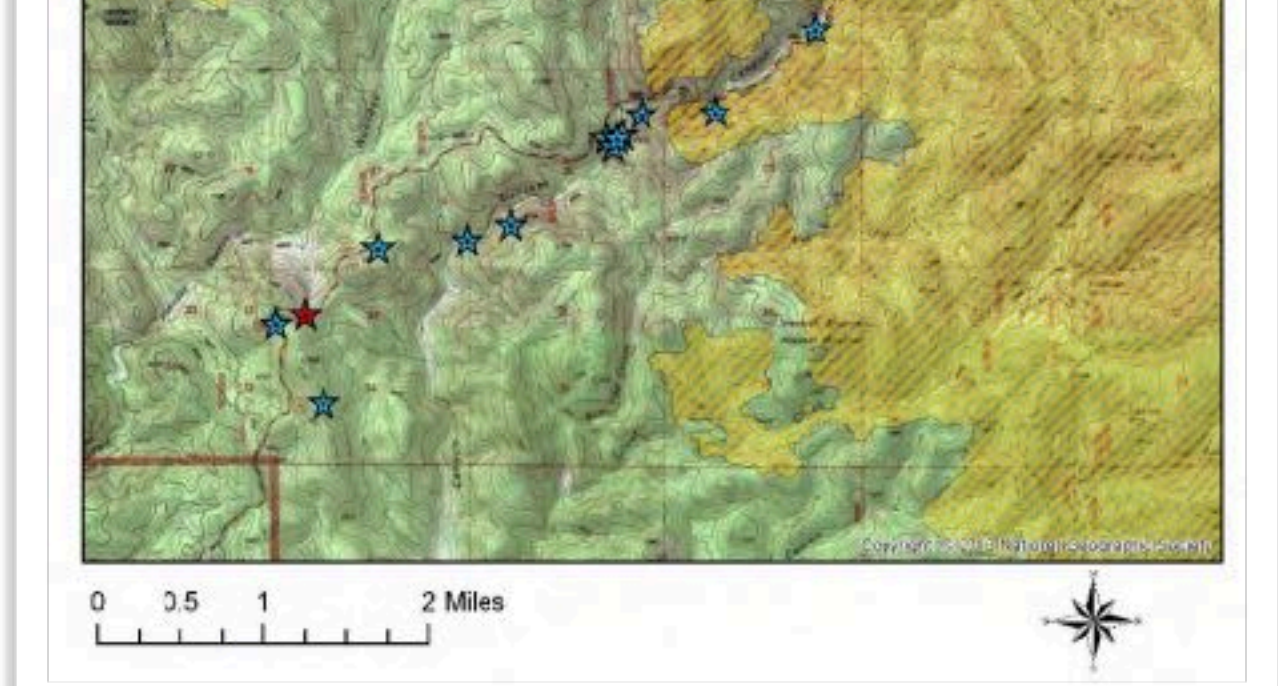
Mimbres Figwort - *Scrophularia macrantha*

(pp. 35 - 37)

"Mimbres figwort is a perennial herb in the figwort family (Scrophulariaceae). It is only known to occur in Grant and Luna counties of New Mexico, where it grows on steep, rocky, usually north-facing igneous cliffs and talus slopes, and occasionally in canyon bottoms along streams in piñon-juniper woodlands and lower montane coniferous forests between 6,500 and 8,200 ft (NMRPTC 1999). Associated species include ponderosa pine (Pinus ponderosa), pinion pine (Pinus edulis), Douglas fir (Pseudotsuga menziesii), chokecherry (Prunus virginiana), New Mexico locust (Robinia neomexicana), Arizona walnut (Juglans major), alder (Alnus oblongifolia), boxelder (Acer negundo), scarlet cinquefoil (Potentilla thurberi), Fendler brickellbush (Brickellia fendleri), mountain brickellbush (Brickellia grandiflora), James buckwheat (Eriogonum jamesii), mountain brome (Bromus carinatus), Gambel oak (Quercus gambelii), Mexican catchfly (Silene laciniata), scarlet bugler (Penstemon barbatus), fetid goosefoot (Dysphania

raveolens), scarlet gilia (Ipomopsis aggregata), sweet four o'clock (Mirabilis longiflora), mountain leaftail (Pericome caudata), and Carruth sagewort (Artemisia carruthii). Mimbres figwort is a USFWS and State of New Mexico Species of Concern and is a Forest Service Sensitive species. NatureServe gives Mimbres figwort an updated conservation rank of S2 (imperiled) (2016).

Prior to this study Mimbres figwort was documented from 22 locations in the Black Range of the Gila National Forest, primarily in the Gallinas/Railroad Canyon areas and the vicinity of Iron Creek (Figure 14; Table 7; NHNM 2013; SEINet 2013). Two disjunct populations known from BLM lands in the Cooke's Range of Luna County and the Chino Mine (Kneeling Nun) in Grant County were not evaluated for this study. Eleven of the locations known from the Black Range were located within the 2013 Silver Fire perimeter (Figure 14). No previous inventories to determine actual distribution and abundance on the Gila National Forest had been completed to assess the status of this species prior to the fire. All of the known locations were derived from the specimen record and were collected prior to 1993, except for one, documented in 2011 (FS 030602EO00012, Sclmac-nmhp22-14). Therefore the majority of documented locations for Mimbres figwort were very general in nature and did not contain any information on abundance.



Known locations for Mimbres Figwort prior to 2013 (blue stars) and distribution in 2014 (red stars)

A total of 15 of the 22 documented sites in the Black Range were searched for in 2014, inside and outside the fire perimeter. Various attempts to relocate these 15 sites took place during the flowering season in July and August of 2014, based on the available location descriptions and maps (NHNM 2013, SEINet 2013). Only three of these 15 sites could be relocated with extant plants (Table 8). Two general locations containing 16 occupied sites were found during surveys, one of which was inside the fire perimeter (Figure 14, Table 7). The second location was outside the fire perimeter, along Highway 152, in an open N-facing roadcut (Scrmac-081914). This site had been previously documented. No plants were found along Iron Creek anywhere within Gallinas Canyon. Areas surveyed included the Iron Creek and Gallinas (upper and lower) campgrounds and surrounding areas, and the area surrounding the junction of Iron Creek and Railroad Canyon (Table 8). One documented population from the Iron Creek campground area, contained the similar looking mountain figwort (Scrophularia montana), which occurred within the habitat of Mimbres figwort (D. Roth 2423, 7/18/2014; D. Roth 2458, 8/18/2014). No Mimbres figwort was observed in this area. Therefore it is assumed this location may have been a misidentification. No documentation on the abundance of plants prior to the fire was available. In 2014 fewer than 400 plants were documented from areas inside the fire perimeter and only 10 plants were found outside the fire perimeter (Table 7; Scrmac-081914). Except for one site (Scrmac-mhp22-15-14), plants were largely scattered in small groupings of 25 or fewer plants per site. The site with the most plants was the northernmost occupied site documented during this survey. The area burned moderately to severely with much of the overstory trees dead or dying. No additional plants were found for approximately 1.5 mile past (north) from this site in Gallinas Canyon, nor for 1 mile upstream in Railroad Canyon. Plants were generally found vigorous and in full flower. In addition to fire severity impacts and canopy removal, much of the stream bank habitat of Mimbres figwort was significantly impacted by post-fire erosion, including stream bank scouring and incision, debris flows and large volumes of debris deposition."

And from pp. 40-41: "Mimbres figwort is far more rare than previously thought. It appears to no longer occupy certain areas from where it was previously documented for unclear reasons. No plants were found along Iron Creek, including well documented sites in the campground areas (Iron Creek

Scrophularia macrantha, Mimbres Figwort (aka New Mexico Figwort), Railroad Canyon, July 23, 2017 by Bob Barnes/Rebecca Hallgarth

and Gallinas campgrounds). Most of these previously documented sites did not burn, but may have experienced some post-fire flooding and associated scouring of the stream banks. Nonetheless, plants should still be expected along the slopes adjacent to the stream banks, from where they were previously reported. Some of these sites may have been actually mountain figwort, mistaken for Mimbres figwort. Although some of the better documented sites in the vicinity of the campgrounds may be extirpated, some of the previously known sites might have been poorly mapped by various agencies, based on general location descriptions from herbarium 41 labels. This may perhaps be the most likely cause of the absence of these plants from various mapped areas outside the fire perimeter, in addition to misidentification.

Because Mimbres figwort appears to have a preference for growing in cool, shady areas, underneath the canopy of mixed conifer forests and along stream banks, the species may not persist over time in the majority of documented sites on the Gila National Forest due to radical habitat alterations caused by the Silver Fire. In addition, many of the sites previously documented outside the fire perimeter were not found in 2014 and may no longer exists. Inventories to determine the actual distribution and abundance of this species on the Gila National Forest are essential to assess the true status of Mimbres figwort. In addition, the persistence of the extant sites within the Silver Fire perimeter should be closely monitored. Seed banking should be considered to maintain an ex-situ collection, in the event that reintroduction will become necessary in the future."

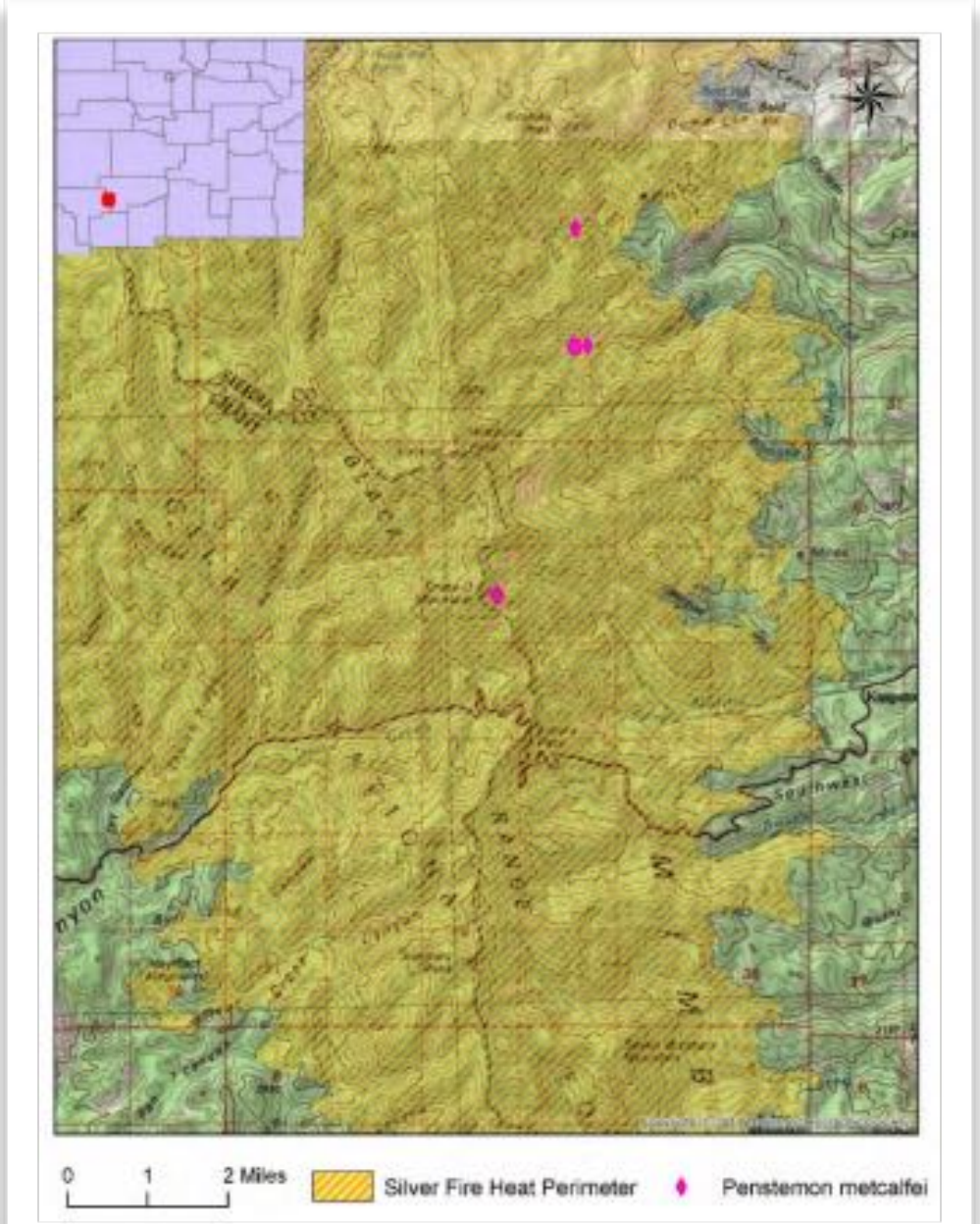
Metcalfe's Penstemon - *Penstemon metcalfei* (pp 42 - 45)

