The Black Range Naturalist

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Lac and Creosote

The early peoples of the southwestern United States used a variety of adhesives including bitumen, asphaltum, plant gums, and resins. The first two are inorganic in nature. The second two are organic in nature.[1]

Lac Scales[2] are insects in the family *Kerriidae* (Lindinger, 1937). There are 8 species in 2 genera in this family found within the United States and Canada. In other parts of the world (China, India, and adjacent areas) species of Lac Scales were used to produce shellac.

Of interest to us is the lac produced by the scale insect *Tachardiella larreae* which uses *Larrea tridentata* (Creosote Bush) as its primary host plant. Apparently this is the only Lac Scale insect found in our area. *Tachardiella* was first described by Cockerell in 1901 (see page 112 of *Early Naturalists of the Black Range*).

Here we explore the natural history of *Tachardiella larreae* and the use of the lac which it produces. A survey of the BugGuide entries for the genus (on 28 June 2025) yielded three images, none of this species. A search of iNaturalist on that same date was more fruitful, including an observation by George Kinney on 20 February 2025 from a few miles northwest of where I took the images shown in this article, an observation by Natalie Wells on 26 March 2023 near Radium Springs, and an observation by Andrew Potter on 14 April 2025 near Truth or Consequences.

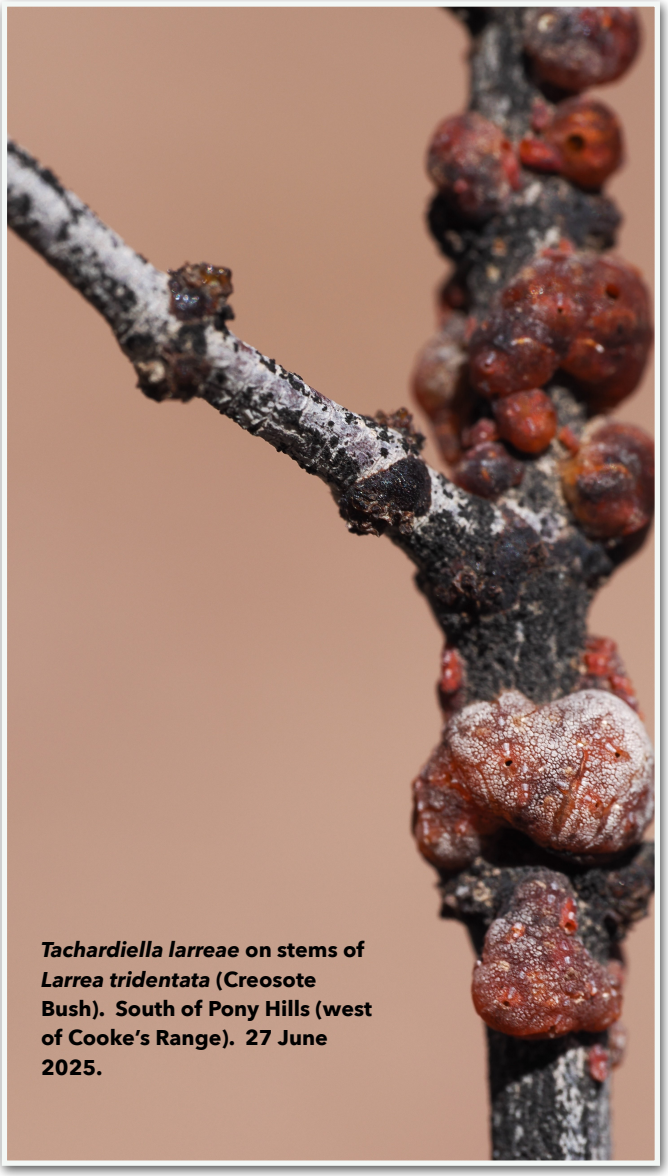
So, what gives with the pictures of this crusty stuff on Creosote stems. Well, that crusty stuff is the insect. The line drawing on the following page is from Kondo and Gullan (2010)[3]. Their review of the genus and their description of a new species is worth the time if you have an interest in this topic. The drawing was used to describe a new species (*T. argentina* - not found in our area); it is a "generalization of several specimens" (p. 346). Compare the drawing to the photographs shown here and two things may become apparent. One, the need for a generalized depiction - a drawing of one of these lumps would not necessarily be useful. And, two, these are insects. They are complex organisms.

The article by Kondo and Gullan includes a key to the identification of species within the genus, a description of each species, and some additional information about their range and natural history.

At p. 348, Kondo and Gullan include a photograph of *T. argentina* being tended by a species of ant (*Camponotus sp.*). See pages 4 and 5 for ant species on *T. larreae*.

Adults of *T. larreae* attach to the stems of the Creosote Bush and stay put for the rest of their lives, feeding on the plant phloem.[4] Creosote Bush generally is found at elevations below 5,000 feet (see the survey summary at the end of this article).

Describing a different species (the Lobate Lac Scale), the University of Florida noted: "The resinous scale covering is light to dark reddish brown. Old individuals will frequently appear black because of the sooty molds. The shape is globose with four lobes, and young individuals generally appear more lobed than mature adults. The case size is about 1.5 mm long, and 1.0 mm wide, but individuals in close proximity will frequently coalesce forming masses of several individuals. Young individuals often appear like a 'fat bow tie'. The resinous case conforms approximately to the shape of the insect inside. Exactly how the insect grows larger within such a rigid case is not understood entirely." Louisiana State University's flysheet on the Lobate Lac Scale includes images of the various life states of this species and is generally descriptive of *T. larreae*.



Tachardiella larreae on stems of *Larrea tridentata* (Creosote Bush). South of Pony Hills (west of Cooke's Range). 27 June 2025.

The Identification Technology Program - Scale Insects describes the life history of Lac Scales as follows: "Lac scales have 3 or 4 instars in the female and 5 in the male. In the true lac scale, *Kerria lacca* (Kerr) there are 2 or 3 generations each year. Eggs are laid inside a brood chamber which is formed as the adult female shrivels during the egg-laying process. There may be as many as 1,000 eggs laid by a single female. Eggs hatch and first-instar crawlers emerge from the test through a hole near the anal opening. The crawlers settle on the new stem growth and produce a broad lac test. Females molt 3 times and enlarge the test until it coalesces with the secretions of other females. Males also produce a test, but it is narrow and has a large opercular opening. Adult males emerge through the operculum and may be winged or wingless. Populations may contain as many as 30% males, but they apparently are unnecessary for reproduction. The biology of *Tachardiella larreae* Comstock has also been studied. There is 1 generation each year, first instars are laid inside the brood chamber, and appear in early spring. Mating occurs in July and eggs begin developing in females in late summer."

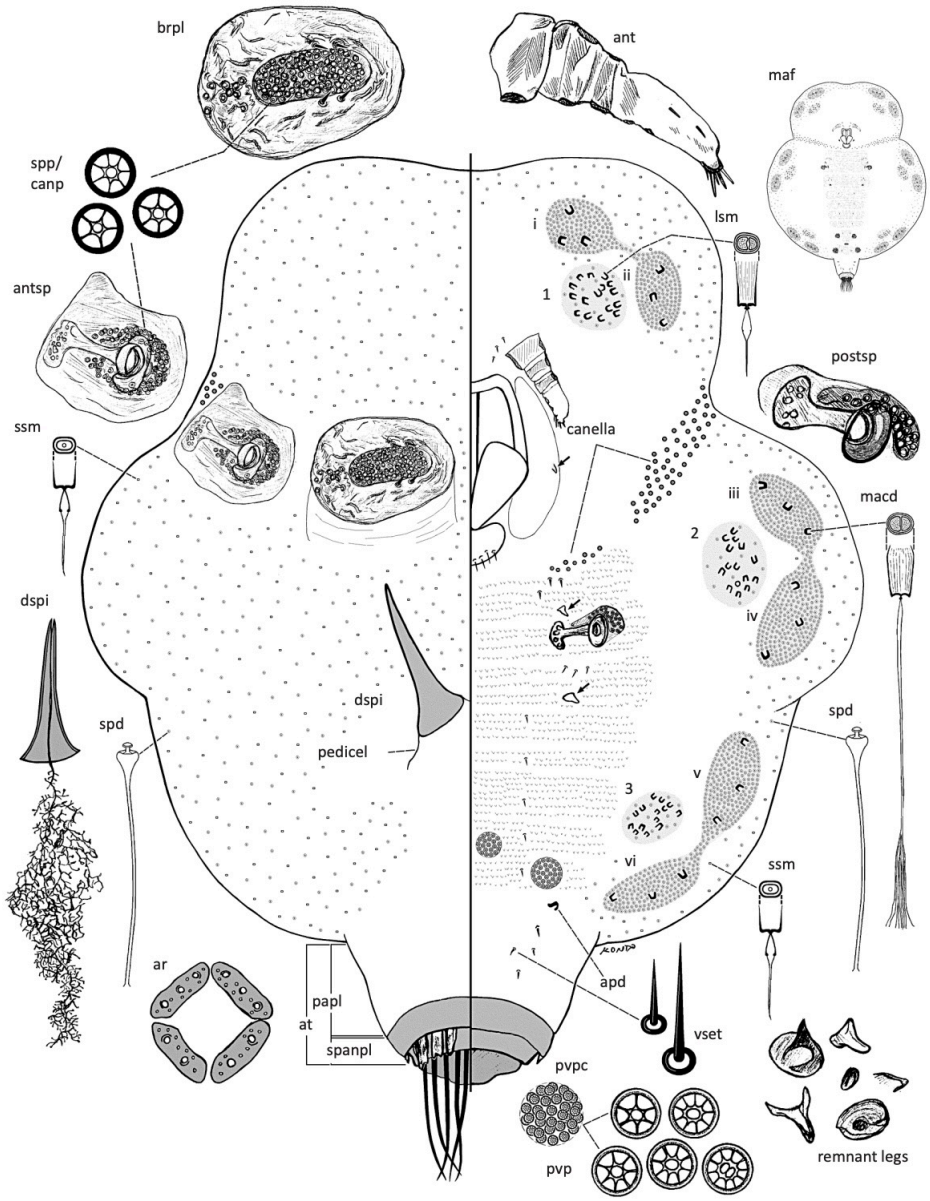


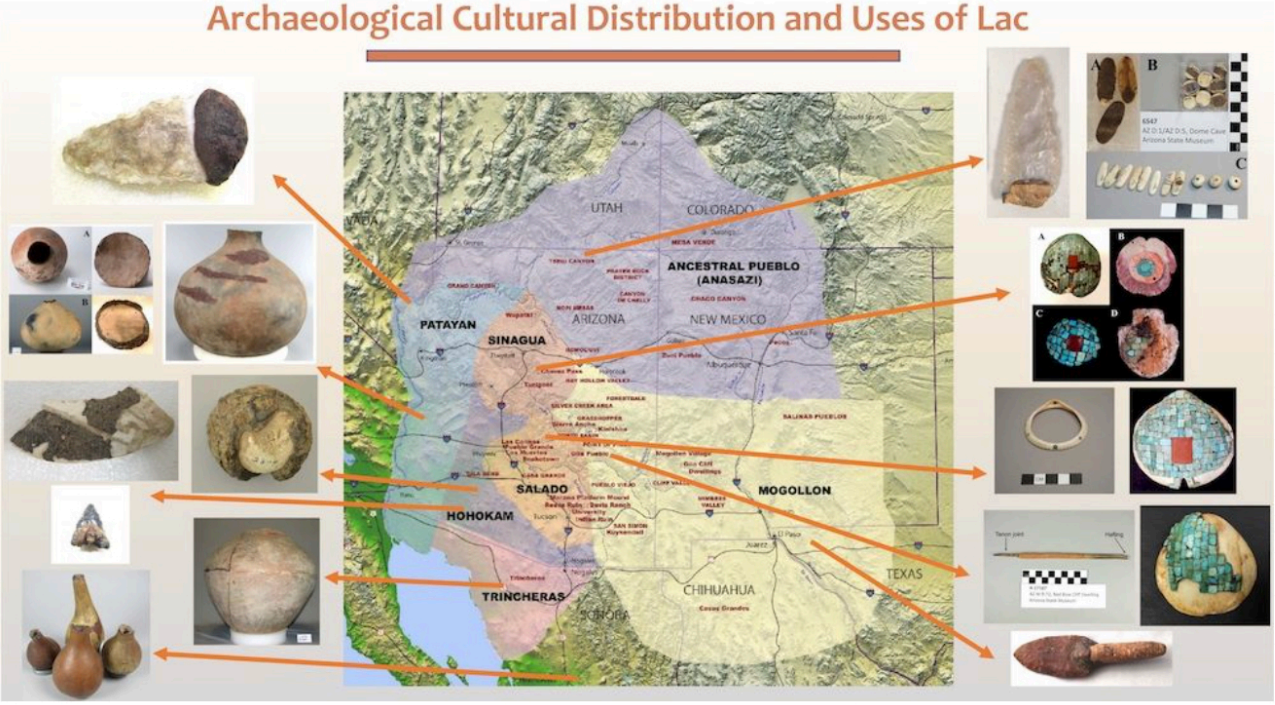
Fig 3 *Tachardiella argentina* adult female. Abbreviations: ant, antenna; antsp, anterior spiracle; apd, apodeme; ar, anal ring; at, anal tubercle; brpl, brachial plate; dspi, dorsal spine; lsm, large-sized microduct; maf, mature adult female; macd, macroduct; papl, pre-anal plate; postsp, posterior spiracle; pvp, perivulvar pore; pvpc, perivulvar pore cluster; ssm, small-sized microduct; spanpl, supra-anal plate; spd, spermatoid duct; spp/canp, spiracular pore/canellar pore; vset, ventral setae. Marginal duct clusters labeled as i, ii, iii, iv, v and vi. Ventral duct clusters labeled as 1, 2 and 3. Variation in size and shape of leg remnants drawn from various individuals.

In the American Southwest lac was used as an adhesive, a sealant, and as a medical remedy by the early peoples. Determining which adhesive had been used when surveying archaeological specimens can be challenging. To that end Bisulca, Pool, and Odegaard[5] evaluated the adhesives in more than 100 artifacts by using various methods including UV-induced visible fluorescence and microchemical testing . . . for insect lac, a new microchemical test was developed based on the pH sensitivity of anthraquinone dyes present in insect lac exudates." The two graphics at the center of the next page are from this work. At the left, an example of the use of insect lac (as well as pine resin) is shown. At the right, the use of insect lac by the Mogollon people is documented.

Personal Survey

When I started my search for Lac Scale in the Black Range I was warned that they were very few in this area. After looking carefully at Creosote Bushes in good habitat for more than twenty hours I had to agree. Do you know how many ranchers will stop and ask you what you are doing when you are looking at Creosote Bushes?

Finally, on 27 June 2025 I found several examples on bushes south of Pony Hills, north of Deming. Time well spent!



Cultural map of the arid Southwest with the archaeological distribution of artifacts made with lac. **See footnote "4".**



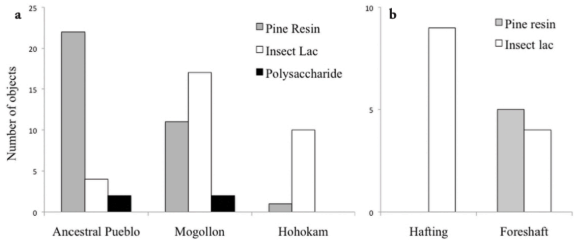
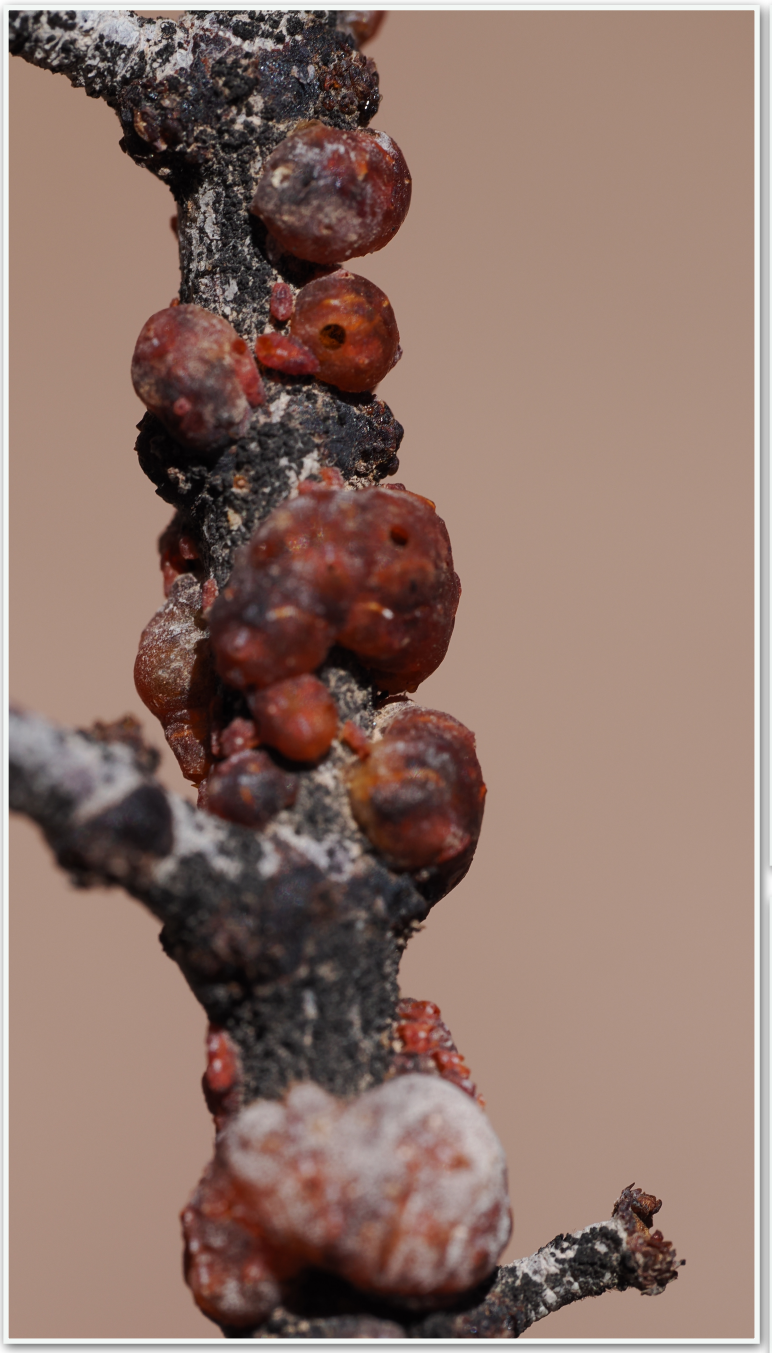


Fig. 5a. Objects with pine resin, insect lac or polysaccharide adhesives in the ASM Archaeological Perishable Collection by culture; 5b. Use of adhesive materials in Mogollon arrow foreshafts; 5c. Arrow foreshaft, Mogollon, Red Bowl Cliff Dwelling, 1325-1400 CE, A-17168. In the arrow pictured insect lac was found in the hafting and pine resin on the tenon joint. (Courtesy of Christina Bisulca and Marilen Pool)

See footnote "5".



















Creosote Bush Factoids

There is more to Creosote than a fine smell following the rare monsoon rain.

The Creosote Bush gall pictured at the top of the next page is fairly common on Creosote Bushes found in the hills to the east of Hillsboro. A search of BugGuide on 28 June 2025 yielded similar photographs but none of the midge larva which caused it. Several species in the genus *Asphondylia* form galls on Creosote, including *A. resinosa* (the Creosote Resin Gall Midge), *A. florea* (shown at the bottom left on the next page in an image by Charley Eiseman under a Creative



Creosote Bush Gall made by *Asphondylia auripila,* February 12, 2025, East of Hillsboro

Commons license), and *A. apicata* (not reported from this area).

Creosote Bush is quick to bloom and fruit in our area and they will continue to bloom and fruit for quite a long time.

The photographs of flowers on the following page were taken on 4 May 2020 just east of Hillsboro, and the fruiting plants on page 9 were photographed on 26 February 2021 (top) and 12 February 2025 (bottom).



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1. **"Insect Lac in Southwestern Cultural Heritage", *Preservation Archaeology Blog*, Marilen Pool (Sonoran Art Conservation Services, LLC), 19 November 2024. Archaeology Southwest website. This blog was utilized as a major source of information in developing this article.**
2. **"Lac" is "derived from the Sanskrit word lākshā '(लाक्षा) representing the number 100 thousand, which was used for both the lac insect (because of their enormous number) and the scarlet resinous secretion it produces" (download from Wikipedia 28 June 2025).**
3. **"Taxonomic Review of the Genus Tachardiella Cockerell (Hemiptera: Kerriidae), with a Key to Species of Lac Insects Recorded from the New World", T. Kondo and PJ Gullan, *Neotropical Entomology*, 29 December 2010.**
4. **The Distribution of Cultural Lac Scale Use (Tachardiella spp.) in the Arid Southwest, video presentation by Marilen A. Pool, PhD, August 12, 2023, for Archaeology Southwest.**







5. **"Resin and lac adhesives in Southwest archaeology and microchemical tests for their identification", Christina Bisulca, Marilen Pool, and Nancy Odegaard, *Objects Specialty Group Postprints*, Volume Twenty-Three, 2016, pp. 221-232.**
6. **"Hands-On Archaeology: How to (Ethically) Harvest Lac", Allen Denoyer, 22 January 2025, Archaeology Southwest.**





Northern Cardinal Nesting - Hillsboro

The first issue of this journal included an article on the range expansion of the Northern Cardinal into our area. In the second issue of the following year we discussed the research into the geographic filters in the evolution of new species and subspecies - specifically as they apply to the Northern Cardinal. Since that time we have discussed the natural history of the Northern Cardinal in snippets of narrative in various articles, but although we knew Northern Cardinals were nesting in the area we had failed to document these events.

In June and July of 2025, Northern Cardinals developed several nests in Hillsboro. Observations were conclusive and non-intrusive, meaning we did not even try to photograph the nests.

Northern Cardinal nests are typically within the foliage of shrubs or small trees, so it is not easy to gather images of them without disturbing the birds.

Unfortunately one of the nests failed, but that provided us with the opportunity to do some documentation after we were sure the breeding pair had moved on to another effort.

If you were to find this nest, without any prior knowledge of what it was, you might assume that it was one made by a Western Tanager. Everything about it, including the color of the eggs (normal brood size for Northern Cardinal is 3-4 eggs) would lead you to that conclusion. But we had that prior knowledge: a Northern Cardinal nest it was.







A Few More Odonata - The 2024 Field Season

by James Von Loh

Variegated Meadowhawk

The most abundant dragonfly in Doña Ana County during all seasons of 2024 (and all prior years) was the Variegated Meadowhawk; throughout the year, however, they were small in size. While they are most numerous along the Rio Grande and other sites with standing water, they may occur in any habitat from Northern Chihuahuan Desertscrub to Rio Grande Cottonwood/Coyote Willow Woodland/Tall Shrubland.





A. Female exhibits 'obelisking' behavior while perching on/ hunting from a perch in the shade of a Screw-bean Mesquite tree in Mesilla Valley Bosque State Park. Note that her abdomen (and thorax stripes) appear to be spotted with whitish areas of either color or pruinosity (typical color of these areas would be gray-green). 09/27/24

B. Immature is bright yellow with markings including wide white stripes ending in a yellow spot on the thorax, bright white spots bordered by brown along the abdomen bottom (S-2 to S-8), and black dorsal spots atop S-8 and S-9. 07/08/24


C


D



C. Male selects a perch on a willow stem along the Rio Grande while linked in a mating wheel with the female (R); in this configuration the male transfers sperm from his S-2 to the female's S-8. 10/24/24

D. Pair linked in a mating wheel where the male (U) releases sperm from his S-2 segment to the female's S-8 segment, where reproductive organs of each are located. 11/16/24

E. An enlarged view of the male's orange cerci pair clasping either side of the female's 'neck' (his epiproct is applying compression against the female's eyes and is not in view) to maintain tandem linkage while in the mating wheel and later to guide the female to egg deposition sites over open water. 10/24/24

Roseate Skimmer

During the 2024 summer and autumn seasons about half the number of Roseate Skimmers as observed in prior years were present along the Rio Grande; most of these were males. Behaviors observed included perching to warm and to hunt, and territorial patrols in search of a mate and to challenge other male dragonflies.

F. Female perches on a Honey Mesquite twig and hunts for small flying insects at Mesilla Valley Bosque State Park; she has reddish-brown eyes, brown face, thorax is brown with a complex pattern of white markings and stripes, the abdomen is brown and has flaps on the sides of S-8. (07/01/24)



Flame Skimmer

During the 2024 summer and autumn seasons fewer Flame Skimmers, *Libellula saturata* (Uhler, 1857), were observed than were present in prior years along the Rio Grande; most of these were males. Behaviors observed included perching to 'sleep', warm, and to hunt, and flying territorial patrols in search of a mate and to challenge other male dragonflies.

G. Male 'sleeping' in the shade of Coyote Willow canopy; characterized by reddish eyes, dark orange thorax with a bright white medial line, and a medium orange abdomen; the wings clearly show the orange patch distribution, associated vein coloration, and dark orange, elongate, basal spots. 07/08/24

H. A backlit female image clearly shows wing color distribution, vein color along the leading wing edges, and the flaps or flanges on abdominal segment S-8. 07/09/24

I. Enlargement of the female head and thorax with some features shaded due to sun angle; her eyes are brown, face is light brownish-white, the thorax and abdomen are medium-brown, the thorax has a white medial line, and there are narrow areas of tan color/white veins along leading wing edges. 08/23/24

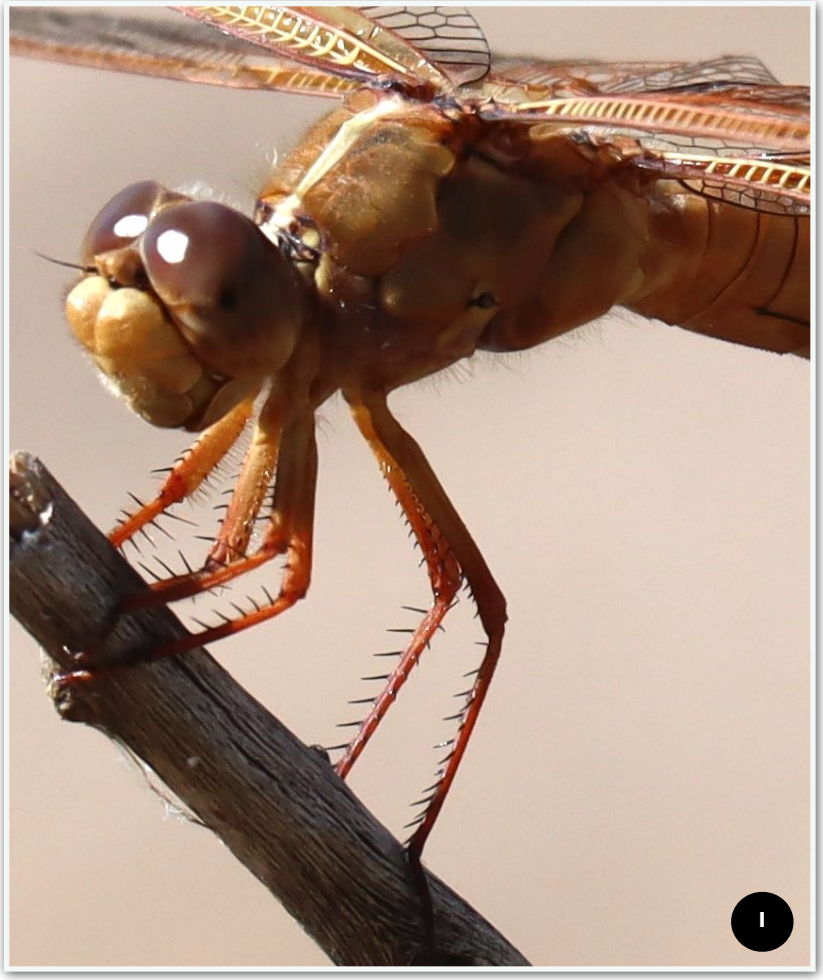
Red Saddlebags

Only a few Red Saddlebags, *Tramea onusta* (Hagen, 1861), were observed along the Rio Grande during 2024; these were entirely perching/hunting males. At Mesilla Valley Bosque State Park, they selected perches high on small Screwbean Mesquite trees surrounded by open patches of Bermuda Grass and annual, weedy forbs.

J. Backlit, ventral view of male illustrates his wing venation and reddish-orange stigma cells, the saddlebag pattern of the rear wing base fully exposed and his red face with dark reddish-brown eyes. 07/08/24









Black Saddlebags

Several Black Saddlebags, *Tramea lacerata* (Hagen, 1861), mostly males, were observed perching/hunting over habitats of the Rio Grande; rarely observed during previous years, 2024 provided the most sightings but still of relatively few individuals. They selected perches on small trees as described for Red Saddlebags and on tall Southern Cattail, but on average, the perches were lower, in the 2m-4m height range. At least one pair was observed in a mating wheel.

K. Male, head and thorax enlargement illustrating blue-black eyes, dark blue face, and bluish-gray thorax. 08/09/24





Blue Dasher

The 2024 Blue Dasher, *Pachydiplax longipennis* (Burmeister, 1839), population was second only to Variegated Meadowhawks in terms of commonness of individual dragonflies using Doña Ana County habitats during the spring through autumn seasons. The large population size continues the trend noted in prior years, e.g., 2019- 2023.

L. Female selects a high perch on a twig to hunt for small flying insects; she is characterized by the green eye color of older individuals, face is white with metallic blue at top, thorax is striped brown and yellow, abdomen is yellow with brown stripes below, and a basal, brown wing spot is present. 08/02/24

M. Next Page: At first glance, the eye color (dark red over gray) suggests a female, however immature males also have this eye color combination and a male's long cerci are evident at the abdomen tip; the nearly solidly blue thorax represents the western form Paulson (2009); additionally, the face is white/metallic blue on top, thorax and abdomen are pruinose blue, and dark brown basal wing spots are present. Because this individual is perched in the shade, the pruinose blue color of the abdomen appears shiny, even waxy/slick. 08/11/24

Plateau Dragonlet

Fewer than ten Plateau Dragonlets, *Erythrodiplax fusca* (Calvert, 1895) were observed during 2024 in two habitats used by low population numbers in past years, an irrigation canal from the Rio Grande (adult forms) and the La Mancha Wetland Restoration site along the Rio Grande levee (immature and adult forms). Preferred habitats are principally emergent plants and stems of short stature for perching and hunting in addition to dense bank vegetation.

N. Next Page: Perched/hunting immature form with light brown eyes, tan dorsal thorax, pale basal wing spot on wings which are projected forward, and yellow abdomen with black rectangles on lower sides of segments, and brown stripes on the dorsal abdominal surface. 08/14/24

O. Next Page: Adult male perches while hunting from Southern Cattail leaves and patrolling for a mate/defending his selected territory; his eyes are dark brownish-red, face is metallic blue, thorax a dark reddish-brown, and the abdomen transitions from dark brown at base to bluish-pruinose (S-3 to S-6), and black at tip (S-7 to S-10). 06/01/24







P. Lateral view of the immature form described above allows viewing of light brown humeral stripes on the thorax and extent of the basal wing spot. 08/14/24



American Rubyspot

The American Rubyspot, *Hetaerina americana* (Fabricius, 1798), was common along the Rio Grande banks from spring through early winter, reminiscent of the 2019 population. Immature individuals emerged from nursery beds of Paspalum, a grass that was inundated during release of high, somewhat erosive, volumes of water throughout the mid-March to October time period. Further photo-documentation of this attractive species and behaviors may inform researchers seeking archival material.

Q. Male turns its eyes vertically, apparently to cleanse, adjust, or otherwise address issues with the eye/antennae/ocelli area by using its tarsi/leg bristles. 07/19/24

R. Pale, tan, immature male perched on a Paspalum panicle to which it had flown, indicating that it had sufficiently dried its wings, following emergence, for flight. 07/21/24

S. Next Page: Immature female perched on a Paspalum panicle to which it had flown; patterns with developing color on her thorax (brown), wing bases (orange), and upper abdomen (brownish) present as she matures. 07/21/24



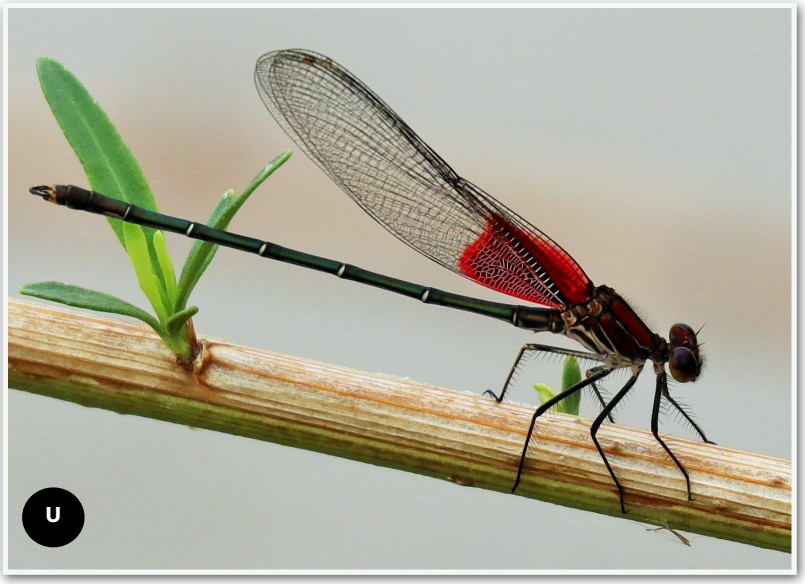




T. Mature female perches on a dry stem of Smooth Horsetail while hunting for small flying insects; eyes are brown over tan, thorax is reddish - metallic green, abdomen is metallic green to black, wing bases are dark to light orange and the pale stigma cell is silvery-white. 07/26/24

U. Mature male perches on a Mulesfat *Baccharis* branch while hunting for small flying insects and attracting a mate; eyes are dark, reddish-brown, thorax is metallic red with white lines at base, abdomen is metallic black, wing bases are red with white venation and the tiny stigma cell is tan. 08/28/24





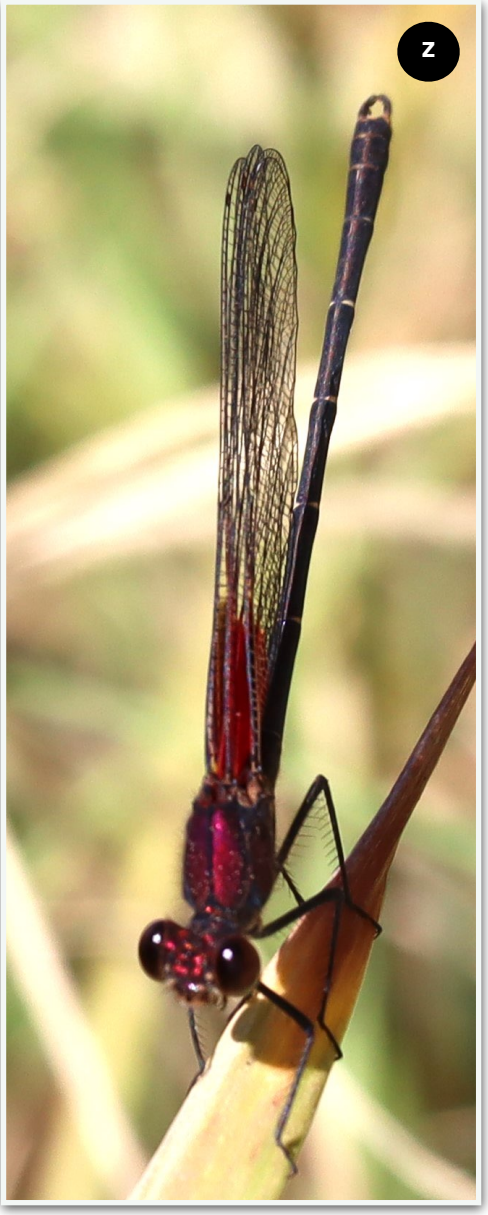


V. The female's dark-colored, curved, sharply pointed ovipositor is exposed after she uncouples from the male; the ovipositor pierces/slits the plant tissues creating sites to deposit eggs. 08/09/24

W. Under the low-light, late autumn conditions American Rubyspot males appeared to be colored/patterned much like the Canyon Rubyspot, *Hetaerina vulnerata* (Hagen *in* Selys, 1853, but an (continued on next page)









W. **(continued from previous page) entry posted to iNaturalist.com allowed my misperception to be clarified by expert analysis. 10/21/24**

X. **Photo-documentation of this American Rubyspot pair in a mating wheel allowed me to identify the female's (R) ovipositor as they completed transfer of his sperm from S-2 to her vagina at S-8 and disconnected from one another. See "V" on previous page. 08/09/24**

Y. **Perched face to face on a Three-square Bulrush stem, a female American Rubyspot (L) and a male Powdered Dancer (R) read/respond to cues, such as his downturned abdomen tip which possibly signals he does not consider her a potential mate. 08/24/24**

Z. **During the low-angle light of late autumn I noticed the male thorax was dark red, as were the face and wing bases, and the remaining wing area appeared very dark with black venation (the stigma cells were difficult to locate in some views). 10/18/24**

California Spreadwing

Fewer than five California Spreadwings, *Archilestes californicus* (McLachlan, 1895), all female, were observed along the Rio Grande in the autumn, mid-November, of 2024; they perched and hunted for small flying insects in/near a dense stand of 4-5m Coyote Willow tall shrubs. During this time period, air temperature dropped below freezing at night and there was one full day of clouds and cold, light rain. It should be noted that similar low numbers were recorded in 2023 along this river reach.

AA. This female perched on a Spiny Chloracantha stem throughout the mid-day of a cold, intermittently rainy day, then moved by mid-afternoon; her color appeared darkened to grayish-lavender under these conditions. 11/17/24

BB. Image enlargement of the female California Spreadwing's head and thorax illustrates her brown eyes (dark above and light below), wide blue dorsal thoracic stripes (divided by a brown medial line), the blue, ovoid lateral patch, and the tannish-brown thorax color. 11/15/24

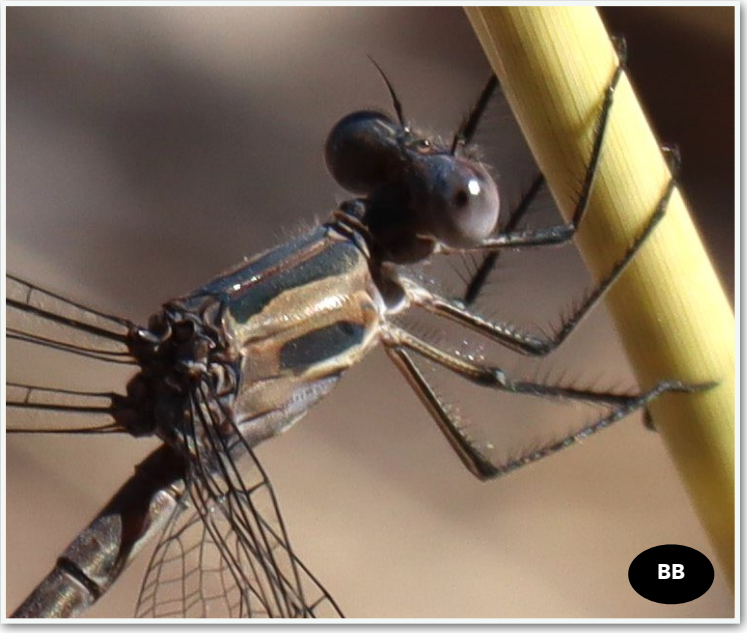
CC. The first observation of California Spreadwings was this female perched on and hunting from a Sand Dropseed tallgrass stem ~5m from a dense Coyote Willow tall shrub community on the Rio Grande bank. 11/15/24

DD. A single Honey Mesquite tall shrub, growing among Coyote Willow, provided a hunting perch during a sunny midday for this female California Spreading. 11/16/24

Familiar Bluet

Familiar Bluets, *Enallagma civile* (Hagen, 1861), were abundant locally throughout the late spring to autumn seasons of 2024 and as observed in prior years, 2019-2023.

EE. Next Page. Dorso-lateral image, a male Familiar Bluet perches while hunting for small flying insects along the Rio Grande. 08/29/24

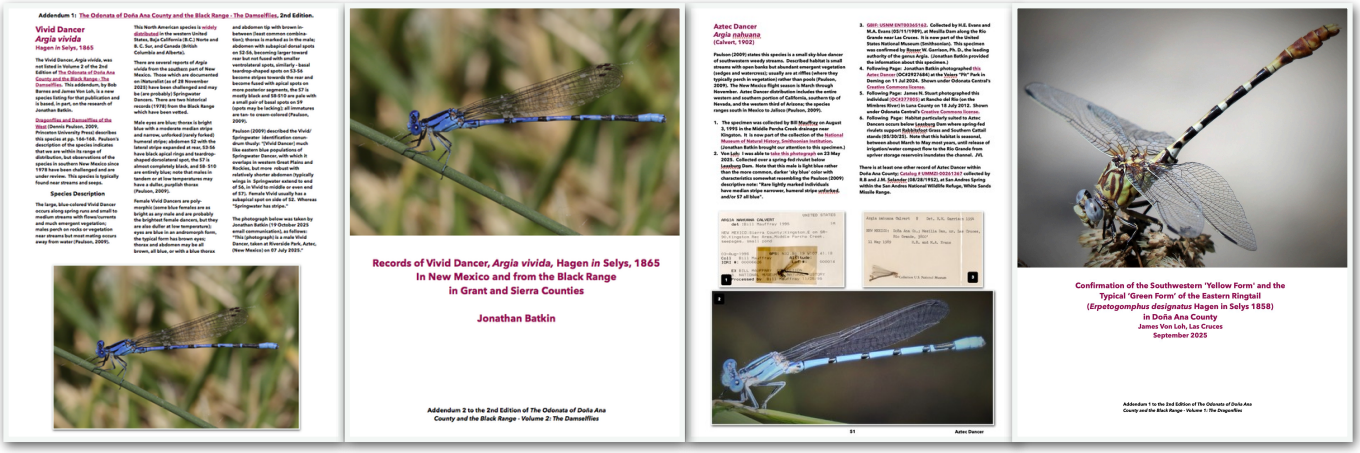












Odonata Updates

We have continued to update the information on Odonata which we publish at the Black Range website, we have published a second edition of the survey work, we have published articles in this journal, and we have added addenda to the second edition to the Odonata page on the website. Thus far, addenda have been added for Eastern Ringtail, Aztec Dancer, and Vivid Dancer (two: one on the species and one on the research which led to including it in our survey). See covers above.

The Glow of a Tanager

Let's talk Dutch masters for a moment, yes, as in painting. It would be a change of pace. Ever wondered at the luminescent glow which emanates from some of those oil paintings? Johannes Vermeer's portraits are famous for the effect. The basic technique he used is well known in the artistic world. Many painters, working in many mediums, know how to achieve it - perhaps not as well, but they know the concept. It all starts with a base level of paint, generally a hue of white but even tans will work; base levels in differing colors create differing effects. After applying the base layer the artist paints her image on top of it, and the light (in this case) hue of the base layer shines through, creating a luminescent glow.

But, alas, this is a natural history journal not a work on art history. Instead of Vermeer, let's discuss "Hidden white and black feather layers enhance plumage coloration in tanagers and other songbirds" (Rosalyn M. Price-Waldman et al.,

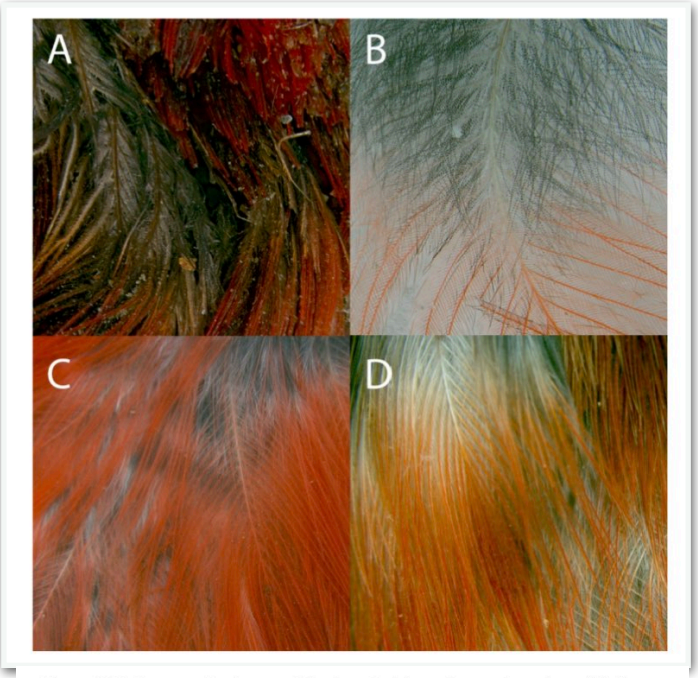


Figure S16. Carotenoid-pigmented feathers lacking achromatic regions. (A) shows the crown of a male house finch (*Haemorhous mexicanus*) and (B) shows the crown of a male northern cardinal (*Cardinalis cardinalis*). Small white achromatic regions are present in the house finch rump (C) and northern cardinal rump (D). (A,C) PMZ 17002; (B, D) PMZ 16469.