"Metcalfe's penstemon is a perennial herb in the plantain family (Plantaginaceae). It is restricted to the Black Range of the Gila National Forests in Sierra County. It occurs on cliffs or steep, north-facing slopes and drainage bottoms in lower and upper montane coniferous forest between 6,600 and 9,500 ft (NMRPTC 1999). Associated species include Douglas fir (Pseudotsuga menziesii), ponderosa pine (Pinus ponderosa), Gambel oak (Quercus gambelii), orange gooseberry (Ribes pinetorum), alpine woodsorrel (Oxalis alpina), scarlet penstemon (Penstemon barbatus), New Mexico locust (Robinia neomexicana), red elderberry (Sambuccus racemosa), chokecherry (Prunus virginiana), canyon maple (Acer grandidentatum), and aspen (Populus tremuloides). Metcalfe's penstemon is a USFWS and State of New Mexico Species of Concern and is a Forest Service Sensitive species. NatureServe gives Metcalfe's penstemon an updated conservation rank of S1 (critically imperiled) (2016). Prior to the 2013 Silver Fire it was known from 5 sites, all of which burned (Figure 15). All these 5 known sites were searched for during July and August 2014. Plants were found in 3 of the 5 known locations, totaling 138 plants in all sites… One Site was likely miss-mapped; no suitable habitat was present at the mapped location or anywhere near it (O.F. Williams s.n., July 20, 1996; SNM 6284). No plants were found at or near the type locality in Trujillo Canyon, where thousands of plants were previously recorded (NHNM EO #3 & 6). This site had severely burned and experienced extreme flooding and debris deposition on the drainage floor following the 2013 fire.

The majority of the occupied habitat of Metcalfe's penstemon burned moderately to severely in the 2013 Silver Fire. In addition to fire severity impacts and canopy removal, much of the stream bank habitat of Metcalfe's penstemon was significantly impacted by post-fire erosion, including stream bank scouring and incision, debris flows and large volumes of debris deposition.

No invasive species were documented in the vicinity of any of the Metcalfe's penstemon sites… The regeneration of deciduous native woody species including aspen, Gambel oak, New Mexico locust, and chokecherry may provide significant resource competition and impact the recovery of some Metcalfe's penstemon sites and habitat.

Because very few plants were documented in 2014 and Metcalfe's penstemon appears to have a preference for



Post Silver Fire Distribution of Metcalfe's Penstemon (2014)

growing in cool, shady areas, underneath the canopy of mixed conifer forests and along stream banks, the species may not persist over time in the majority of documented sites on the Gila National Forest, due to radical habitat alterations caused by the Silver Fire. Because of its extreme rarity and alterations to all of the known habitat, inventories to document the actual distribution and abundance of this species and close monitoring to determine population trends of this species are highly recommended. Seed banking should be considered to maintain an ex-situ collection, in the event that reintroduction will become necessary in the future."

These extracts do not capture the full extent of the research and documentation which went into the report, and we encourage you to follow the link at the beginning of this article so that you can review the work in its entirety.

This report was prepared for the U.S. Fish & Wildlife Service and portions are reprinted here with the permission of that agency and the author.

And a Bit More:

In private correspondence on December 27, 2018, between Bob Barnes and Daniela Roth, she noted: "I went back into Railroad Canyon (and other sites) this past summer to find out how plants are doing 5 years post-fire, considering the significant alterations to their habitat. One site, the northernmost site in Railroad Canyon, contained 100 – 200 plants in 2014, had 6 plants in 2018. Very disconcerting.

Unfortunately we have no abundance data for any of the sites prior to the fire, but I suspect that the species might be more rare than previously thought. I am now evaluating the species for State Endangered listing. Might have to do that for Penstemon metcalfei as well. Since these 2 plant species are so very rare and perhaps are in decline due to the Silver Fire, I would greatly appreciate if you could keep an eye out for them, wherever you go in the Black Range during the late summer months. More likely than not there are other, previously undocumented populations out there somewhere. If you find them please take a photo, note the location, and provide a count estimate. I did relocate the populations below the Lower Gallinas campground last summer (unburned). Previous site descriptions were vague, but there were enough collections from the area that I figured it had to be somewhere along the rock faces on the other side of Iron Creek, which was flooding during my 2014 surveys and I could not get across. This past summer the creek was dry and I could find these (very sparse) populations along the trail on the other side of the creek."

Other sources of information:

Scrophularia macrantha

Vascular Plants of the Gila Wilderness
The Black Range Website (www.blackrange3.org)
New Mexico Rare Plants
Denver Botanic Gardens

Penstemon metcalfei

Vascular Plants of the Gila Wilderness
New Mexico Rare Plants
First described by Wooton & Standley in 1909 see following page.
See Vol. 1, No. 1, pp. 21-23 of this newsletter for information about Metcalfe.

Penstemon metcalfei

Elmer Ottis Wooton and Paul Carpenter Standley begin "Some hitherto undescribed plants from New Mexico" with "During the summer of 1904 and the spring of 1905, Mr. O. B. Metcalfe made a botanical collection of some six or seven hundred numbers about the south end of the Black Range in Grant and Sierra counties of New Mexico. The region is one that was almost unknown botanically before that time." p. 105 (Bulletin of the Torrey Botanical Club, Volume 36, pp. 105 - 112). At page 112, the initial description of *Penstemon metcalfei*, under its original designation, *Pentstemon puberulus*, is found (see right).

At page 21 of Volume 1, Number 1, of this newsletter there is an article about O. B. Metcalfe.

Pentstemon puberulus sp. nov.

Perennial from a slender, creeping root; stems few or single, erect or somewhat reclining at the base, slender, 4 dm. high or less, minutely puberulent throughout; leaf-blades entire, lanceolate or the lowest ovate, acute or the uppermost acuminate, thin, glabrous, the uppermost sessile and clasping, the lower ones sessile but not clasping, the radical leaves on slender, winged petioles which are as long as the blade or longer, the blades decurrent upon the petioles; inflorescence a short, interrupted thyrse, rather few-flowered, peduncles 2 at each of the upper nodes, 3–6 flowers on each peduncle, the flowers on pedicels 1 cm. long or less; sepals linear-lanceolate, separate almost to their bases, long-acuminate, 12 mm. long or less, pubescent; corolla 25 mm. long or less, rather light purple (when dry), straight, somewhat narrower and less inflated than in the related species, with a few scattered, silky hairs on the outside, rather conspicuously 2-cleft, the two lips about equal in length or the lower a little longer, the lower lips composed of 3 rather large, oblong, rounded lobes, and the upper lip of two smaller rounded ones, the lower lip somewhat bearded within; sterile filament club-shaped, with a long and dense, bright yellow beard.

This plant is most closely related to *P. glaucus stenosepalus* A. Gray and *P. Whippleanus* A. Gray, but is distinguished by its thinner leaves, pubescent stem, rather less dense inflorescence, and its narrow and less deeply 2-lipped and lighter-colored corolla. From *P. Whippleanus* it differs also in the rather larger size of the plant and the bearded sterile filament. Type collected on shady slopes at the Lookout Mine, Sierra Co., New Mexico, May 2, 1905. *Metcalfe 1605.*

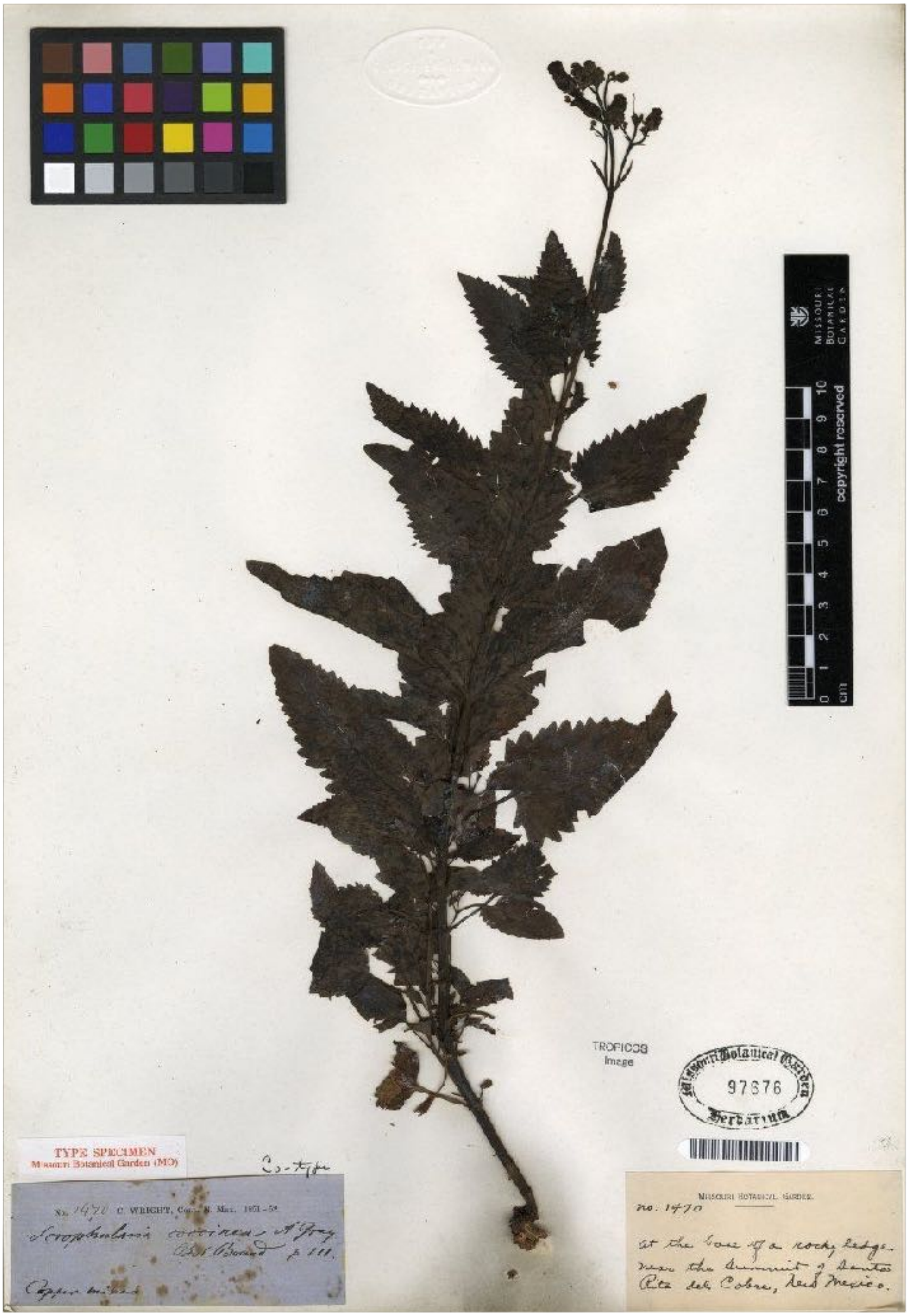
NEW MEXICO COLLEGE
OF AGRICULTURE AND MECHANIC ARTS,
AGRICULTURAL COLLEGE, NEW MEXICO.