Science Advances, 23 July 2025, Volume 11, Issue 30, DOI:10.1126/sciadv.adw5857). As you might gather from the title of the article, various bird species were using the the base color effect well before Homo sapiens evolved. This is a well conceived and well executed study. The research article and the supplementary materials available at the link to the article are well worth the time if you have an interest in the topic or wish to review an excellent description of scientific research.

In a rare case for scientific reporting, the abstract of this study is worthy of repetition - in its entirety.

"Birds are renowned for their diverse and colorful plumage. Here, we demonstrate that vibrant plumage in the tanager genus *Tangara* is substantially intensified by a 'hidden' layer of achromatic (white or black) plumage concealed beneath the outermost colorful layer. Using hyperspectral imaging, multispectral photography, microspectrophotometry, reflectance spectrophotometry, and optical modeling, we show that hidden white and black feather layers are systematically distributed on the body to enhance the brightness and saturation of carotenoid-pigmented and structurally colored plumage, respectively, by increasing or decreasing the amount of back-scattered light that interacts with pigments or nanostructures. We compare male and female coloration and show that sexual dichromatism in some *Tangara* carotenoid plumage stems primarily from white layers in males and black layers in females rather than from differences in carotenoid pigmentation. Last, we find that white and black hidden feather layers are widespread in colorful passerines. Hidden feather layers likely play a previously overlooked but critical role in colorful plumage evolution in birds."

In previous issues of this journal we have discussed feathers, their purposes, their structure, and how they create color - either through pigmentation or structure. (See "Feathers" in Volume 5, Number 1, January 3, 2022, as one example of our fascination with this topic.)

Color and imaging? My fascination with those topics crops up occasionally in this journal. (See "The Camera and Natural History - William L. Finley", Volume 4, Number 4, October 3, 2021, for starters.) Consider that fascination and you will understand why I believe this is such a great abstract. Think "hyperspectral imaging, multispectral photography, microspectrophotometry, reflectance spectrophotometry, and optical modeling", golly gee whiz.

Although the subject study was heavily focused on *Thraupidae* (tanagers found south of the United States border with Mexico), it also explored the feather layering effect in many non-tanager species. The graphic at the bottom of the previous page is from the study and demonstrates the effect dramatically in the House Finch and Northern Cardinal, both of which are in my yard as I write this. The top images show feathered areas without the layered effect while the bottom images show areas with the effect. The luminescence of the feathers in the bottom photographs is striking.

The Western Tanager (see image at the top of the page), *Piranga ludoviciana*, is not a Tanager. It, and the other North American Tanagers, were moved to the Family *Cardinalidae* based on a 2007 study which resulted in significant realignment in the traditional Cardinal and Tanager taxonomic regimes.

Not only is the Western Tanager not a tanager, or more precisely not *Thraupidae,* it was not included in this study. Although not certain, I would wager that the head area of this species has a layered feather structure. The color of that area can be breathtaking at times, especially in the low level lighting of early morning and late evening.

Our understanding of the amount we do not know about the natural history of the world increases with every new research study. For some humans that is a frightening thing. For the rest of us it is an exciting and invigorating thing. Makes you want to get up and have a cup of coffee and one of tea.

New Exhibits at the Hillsboro Natural History Museum

April One News Release

The Avian Biology Wing and the Geologic History Wing of the Hillsboro Natural History Museum announce new world class additions to their renowned collections.

In December we received the specimen shown to the right from a turquoise miner in the Sacramento Mountains who was interested in an end of the year tax benefit. Working with the Musée de Génétique Historique (Institute of Historical Genetics) in Paris, France, and the Mauritius Biological Center, we have been able to authenticate the specimen. We invite you to discover the enigmatic Dodo, once native to the island of Mauritius, extinct since the late 17th century. This specimen, captured by the renowned naturalist Alfred Russel Wallace, will be a rare highlight of our permanent collection. It is currently part of our "Extinct Animals Tour" at the Portland OMSI Museum. It will return to Hillsboro at the end of the tour in August of this year. In the exhibit it is shown standing on a bed of lush, green artificial grass. This taxidermy display captures the bird's distinctive plumage and stout, curved bill. It serves as a poignant reminder of human impact on biodiversity and the delicate balance of ecosystems.





In August it will be integrated into the rest of the collection in the Avian Biology Wing of our museum. Many of you will not want to wait until August to visit the museum. The permanent collection of the Avian Biology Wing already includes an incredible number of high quality specimens. During a visit you can step into the enchanting world of ornithology with our latest exhibit, "Feathers and Fragments", a small portion of which is shown to the right. Here, we unveil a breathtaking array of bird eggs and feathers, each specimen telling a story of adaptation, survival, and beauty. This historic collection includes eggs from myriad species - from the speckled wonders of the European Robin to the robust, blue-green eggs of the American Robin, stretching from the temperate forests of North America to the vibrant tropics of South America.

Egg collecting, or oology, was once a revered scientific practice aimed at understanding bird reproduction and taxonomy. However, this practice has become highly controversial due to its impact on bird populations. Today, we recognize the ethical implications and the need for conservation, and emphasize that this collection was assembled during an era when the effect of such practices was not fully understood. These artifacts provide invaluable insights into species that have since faced challenges or changes in their habitats.

Our display cases house feathers from birds like the iridescent plumes of the Indian Peafowl and the soft down of the Arctic Tern, showcasing the evolutionary artistry in bird plumage. These feathers not only represent aesthetic diversity but also display functional adaptations for flight, insulation, and camouflage as feathers have evolved on multiple continents.

This exhibit not only educates but also invites reflection on our historical relationship with nature, encouraging a dialogue on conservation and the ethical stewardship of our planet's biodiversity. Don't miss this rare opportunity to connect with the avian world through the lens of history and science.

The July 2025 issue of this Journal addressed reintroduction and de-extinction efforts in the world generally and within the Black Range specifically. DNA samples from the oological collection and from the new Dodo will help advance those efforts.

The Geologic History Wing of the Museum has added an incredible quartz and gold specimen to the permanent collection and its Economic Geology Exhibit. This crystal was found in a backyard in the "Happy Flats" neighborhood of Hillsboro. (The exact location is redacted.) The specimen is on permanent loan to the museum with the proviso that the museum conduct research on the origin of the gold inclusion. That research is being conducted within the museum's BSL-2 rated research facility. (Because of cost containment efforts, this facility, which is capable of BSL-4 activities, is operated at lower safety levels. Rest assured that if necessary the safety containment effort can be raised to BSL-4 with the flip of a light switch.)

The theory that quartz crystals with gold veins contain ancient alien DNA is a fringe idea often discussed in alternative history and pseudoscience circles. Proponents of this idea suggest that these geological formations, particularly those with gold, could have been influenced by extraterrestrial beings who allegedly visited Earth in ancient times. According to some speculative narratives, these aliens might have left behind their genetic material within such crystals, perhaps as a form of communication or biological experiment. However, this claim lacks scientific evidence and is not supported by mainstream geology, biology, or archaeology. Instead, the presence of gold in quartz is well-explained by natural geological processes like hydrothermal activity, where gold particles are deposited within quartz veins over millions of years.

Thus far, we have found no evidence to support the idea advanced by the alien-infusion crowd. However, to err on the side of safety, the specimen is housed in a quadruple-sealed enclosure which forms three air gaps. The outermost air gap is filled completely with argon gas, the middle air gap is filled with helium, and the innermost "air" gap is a vacuum. In addition, all visitors to the exhibit will be fitted with an alien-genetics detection module (AGDM) which hangs from a neck lanyard (the devices are collected as visitors leave the museum). Signed releases are required before entering the room with the exhibit.

All of that said, we invite you to witness the marvel of nature's alchemy at the Hillsboro Natural History Museum, where the Economic



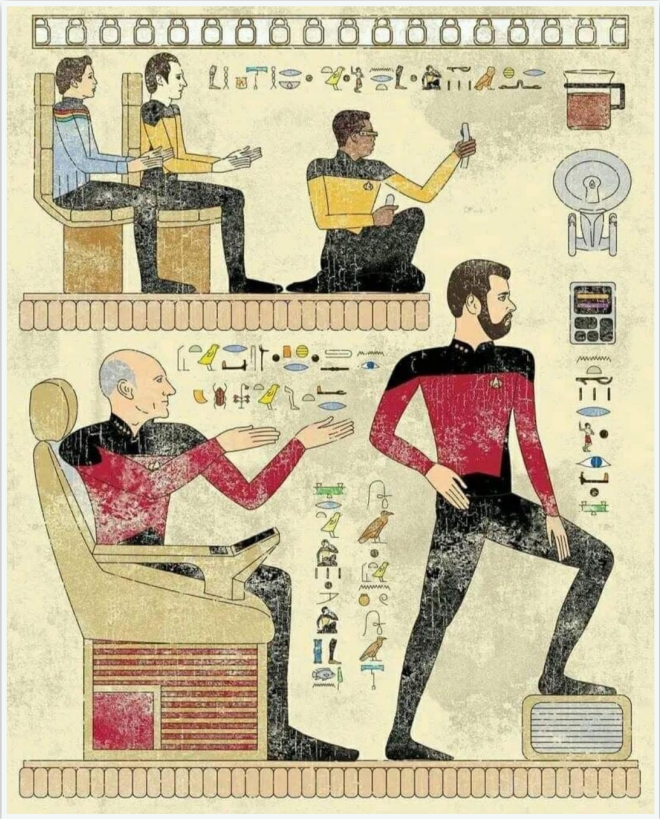


Geology exhibit features this spectacular large quartz crystal interlaced with gold veins. This piece is not just visually stunning but also tells a story of geological dynamics. Here, the gold was uniquely attracted to the quartz through piezoelectric sparks, generated by the seismic activity of earthquakes, illustrating the fascinating interplay between earth's movements and mineral formation.

In other news, the museum is in final negotiations with the National Park Service, which is in the process of selling off the national heritage as part of the current administration's tax program, to purchase the two meteorites which landed at White Sands National Park on October 7 of last year (see photos on next page). The Hard Rock Wing of the museum is being retrofitted to reinforce the floors. Fund raising is underway: a penny jar for donations can now be found at the Hillsboro Park outhouse. How these interstellar visitors were able to make such soft landings is still unknown. However, it should be noted that the Egyptian hieroglyph pictured on the following page was found nestled within one of the small craters of the meteorite shown at the center left of the following page.







A Jewel In The Mountains

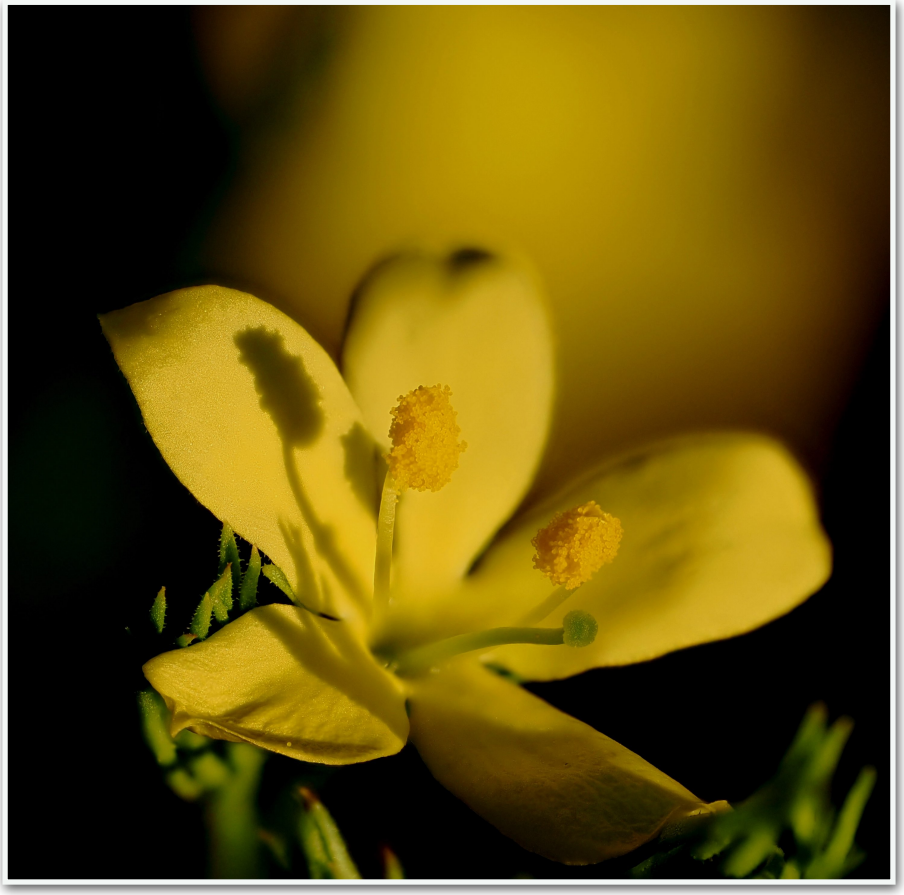
The Grand Outing in Hillsboro is a "picture book" which takes the reader (or listener - turn on "listen") on a day trip through Hillsboro. Jon Barnes created this work using Gemini.

All of the photographs in this article were produced using Large Language Models (LLM's). Although there are bits of truth scattered throughout the article it is basically a fabrication of an alternative universe. Because you read this journal we trust that you are able to ferret out fact from fiction and are able to appreciate this and all of the other fiction which permeates our lives and culture at the moment. We do not use LLM's in the production of articles for this journal, except for April 1 press releases.

Two Stamens - *Menodora scabra*

One of the diagnostic features of *Menodora scabra* (Gray), Rough Menodora, which is shown at the right and on the Black Range Website, are its two stamens.

The range of this species is limited to the southwestern United States and northern Mexico.



Orange Flying Beetles

In mid July *Lycostomus loripes* and *Neolycus fernandezi* create a show in this area. These are the orange beetles seen flying about flowering bushes, where they congregate to mate. They are ~10mm long.

Although "*Phylogenomic analysis of the family Lycidae (Coleoptera: Elateroidea)*", the Master thesis of Dominik Kusý, does not deal with these species specifically, it is an excellent study of the family.

Lycostomus loripes (Chevrolat 1835)

This species is listed as *Lycus loripes* in some sources. Its range extends from southeastern Arizona into west Texas, south into Mexico. The very similar *Lycostomus simulans* is found in Arizona.

The photographs on this and the next two pages were taken in Hillsboro on





















July 20 and 21, 2025. On July 19, 2025, many were found in Warm Spring Wash northeast of Hillsboro on Mule Fat, a.k.a. Seepwillow, *Baccharis salicifolia*.

Neolycus fernandezi (Duges, 1878)

In some sources this species is still called *Lycus fernandezi* which is the Latin binomial that Duges originally assigned to it.

This species is found from Arizona eastward to central Texas and south through most of Mexico. The very similar *Lycus arizonensis* has a range which overlaps the range of this species in the United States. The boundary between the black and orange portions of the elytra (the hard shield which covers the wings) is more jagged in *Neolycus fernandezi* (as shown within the circle below)



than in *Lycus arizonensis*. This edge is much more even in *L. arizonensis*, as shown in the image directly below, by Mike Quinn (from Ash Canyon of the Huachuca Mountains of Arizona on 24 July 2023). Shown here under a creative commons license.

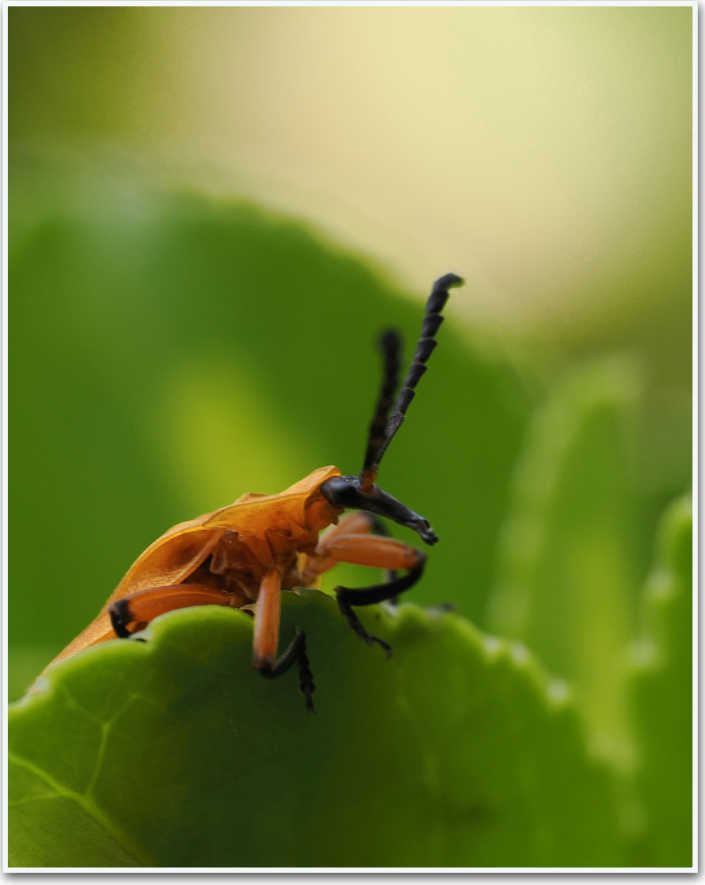


The photographs of *Neolycus fernandezi* on this and the two following pages were taken in Hillsboro on July 20 and 21, 2025.













The image at the bottom left on the next page was taken in Warm Springs Wash at the end of July 2025. We do not venture to call this *Lycus arizonensis* (see bottom left on the previous page) but there is the distinct possibility that it is that species. *L. arizonensis* is found in this area and the edging between the two colors of the elytra is more even. But...

When an individual can not be sorted to species, an entomologist might dissect it and either by applying the findings to an established key or perhaps establishing a key if the species is newly described, arrive at a finding. In the pursuit of knowledge this type of activity is often necessary.

The knowledge obtained by that process can have profound legal, and in the longer run, environmental, consequences.

Natural History Blog

The Natural History Blog on the Black Range website provides frequent updates on natural history observations in the Black Range and information which pertains to the natural history of the area. It also provides bits of news; for instance, it will sometimes announce the publication of The Black Range Naturalist prior to our email notification chain.





Pleistocene Vertebrates

Arthur H. Harris, UTEP Biodiversity Collections, Department of Biological Sciences, and Centennial Museum, University of Texas at El Paso, has developed a great resource on the Pleistocene Vertebrates of Southwestern USA and Northwestern Mexico.

Specimen records are listed by species and by location (for instance, view the pages on Palomas Creek [Black Range], Starvation Draw [west of Cooke's Peak], Anthony Gap Cave, and Pendejo Cave to appreciate how extensive this listing is. The main site location page is found here).

The references page (Literature Cited) provides an extensive listing of other sources of information.

What's New on the Black Range Website

The What's New Page on the Black Range Website lists changes to the website. Additions to the site and to the Vimeo portfolios which support it happen all the time. This page is a good way to keep track of the most recent changes.

Egg Mass on Littleleaf Sumac
Datana perspicua - July 2025
by Bob Barnes

The masses of insect eggs shown to the right (one mass before hatching, the other after) were photographed in Warm Springs Wash, northeast of Hillsboro, in late July 2025. The eggs were laid on leaves of Littleleaf Sumac, *Rhus microphylla* (Engelmann, 1852). The photograph at the top right depicts a very small area, about 1 inch from top to bottom. These eggs are little.

I liked the photographs and wanted to say something about them. But what? I knew that the chances of identifying the insect which laid the eggs were virtually nil.

(The story behind this article is convoluted, sometimes strained, and humbling. I am not sure of its value. After a lot of effort I was making no headway on this identification issue. So I decided to write about failure and the value of failure. At about the same time an article in *Nature*, on the same topic - characterized as the "the publication of null results" was issued. Unfortunately, I eventually solved the puzzle and made the identification. I did not, however, want to lose the work that had gone into the failure piece. So here we go, the original as written about failure, evolving into a species identification article.)

Nonetheless, I set out to do that and failed miserably. This is the story of that failure.

Step One: Get into some kind of ballpark. I was not particular, it could be the ballpark of the Baltimore Orioles (no wait, that will not do, their name might be changed by Executive Order). Well, a ballcourt from an ancient Mexican civilization, that will do. In any case, try to narrow the search. That went fairly successfully, though I found myself in various (wrong) ballparks as I mulled search parameters which would yield plausible results. In this process I learned something about a few ballparks that I would never have guessed. That is success, but not the success I was searching for - it seemed more like I was a AAA baseball player making the rounds to small cities across North America.

Using Google's visual search function on the top right image I got to a bunch of reddit threads (after dismissing various berries as a possibility) which included images of similar eggs which participants thought were laid by some type of stink bug. That did not seem too likely too me, but search after search narrowed it to that ballpark - the stink bug ballpark. I spent quite some time in this ballpark. A lot of catching flies and hitting singles, mostly striking out, certainly no home runs.

What is the size of the stinkbug ballpark? BugGuide states that there are more than 220 species, in 64 genera, in 5 subfamilies in the United States and Canada. Not terrible, I can tell a lot of the adult forms apart. But there are pitifully few images and little information about the nymphs which eventually become adults and almost none on the eggs. Not much of a setback since I did not locate any nymphs anyway.





Step Two: Could I find resources which were "egg specific"? BugGuide has pages of unidentified pentatomid eggs and hatchlings. Progress. I've learned a word I will probably never use again. But a potential problem as well; the eggs depicted here look more spherical than those depicted at BugGuide. Further study seemed to consistently show that stink bug eggs were barrel shaped, not spherical.

Basic assumption wrong? Not a stink bug? Perhaps.

In due course I found an online presentation about "Eggs of Pentatomidae found in the Eastern USA". Fascinating and mostly overwhelming. My grasping at straws was proving unproductive, not that I would give up. No I would continue to ignore barrel shaped v. spherical egg shape for quite some time.

Step Three: How about the egg laying habit (covering both sides of one leaf) or the host plant? Maybe someone has done something on this somewhere, but darn hard to find if they did. Several stink bug species seemed to be quite cosmopolitan; when it comes to host plants some include the Littleleaf Sumac.

Step Four: How about the population? There are not many masses of eggs visible, two groupings in roughly a hundred yards of wash. Given the small number of eggs that represents and some level of mortality, the hillsides are probably not overrun with this species. Not much help there.

Step Five: Real research? I continue to monitor them but even if I find nymphs I doubt there is a way of getting to species (not willing to put in the time/effort to collect and try to raise them).

Step Six. Smile and give up. I have concluded that I am stuck with unidentified photos.

Having reached this despicable state of affairs I mused about an article in *Nature* (wouldn't anyone?) by Laurie Udesky, 22 July 2025. In "Researchers value null results, but struggle to publish them" she notes that a survey conducted by Springer Nature (released on that same day) indicated that although researchers valued null results (an experimental hypothesis was not supported, for instance) they rarely sought to publish those results: "69% didn't think null results would be accepted for publication; 52% didn't know which journals would consider publishing research with null results; 19% worried that their institution or funder wouldn't cover publishing costs; and 21% were concerned that they'd be viewed negatively by their peers. . . Of the 1,228 respondents who were able to publish their null results, 39% said that the process helped to inspire a new hypothesis or methodology and 28% said it prevented the duplication of unnecessary research."

Inspired by greater minds, I thought it okay to publish my own null results.

But then, James Von Loh (one of the knowledge keepers I reached out to in my quest) came up with some suggestions after querying iNaturalist. iNaturalist suggested some specific stink bug species and some species of moth.

Step Seven. Stop smiling. Is Uhler's Stink Bug, *Chlorochroa uhleri* (Stål, 1872), a possibility? The iNaturalist match with this species appears to be based on an observation from Southern California in July 2025 which depicts an egg mass. After consulting with the observer this avenue of exploration does not appear productive.

There are observations of other members of this genus in our general area, including *Chlorochroa ligata* (Say, 1832)



which appears to be quite common. However, an observation on BugGuide which purports to (possibly) be an egg of this species does not match well. Nor, for that matter, do the images by Whitney Cranshaw at Colorado State University. So let us dismiss this common species as a possibility.

Step Eight. Time for a digression. (I have problems with focus.) Gordon Berman sent two photos of unidentified eggs on a tuft of grass which he cut and laid on some lichen to take a photo - so again very small. One of these photos, with an enlarged detail, appears on the next page. In any sort of normal world I would have thrown up my hands and said "I have not a clue". But if normal implies something static the world is not that. I had been looking at a lot of stink bug eggs as part of my search. And Gordon's photos certainly looked like those of *Chlorochroa ligata*. See Mike Quinn's BugGuide observation, below, from 27 March 2009 in Travis County, Texas. (Shown below under a Creative Commons license.) A bit of (probable) success snatched from failure. On the other hand, they don't look anything like "my eggs".







***Chlorochroa sayi*, Say's Stink Bug, is also found in this area. Its eggs are described as barrel-shaped and the images which purport to be eggs of this species are indeed barrel shaped and not a good match for "my eggs".**

Insects in this genus take about 120 days to progress through the egg-nymph (several molts)-adult life cycle. This according to Ontosight which has a species entry, which appears to be AI generated. Eggs apparently hatch within 4-7 days of being laid.

In reference to stink bugs, the University of California Pest Management Guidelines note the barrel-shaped eggs with circular lids, the eggs being pearly white initially and then turning cream colored just before hatching. Eggs are laid in about 14 to a cluster. All of this does not appear to be a good match.

The barrel shape of the eggs of stink bugs keeps cropping up in my surveys, an unfortunate factoid which may result in a "null result" since stink bugs seemed to be my only viable lead.

Step Nine: Back to the field. Six days after my initial "egg find" I was back at Warm Springs Wash, looking for egg masses for the fourth time. (There are a lot of Littleleaf



Sumac bushes in that wash and these eggs are very small.)



I found that all of the egg masses I had located before were hatched. So farther up the wash I went, hoping to find more. At some point I noticed what looked like some scale on a sumac twig. I had been looking at lac scales on mesquite and knew that there were several species, each using (for the most part) a different species of host plant. So a closer look was in order. No, not scale. A mass of small caterpillars in an area about one and a half inches long and one inch wide. Three photos from that observation are shown here. The leaf in the background in the top photograph is Littleleaf Sumac, so roughly 1.5 inches long.



Using the resources at BugGuide and images from Butterflies and Moths of North America (BAMONA) I was able to narrow my search to the genus *Datana*. Included in my search results were these *Datana* eggs on BugGuide. The curator at BAMONA concurs that my observations are of *Datana perspicua* (Grote & Robinson, 1865), Spotted Datana (Hodges #7908), based on image, host plant, and range match. The curators at BugGuide have agreed to the genus level, that it is *Datana*. Video of this observation may be viewed here.

Of interest to me is that this species is in the genus *Datana*. In the April 2023 (pp. 9-19) and October 2023 (p. 73) issues of this journal we discussed the process of identifying *Datana neomexicana* from an observation near Kingston. During that effort we noted the apparent defensive tactic of raising both ends of the body when threatened. When I first located the mass of *Datana perspicua* they were moving quite vigorously (see video). Once they became aware of my presence they froze, not moving for at least 15 minutes. This was such a significant behavior that I had to place a note in the video, indicating that it was video, not a photograph.

Success, snatched from the jaws of failure. What about that failure thread, at one time the purpose of this article? Failure and success are segments of the same continuum. Sometimes success is predicated on the failures which came before.

This bit of observation took me down a few paths which I had not anticipated. Some were dead ends when considered as part of this effort, but led to insights which I would otherwise have not encountered. And when all is said, boring or interesting, a good dose of humility never hurt anyone.

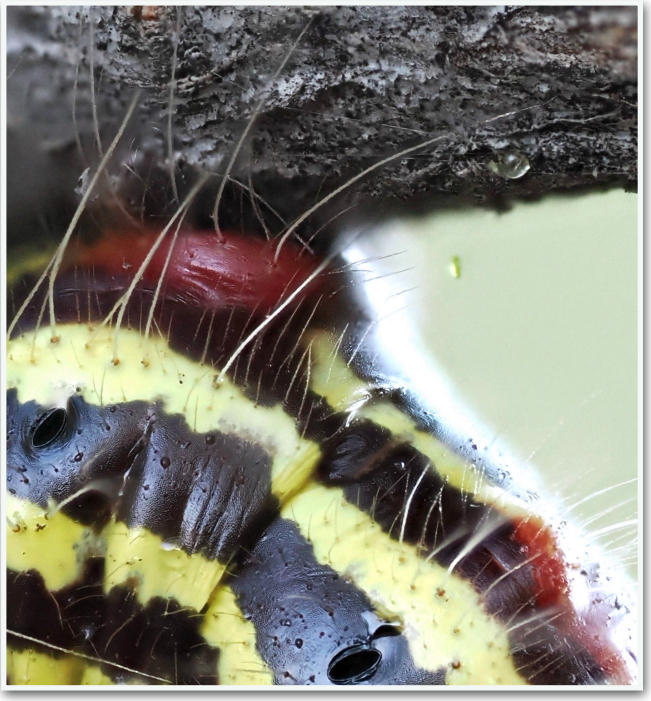
For those of you who wonder where this all ends up: Andrew Meeds made the iNaturalist observation shown below on 05 July 2019 east of Cliff in Grant County. The adult phase is not that small, having a wingspan of about 50 mm (about 2 inches). Shown here under a Creative Commons license.



Addendum

On 21 August 2025 I returned to the bush where I had initially photographed the egg mass. I had visited this bush on 06 August and had found small caterpillars like those shown in previous photographs. I walked up the wash checking every Littleleaf Sumac I encountered, making for slow going, especially inspecting those with areas with bare branches where something (perhaps this species) had its fill.

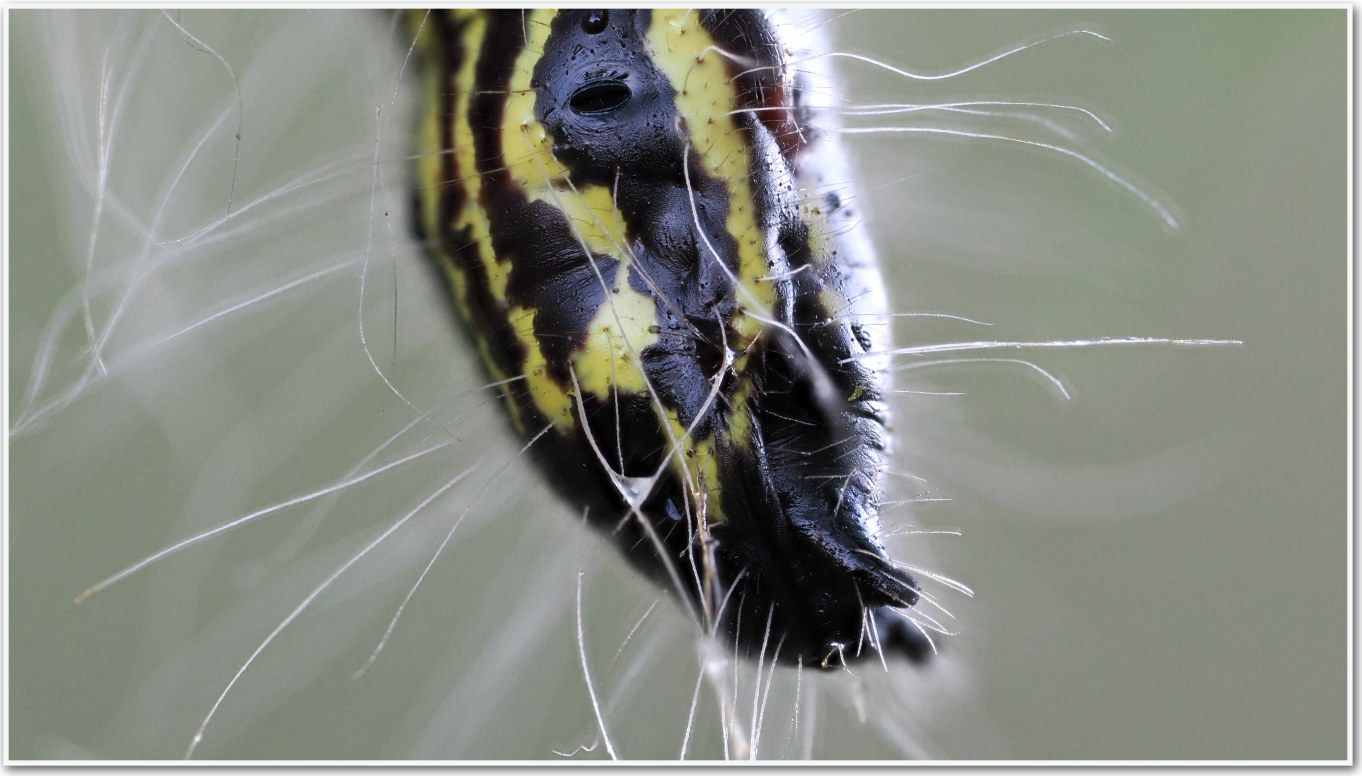
At the "initial bush" I found the caterpillars shown below and on the two following pages. These individuals are later instars of the small caterpillars shown previously in this article. This caterpillar stage is larger (roughly one inch in length) and has slightly different coloration. While setting up the camera I hit the bush, causing the caterpillars to go into the typical *Datana* defense posture, which I have come to know and love, shown in these photos.



In Volume 6, Number 2, of this journal we described our observations of a different species, *Datana neomexicana*, which we observed near Kingston. In that issue we also discussed a bit of caterpillar anatomy, some background for this observation (see also this site). As in *D. neomexicana* most of the prolegs (the "suction cup legs") are red.



In the above detail, spiracles are shown within the large dark band which begins at the bottom center and arcs to the center left. These round openings are the "breathing" pores of the caterpillar and extend all along the abdomen. In this individual they were all within the black band shown here. The rear of the caterpillar is shown at the top of the next page. This detail also shows the setae (hairs) which provide a sense of touch.





The two protrusions at the very end (right side) of the caterpillar in the top photograph are the anal prolegs. The locomotion of a caterpillar is "hydraulic", involving the pumping of blood from one part of the body to another. The legs are used for grasping and holding as one part of the body is flooded with blood, causing the other to contract (legs grasp), blood flows back, repeating sequence.

The three pair of legs at the front of the caterpillar are called thoracic legs. They are jointed and have hooks which are used in grasping food.

Note bottom photo, above, shows the variability in length of the setae. This is also shown in the center left photograph on the following page.









as those in the middle. In the photograph on the next page the two prolegs at the anal end appear to be at different stages of development, while those nearest the developed prolegs at the center of the abdomen appear to be three reddish "knobs" which have yet to form into the "suction cups" at the middle. Those "suction cups" aren't. They encircle a number of small graspers but apparently do not create suction.



The two bottom photographs are of another individual of this cohort, showing a section of denuded Littleleaf Sumac.

The center right photograph provides a bit of scale, Littleleaf Sumac leaflets in the background.

In the top photographs of this and the next page the red prolegs at either end of the abdomen appear to be not as well developed



What happens next? Unfortunately, not much. I had hoped to find these caterpillars again to validate their supposed response to certain pitches of sound. I did not find these caterpillars again.

The pupal stage of this species' life is spent underground. The caterpillars crawl to the ground, burrow in, and pupate. Awaiting the next stage of the life cycle.

Then and Now - As Seen in Maps

Cartographic depictions of our landscape (maps) are used by all of us, all of the time. If you are working in the field they can be the tool you use to get from where you are to where you want to be - that and a good set of boots.

Maps change. That is something we don't always think about, but every edition of a map has changes from the previous. Sometimes those changes reflect changes in the natural topography, sometimes changes made by humans, sometimes as a result of a change in emphasis (of the map maker).

In our explorations, we often look at several maps of the same area. The maps may have been made by different entities but are contemporaneous; the maps may have been developed at different times; the maps . . . There are many reasons and ways the maps may be different. That is what we want to look at more closely in this article.

In last year's April issue of this journal we explored the concept of repeat photography and its use in gaining insight about changes in our natural landscape. Here we analyze what the changes in a basic tool, over time, tell us about our natural landscape.

Our focus is on natural history so our exploration of the before and now in maps will focus on that broad topical area.

To provide a broader perspective, before we delve into more modern detail, we have included several historical maps on the following page. These maps depict what was known and what was considered important. These maps were copied from Early Naturalists of the Black Range.

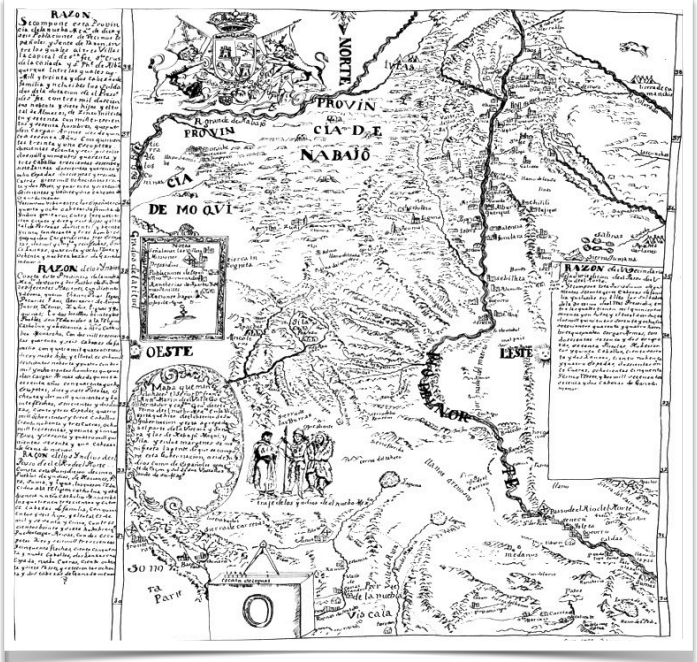
1650. Nicholas Sanson's map (*L'Amérique Septentrionale, Le Nouveau Mexique et La Floride* - detail at the upper left on the next page) had the Rio de Norte flowing into the Gulf of California but represented a major step forward in understanding the geography of the area. In addition to the known land forms at that time this map includes various communities and population centers (e.g. "Apaches de Xila"). Those exploring the Gila today may not find this map useful, but in the late 1600s every data element could mean the difference between life and death.

1758. Bernardo de Miera y Pacheco was one of the most important cartographers in New Spain (if not the most important) during this period. By 1743 he had settled in El Paso but moved to Santa Fe in 1754.

His map "*Map which Don Francisco Antonio Marín del Valle, Governor and Captain General of this kingdom of New Mexico, ordered drawn*" was widely used during the colonial period and is shown at the top right on the following page (and detail below that). Note the following in the detail: The existence of the Sierra del Cobre Virgen northwest of the Sierra Florida and the Rio de las Mimbres between the two. (The Rio Mimbres is shown flowing into a lake.) North of the Sierra Florida is Cerro de los Remedios, which refers



Nicholas Sanson's map



Map of Bernardo de Miera y Pacheco



to what is now known as Cooke's Peak. (*Cooke's Peak - Pasaron Por Aqui - A Focus on United States History in Southwestern New Mexico*, p. 19.)

1771. José Ramón de Urrutia y las Casas was a cartographer during the period when he was in New Mexico and crafted several maps, including the *Primera Parte* map of 1771 which is shown at the bottom right, with detail.

As with many maps of this era, it takes a bit of orienting to understand what is being shown, because the geographic knowledge of the mapmakers was imprecise. Note, however, that there is much which is right about this map. The map shows a river flowing across the top of the map, labeled as the Rio Gila, and it flows into another larger river before entering the Gulf. Turning to the detail, the headwaters of the Gila are shown originating from the Sierra de Gila, just north of the Sierra del Cobre and Sierra Florida. The Rio Grande and the San Diego crossing are shown correctly, as is the Jornada del Muerto. Laguna de Guzmán in Chihuahua is also shown.

Of interest to us are the rivers flowing into the Rio Grande from the west, one of which is named the S. Bernardo.

Paso del Rio del Norte is placed too far north. Many things seem right once it is moved farther south.

1804: The map on the following page, and the detail on the page after that, is named after Alexander von Humboldt because he was a contributor of information. It shows "The Sierra del Mimbres", the Diego crossing of the Rio Grande, the source of the Rio Gila and the Valley of



Urrutia's Map




A MAP OF
NEW SPAIN
from 16°. to 38°. North Latitude
reduced from the Large Map drawn from
astronomical observations at Mexico
in the Year 1804.
BY ALEXANDRE DE HUMBOLDT.
and comprehending the whole of the information contained in the
Original Map,
except the heights of the Mountains.
LOUISIANA
PROVINCIA DE TEXAS
PROVINCIA DE SONORA
PROVINCIA DE NUEVA VIZCAYA
PROVINCIA DE NUEVO LEON
PROVINCIA DE NUEVO SANTANDER
PROVINCIA DE SAN LUIS POTOSI
PROVINCIA DE GUANAXUATO
PROVINCIA DE MECHOACAN
PROVINCIA DE MEXICO
PROVINCIA DE VALLADOLID
PROVINCIA DE GUADALAXARA
PROVINCIA DE ZACATECAS
PROVINCIA DE DURANGO
PROVINCIA DE CHIHUAHUA
PROVINCIA DE NUEVO MEXICO
PROVINCIA DE LOS TEJAS
PROVINCIA DE LA NUEVA ESTREMADURA
PROVINCIA DE LA ALTA CALIFORNIA
PROVINCIA DE LA BAXA CALIFORNIA
GULF OF CALIFORNIA OR SEA OF CORTE
Vermilion Sea
GREAT NORTHERN OCEAN
GREAT EQUINOCTIAL OCEAN
(MAR DEL SUR OCEANO PACIFICO)
GULF OF MEXICO
Rio Bravo del Norte
Rio Colorado
Rio Gila
Rio Nueces
Rio Grande
Rio Salado
Rio Puerco
Rio Colorado
Rio Gila
Rio Nueces
Rio Grande
Rio Salado
Rio Puerco
Sierra Madre
Sierra Verde
Sierra Nevada
Sierra Madre
Sierra Verde
Sierra Nevada
Yanquicas Indians
Yumanes Ind.
Yabipias Indians
Apaches Gileños Indians
Jumas Indians
Cajuenches Ind.
Pericues Ind.
Tarahumares
Nuevo Andalucia
Texas Indians
Pampopas Indians
Jonigueth Indians
Tejuas Ind.
Jalchedunes Ind.
Mogui Ind.
Apaches Llaneros Ind.
Apaches Lipanes Ind.
Tawakanes Indians
Nation of Cadodaquis
Nation of Natchitoches
Fertile Savannahs
ISLES OF REVILLAGIGEDO
Isle San Benedicto
Isle San Benedicto
EXPLANATION.
A CAPITAL or large TOWN.
a Less considerable Town. Presidio.
a Village.
Seat of the provincial Council of the Mines.
Real Mine.
Hacienda Farm.
Rancho Station of Missionaries.
Presidio, Military Post.
Astronomical Observation
calculated by M. Oltmanns.
Freedom 1st
Published as the Act directs 1st Oct. 1811 by Longman Hurst Rees Orme and Brown Paternoster Row.



Florida. It also shows the homeland of the Apaches Mimbreños. The location of major features was maturing but not exact.

> "This map is said to represent the dawn of the modern era of the scientific understanding of physical geography. It depicts the convoluted topography that reveals the Southwest to be straddling a backbone of two major mountain ranges and drained by a confusing network of rivers and intermittent streams. Subsequent scientific observation reaffirmed that the area was divided longitudinally into a series of ridges and valleys. This is not to say that Humboldt's map was correct, for it contains a number of significant errors. On Humboldt's map, even rivers that today we know have more transverse courses seem to be constricted horizontally because of the cartographic inability to determine longitude effectively.
>
> Despite certain errors, however, Humboldt's map reminds us of a basic fact of the region's geography, namely, that it is easier to traverse along north-south than east-west lines. This helps to explain the pattern of settlement in the Southwest for much of its history. Even under Spanish rule the area was compart-mentalized along north-south axes, such as the Rio Grande in New Mexico and the Santa Cruz and San Pedro River valleys in Arizona. The topography also helps to explain the difficulty that rational people have in drawing lines around the region: there are no such physiographic borders in the landscape."*

At this point we stop the survey of the historic maps of our area. If this topic is of interest to you, please take a look at Early Naturalists of the Black Range.