Scrophularia macrantha

The Harvard University Herbaria maintains many of the specimens collected by O. B. Metcalfe, including the specimen sheet shown below. A specimen of *Scrophularia coccinea* (later to become good. The specimen sheet, however, indicates that it is the type specimen. How is it that this specimen is a "a type specimen" when the specimen of *S. coccinea* (to be *S. macrantha*) collected by Charles Wright in 1851-2, is shown on the next page of this newsletter, as a "Type"?

"The scientific name of every taxon is almost always based on one particular specimen." The initial description of a plant named *S. coccinea* (the basionym or original name) was published in 1753. That plant is now classified as *Russelia coccinea*. In 1859, Asa Gray used the specimen on the following page to describe the subject species as *S. coccinea*. In 1910 E. L. Greene described *S. macrantha* based on the specimen to the left and it is that name which applies to the subject species. In 1962, *S. neomexicana*, was described by Shaw. All of these names have type specimens.

In the December 6, 2005 issue of The New Mexico Botanist, Eugene Jercinovic, writes a short biography about Edward Lee Greene (a great read, candid) which includes a listing of the plant species found in New Mexico which Greene originally described and their current naming.

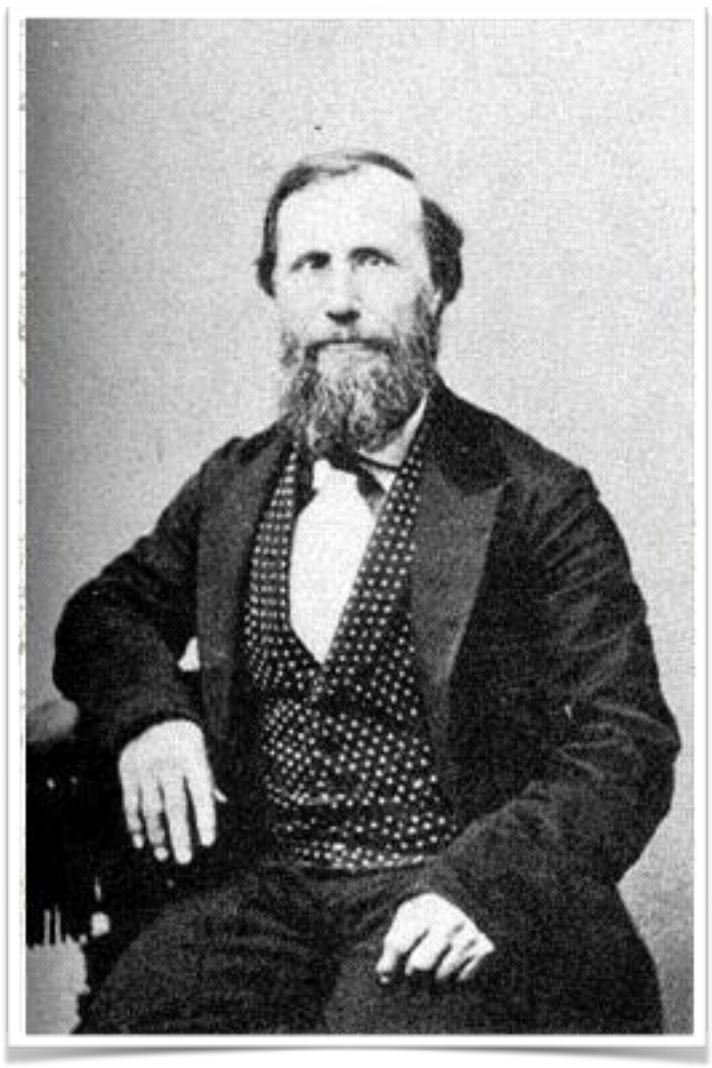


The type specimen of Scrophularia coccinea (later S. neomexicana and S. macrantha) collected near the summit of Santa Rita del Cobre, New Mexico by Charles Wright in 1851-1852.

Charles Wright

by John Dunne-Brady/Bob Barnes

Who was Charles Wright, the person who collected the type specimen of Scrophularia macrantha shown on the previous page? Charles Wright, 1811-1885, was an important plant collector who collected primarily in Texas (1837-1852), Cuba, Hispaniola, Nicaragua, Hong Kong, and Connecticut. Many plants are named in Wright's honor. The Texas State Historical Association has a brief biography of Wright on its website, focused primarily on his time in Texas.



Charles Wright

John Dunne-Brady has gathered a significant amount of information about early naturalists. His entry on Charles Wright is reprinted below (note the significant number of plants named in his honor [eponyms] and the significant number of noted botanists who chose to bestow that honor).

"WRIGHT, Charles [Carlos] (1811-1885); American botanical explorer and plant collector; worked for Asa GRAY (1810-1888) in Texas (1849) and in New Mexico and Arizona (1850-1851); surveyor and botanist on Mexican Boundary Survey (1851-1853); southwest collections published by Gray in Plantae Wrightianae (1852); botanist on Ringgold-Rodgers Expedition to Pacific northwest (1853-1856); collected in Cuba and Santo Domingo for 11 years; his early Caribbean collections published by August Heinrich Rudolph GRISEBACH (1814-1879) in Plantae Wrightianae (1860); eponyms: *Carlowrightia* (A.Gray,1878) WrightWort; *C. linearifolia* [Torrey, 1859] (A.Gray,1878) {=*Schaueria linearifolia* (Torrey, 1859)} Heath Wrightwort; *Acourtia wrightii* [A.Gray,1852] (J.L.Reveal+R.M.King,1973) {=*Perezia wrightii* (A.Gray,1852)} Wright Desert Peony; *Aloysia wrightii* (A.Heller ex Abrams, 1906) Wright Bee Brush; *Aristida wrightii* (Nash, 1903) Wright Three-Awn Grass; *Aristolochia wrightii* (Seemans, 1856) Wright Snakeroot; *Baccharis wrightii* (A.Gray,1852) Wright Desert Broom; *Bothriochloa wrightii* [Hackel, 1885] (Henrard, 1941) {=*Andropogon wrightii* (Hackel, 1885)} Wright Beard Grass; *Buddleja wrightii* (B.L.Robinson,1891) Wright Butterfly Bush; *Cheilanthes wrightii* (W.J.Hooker,1858) Wright Lip Fern; *Cordylanthus wrightii* (A.Gray,1859) Wright Bird Beak; *Datura wrightii* (Regel, 1859) Wright Jimsonweed/Thornapple; *Eriogonum wrightii* (Torrey ex Bentham, 1856) Wright Buckwheat Bush; *Garrya wrightii* (Torrey, 1857) Wright Silk Tassel; *Gnaphalium wrightii* (A.Gray,1882) Wright Everlasting; *Gutierrezia wrightii* (A.Gray,1853) Wright Snakebroom; *Houstonia wrightii* (A.Gray,1882) Wright Bluet; *Hymenothrix wrightii* (A.Gray, 1853) Wright Hymenothrix; *Lotus wrightii* [A.Gray,1853] (E.L.Greene, 1890) {=Hosackia wrightii (A.Gray,1853) Wright Birdfoot Trefoil; *Muhlenbergia wrightii* (Vasey ex J.M.Coulter, 1885) Wright Muhly Grass; *Panicum wrightianum* (Scribner, 1898) Wright Panic Grass; *Pappophorum wrightii* (S.Watson, 1883) Wright Pappus Grass; *Pellaea wrightiana* (W.J.Hooker, 1858) Wright Cliff Brake Fern; *Platanus wrightii* (S.Watson, 1875) Wright Sycamore; *Sageretia wrightii* (S.Watson, 1885) Wright Sageretia; *Solidago wrightii* (A.Gray, 1880) Wright Goldenrod; *Sporobolus wrightii* (Munro ex Scribner, 1882) {=*Sporobolus airoides var. wrightii* [Munro ex Scribner, 1882] (Gould, 1949) Wright Giant Sacaton Grass; *Thelypodium wrightii* (A.Gray,1852) Wright Prince's Plume."