These early maps reflected what was known, easier to fathom when we are looking at "old" maps than when we are looking at more modern ones, but always a truism. They also reflect what was important to the mapmakers and map users. During the early European era of our area, travelers were trying to understand the basic geographic layout of the land. They needed to understand the major topographic characteristics. What was the nature of the mountain ranges? Did they run south to north or west to east, how high were they, were there passes? Rivers were important: how big were they, where did they run, were they intermittent or perennial? Who was living on the land and where?

Their interests were more basic than those of current travelers. Or perhaps it is simply a matter of scale. Today's traveler may be interested in the location of the next gas station (or electrical charging station) and whether or not the next town has a good restaurant. A traveler in the 1700s was interested in the same basic thing, how many days or weeks was it to the next small village, were the inhabitants welcoming or hostile, was there some kind of food available. Scale.

The natural history concerns, if there were any, during this period were also more basic and generally focused on major landforms and ecosystems. That is not to say that there were not natural history surveys being made during the early years of European occupation. Even the expeditions which were focused on riches and empire noted natural history.

1540-1542. The account of Coronado's travels was written by Pedro Reyes Castañeda. There have been various translations and interpretations of his work. "The term 'pino' was used by the chronicler of the expedition when describing the trees observed. Reference was made to 'pillars of pine', which may have been ponderosa pine, that were used by the Pueblo Indians to construct footbridges. Extensive montane pine forests in the region were mentioned by Coronado, as they were by several subsequent Spanish explorers in the late 1500s." (Clevy Lloyd Strout, 1971. "Flora and fauna mentioned in the journals of the Coronado Expedition", *Great Plains Journal II* (1): 5-40.)

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*Richard Francaviglia, "Elusive Land: Changing Geographic Images of the Southwest", *Essays on The Changing Images of the Southwest*, edited by Francaviglia and Narrett, University of Texas at Arlington.

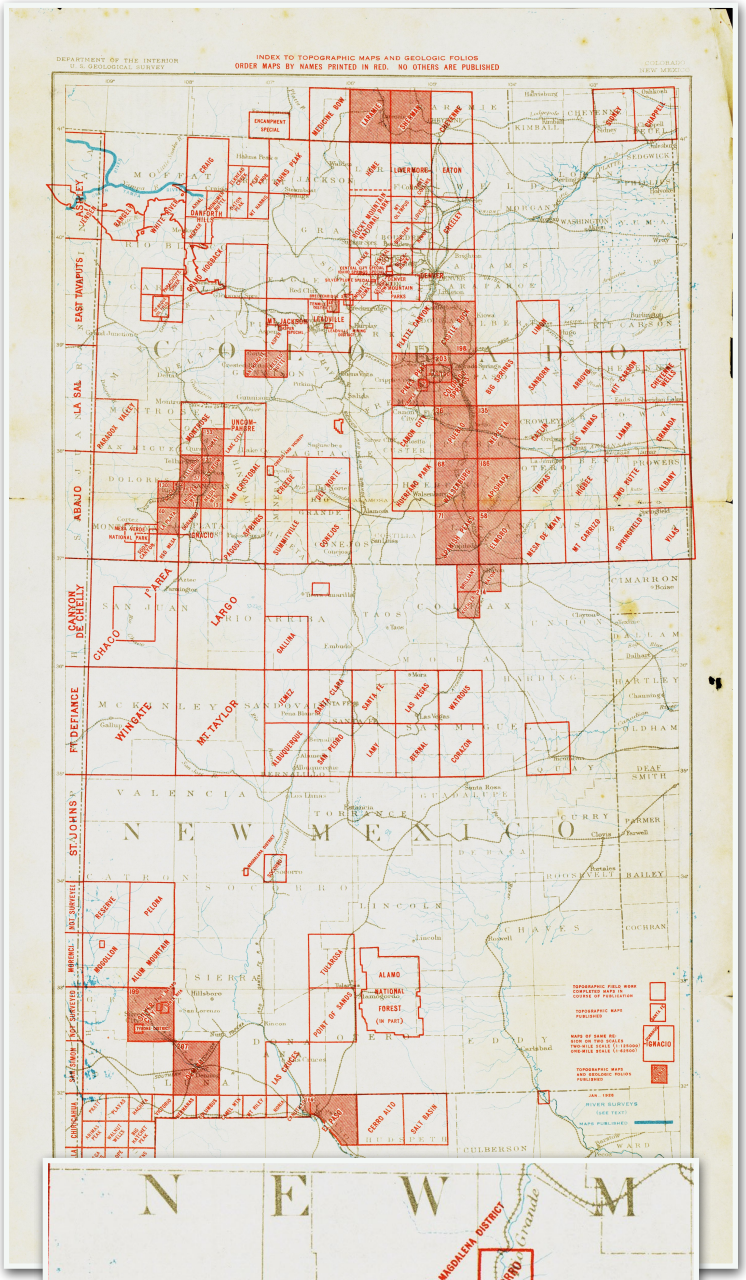
Modern Surveys of the US Geological Survey

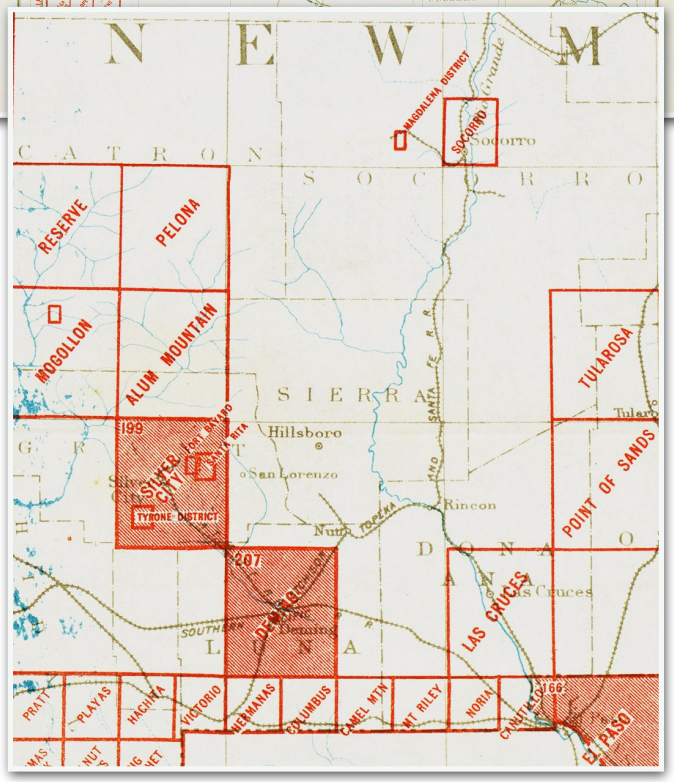
The United States Geological Survey (USGS) mapped the United States. Naturalists and hikers know their work. Those born prior to about 1980 grew up using "quads", the quadrangle maps of various scales produced by the agency. In this century, the use of "quads" by the more casual outdoors person is greatly diminished, replaced by various "apps". Many of these apps are based, at least in part, on the topographic data gathered by the USGS if not directly on the quadrangle maps it published.

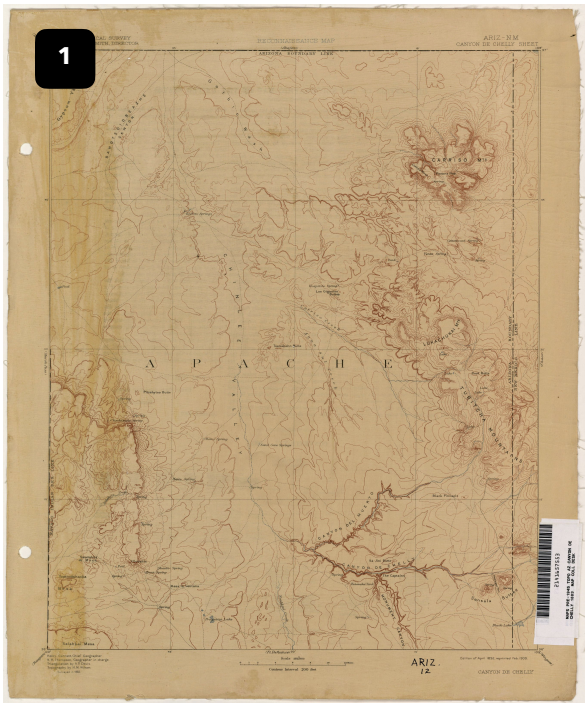
In this next section we focus on the comparison of different editions of these maps and what that tells us about changes in the natural history and topography of our area and changes in the topics of interest to mapmakers and users.

It is not hard to find a quadrangle for an area at this time. The United States is covered thoroughly. When the mapping of the nation did start it was slow. It involved a lot of work, a lot of personnel, and the prioritization of areas to be surveyed. The 1928 index to the surveys of Colorado and New Mexico is shown at the right; the detail at the bottom is an enlargement to show our area of interest. The areas in red are topographic maps and geologic folios which had been published. The named areas within red lines are topographic maps which had been published. That's it, no topographic maps for the Black Range. Note that the railroad spur from Nutt to Lake Valley is still shown as part of the railroad network.

Don't think that the maps of this era lacked detail. The map of Canyon de Chelly (1892) is shown below ("1'). For this and other maps shown here "click" on the link icon within the map image to access a larger copy of the material.









This detail ("2") is from the bottom right of the topographic map shown on the previous page. Mapping to contour line precision requires a lot of field time. Note that springs are identified on the map.

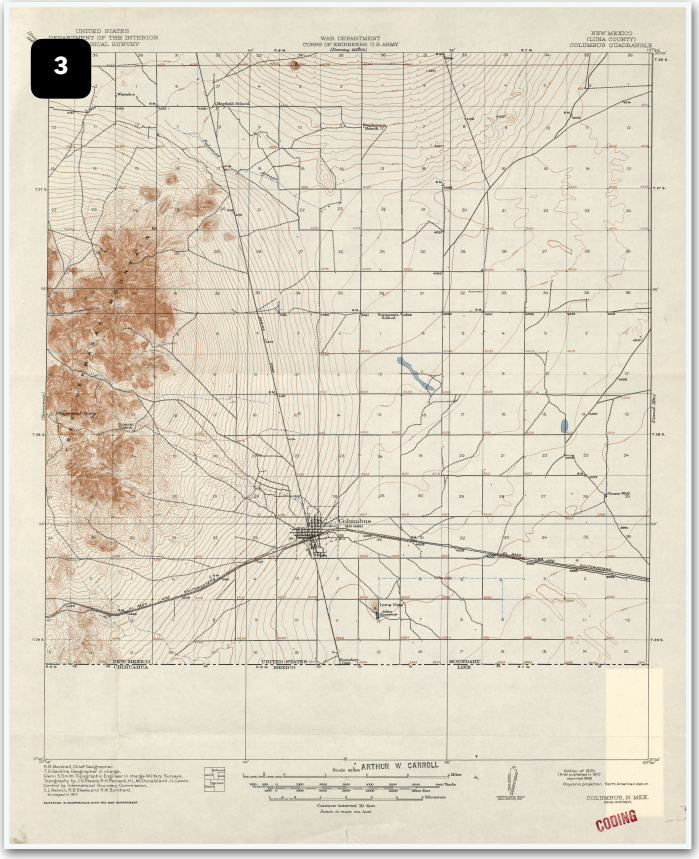
The Columbus quadrangle (south of Deming) to the right ("3') dates from 1920, first rendered in 1917.

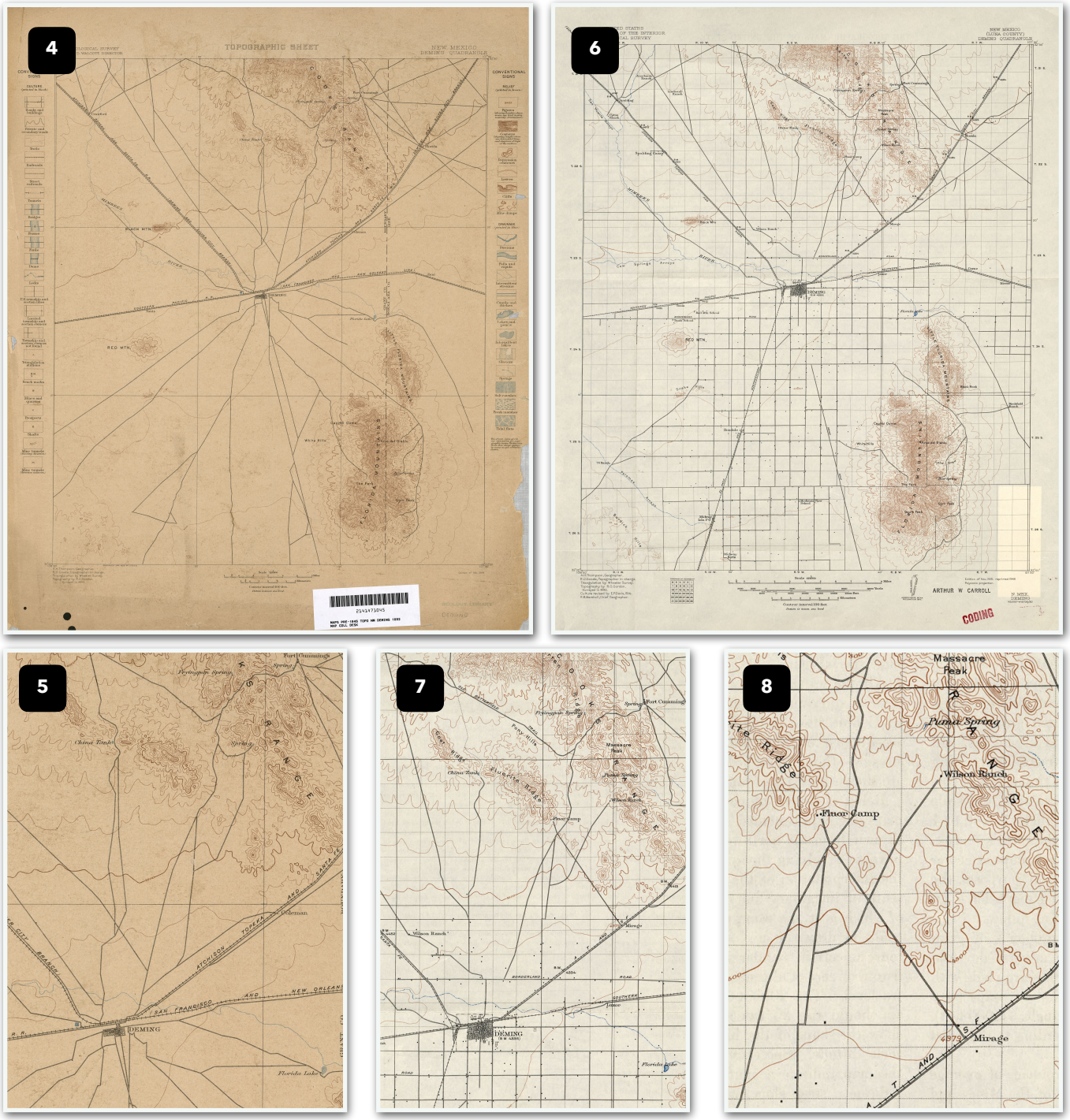
At the next page we note some cultural changes in maps from the Deming quadrangle. (Map "4" and its detail "5" are from 1899 and map "6" and two details from the map, "7" and "8", are from 1915.) The scale for these maps is 1:125,000.

In details of the maps ("5" and "7") it is apparent that Deming grew a lot between 1899 and 1915.

Springs are identified on both maps, more apparent in the details of the maps ("5", "7", and "8"). The "Old Butterfield Trail" is shown on both maps but is labeled as such in the 1915 edition. Fort Cummings and the spring we know as Cooke's Spring is shown on both maps.

In the 1915 version of this quadrangle, the road from "Mirage" (a watering station on the Atchison Topeka and Santa Fe Railroad) to Fluor Camp at the south end



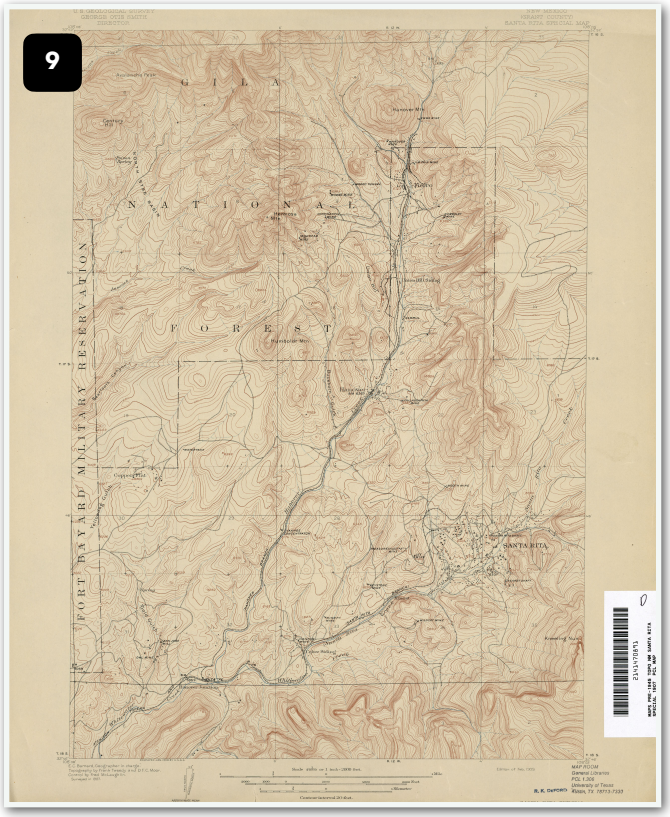


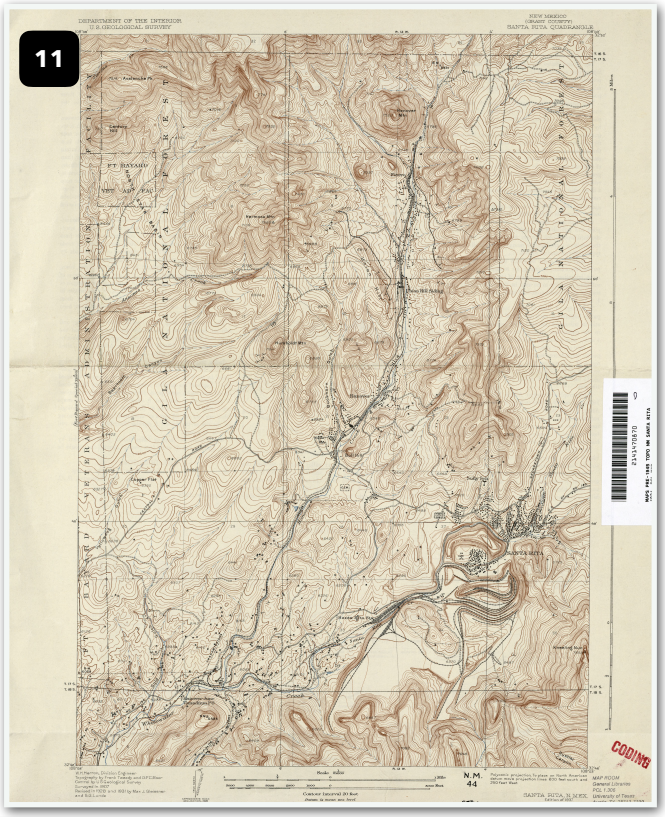
of Fluorite Ridge (which is named) reflects the increased mining of fluorite to harden steel. As the geology of this region became better known the diversity of minerals mined in the area grew, reflecting the strong linkage between cultural developments and natural history.

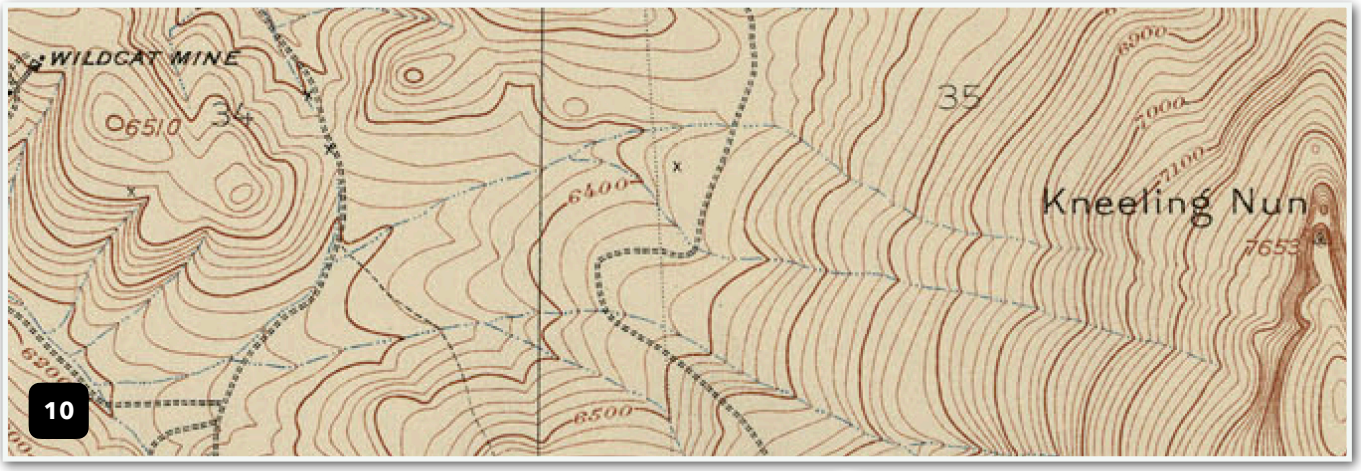
Map 9 is a special edition of the Santa Rita quadrangle dating from 1907. The scale is 1:24,000. Among other things it shows a town which no longer exists, or no longer exists at the location indicated. Santa Rita was moved so that the open pit mine now called the Chino Mine (in some sources the Santa Rita Mine - in the past it was called Santa Rita del Cobre) could be dug. La Esperanza Vineyard and Winery which is located near the mine, in the Mimbres Valley, sells a semisweet red wine called "Born in Space". The wine's name is a multi-layered pun acknowledging Harrison Schmitt, who was a crew member on Apollo 17. Schmitt was born in Santa Rita before the town was moved. Quite literally, he was "born in space" now above a huge open pit mine.

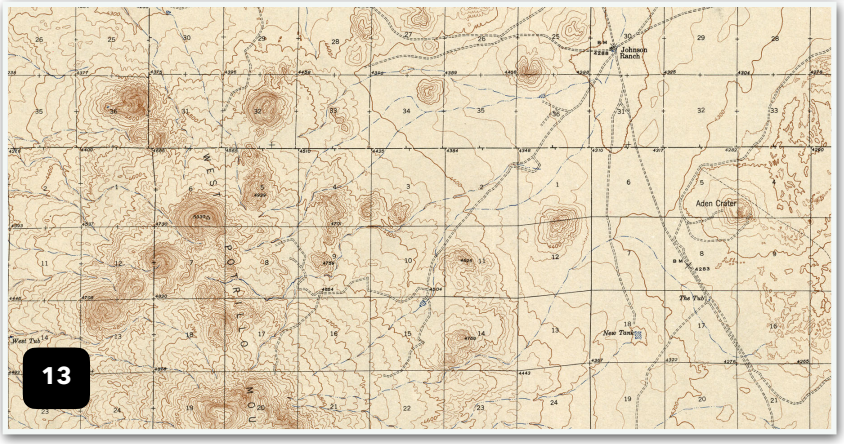
At the lower left of the map the Kneeling Nun geologic formation is noted (see "10"). "The Kneeling Nun, Santa Rita, New Mexico" describes some of the geology and cultural history associated with the formation. This map includes the various mines in the area as cultural features. The mining, the Kneeling Nun, and other features are all indicative of an area which has been very geologically active in the past.

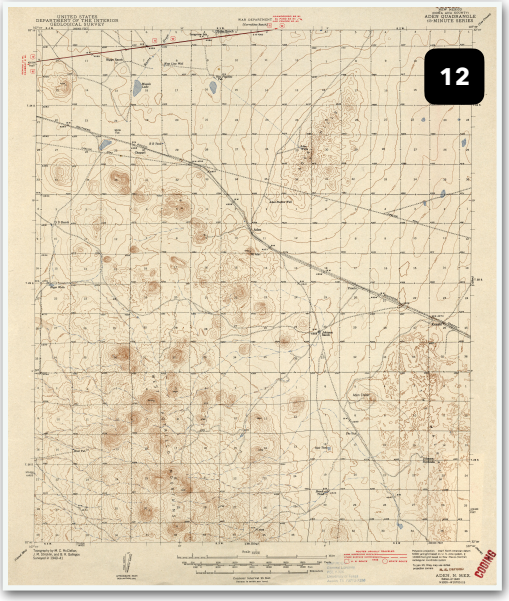
By 1931 (see "11") most mine shafts and adits were shown but not named, and Santa Rita was about to be moved.







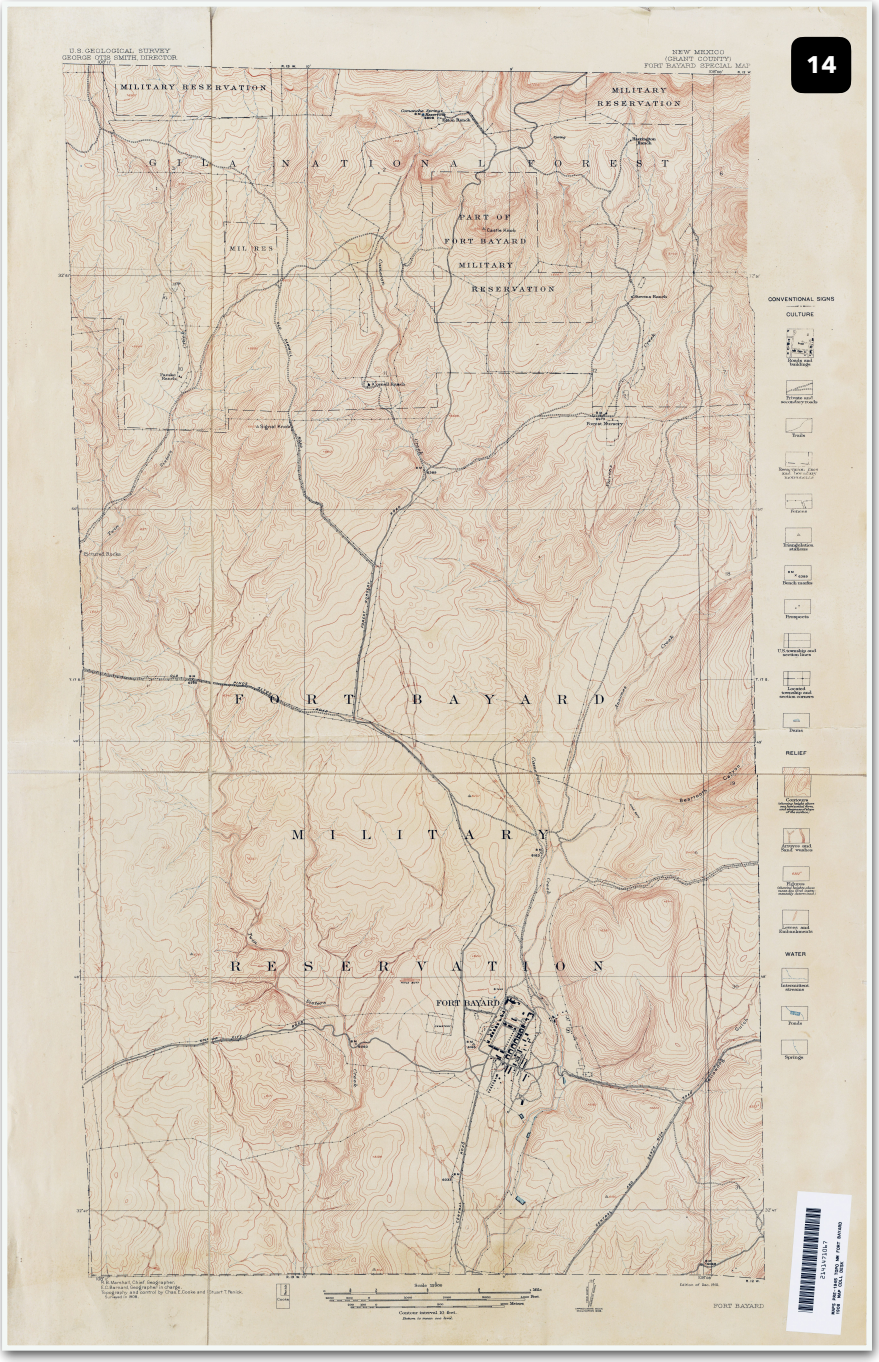


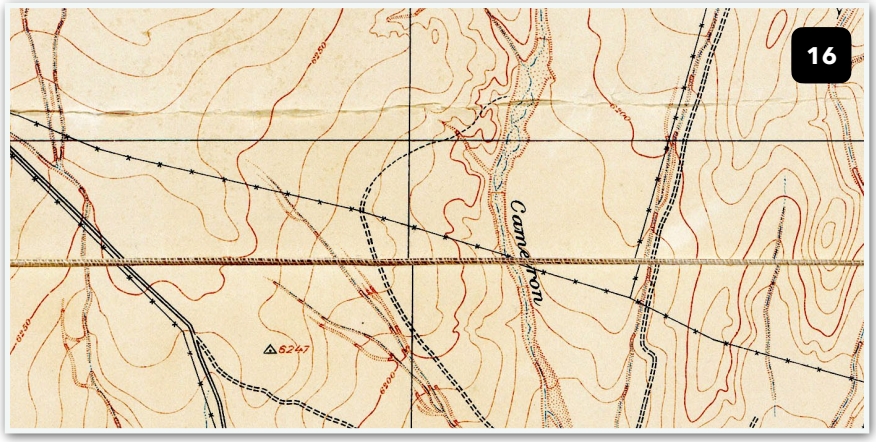


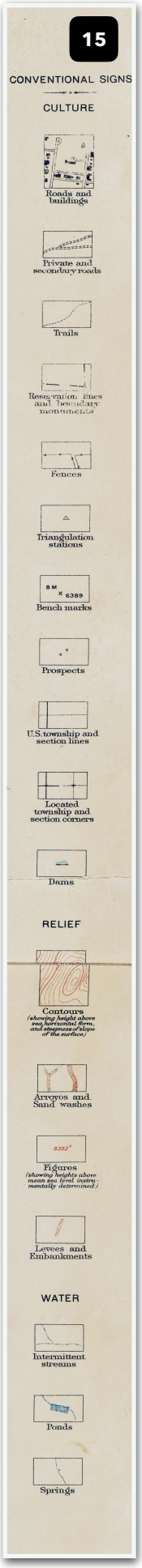
The map index from 1928 clearly shows the interest of various parties in mapping the borderland with Mexico. By 1942 maps had gone through multiple generations in this area. See "12" and the detail from it, "13", which clearly show the Aden Crater and West Potrillo Mountains, geologic features which have been discussed in previous issues of this journal.

The Fort Bayard map of 1908/1910 was published at a 1:12,000 scale and is interesting on several levels. For instance, it shows fencing and has a key to the standard topographic symbols (benchmarks, trails, arroyos and sand washes, intermittent streams, prospects, springs, etc.) - see detail at "15".

The USGS maps shown here and previously are from the same era, and they tell us much about what was important in that time. Cultural features were depicted in detail and it is easy to follow changes in the human landscape from one edition of a map to the next. Natural history began to be reflected in more place names over time, but this appears to be a bit whimsical. Landscape contours were sophisticated from the earliest period, and a recognition of western interests became more apparent (maps distinguishing between washes and intermittent streams, for instance). The detail ("16") of this map shows how the mapping of waterways was handled. Cameron Creek is shown as an intermittent stream within a wash matrix, and like all such features it is bounded by a levee or embankment. Legal questions about the status of washes versus intermittent streams versus perennial streams continues to this day. The background data, how it was gathered, analyzed, and archived was changing; however, more on that later.







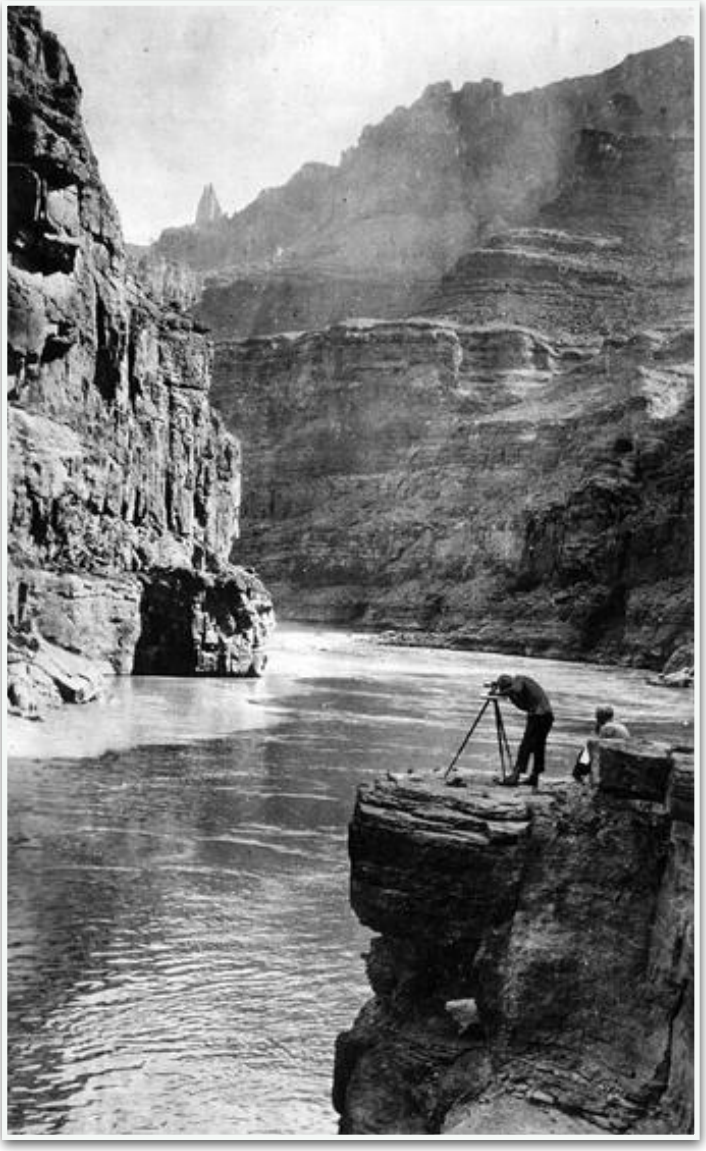


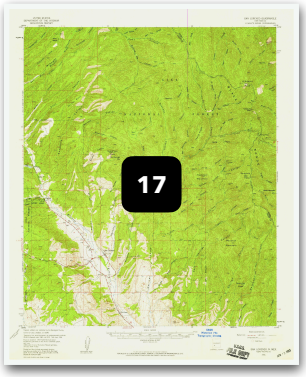
Survey techniques during the early part of the 1900s are highlighted in the USGS film of the 1923 survey of the Grand Canyon. (Click link icon to watch.) This is more of an adventure film than one about surveying techniques - there is a lot of "brown water" footage. However, it is chock full of natural history. This is before the dams, and the river rises and falls quickly, sometimes as much as 20 feet. For whitewater aficionados, note that the boats are being rowed (but no rowing frames, just oar locks) not paddled, and that modern white water rowing techniques are being used: rowers face downriver and row for maneuverability.

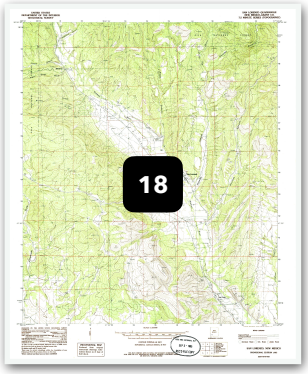
Film and photography had reached its stride by this time, allowing us to see footage of the survey participants and occasionally some survey equipment. The mapping was performed mostly by the cartographer R. W. Burchard (at arrow in photograph below).

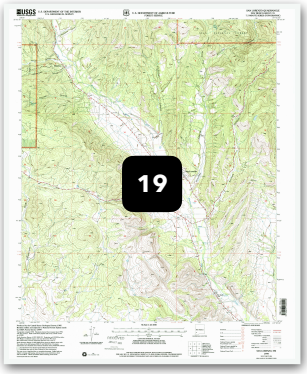
The survey was comprehensive and included the assessment of streamflow of the various tributaries, for instance. These, of course, were just data points and did not represent the increases and decreases of streamflow which occur for various reasons.

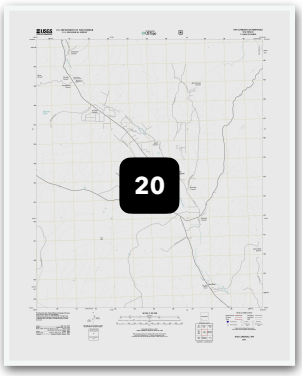












17. The San Lorenzo quad (1:62,500) from 1956.
18. The 1:24,000 scale map of San Lorenzo from 1985.
19. The 1:24,000 scale map of San Lorenzo from 1999.
20. The 1:24,000 scale map of San Lorenzo from 2011.
21. The 1:24,000 scale map of San Lorenzo from 2013.
22. The 1:24,000 scale map of San Lorenzo from 2017.
23. The 1:24,000 scale map of San Lorenzo from 2020.
24. The 1:24,000 scale map of San Lorenzo from 2023.

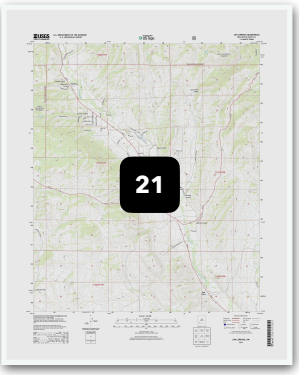
All of these maps may be downloaded from the USGS topoview page at this link. All are available in a number of formats - jpeg, kmz, GeoTiff, and GeoPDF.

"What is the purpose of this little exercise?" you might ask.

It demonstrates two key factors of mapmaking during our era. One, there has been a shift away from print (hardcopy) to digital formats. There is extremely little cost associated with the distribution of these maps. Two, these maps are not based on new on-the-ground surveys. They are being produced from existing data files, often synthesized from a variety of sources, many of which are based on digital surveys produced by aircraft and satellites. This last point is especially important for natural history research. Since data can be derived from multiple sources, a wider array of data can be depicted on a map, and since the base maps are available in a variety of formats, layering and interpolation is possible. For example, in the October 2025 issue (Vol. 8, Number 4) of this journal we discussed the geology of the Hillsboro Quadrangle. Throughout the issue we utilized the overlay of a .kmz layer (the Hillsboro geology map) onto a Google Earth image of the same area. An example from page 66 of that issue is shown to the right ("25"). Utilizing such techniques makes it possible to see the geology (as depicted on geologic maps) in the field, an overlay of whatever electronic map source you are using.

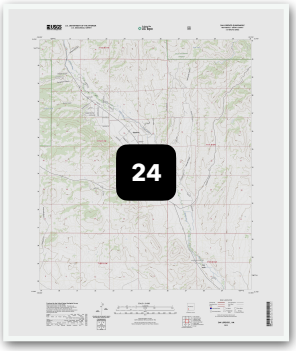
Mapmaking and map usage are not what they used to be, so what are some examples of what they are?

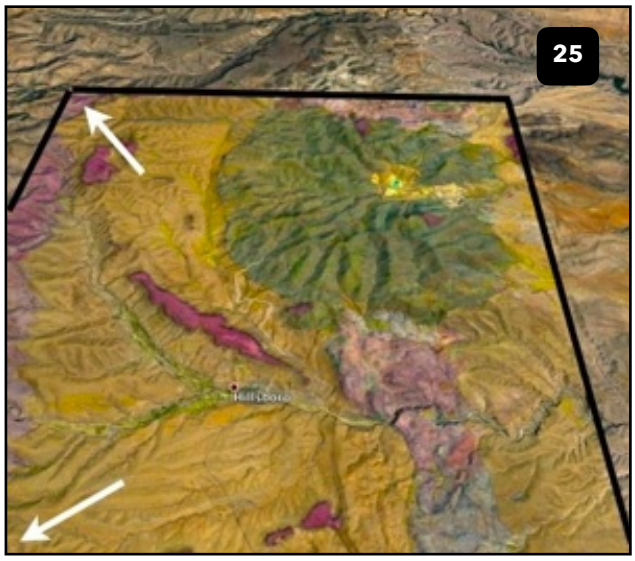
But before we jump ahead, let us address the changes in the way the San Lorenzo area was depicted between 1956 and 2023. (Ignoring the changes in cultural infrastructure, new roads, new housing developments [Casas Adobes, etc.], and the change in map scale which allow the naming of more cultural items.) First of all, and somewhat amazingly, the contour interval is the same in both maps (despite the difference in scale), 40 feet. The definition of elevation interval was maintained.



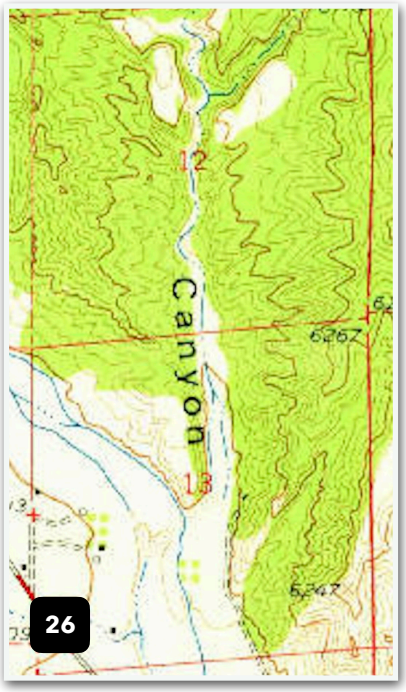


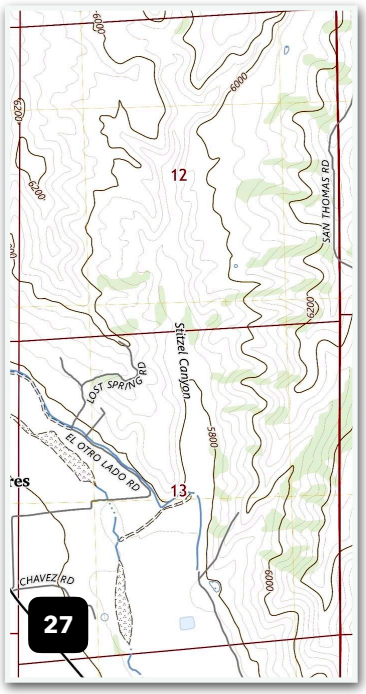


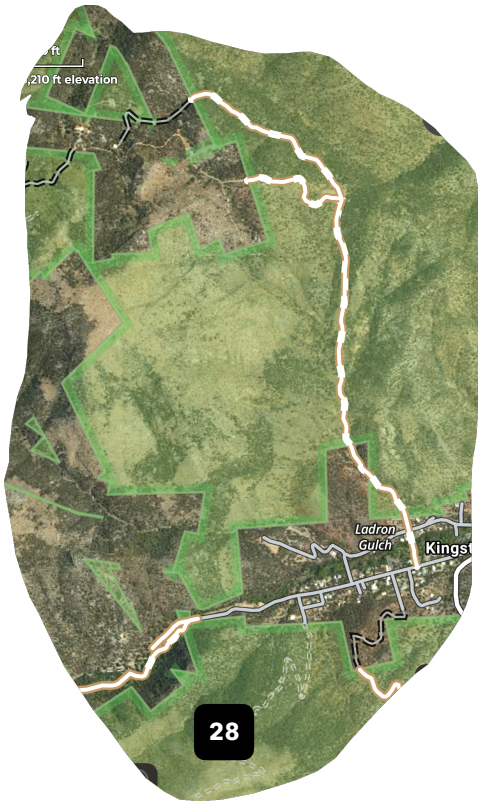




In 1956 the Mimbres river was shown as a perennial river. In 2023 it is shown as intermittent in places and as a "wash" in others. In places the flow of the river (blue line) is actually the acequia (see T17S R11W Sections 13 and 14).







Map details from the 1956 map ("26") and 2023 ("27") are shown above. The apparent difference in the area of full forestation is dramatic, but see our assessment of Google Earth images later in this article.

Elevation points and benchmarks shown on the map of 1956 are not shown on the map of 2023.