Some of these species are featured on the Black Range Website. A few examples are:

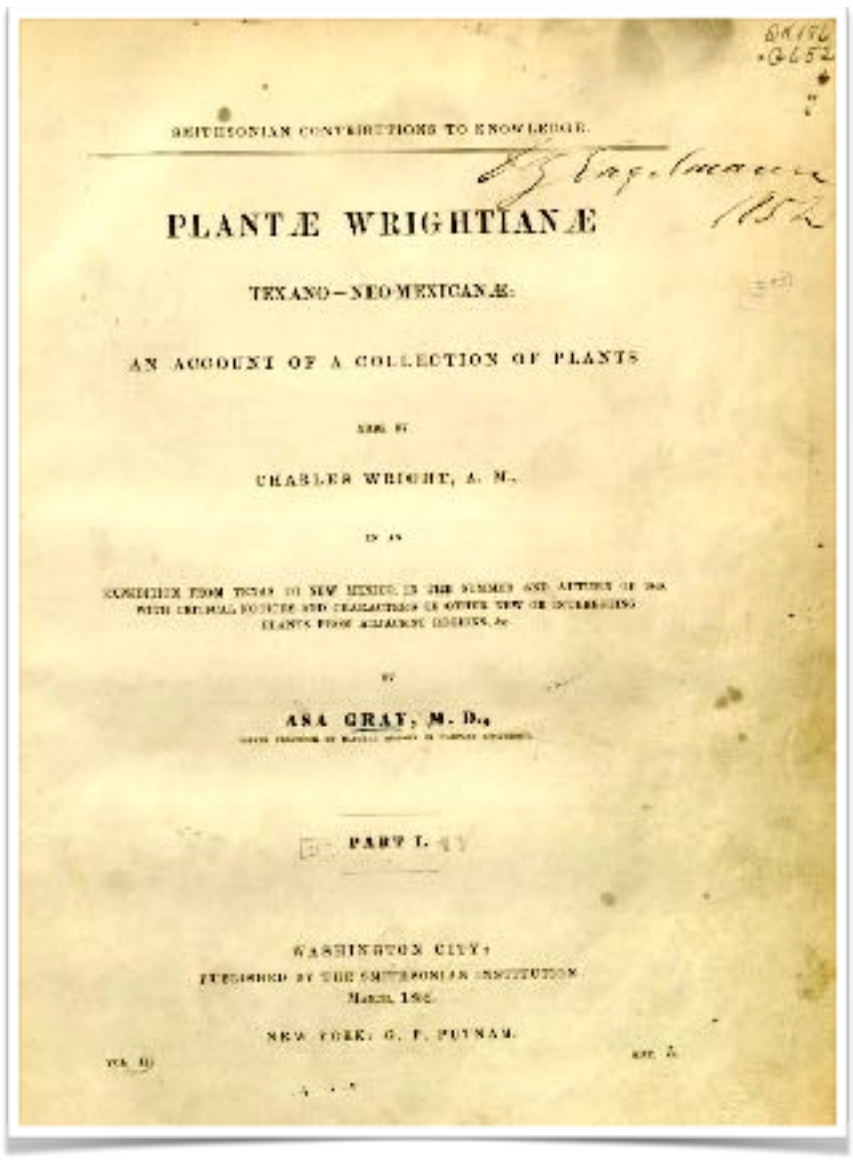
Wright's Thelypody

Wright's Thelypody (*Thelypodium wrightii)* was first described in 1852 by Asa Gray, who named it in honor of Charles Wright. Gray described over 7,000 plant species; was an extremely important person in American botany; wrote the "Manual of the Botany of the Northern United States" (a.k.a. Gray's Manual), published in 1847/48; co-authored "Flora of North America" with Torrey; etc. etc. The Asa Gray Award of the American Society of Plant Taxonomists is named for him. Photo below by Bob Barnes from Southwest Canyon, east slope of the Black Range.

Red and Yellow Pea - *Lotus Wrightii*

The specimen shown below is an isotype for this species (it is a duplicate specimen of the holotype - the single specimen which is the type for the species). It was collected by Charles Wright in 1851. See *Lotus wrightii* page on the Black Range website.

This specimen, and the rest of his collection, were the basis for Asa Wright's "Plantae Wrightianae Texano - Neo Mexicanae - An Account of A Collection of Plants Made By Charles Wright..." published in 1852-3.



Wright Buckwheat

***Eriogonum wrightii wrightii*, pictured below, was first described by John Torrey in 1856 and named in honor of Charles Wright. Photo below by Bob Barnes from the east slope of the Black Range, above the Kingston Cemetery.**

Ipomoea gilana - a new species of Morning Glory from the Black Range

The discovery of new plant species in the Black Range did not end in the 1800's. On December 18, 2017 Keith, Stamler, Randall, Perez, and McDonald published their description of a new species of Morning Glory in Systematic Botany, Volume 42, Number 4, December, 2017, pp. 974-978. The species is known from one location on the east slope of the Black Range. The image below is from the published description.

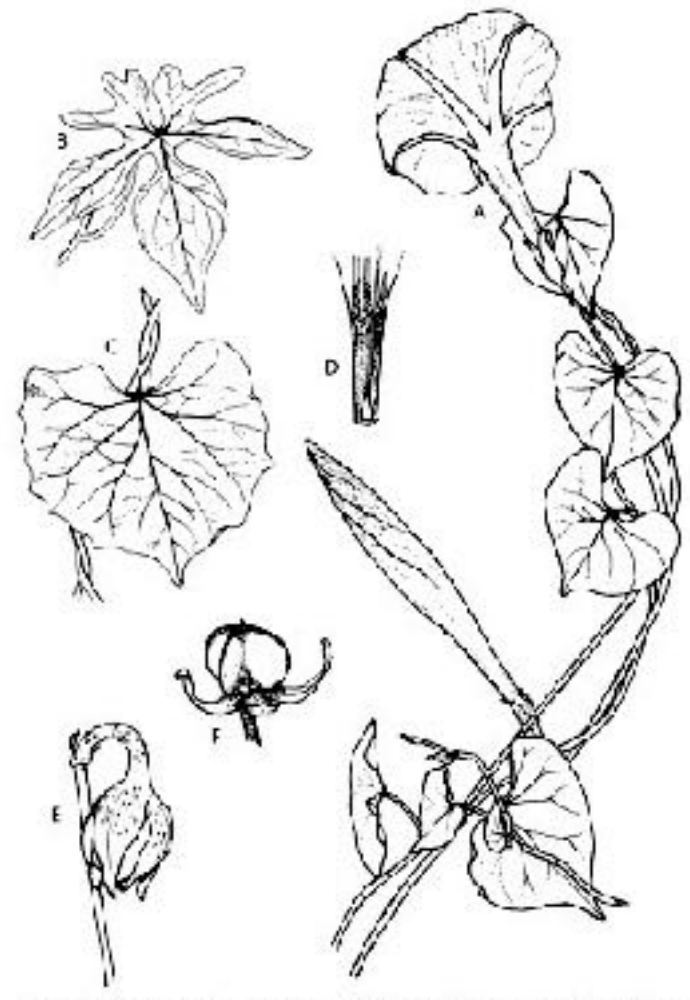


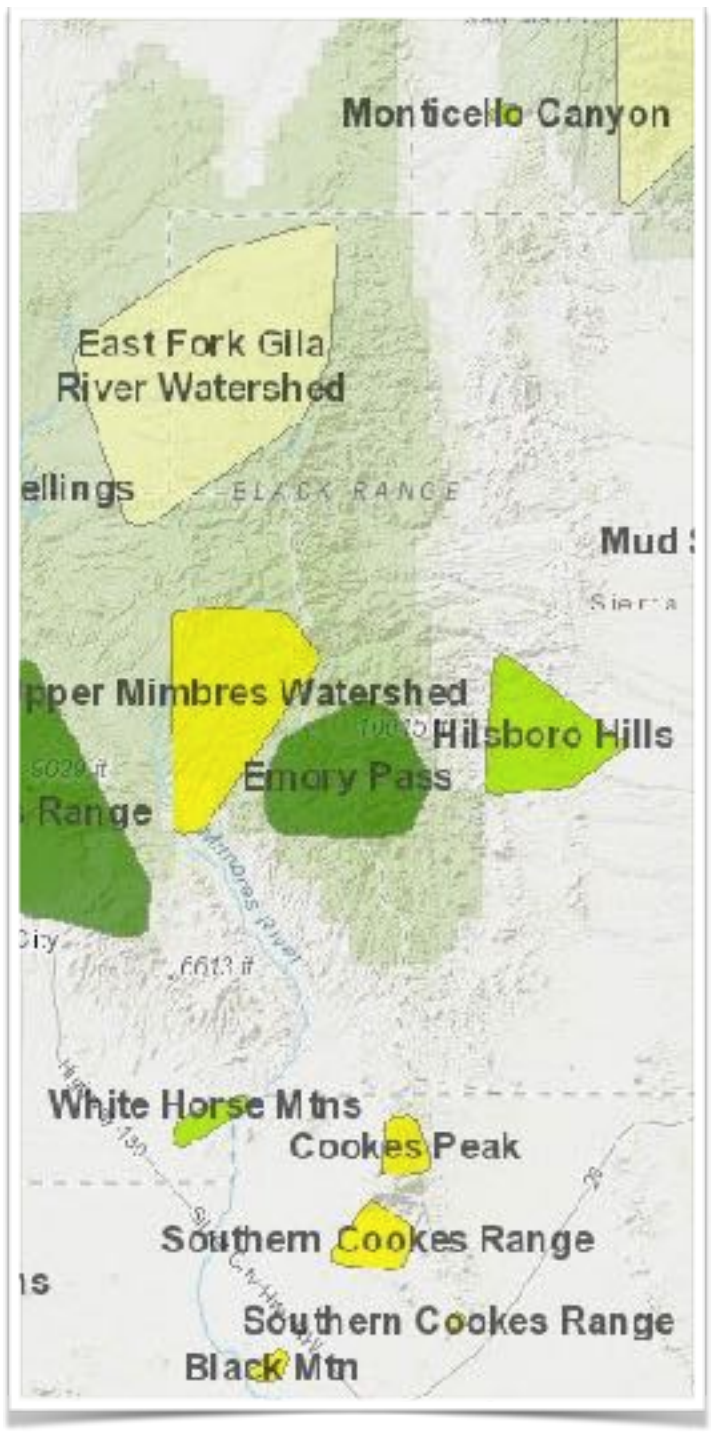
FIG. 2. *Ipomoea gilana*. A. Growth habit. B–C. Variation in leaf blades. D. Filament insertion and adnation to base of corolla tube. E. Immature capsule on recurved, papillose pedicel. F. Persistent septa of 3-locular capsule.

Important Plant Areas of New Mexico

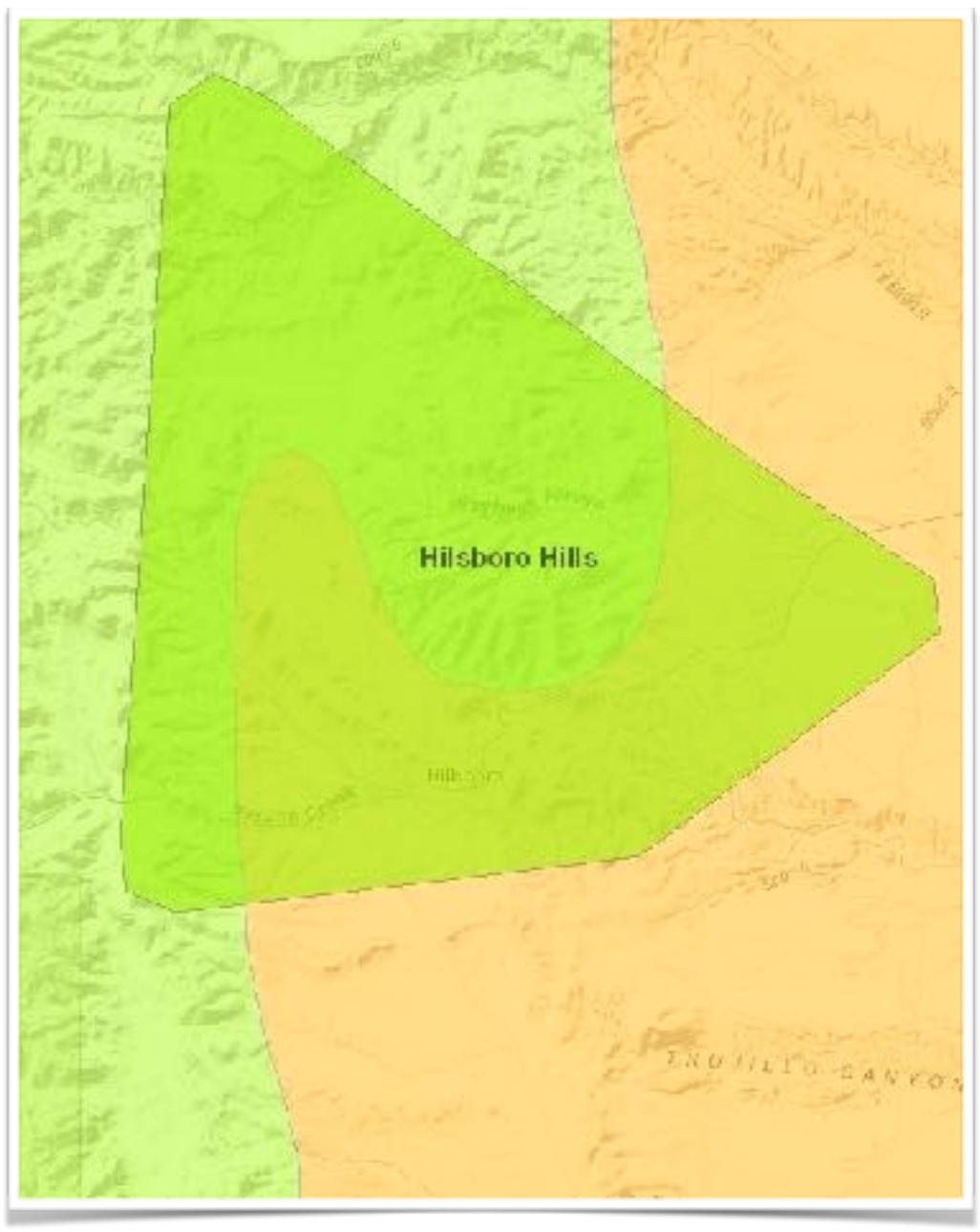
New Mexico State Forestry Division

"A website you might find interesting with respect to rare plants and wildfires in New Mexico is our interactive map of Important Plant Areas of New Mexico. You can zoom in on that map and add a fire history layer (in addition to other layers) to get a better understanding of how our Important Plant Areas (hotspots for rare plants) have been impacted by large wildfires over the past 20 years or so."
- Daniela Roth

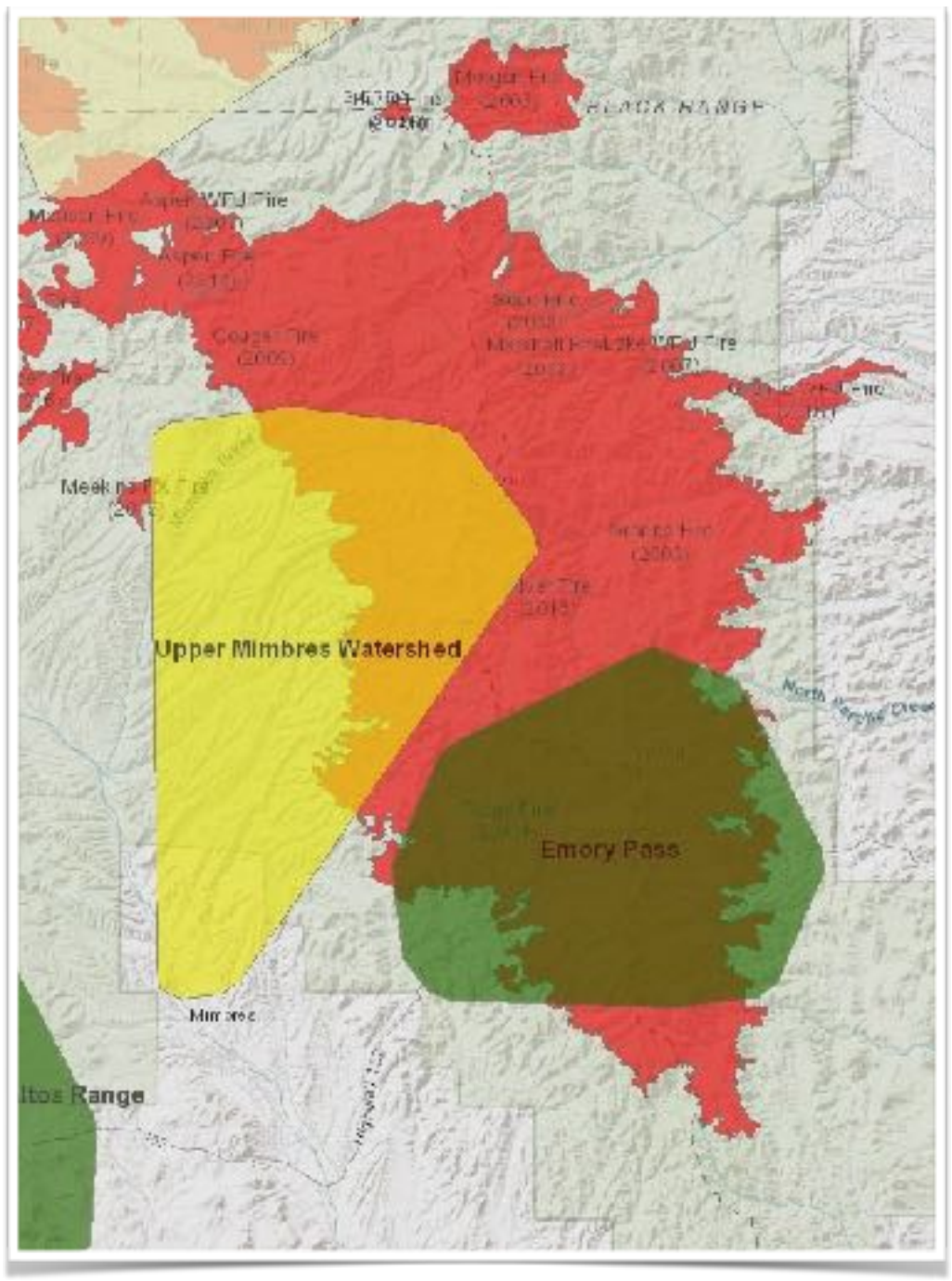
Light green, on the map of important plant areas (detail of the Black Range area shown below), indicates an area with a biodiversity rank of "Very High". Dark green indicates the highest biodiversity rank of "Outstanding", light yellow ranks "High", and bright yellow indicates a ranking of "Moderate".



It is an interactive map with a great deal of interactive capability, and thus, a lot of information. The detail of the Hillsboro Hills Important Plant Area, below, shows the ecoregions in the area, in this case, the Chihuahuan Desert to the east and the Arizona/New Mexico Mountains Ecoregion to the west. Township and Range map designations can also be overlaid as a filter on this map.



There is also a filter which indicates wildfire history. A detail of the Black Range is shown below, indicaing large fires by calendar year, 2000 to 2016.



Letters To The Editor

Regarding the Fire History of the Black Range Article in Volume 2, Number 1

Thank you for including me in your mailing. Such a treat to receive it here in the Hill Country of Texas.

Really enjoyed the article by Larry on the fire history. Although I am not back in the area very often, my history of living in Kingston also included my stint with the Forest Service as a Silver City-based Hotshot crew member and then seasonal employee/firefighter for the Black Range. Fast forward to 2013, I had just returned for work in Morocco after a visit to my mother's when the Silver Fire forced her and my aunt to evacuate their homes near Kingston. The firefighters, both professional and volunteer, did an amazing job, as did so many Hillsboro residents who opened up their homes to the evacuees and supported the firefighting efforts.

- Steve Jarvis
New Braunfels, TX

Regarding the Black-chinned Hummingbird Video Article in Volume 2, Number 1

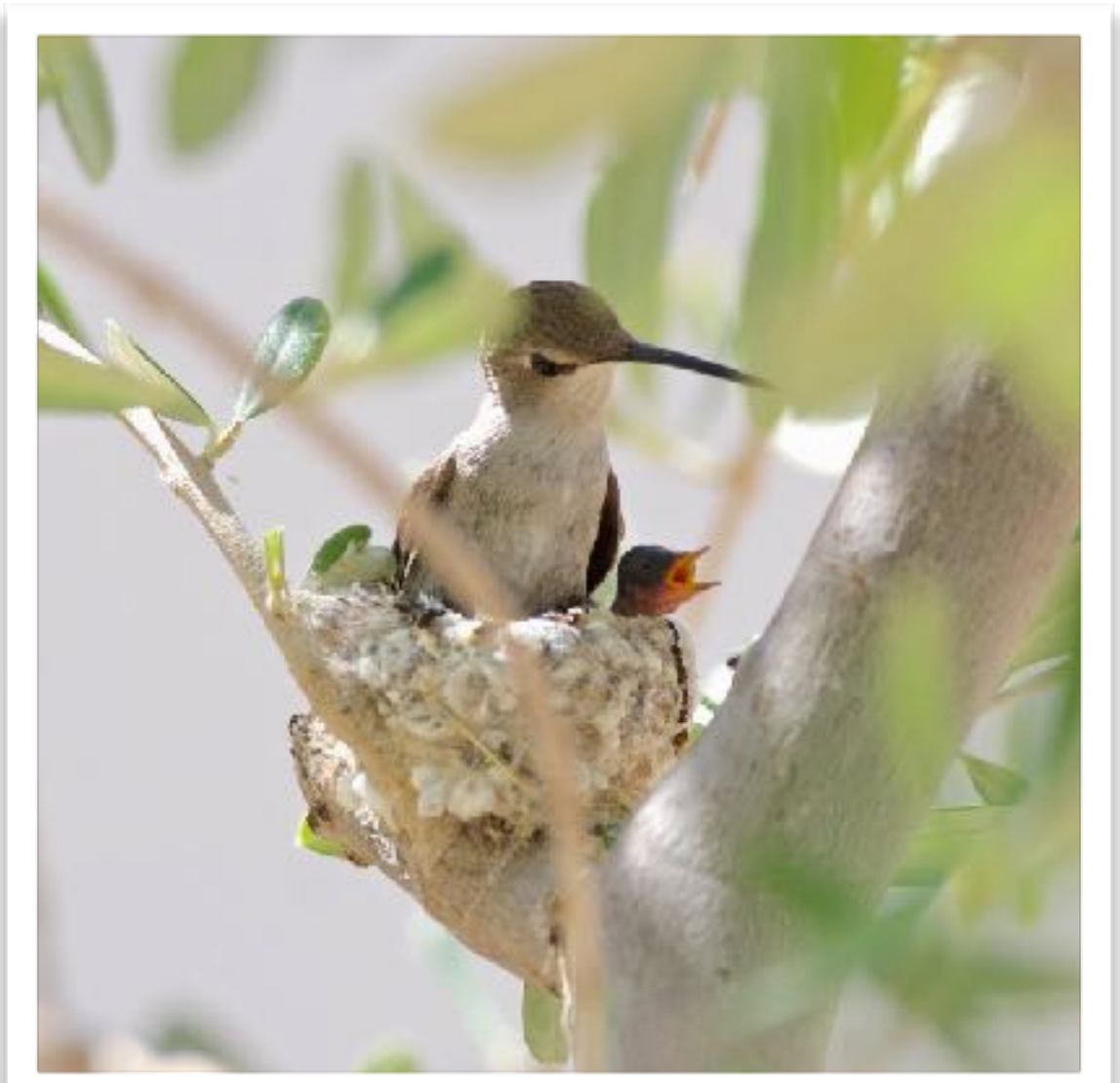
Just wanted to share some experiences with some of our "past" hummingbird nesting behavior.