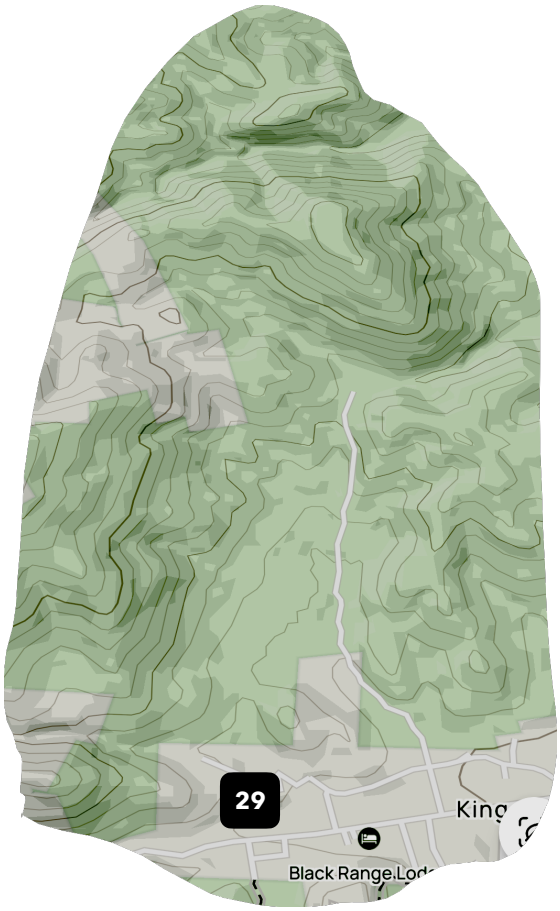
Popular Map Applications

Paper has given way to the screen of digital devices. A screenshot of the area around Kingston is shown above right ("28"). It's an image from the onX app community. This particular image is from the onX series for 4X4 enthusiasts and "off-roaders". The layers (over a base satellite image) are optimized for the type of information that community uses regularly. Customization is possible. The image at the bottom right ("29") is a screenshot from the All Trails app. In this case it shows cultural features (including foot trails) and topography depicted with vegetation shading and elevation contour lines.

Most of these maps are using data layers on top of some type of base layer. The base layer may be a topographic map, a satellite image, actually anything you wish. An additional layer(s) of information is synchronized with the base level to depict additional content. This is the same technique (augmented over time) that we (meaning, Jon Barnes) utilized in 2015 to enhance Google Earth images with geologic map overlays (see "25").

Nearly all of the popular map applications allow the user to add additional information to "their" database and to output that information in some manner. The user can add photographs and "attach" them to a particular location, or a note, or a waypoint, which can enable the user to utilize a variety of assessment techniques.

Many digital devices allow the user to apply information (make notes, circles, whatever) to a screen image.



Assessing Changes Over Time

Earlier we showed the apparent differences in forestation in T17S R11W from 1956 to 2023 (maps "26" and "27"). The two map details shown may represent actual changes, but that does not comport with our understanding of the way these changes manifest. Instead, we believe this is a mapping artifact of the 1956 map.

Using Google Earth we looked at these areas from 1985 to 2023. We did not see major changes in vegetation in this area using those images. This is juniper-piñon habitat and except for intrusions associated with human habitation it remains basically unchanged (land usage - for example, excessive grazing - does not show at this level of detail).

We believe that there are landscape changes which can be assessed using technologies like Google Earth, even if the Stitzel Creek assessment did not show dramatic change. To test this supposition we checked the area north of Kingston which we used in our comparison of apps and the discussion of their research potential.

From 1985 to 1996 the Google Earth imagery used Landsat data and the resolution is not what we generally expect today from satellite images (see "30" from January 1985). In 1996, Copernicus Data was added to the mix and resolution increased dramatically (see "31" from September 1996). Copernicus is a European Union system and data set and its utility as a research source may be more stable, in the foreseeable future, than data sets and data analysis created and maintained by the United States.

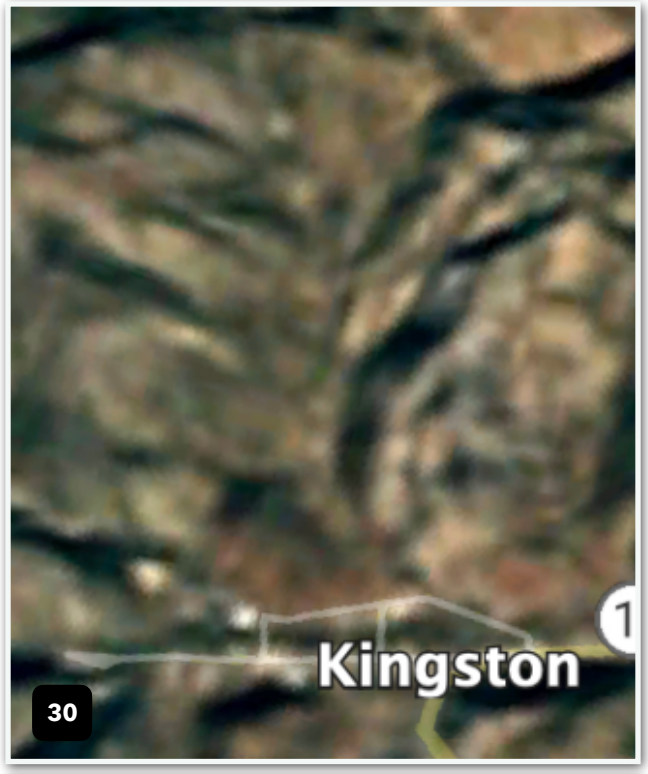
By July 2005, imagery was quite detailed (see "32"). This data is from NMRGIS.

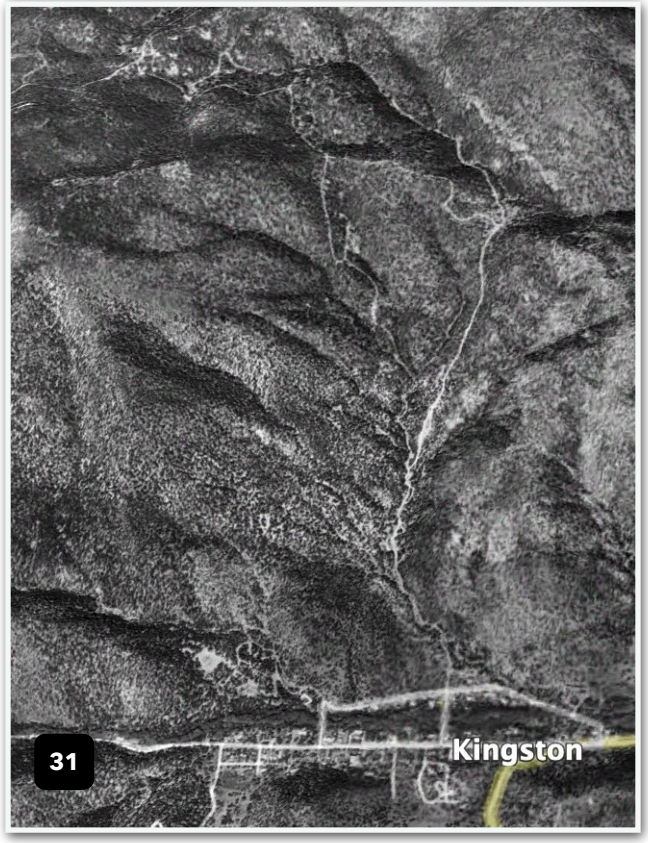
Changes associated with the Silver Fire were dramatic, as shown in the image from November 2014 ("33"). An image from January 2023 ("34") shows some vegetative recovery over the intervening 8.5 years.

This type of tool can be useful in accessing changes over time but is limited by the short period over which data are available. Images from the last thirty years have enough resolution to be useful at large scale, but visual granularity is limited.

Google has introduced a new tool which provides a more robust time lapse assessment of change. Watch a sample of this tool from the area discussed above at this link. Part of the data used in this new tool is the same as that discussed above, so you can see the changes in visual resolution occur quite dramatically.

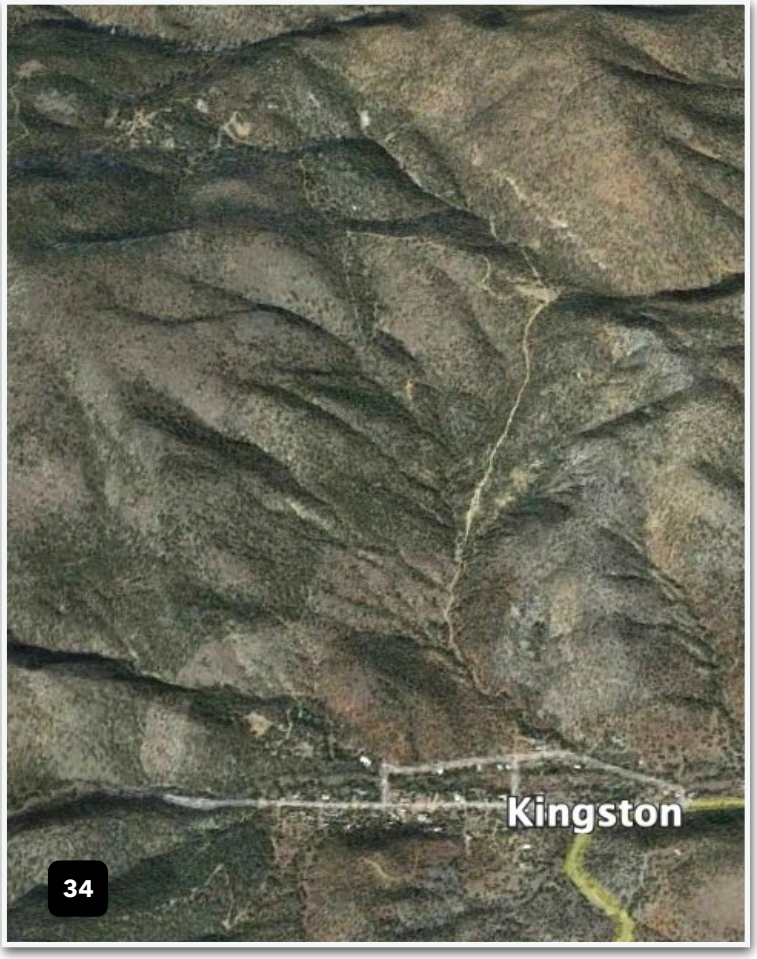
The Copernicus browser provides access to various visual filters and augmented data sets to enhance the usefulness of the visual images. Take for example, the application of filters which allow the assessment of moisture (see "35" as an example of the application of the moisture index). The scene assessment ("36") also tracks the moisture index. In the scene assessment, green equates to vegetative cover and yellow equates with rock and bare earth. The short wave interval composite imagery ("37"), which is one tool used to assess amount and type of vegetative cover, tracks the moisture assessments as do other vegetative cover assessment tools.

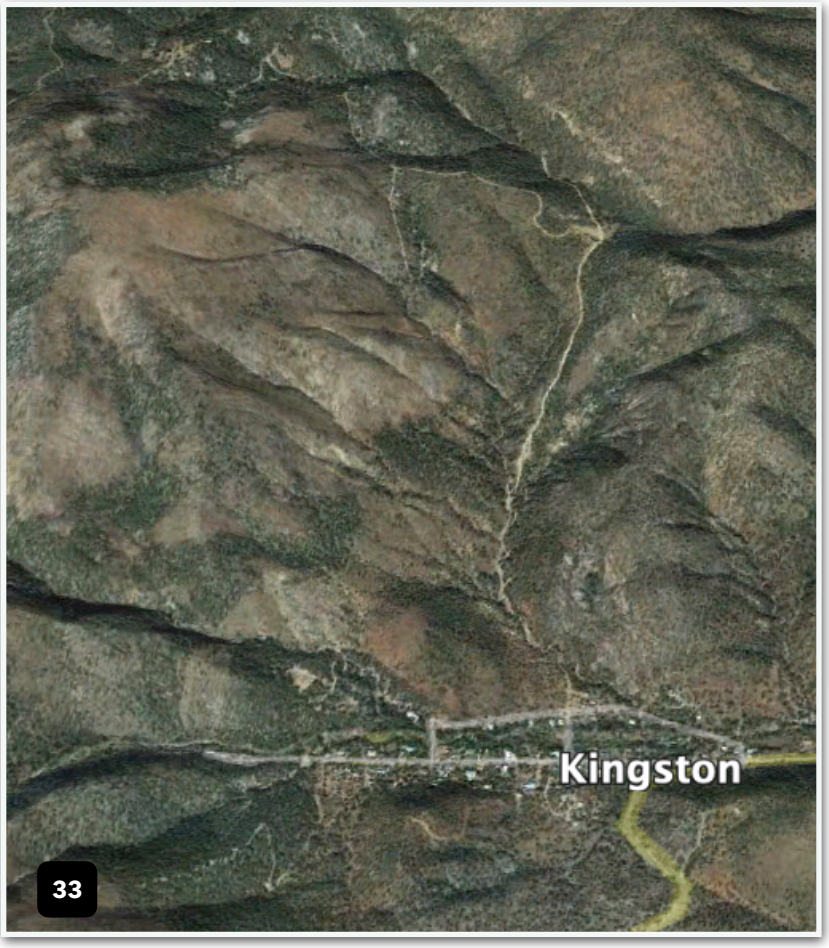


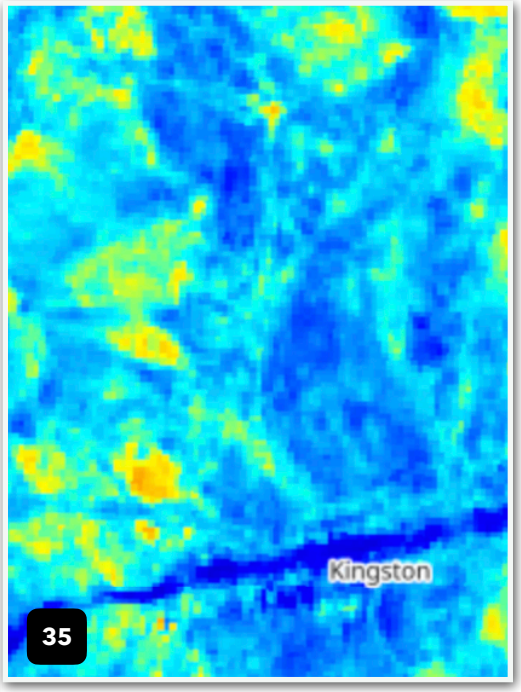


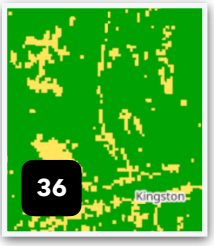
These tools and others discussed previously in this journal allow large scale assessment of vegetative cover, temperature variation, moisture, and other data sets at greatly reduced cost and significantly enhanced efficiency and effectiveness. Such tools are a good investment.

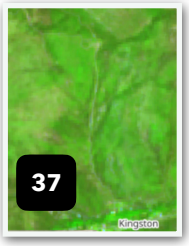

32
Kingston


34
Kingston


33
Kingston


35
Kingston


36
Kingston


37
Kingston



Exuvium

On 09 August 2025 I was gazing lazily out a window feeling good about not being outside where the temperature was 101° F. when I noted something on a seedhead of grass. I looked at the object for about fifteen minutes, listening to a podcast about bird migration and feeling quite content. After some time I was able to convince myself that it was a bug, of some type, with a long proboscis which it had inserted into the seedhead. Its form was "weird" (a technical term I am lobbying to add to the official glossary of entomology).

At the end of the podcast my curiosity overcame my inertia; I grabbed my camera and headed outside.





Ecdysis is the process an arthropod goes through when it moults. When an arthropod grows too large for its skin, the skin splits, the arthropod emerges, and its new (larger) skin hardens. This explanation is overly simplistic - and not the topic of this article. The topic is that which is left behind.

In previous issues of this journal, James Von Loh photodocumented and explained this process as it relates to the Odonata found in the Black Range and Doña Ana County.

That which is left behind, the old skin, is called the exuvium, and it was the exuvium which I was seeing on the seedhead. In this case the exuvium of a cricket or grasshopper (that is a thumb in the image to the left).



But that was not obvious to me immediately. In fact, it did not become clear until I changed my camera angle to take the image at the bottom of this page. When I saw the gaping hole where the body should be I knew immediately what I was looking at but I was also astonished. Something about the drama of the event permeated what was left behind.

Prior to understanding that this was the exuvium of a hopper of some type I worked out that the proboscis at the top was not that at all, rather I was looking at the hind legs of a creature. I was assuming at that point that the creature was alive, adding to a bit of photographic tension as I endeavored not to scare it. Preconceptions and stereotypes can make you out to be such a fool.

There is a lot to be gained from the study of an exuvium. When I think of "what's left behind" I tend to think of something in ruin. The detail of this shell is so delicate, so intricate, a perfect cast. The images of the head on the next page are astonishing in this respect. The compound eye is not simply a "blob of an eye", it is a compound eye, for instance.

But never being entirely satisfied with such things I can only reflect on the fact that the process of ecdysis occurred right in front of me, or at least in front of where I sometimes sit, and I missed it - that would have been something to video!!













Sora in Kingston

On 22 August 2025, Linda Sweanor found this dead Sora on a street in Kingston, only 25 feet from the middle fork of Percha Creek. How it came to be there is unknown.



Spine-tipped Dancer Field Verification

Volume 2: The Damselflies **of the two set** ***Odonata of Doña Ana County and the Black Range*** **was published in September 2025. It and its companion volume on the dragonflies is available for download at the Black Range website.**

During the last stages of our edit of that volume Jim Von Loh captured some images of a Spine-tipped Dancer, *Argia extranea*, (Hagen, 1861) near the Aguirre Springs Campground in the Organ Mountains. One of his photographs of this record is shown at the center right.

This is his (Von Loh's) account of what happened following his posting of the observation to iNaturalist.

"Following my posting (07/24/25) of a damselfly image to iNaturalist that was identified as Spine-tipped Dancer, I received an email communication from Jonathan Batkin, as follows: 'Jack Holloway texted me late last night about your post on iNaturalist of a Spine-tipped Dancer. That's yet another great find, as there are only two fully accepted records of it in New Mexico. I am considering driving over there to check the area where you found it. It looks like the trailhead is accessed quite easily. How much water is in this location, and is there any permanent or at least reliably seasonal water in the area? This specimen looks so fresh that it's hard to believe that it blew in from somewhere else.'

"Jonathan, Gordon Berman, and I met at the Dripping Springs Visitor Center, then drove over San Agustin Pass to the Aguirre Springs Campground parking area to commence the short hike up Pine Tree Recreation Trail, into Sotol Creek. I showed the exact habitat to Jonathan and within a minute or so he had observed a male damselfly and began collecting photographs with his motor drive whirring. He carefully checked his images to assess their quality and also to make a positive identification of this damselfly from diagnostic characteristics. They met Jonathan's parameters, and we then documented the habitat geolocation using a hand-held Global Positioning System receiver (Garmin Etrex SE). Jonathan's images and habitat/location information will soon adorn the Odonata Central database!"

Von Loh's photo at the bottom of this page is captioned: "First contact between the affable Spine-tipped Dancer and fully-focused Jonathan Batkin. It's kind of a tight fit for a human, a spacious home (with running water and a view) for a damselfly. And the habitat visit became a total success in the mid-morning light - thanks to our gracious damselfly host."







Acrolophus kearfotti (Dyar, 1903)

Hodges #0357

Earlier in this issue we discussed the difficulties of arriving at the species, or even the genus, level of identification. In the case of *Datana perspicua* (Grote & Robinson, 1865) we finally arrived at a satisfactory determination. On 18 July 2025 we started a similar process by taking the photographs shown on this page, and the following pages, in Hillsboro.

Again the culprit was a moth, a small moth. I reached out to the usually authoritative websites and to various subject matter specialists. Some felt this moth might be in the genus *Givira*. This link is to the BugGuide page for that genus.

BugGuide (Bob Biagi) responded with the genus *Acrolophus*, Tubeworm Moths. Follow the link for additional information and note that there is a long column of "synonyms and other taxonomic changes". BugGuide lists 53 species in this genus in the eastern and southwestern parts of the U.S. Several more species within the genus are awaiting description. The image galleries for the genus match well with the individual shown here. Range information on many of the species is minimal to nonexistent. iNaturalist provides an identification key for 19 of the eastern species. The iNaturalist reference notes "There are several undescribed species, and identification in the West is challenging due to the lack of available references."

Butterflies and Moths of North America (BAMONA) responded with *Acrolophus kearfotti*, a new species for New Mexico. The individual shown here is darker than the images of this species I have found, but the general patterns are right.

But let me digress from the substantive topic of moth identification to note the substantive topic of community.



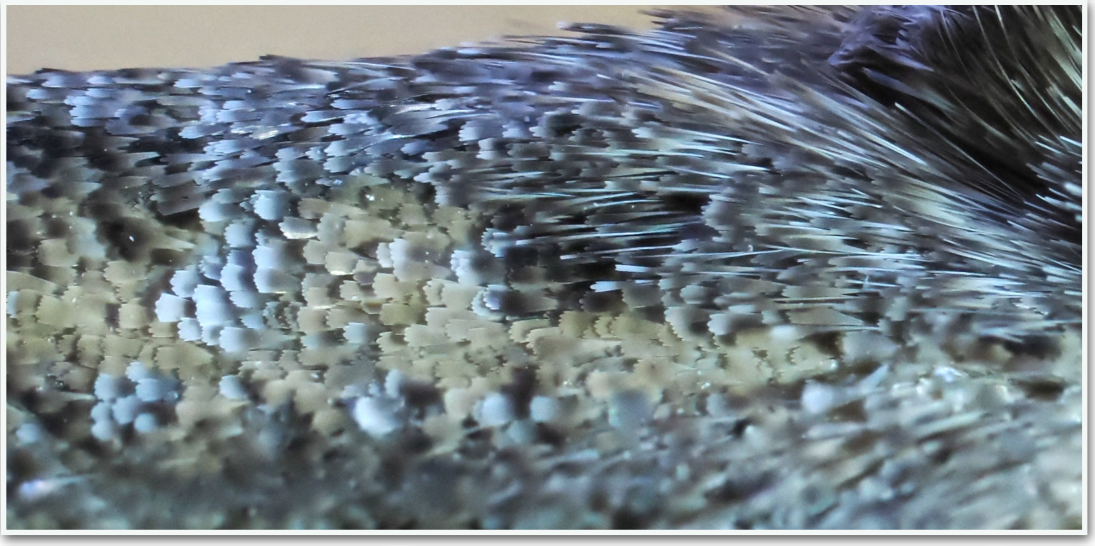
My inquiry went out at 10:22 A.M. on 18 July. On the 19th I received a response, which involved reaching out to another level of contact, and on the 20th I received another - both responsive to the (difficult) "technical issue" of identification. My inquiries to BugGuide and BAMONA were responded to the same day. I personally find this amazing. I am by no means an entomologist, and approach the field with trepidation, but even with my lack of standing in the field, knowledgeable (busy) people took the time to review and comment. (And I might note that several others responded with useful suggestions about how to proceed with the identification question.)