Enjoyed looking at much of the video footage of the BCHU nesting. The attached image (see right) is of Costa's by a buddy (Dave Boyarski) who assisted us with camera and video images for 5 years (2014-2018) monitoring over 100 active Costa's nests in Mesquite, NV.

I was curious watching your BCHU videos to see any different events - as compared with the Costa's species. Gigi and I have also monitored active Anna's nests, when living in Ivins, Utah (very SW area of the state) and also have monitored a Calliope nest in the Bitterroot Valley when conducting a Valley study living in Hamilton, MT (2006-10).

When watching chicks one morning for 45 minutes without seeing the Calliope hen return concerns raced through my head about what happened to her. Then she would return as normal, feed, and be off again, but those were long minutes to watch with a zoomed spotting scope, but also very interesting observing other nesting activity and events. The successful nesting female was very tolerant with allowing us to view from 20-30 feet away.

One time when watching and thinking about how far she would roam gathering food for the young chicks, a young ground squirrel came bouncing through the area. The nest was about 3 feet above the ground in an outer swinging branch of a service berry bush. Watching this now without the scope, the hen zoomed down from a close upper ponderosa branch perch and was all over the small mammal dive bombing and quickly escorted it out of the area. After that I had noticed it was her regular perch while monitoring the young and nest, when I actually thought she was out foraging for many minutes. Another moment of learning what I don't know about hummingbirds.....



I had also read about different hum species using certain nest materials and how to possibly ID a hummer's nest without an ID of species. I think now and having observed different species nests, that they will most probably use what is close by for various bits of nesting plant material, and especially on the outside of the nest for camo.

Black-chinned species with our limited experience seemed to use more white plant material than the Costa's (which seem to use more gray), but that observation may have just been from behavior in that study area. Anna's use more thin bits of tan/brown bark, maybe from palm trees. We saw more tiny feathers used in the Anna's and Costa's nests, but they were also present in Black-chinned nests.

The nesting substrates would vary with all species in trees, bushes, or on human made objects. It is thought by us that possibly, due to past experience, the adult female will build the nest where she thinks it is safe from weather elements and predation. Maybe learning from mistakes in the past? Many hummingbird enthusiasts have searched for nests in their yards with no luck, and asked for clues. As we say, she will build the nest where she thinks the nest will be safe.

It was also good to see in your long video, (1:50 footage mark) the burst of quick energy of wingbeats of the young 15 day old chicks just seconds after the adult left the nest area, and by each chick, or both of the young.

We would await this event with the Costa's just seconds after the adult female fed the two chicks and left again. We would wait for the burst of activity as the quick energy from the slurry of nectar/sugar water and bugs hits their system. It is probably burned up quickly with the 10 second blur of the wingbeats as they seem to try and outdo each other being cocky, and standing in the nest with the attempted tiny lift off.

With the young early in the nest and the first sign of feather quills, it is interesting also to see the preening and scratching of the emerging/growing pin feathers, as it must be itchy for several days as the feathers continue to grow at such a rapid rate.

And the first poop at 1-2 days old with rump to the edge with instincts similar to a hawk pooping out of the nest is always exciting to unexpectedly witness.

- Ned and Gigi Batchelder
Las Cruces, NM

Steve Elam, of Hillsboro, shares this natural history experience from his past.

A Peregrine Falcon Chick

by Steve Elam

Our mine built a nesting box at the top of a unused coal unloader. The birds have nested there for many years. The Peregrine Falconers would rappel to the top and take the nesting box down and examine the birds. Most years there were 2 chicks in the nest. They would take a blood sample and band them. As the safety manager I would make sure they were ok to be on mine property. They were okay with being handled when young. Once they got full grown that changed. When they started to fly they would hunt the pigeons flying around the buildings. Mom would teach them to hunt. Every once in a while they would take a seagull. The banding team let me handle the young chicks when they banded them. We wouldn't see the male but the female would stay around the plant. The operators would feed them fresh fish. Once the chicks hatched she would only feed them food she hunted. The birds have been around the mine buildings for more than 30 years.

One of the benefits of working there.

Weather Forecasting: A 5-day forecast is currently as accurate as a 1-day forecast was in 1980*. As we grow into the increasingly turbulent weather of the future, brought about by human induced climatic change, the value of accurate weather forecasting will grow immensely. In 2009 weather forecasting was valued at $31.5 billion (USD) in the United States alone on an investment of $5.1 billion (USD), $3.4 billion of that being public funds and $1.7 billion private.**

**P. Bauer, A. Thorpe, G. Brunet, Nature 525, 47 (2015)*
***J. K. Lazo, R.E. Morss, J. L. Demuth, Bulletin of American Meteorology Society, 90, 785 (2009)*

Hillsboro Precipitation Records for the Last 50 Years

by Russ Bowen

The record of precipitation by month for Hillsboro, NM (NWS Station #29-4009) over the past 50 years is on the following page. I was going to limit it to the last 25 years, but it is difficult to see any trends or cycles with a smaller data set.

Speaking of trends, the 29 years (1935-1968, 5 years were incomplete & omitted) for which there are records, prior to the 50 years displayed here, were considerably drier averaging 11.03 inches per year. The last 50 years as indicated averaged 13.04 inches per year. The 79 years total for which we have data then average 12.30 inches per year.

The wettest month on record for each of the calendar months is displayed at the bottom of the data, the wettest month of all being August of 1993 with a total of 7.93 inches. It is interesting to note that even in our driest portion of the year, given the right circumstances, a considerable amount of precipitation can accumulate. The greatest annual precipitation received of 20.33 inches was in 1941 (not shown); however, 1986 was a close runner up with 20.24 inches collected.

The driest year on record for Hillsboro was in 2012 with 4.38 inches, preceded by a dry year as well with 6.30 inches in 2011. The two years posed a serious drought for Hillsboro resulting in the loss of many trees & shrubs along Percha Creek.

50 Year Precipitation Summary for Hillsboro, New Mexico 88042 (NWS Station 29-4009)

Latitude 32.9203 Longitude -107.5657 Elevation 5266 ft.

Year	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL		Year
1969	0.00	0.11	0.19	0.00	0.70	0.24	2.80	3.40	2.51	2.05	0.09	1.40	13.49		1969
1970	0.03	0.80	0.35	0.00	0.00	0.43	2.59	1.50	0.56	1.85	0.01	0.38	8.50		1970
1971	0.08	0.00	0.00	0.12	0.00	0.24	2.68	3.67	1.24	2.14	0.27	0.93	11.37		1971
1972	0.00	0.00	0.00	0.00	0.48	3.16	2.31	4.70	3.83	4.06	0.48	0.56	19.58		1972
1973	0.72	2.45	0.30	0.00	1.44	0.15	2.19	1.34	0.18	0.03	0.15	0.00	8.95		1973
1974	0.16	0.00	0.00	0.08	0.90	0.08	4.52	2.52	3.79	3.61	0.08	1.42	17.16		1974
1975	1.64	0.18	0.56	0.00	0.09	0.04	3.66	2.14	7.11	0.42	0.59	0.81	17.24		1975
1976	0.00	0.65	0.06	0.10	0.15	0.43	3.39	0.74	2.82	2.49	0.66	0.17	11.66		1976
1977	1.10	0.00	0.60	0.43	0.00	0.16	4.32	4.78	1.85	0.48	0.37	0.42	14.51		1977
1978	1.03	0.30	0.17	0.00	0.47	2.21	1.26	2.82	1.52	2.28	2.09	0.93	15.08		1978
1979	1.43	0.80	0.00	0.64	1.43	1.21	3.10	2.86	3.32	0.08	0.00	0.46	15.33		1979
1980	1.70	1.07	0.19	0.56	0.63	0.00	0.06	2.41	3.92	0.16	0.31	0.15	11.16		1980
1981	1.02	0.10	0.52	0.25	0.76	2.44	3.31	1.48	3.73	0.99	0.91	0.00	15.51		1981
1982	0.11	0.69	0.26	0.35	1.29	0.03	1.21	3.40	1.65	0.07	1.08	3.05	13.19		1982
1983	0.44	0.74	0.61	0.47	0.23	0.16	1.42	1.56	4.37	2.73	2.09	0.26	15.08		1983
1984	0.57	0.01	0.61	0.00	0.50	1.37	1.43	4.71	1.17	3.18	0.34	2.50	16.39		1984
1985	0.75	0.22	0.69	1.30	0.42	0.65	2.51	1.37	3.02	2.84	0.47	0.11	14.35		1985
1986	0.20	0.36	0.26	0.00	1.61	1.88	4.11	1.80	1.13	3.40	2.53	2.96	20.24	Mx	1986
1987	0.30	0.59	0.40	0.05	0.39	1.14	1.02	2.16	0.66	0.54	0.82	1.65	9.72		1987
1988	0.61	1.80	0.24	0.19	0.22	0.39	3.19	5.95	0.71	0.93	0.14	1.25	15.62		1988
1989	0.69	0.29	0.07	0.05	0.43	0.00	4.47	2.33	1.04	1.82	0.00	0.63	11.82		1989
1990	0.18	0.62	0.50	0.13	0.32	0.71	4.22	3.50	5.65	1.11	1.90	0.98	19.82		1990
1991	0.96	0.51	0.17	0.00	0.61	0.57	3.16	4.33	3.34	0.08	0.67	4.70	19.10		1991
1992	0.79	0.50	0.17	1.52	5.45	0.53	1.16	1.78	0.71	1.38	0.00	2.16	16.15		1992
1993	1.95	0.30	0.02	0.00	0.57	0.29	2.51	7.93	0.21	0.85	0.20	0.34	15.17		1993
1994	0.56	0.00	0.09	0.21	0.50	1.08	1.57	1.16	1.17	0.76	3.35	2.33	12.78		1994
1995	0.91	0.11	0.16	0.00	0.00	0.74	1.94	0.89	3.28	0.00	0.00	0.15	8.18		1995
1996	0.03	0.49	0.00	0.47	0.00	2.05	1.51	1.36	1.81	1.64	0.50	0.00	9.86		1996
1997	0.86	1.11	0.33	0.18	0.56	0.76	2.40	1.79	3.34	0.90	0.09	1.01	13.33		1997
1998	0.09	0.14	0.61	0.37	0.00	0.00	4.62	0.83	0.33	3.19	0.28	0.00	10.46		1998
1999	0.13	0.00	0.89	0.00	0.39	0.65	2.21	6.89	0.78	0.00	0.00	0.00	11.94		1999
2000	0.00	0.00	2.02	0.20	0.00	4.30	1.67	1.36	0.00	0.00	0.00	0.00	9.55		2000
2001	1.21	0.75	0.00	0.20	2.00	2.24	2.41	2.75	1.66	0.19	0.42	0.14	13.97		2001
2002	0.12	0.53	0.00	0.00	0.19	0.12	1.30	0.61	0.72	0.90	0.11	1.28	5.88		2002
2003	0.00	0.96	0.04	0.08	0.00	2.02	1.56	1.67	0.49	0.20	1.06	0.11	8.19		2003
2004	0.59	0.12	0.85	2.47	0.35	0.25	1.31	4.21	0.66	1.33	2.26	0.62	15.02		2004
2005	1.64	2.29	0.61	0.21	0.88	0.00	0.53	2.20	1.23	1.47	0.00	0.00	11.06		2005
2006	0.19	0.36	0.06	0.05	0.05	0.58	2.92	6.48	4.45	2.69	0.01	0.19	18.03		2006
2007	1.70	0.24	0.38	0.89	1.70	0.19	1.55	0.62	2.24	0.01	0.34	1.66	11.52		2007
2008	0.53	0.17	0.00	0.00	0.57	0.01	5.77	2.88	3.03	0.77	0.37	0.13	14.23		2008
2009	0.01	0.00	0.23	0.02	1.12	0.76	1.97	2.13	1.82	0.66	0.88	0.99	10.59		2009
2010	1.59	1.13	0.23	1.74	0.17	1.03	3.43	2.92	0.88	0.87	0.00	0.27	14.26		2010
2011	0.00	0.19	0.00	0.00	0.00	0.08	0.59	0.43	0.58	0.59	0.97	2.87	6.30		2011
2012	0.11	0.36	0.08	0.00	0.01	0.10	1.71	0.74	0.68	0.02	0.09	0.48	4.38	Mn	2012
2013	0.35	0.00	0.11	0.04	0.14	0.13	2.33	1.53	5.70	0.09	0.97	0.59	11.98		2013
2014	0.01	0.00	0.14	0.87	0.01	0.06	2.03	2.31	4.70	1.36	0.08	0.12	11.69		2014
2015	1.77	0.22	0.47	0.04	0.39	2.17	2.43	0.87	1.50	1.21	0.64	0.34	12.05		2015
2016	0.37	0.11	0.00	0.94	0.63	0.27	1.28	5.58	2.77	0.54	2.14	1.42	16.05		2016
2017	2.66	0.62	0.03	0.06	0.20	2.27	2.25	1.14	2.48	1.18	0.03	0.25	13.17		2017
2018	0.01	0.84	0.29	0.00	0.00	0.91	2.04	1.73	1.86	2.63	0.00	1.22	11.53		2018
Avg	0.64	0.48	0.29	0.31	0.58	0.83	2.40	2.61	2.16	1.26	0.62	0.89	13.04		Avg
	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL		
Wettest	2.97	2.45	2.33	2.52	5.45	4.30	5.77	7.93	7.11	4.06	3.64	4.70	20.33		
	1949	1973	1958	1957	1992	2000	2008	1993	1975	1972	1961	1991	1941		

More Memories from Hillsboro Peak

by Don Precoda

"Consider the ravens: for they neither sow nor reap; which neither have storehouse nor barn; and God feedeth them: how much more are ye better than the fowls?"

- Luke Chapter 12 Verse 24 KJV

Of all the wildlife on Hillsboro Peak the most numerous, active, colorful, noisy, tuneful, watchable, and easily observed is the avifauna. Their arrival in springtime, courtship and mating, followed by nest building, then egg laying and hatching, domestic habits, fledge and first flight unfold in due course dependent upon the bird type and size. Larger birds like red tails or eagles require longer gestation, longer egg sitting, later fledge, and later flight, totaling months. Smaller birds will accomplish the procreative process within weeks.

Courting eagles are soaring high above the western sky. They come together, talons clutching talons, turning, spinning, wings spread wide, seeming to float in midair but spinning, falling, cartwheeling, seen from the tower through binoculars. No flapping of wings. The act takes some minutes. Then separation; both rising on an updraft to a great height to repeat the act, talons clutching talons, spinning, falling, cartwheeling high above the western sky. Over and over for an hour before they disappear into the distance.

For smaller birds mating is quick; robins and other small birds on top of a big rock or on the ground in the meadow or on a tree limb, hurried and noisy, four seconds and finished. Hawks always off the ground on a dead tree limb, the female calling to the waiting nearby male who flies to her perch immediately, copulation completed in ten seconds or less. For all birds practice makes perfect. The act will be repeated until the female calls quits.

Nest building is accomplished silently and secretly. Great care is taken to use all available canopy cover. On Hillsboro Peak nests are built in the tall timber on the leeward slope below the meadow to mitigate the frequent high winds and bad weather, plus security against four legged critters that climb trees. Locating nests is not difficult for the patient observer. The adult not sitting on the nest will perch close by. Once the perch is known the nest may be spotted and watched from the ground below or scoped from the enclosed tower at the edge of the meadow, 60 steps above the ground and equipped with wrap around windows. Larger birds will renovate and reuse the same nest year after year. The egg laying, hatching and domestic habits, fledge and first flight of the different bird types is always entertaining for the interested viewer.

A hawk takes a pigeon in midair with a loud smack heard in the tower; then a controlled fall to earth in the meadow. Over several minutes the hawk tears off the head, wings and legs, maybe gobbles a little neck meat torn from the discarded head. Then it pulls feathers from the body. Eventually it fashions a meaty aerodynamic shape that it clutches with talons fore and aft and flies to the nest. Its mate leaves the nest to hunt its own lunch while the breadwinner tears off tasty morsels and feeds the young. These young may survive another afternoon. The ants will glean sustenance from pigeon remnants left behind on the ground. Another day another hawk lands in a jays' nest containing nestlings. Jay parents raise a noisy ruckus heard in the tower. The parents attempt to drive the hawk off the nest but are powerless against the much larger bird. Quickly the hawk kills, tears apart, and devours one nestling. Nest mates are silent witness. The hawk kills a second nestling, fashions a meaty aerodynamic cylinder and flies homeward. The jay parents return to the nest and resume domestic duties. They clear away the mess and tend to the surviving young.

Hillsboro Peak - Sunup in mid May 2015 - Photograph by Don Precoda

Those black thieves the ravens with their sixes and sevens gang up against the nesting hawks, owls, falcons, or turkeys and steal their babies. Always a noisy and violent occurrence. Woe to the hawk pair, perhaps first time nesters, unaware they are being stalked and stared at by those black thieves the ravens. Perhaps both parents will leave the nest unattended for a short minute or two. If so the ravens quickly and quietly raid the nest for eggs, then escape to devour nearby. Ravens are adept at flying with an egg held in their beak. The returning parents find two eggs where there were four, or one egg where there were three, or no eggs at all. Woe to the owls defending their hatchlings with flapping wings and loud cries. The owls battle four, five, or six noisy ravens to the front while one silent raven comes from the blind side, snatches and flies away. Successful theft is only half the battle. Ravens cannot hold their capture with feet, only with the beak. This makes for unbalanced and awkward flight. The fleeing thief must defend its loot from other ravens that turn away from the owl nest to set upon the lone thief. Usually the captured hatchling is dropped onto a rock in the meadow, then squabbled over and eaten by other ravens. Woe to the little kestrel couple who are suddenly muscled off their own nest by the bigger bulk of those black thieves the ravens. Fierce and ferocious defenders of the nest, kestrel parents counterattack with sharp beak and talons aiming for raven eyes. A raven with one eye cannot fly. The half-blind raven can only circle to the ground in the meadow where the thief is set upon by its own kind, sensitive to any weakness. Or picked up and carried off by a fox or other critter drawn to

the area by the noise of fighting. Or die and disappear before the next sunrise - the stink draws varmints who have their own babies to feed. If the kestrel defense fails - perhaps a kestrel parent injures a wing or worse, it perches close by, dies within hours, and falls to the earth to be devoured by the four-legged critters that patrol the area daily and nightly. In the wild a body must eat or be ate. And the body with the best nose usually eats best. A single kestrel parent may not be able to hunt, feed and protect the remaining young by itself. The chances of starvation are great, survival small. Another day another falcon has made a kill in the meadow and is flying to a perch, the small body of the kill clutched in its talons. The falcon is not as fast or agile in flight with the added weight. Three ravens gang up against the falcon attempting thievery by dive bombing, intimidating, harassing, and hoping the falcon will loose its lunch to fall to the ground. The falcon is forced to perform aerobatic maneuvers that tire or endanger it. For self-preservation or the survival of its young the falcon drops the kill. Those black thieves the ravens follow the kill to the ground, then squabble and fight over the fresh meat. Adult turkeys lead many chicks around the fringes of the meadow. Two ravens close above in a standing snag look down at the easy meat and chatter chatter. Baby stealers. Turkey chicks are an easy meal for raptors, ravens, and four legged critters; they live, sleep, and die on the ground until old enough and strong enough to perch in trees. Very few turkey chicks survive to maturity.

In the most recent year the raptor population on Hillsboro Peak seems to have declined. Nests that hosted past generations of raptors are now unused and empty. Raven numbers are also diminished. The few ravens are reduced to scavenging dead mice in the meadow or taking lady bugs from the tree tops. There was a mouse die-off that summer.

For the most part the young bird is easy to distinguish from the parent. A young eagle sports different colored plumage than adults. Young woodpeckers are smaller than adults. New hummingbirds are slightly smaller than adults and fly differently the first few days after leaving the nest. New robins show different colors than adults. Some behavior must be learned, other behavior comes with DNA. Young geese and cranes must be taught the migratory route - they have never gone south before. Or north. This learning is accomplished by traveling in family groups. A goose family will include mom and pop who know the way, one or two yearlings not yet sexually mature, and this year's smaller newbie. I saw this one midnight in the lonely waste of Cornucopia Draw. But I have digressed. Let us fly back to Hillsboro Peak.

The days of mid-July through late August are busy times for avifauna on Hillsboro Peak. Monsoon rains fall day and night. Measured precipitation between one and two inches in a 24 hour span is common. Dry canyons have flowing water. The grass in the meadow is tall and green. Mushrooms grow in profusion on the shaded north slope below the meadow. The croaking of frogs wakes me up at night. The ravens have departed for parts unknown. The young of smaller birds have flown and are learning the wider world beyond the nest. The young of larger raptors may have fledged but remain near the nest to be fed by the over-worked parents. At this time the young raptors are presented with full-body prey and will do their own dissecting. Young raptors engage in mock fights with siblings. Stretching, flexing, jumping, flapping wings, and voice practice occupy the hours. The wet environment causes much preening. Turkeys roost in trees, so mortality has slowed. Young hummingbirds are embarking on their first flight. Over a two-day span in late July the number of hummers at the feeders goes from 10 or 15 to 35 or 40. Visitors report their hummingbird experience on Hillsboro Peak at this time is better than Tucson's Botanical Garden. The new hummers are hesitant fliers. They hover close to the feeders watching the adults. They do not show the quick darting flight of adults. The words "slow and cautions, but still curious" come to mind. Perching on a wire appears to be a learned skill. Anything red is thoroughly investigated. This includes exterior walls of the old cabin, tower, fence posts, and signage. They get in trouble. One afternoon I sensed a horsefly biting my backside so I swatted. A tiny squeak. Turning about I saw a hummer lying on the ground. Not sure if it was alive or dead, I placed it on the ground in the shade of a bush. Immediately another hummer came hovering beak to beak. Squeak squeak. After several visits over twenty minutes that hummer gave up. Memories…like a passing cloud…fading away. A young woodpecker perches on near-vertical tower steal and goes to work. Peck peck peck. Something is not right. Rears its head back, looks at it sideways. Tries again. Peck peck peck. No go. Tries again. Peck peck peck. Nope. Shakes its head in disgust and flies away. Another Hillsboro Peak memory.

Hillsboro Peak has many tales to tell. Stories of mountains and memories, sunsets and smiles, wild weather and wildlife.

Happy trails to you.

Ants: Seed Harvesters

by Walt Whitford

Everyone is familiar with ants because these insects often are seen as pests when they enter family homes. One of the most frequently asked questions to scientists who study ants is "How do I get rid of ants that are causing problems?" The method that I recommend is simple and effective. Make a mixture of peanut butter, honey, and borax in equal amounts. Smear the mixture on the sides of a jar with a cover. Make holes with a nail or spike in the lid of the jar depending upon the size of the problem ant species. The jar must have a lid to prevent pets from getting to the mixture which could kill or injure the pet. The ants take the poison food back to the colony where it is fed to the queen and workers. It takes a week or two for the colony to die out. This is the most effective way to eliminate an ant colony without spreading poison around the house.

Ants are found in virtually every terrestrial habitat from extreme deserts, to the edges of the tundra. While the

highest species diversity is in the wet tropics, arid environments such as the lower elevations of the Black Range are home to a large number of ant species. For example, twenty ant genera have been reported in the Ants of New Mexico (MacKay and MacKay, 2002). There are more than 10,000 described species of ants on the planet, but that number probably represents approximately two thirds of the ant species on the planet because many cryptic species are missed by myrmecologists (scientists that study ants). Unfortunately there are few ant species that have common names and most of these are pest species such as the "Imported Fire Ant". While some species have had common names applied to them, most are known only by their scientific names.

Ants are social insects. In most social insects there is only one reproductive female, the queen. Workers are sterile and female. Males or drones are produced during the reproductive season which in this part of the world is in June prior to the onset of the summer monsoon rains. Both males and alate females (potential future queens) have wings. Alates and drones emerge from their nests generally following the first large rain event. Reproductive ants form swarms that are frequently seen following the first good rains of the season. Swarms of drones and alates contain ants from several colonies which allows for mating with ants from different colonies. This mating system helps maintain the genetic viability of the species.

A Rough Harvester Ant nest. Note the relatively uniform size of the pebbles on the surface and the small entrance. Photo by Walt Whitford.

Following mating, queens shed their wings and frantically try to find a suitable location for a new colony. Newly mated queens dig a nest which consists of a tunnel and a chamber in the soil. Some ant species nest in hollow stems and holes in the root crown of woody plants. After locating a nest site and excavating a tunnel, newly mated queens produce eggs and callow worker ants. New workers are approximately half the size of workers of established colonies. Most incipient colony queens and callow workers are killed by workers from established colonies in the area. Established colonies have foraging territories that vary in size from a few yards in diameter to 50 yards or more in diameter. The size of foraging territories varies with the body size of the species and size of the colony. Once established, a Rough Harvester Ant (Pogonomyrmex rugosus) colony may remain functional for more than 30 years. In these colonies, workers are recruited to do different tasks. Nest maintenance workers are younger than forager workers as is seen in their heavier weight and less wear on the mandibles. Nest maintenance workers perform a variety of tasks such as cleaning eggs, larvae and pupae to keep fungi from growing on incipient workers. Nest maintenance workers also enlarge chambers to accommodate the larvae and pupae and to store seeds collected by the workers. The mandibles of workers are worn and it is surmised that foragers not only collect seeds but also mill seeds. Milling involves removal of the seed coat from seeds which causes wear on the mandibles of workers. The husks or chaff are carried out of the nest and deposited around the margins of the nest disc. One feature of Rough Harvester Ant nests is the amount of chaff around the margins of the disc. As the chaff decomposes nutrients such as nitrogen and phosphorus are released making the disc margin soil more fertile than the surrounding soil. However, soil enrichment varies with the topographic location of the nest and the surrounding vegetation.

Twenty genera of ants have been reported from the grasslands and woodlands of the Black Range. Eleven of these genera are also found in desert areas in addition to the mountain foothills. Of these, several of the larger species that produce large nests are obvious even to the casual observer.

One of the seed harvesting ants has been studied extensively because they collect seeds and are thought to reduce the seed bank. In the western U. S. where livestock grazing is the dominant land use, any organism that causes a perceived loss of grass cover is considered to be a pest species. One species, the Rough Harvester Ant, produces a nest disc that is composed of relatively uniform gravel, pebbles, and sand. Nest discs of the Rough Harvester Ant are devoid of vegetation. The worker ants that produce the large nest discs are relatively large. Lengths of Rough Harvester Ant workers vary from 0.25 inches to 0.4 inches in length with head widths ranging from 0.08 inches to .125 inches.

In pinon-juniper and ponderosa pine woodlands the estimated abundance of Rough Harvester Ant colonies varies from approximately 4 colonies per acre to as many as 10 colonies per acre. In these environments, Rough Harvester Ants reduce the plant cover around the nest disc by approximately 0.5 % by cutting and removing plants that affect the foraging activities of the colony.

A Rough Harvester Ant with a seed. Photograph by Walt Whitford.

Rough Harvester Ants are known as central place foragers where the nest is the central place. Foragers collect seeds and insects from locations nearest the nest disc and then move to patches of seeds at varying distances from the nest disc. The result of this foraging behavior is to deplete organic materials from areas around the nest and enrich the corona of soil adjacent to the nest disc. Experiments on cleared arenas with seeds colored with food dyes documented that the workers cleared the concentrations of seed nearest the nest while establishing trails to the more distant seed concentration. Foraging trails are marked by "scouts", individual foragers that locate rich sources of seeds and establish a chemical trail back to the colony by dragging their rears along the soil surface. The chemical trail is produced by a gland near the stinger. If there are no rich sources of seeds, Rough Harvester Ants search for seeds as individuals rather than as a group that follows a chemical trail. When there is an absence of spring flora, harvester ant colonies remain closed. During one year when harvester ant colonies were not active, several Texas Horned Lizards, one of the predators that depend upon harvester ants as prey, were found dead near a colony. We thought that this may have occurred because ants are the primary source of water for these lizards. The dead lizards were emaciated and probably desiccated.

When winter rains are sparse, Rough Harvester Ants may not forage even when environmental temperatures are suitable for foraging. These ants are capable of moving at body temperatures between 45oF and 125oF. The numbers of Rough Harvester Ant workers that occupy established colonies in winter varies between 1000 and 6000, but these numbers do not necessarily reflect the numbers in the colony during a time of food abundance when the queen is producing a large number of eggs. Rough Harvester Ants frequently forage at night during the heat of summer. In mid-summer, Rough Harvester Ants can only be active between dawn and the time that soil temperatures exceed 130oF which is usually around 10AM. Foraging at night allows Rough Harvester Ants to avoid competition with two other species of seed harvesting ants (Desert Seed Harvesters and California Seed Harvesters) which are limited to foraging in daylight hours. These species do not produce large colonies and have more ephemeral nests than Rough Harvesters.

Foraging by harvester ants is determined by temp-erature but is in-dependent of air relative humidity. However, when the soil around a harvester ant nest was wet by sprinkling water, the ants exhibited intense activity around the nest. One favorite trick to get Rough Harvesters to boil out of their nest is for a human to blow into the nest opening. The breath of a human must be close chemically to the "danger" pheromone because within seconds, ants emerge from the colony and will attack anything in the vicinity. After blowing into a harvester ant nest hole, scramble out of the way because the ants coming out of the nest are very agitated and will bite and sting if a human remains near the nest. Rough Harvester Ants are reported to have venom that is the most potent mammalian toxin based on the amount of venom produced. When harvester ants sting, they anchor themselves with their mandibles. The mandibles fasten the ant to the victim which allows the ant to insert the stinger with force. While fastened to the victim, the ant injects the stinger and venom multiple times. The sting wound is swollen hard and very painful. Multiple stings can result in anaphylaxis which may be fatal.

Rough Harvester Ants have been described as keystone species in the ecosystems in which they occur. These ants serve important ecosystem functions by stashing seed husks around the nest disc, bringing sub-soil to the surface when excavating nest chambers, and aerating the soil, and are the primary prey of Texas Horned Lizards. Animals that generate patchiness in arid and semi-arid ecosystems are critical for the normal functioning of the landscape.

Whiptails

by Randy Gray

Deserts and lizards go together. One group of lizards referred to as whiptails (sometimes race runners) are often the most noticeable lizards out and about while on a walk. They have long slender bodies, pointed snouts and long tails and are most often seen in late mornings and early afternoons moving along with a jerking gait, stopping to scratch the soil or leaf litter in search of insects, and quickly darting away when disturbed. The New Mexica Whiptail is the State Reptile of New Mexico https://youtu.be/auW5C5lzr3c

There are fifteen species of whiptails in New Mexico and six of them are likely to be observed in and around the Black Range. The species in this region are the Chihuahuan Spotted Whiptail, Checkered Whiptail, Little Stripped Whiptail, New Mexico Whiptail, Western Whiptail and Desert Grassland Whiptail. To the casual observer all whiptails look the same. You have to take a close look at the different patterns (eg., stripes, spots) and colors to distinguish between these species since their body shapes and sizes are similar.

They eat insects and some occasionally consume vegetation. They are eaten by other species such as Roadrunners and a variety of snakes.

All whiptails are oviparous (lay eggs). However, several species are parthenogenic which means females are able to produce eggs without mating which is referred to as asexual reproduction. Some species can alternatively reproduce through parthenogenesis, even when the species has males. In the Black Range the Chihuahuan Spotted Whiptail, Checkered Whiptail, New Mexico Whiptail, and Desert Grassland Whiptail are parthenogenic and there are no known males.

Aspidoscelis exsanguis - Chihuahuan Spotted Whiptail
North Wicks Canyon, East of Hillsboro - photo by Bob Barnes

Aspidoscelis inornata llanuras - Little Striped Whiptail
Warm Springs Wash, east of Hillsboro, NM - photo by Bob Barnes