The images on this and the next two pages are those which I posted with my inquiry.

Thinking small for a moment, this moth was about 10 mm long. I cropped the top image on the next page for the detail images on that page. At this point we are getting small, really small.

The center and bottom left photos on the next page show several characteristics of moth scales. These scales are chitin-based, overlap, and cover (other than eyes and such) the bodies of moths. Sooooo .... Small, think really small. There may be a theme developing here.

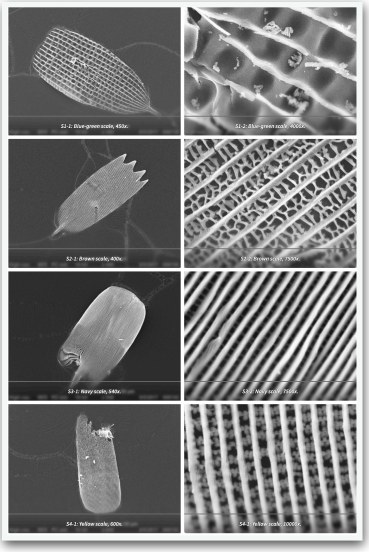




Moth scales provide camouflage, insulation, and thermoregulation. They also reduce drag when the moth is in flight. We generally do not refer our readers to commercial sites, but in this case we refer you to the McCrone Group website, and in particular the McCrone Atlas of Microscope Particles. Not only am I loathe to repeat what they have already said, I could not do it any better.







Images of moth scales from the McCrone site.





"The universe is full of magical things patiently waiting for our wits to grow sharper."

-- Eden Phillpotts*

*** See next page.**

***Eden Phillpotts wrote this in 1918 in *A Shadow Passes* (p. 19). It appeared in the following passage, in which he describes *Menyanthes trifoliata* (Buckbean):**

> **"In the marshes the buckbean has lifted its feathery mist of flower spikes above the bed of trefoil leaves. The fimbriated flowers are a miracle of workmanship and every blossom exhibits an exquisite disorder of ragged petals finer than lace. But one needs a lens to judge of their beauty: it lies hidden from the power of our eyes, and *menyanthes* must have bloomed and passed a million times before there came any to perceive and salute her loveliness. The universe is full of magical things patiently waiting for our wits to grow sharper."**

Why is this important? Because similar phrases are attributed to Bertrand Russell, "The world is full of magical things patiently waiting for our wits to grow sharper" and to William Butler Yeats, "The world is full of magic things patiently waiting for our senses to grow sharper." Attributions of the basic phrase still recognize Russell and Yeats, even though they just repeated it (with the smallest of changes). Why? Such attributions often appear in "quote books" and, apparently, quotes by Yeats and Russell sell better than those by Phillpotts.

Hats off to Phillpotts (or to whomever actually said something like it originally) because the phrase captures the excitement the unexpected generates in me. The process which follows is often one of error, error, repeat it's an error, nope, wrong, nice try, error – but gradually something comes out of this process.

In "6 questions about consciousness with Annaka Harris" (Max Tegmark's interview with her in *The Mystery of Being You* on bigthink.com) she describes the scientific process better than most.

> **"The scientific method is the only self-correcting system we have for expanding our understanding. It has its flaws, but it's also humble. It expects to be proven wrong as part of the method for uncovering truths. That's what makes it so powerful.**
>
> **There's something exciting about realizing that something you felt 99% sure about wasn't quite right – or was entirely wrong. It paves the way for new questions and better understanding. If we're willing to admit we have made incorrect assumptions and apply our tools more creatively, we might finally get somewhere. We might start seeing the Universe for what it is – maybe even as conscious."**

This is a process of discovery. Want to know what species a small moth is? Enviable. But don't forget to stop along the way to hear from many others, muse at scales you can barely discern with the naked eye, or wonder who really said what.

Identifying small moths is not something I want to spend a lot of time doing. I will leave that to those who have a passion for that pursuit. But it occurs to me that entomologists may have more experience in ferreting out the truth from small hints than I.

Hunting and Gathering - Stories about conservation, hunting and fishing, work and play . . . about life in the Southwest by Bob K. Barsch

In our last issue we reprinted "Fire Species", one of the essays from Barsch's book. Bob Barsch gave us permission to republish another essay from *Hunting and Gathering*. This on "counting", a tool of the trade. From the book:

Of Poults and Pineseeds

The land is full of mysteries and numbers are the key to its secrets.

In 1986 as I walked around the piney woods in the Flagstaff area in mid-July, I noticed green cones on the larger ponderosa pine trees. I have a somewhat compulsive nature when it comes to counting things so, I decided to determine the percentage of ponderosa pine trees that had green pine cones.

I selected two sites for my counting, one near Williams, Arizona at the lower range of ponderosa pine and another near Flagstaff where ponderosa pine grows at higher elevations. At each site, I simply walked through the woods in a somewhat straight line and selected one hundred trees that were at least as wide at chest-height as the distance from the top of my fingers to my elbow. At each tree, I looked up into the green boughs with binoculars and searched for green pinecones. If the tree had cones, I put a dot under "with cones" and if the tree had no cones, I put a dot under "without pine cones". Pure science. These were happy times: I felt good counting.

Indeed, I was happy knowing that there were two spots on the earth where I knew more about cone production by ponderosa pine than any one else in the world. I was a pioneer. I had pushed back the curtain of ignorance! Knowledge of the universe was in my hand! In fact, the counting was so much fun that I did it the next nine summers.

One day I noticed (after nine years) that I had a lot of dots on the subject of ponderosa pine cone production. So, I added up the dots by year and found that cone production was highly variable. There were two years when eighty-five to ninety-five percent of the trees had cones and two years when none of the trees had cones. The percentage of trees with cones during the remaining years varied between those extremes.

I also read some articles by other people who like to measure and count things. These particular articles said that ponderosa pine takes two years to produce cones. The little female flower or "conelet" is produced in the spring of the first year, goes through the next winter in its virgin conelet state, and is then pollinated the following spring. By mid summer of the second year the fertilized cone grows to full size and begins to drop seed in the latter part of the following October. This delayed form of reproduction fascinated me, but then, a lot of things fascinate me that bore other people to tears. Plant sex - wow!



Another example: As I happily surveyed deer at Mount Elden one wintry December morning immediately after a windstorm, I noted a thing of interest. The earth had about a foot of snow on it and on top of the snow was a fair scattering of fresh, dark brown pine seed. My first impulse was to randomly establish plots in the snow and count the little brown seeds in each selected square meeter. But, I repressed the feeling for fear that the snow would melt before I finished counting. I felt the longing, and remorse of the artist who fails to capture the beauty of a fading sunset. To quote Goethe: "More light! More light!" Actually, that is not so profound - I once had a pet raccoon that could turn on an electric light.

Back to enlightenment. I did have a vision at the time of wild turkeys walking around on a crust of snow picking up the pine seed. The vision was not real, but the probability was. With a single observation, I realized that ponderosa pine cones did not release all of their seed in late October. These seed could be available for wildlife use into winter when deep snow covers the earth.

The thrill of discovery in this case was tied to one observation or to what is known among mathematicians as the "marble statistic" - it only takes one marble to tell which way the floor is leaning. Mathematics on a roll?

Of course, one person can not count everything. He or she must rely on what others have counted, measured, and observed. Thus, we have the joy of reading - and I have read that ponderosa pine seed are the primary food source in winter for wild turkeys in South Dakota.

Dr. Mark Rumble, another person who likes to count in South Dakota, determined the number of calories per gram for the mast of several plant species, including manzanita fruit and seeds, ponderosa pine seeds, and overcup oak acorns. Of these sources of calories for wildlife, the seed of ponderosa pine was highest in calories per gram. In fact, ponderosa pine seed was believed to be the number one reason wild turkeys fare so well in the Black Hills of South Dakota. So, after reviewing the information and after nine years of compulsive behavior, I decided it was time to connect the dots.

I tallied all my dots by year for ponderosa pine for all trees with and for all those without green cones in mid-summer. For each year, I matched the percentages of pine trees with green cones with the numbers of poults per wild turkey hen surveyed the following summer in the Flagstaff area. With nine years of data, I found a link between the pine cone surveys and the numbers of turkey young per hen surveyed the following summer.

On another occasion when I was surveying deer in winter near Williams, I happened upon another "marble statistic". I noted wild turkeys feeding in dead needles under pine trees. I also noted nearby that Clark's nutcrackers were doing the same. The latter species of bird also feeds on pine seed. These observations piqued my interest because I had not recorded any trees with green cones the previous summer. I guessed that the birds were feeding on ponderosa pine seed and that the seeds were over a year old.

To evaluate the possibility that turkeys feed on two-year-old seed, I reran the analysis of pine trees with cones and turkey poult data. This time, I arbitrarily multiplied twenty percent times the percentage of trees with green cones each year and added this value to that of the next year. The transformed pine cone data did a better job this time; they now explained forty-nine percent of the variation in the numbers of poults per turkey hen. The chances of having a match between pine mast production in the fall and poults per hen the following summer rose to ninety-seven out of one hundred. In the world of wildlife statistics, these odds are almost as good as a marble roll.

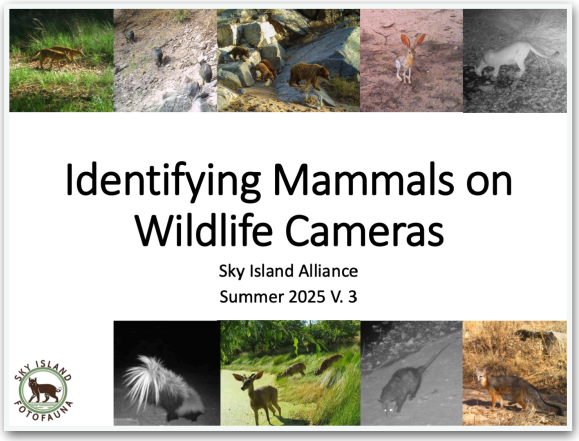
And, because we're on a roll here; notwithstanding the mental image of a fastidious dung beetle, a valid question would be: "What does all this counting have to do with wildlife management?" Well, if heavy pine seed crops translate to higher turkey poult production and survival, perhaps we need to look at what it takes to produce more pine seed.

In 1960, researchers with the Rocky Mountain Forest and Range Experiment station near Flagstaff found that ponderosa pine trees twenty-eight to forty inches in diameter produced ten to twenty times more cones than did trees that were smaller in diameter. We can deduce a problem when we note that smaller trees now comprise 97 percent of the ponderosa pine forests in the Flagstaff area and that the larger yellow-bark pines are relatively few and far between. Of course, I am not saying turkeys need "old growth". They just need big, old, live ponderosa pine trees. Is that too much to ask?

I will close with a note of support for two of my colleagues who do a lot of counting. Brian Wakeling and Tim Rogers intensely studied the winter habitat relationships of Merriam's wild turkeys along the Mogollon Rim in Arizona from 1990 to 1994. They found that turkeys did not search for pine seed but sought out Gambel oak acorns and juniper berries when the latter kinds of mast were available and pine seed was in short supply. During their study, Wakeling and Rogers found a pound of pine seed or less per acre where turkeys fed.

By contrast, turkeys in old-growth ponderosa pine might find up to twenty-five pounds of pine seed per acre in good years. The data indicate that good years of pine seed production are generally good years for turkeys, for turkey poult population, and for increases in turkey populations. I think we can count on those probabilities and, if not, at least we will have fun counting.

Identifying Mammals on Wildlife Cameras



Whether they are involved in casual "see what is out there" or more structured surveys, many observers use motion activated cameras (trail cameras) as non-intrusive assessment tools.

Camera observations can be a challenge sometimes (and I am not talking about a camera knocked upside down and recording a Black Bear apparently walking across the top of the video, completely unconcerned that several laws of Newtonian physics predicted that it would fall to the ground at the bottom of the video).

To help us identify those images the camera has worked so hard to capture, the folks at Sky Island Alliance have produced a great .pdf, *Identifying Mammals on Wildlife Cameras*.

Desert Stalked Puffball, *Battarrea phalloides*

The *Battarrea phalloides* ([Dicks.] Pers., 1801) shown on this and the following page was photographed in Hillsboro on 07 September 2025. The species was first mentioned in 1784 in an article by Thomas Woodward, noting a new species found by Humphreys - in Norwich, England. James Dickson first officially described the species in 1785, as *Lycoperdon phalloides*. In 1801, Christian Persoon transferred the species to the genus *Battarrea*. This species has a wide distribution; it has been found in Africa, Eurasia, Australia, and in the Americas. It is found in dry sandy habitats.

This species is known by a number of common names including Scaley-stalked Puffball, Sandy Stiltball, and the common name generally used here, Desert Stalked Puffball.

The above-ground height of this species averages about 16", but a specimen found in Mexico was 27.6" tall. The specimen shown to the right is about 10" tall, and the one shown below was 12" tall.

The spores are ochre in color and are dispersed by the wind.



As shown here, the covering over the spore case has split and sits on top of the case.

In the photograph directly below, the cover has come



off and lies at the left side of the image (see also the photograph second from the bottom right on the following page). Spores have dispersed and their ochre color is clearly visible.

The photograph at the top right on the following page shows the spore case with a detail below that. Additional photographs at this link.













Updates and Tidbits

Bats

In our July 2025 issue we published a survey of the Bat species found in our area. The following tidbits and updates have come to light since then.

Wind turbines kill an inordinate number of bats every year. In fact, it is posited that they are the single greatest cause of bat deaths every year. But why? Per Kristin A. Jonasson et al. (Jonasson Kristin A., Corcoran Aaron J., Dempsey Laura, Weller Theodore J. and Clerc Jeff. 13 August 2025 "Bats flying through a Y-maze are visually attracted to wind turbine surfaces" *The Royal Society Biology Letters*. http://doi.org/10.1098/rsbl.2025.0242) it is the light reflecting off the blades. Bats are attracted to light at night, wind turbine blades are massive, spin very fast (when looking at a wind turbine blade, look at the tip of the blade to determine its speed) and reflect moon (or any other kind of) light. Bad news for the bats. The conclusions of the study are not based on the correlation of data sets but rather very rigorous experimentation.

One of the bat species found in our area is the Big Brown Bat, *Eptesicus fuscus* (Beauvois, 1796). The genus has been split into three. The change does not affect the Latin binomial of the species found here. The Mammal Diversity website notes: "Whether *E. fuscus* as currently defined represents a species complex is needed *(to be determined*) before species are split from it; *E. fuscus* is retained in the genus *Eptesicus*, while all other species in the genus have been moved to *Neoeptesicus* (American species) or *Cnephaeus* (Afro-Eurasian species)." Whether or not *Eptesicus fuscus* is split into multiple species awaits further research.

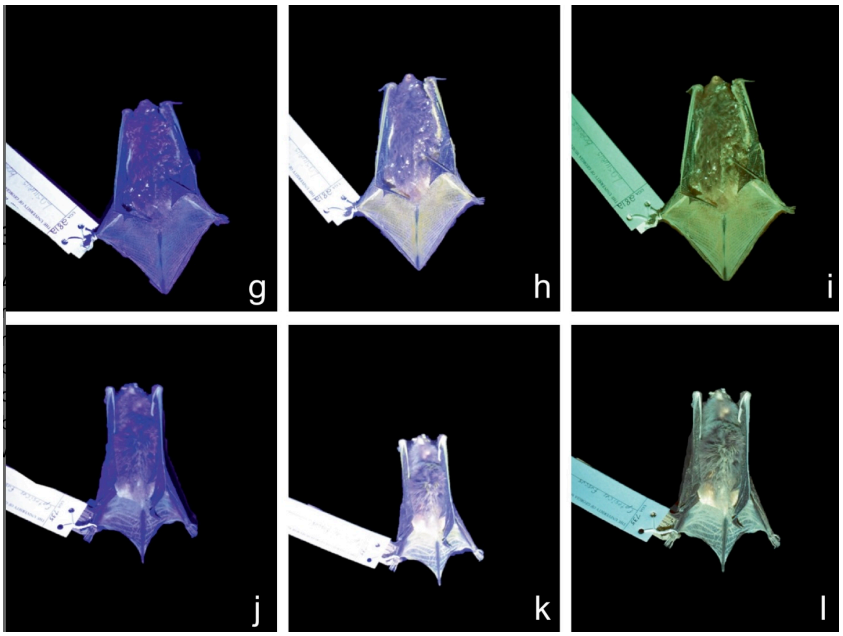
LiveScience (commercial site) has recommendations on "Best bat detectors in 2025 – Hear bats and their echolocation". We do not endorse this article but rather provide this link to present the "what's possible".

Photoluminescence is being discovered everywhere. Later in this edition of "Updates and Tidbits" we report on research findings of fluorescence in Long-eared Owls. (Photoluminescence is a broad category which includes fluorescence, light-scattering, and phosphorescence.)

B. J. Roberson, S. Perea, D. DeRose-Broeckert, and S. B. Castleberry reported finding florescence in six species of North American Bats. ("Glowing Green: A Quantitative Analysis of Photoluminescence in Six North American Bat Species", *Ecology and Evolution* e71885, https://doi.org/10.1002/ece3.71885, 28 July 2025.) Three of the bat species were included in our survey of the bats of the Black Range; *Eptesicus fuscus* (Big Brown Bat), *Tadarida brasiliensis* (Mexican Free-tailed Bat), and *Lasiurus borealis* (Eastern Red Bat).

The authors noted that: "We used museum specimens to examine wavelength at peak photoluminescent emission, within and among species. We observed green photoluminescence on the wings, uropatagium, and hind limbs of all 60 museum specimens examined. Spectral scans revealed a consistent emission peak between 520 and 552 nm corresponding to the observed green color. We found no differences in wavelength between species or sexes. Wavelength was not related to specimen age, supporting the use of museum specimens for detection of photoluminescence. Our results suggest the potential for photoluminescence to be homologous in origin among the species we examined. We emphasize the need for further exploration into potential evolutionary and functional roles of photoluminescence across mammalian taxa."

Most research in this area is focused on the what rather than the why at this point.



Caption from the article: Specimens of, Lasiurus borealis (g–i) and Eptesicus fuscus (j–l). Specimens were illuminated under 410 nm light and photographed under UV light alone (left column), under filtration using yellow-tinted UV-filtering lens (center column), and under filtration using a 470 nm longpass filter (right column). Both the graphic and caption have been modified to focus on species of the Black Range.

Blister Beetles and Cantharidin

In our last issue we provided a survey of the blister beetles which are found, or which may possibly be found, in the Black Range.

The *Meloidae* are blister beetles and were the subject of the January 2026 article in this journal. *Oedemaridae* are the "False Blister Beetles"; both they and *Meloidae* are in the Superfamily Tenebrionoidea.

H. Yazaki, K. Hashimoto, N. Sato, and F. Hayashi reported their findings about the chemical cantharidin and its role in the natural history of (among other species) blister beetles on 30 September 2025. ("Cantharidin world on bird droppings: Reused cantharidin after bird predation of cantharidin-producing insects", *Entomological Science*, 28: e12612. https://doi.org/10.1111/ens.12612.) Quoted material (below) is from this article; citations within the article are removed here.

"Cantharidin ($C_{10}H_{12}O_4$), (is) a monoterpene anhydride . . . it is produced only by the beetles of *Meloidae* and *Oedemeridae* as a defensive chemical against entomopathogenic fungi, predatory insects, and vertebrate enemies. Male adult meloids contain synthesized cantharidin, but females are unable to synthesize it and acquire it from males through frequent copulation for defense of themselves and deposited eggs from predators. In contrast, both sexes of oedemerids produce cantharidin in their bodies and there is little or no transfer of it from males to females.

"Cantharidin also functions in attracting arthropods other than cantharidin-producing beetles and forms a peculiar community, the so-called 'cantharidin world'. The members of this community interact via cantharidin."

The subject article describes many of the interactions of the "cantharidin world" and in particular how various insect species go about obtaining cantharidin when they are unable to produce it themselves. It is such a valuable chemical in the natural history of many species that they will search out any source of the chemical and ingest it.

If this type of detail in the study of natural history fascinates you this article is an excellent resource.

Humans and the Rest of Nature

"Amid global environmental changes, urbanisation erodes nature connectedness, an important driver of pro-environmental behaviours and human well-being, exacerbating human-made risks like biodiversity loss and climate change." (Richardson, M. "Modelling Nature Connectedness Within Environmental Systems: Human-Nature Relationships from 1800 to 2020 and Beyond", *Earth* 2025, 6, 82. https://doi.org/10.3390/earth6030082)

The truth of this statement punched me in the face a few years ago when we had a delivery made from El Paso to our little mountain berg in New Mexico. The driver was young, friendly, and excited. He had seen a herd of deer while driving into town. He had never seen a herd of deer. And I wondered how you can teach natural history to someone who has never experienced nature.

Sex

In a number of previous articles we have discussed the multiplicity of reproductive systems which life employs on this planet. If you can think of a variation, something is doing it. The hardwiring which some humans believe to be the norm is simply not. One of the most interesting reproductive processes involves sex change - when, for whatever reason, the sex of an individual changes during the course of its life. In "Prevalence and implications of sex reversal in free-living birds" Hall et al. (13 August 2025, The Royal Society's *Biology Letters* 2120250182) report on their findings that "By comparing internal and external morphological characteristics with polymerase chain reaction results from sex-linked molecular markers, we identified sex-reversed individuals in all five species, with rates ranging from 3 to 6%. Our findings suggest that sex reversal is a common and potentially widespread phenomenon in avian species."

To further complicate perceptions, Juvé et al. in "One mother for two species via obligate cross-species cloning in ants" (Juvé, Y., Lutrat, C., Ha, A. et al., *Nature,* 03 September 2025) report on their findings that a queen harvester ant lays eggs which hatch into two species. Through "a combination of field work, population genomic analyses and laboratory experiments (we) provide the resolution of this paradox: females of one of the species (*M. ibericus*) clone males of the other (*Messor structor*), as they need their sperm to produce the worker caste. We discuss the evolutionary history of this natural case of cross-species cloning, which suggests a domestication-like process for exploiting another species' gametes . . . producing another species' male is not an accident, but a female life cycle requirement. We suggest defining such females as xenoparous, meaning they need to produce individuals of another species as part of their life cycle."

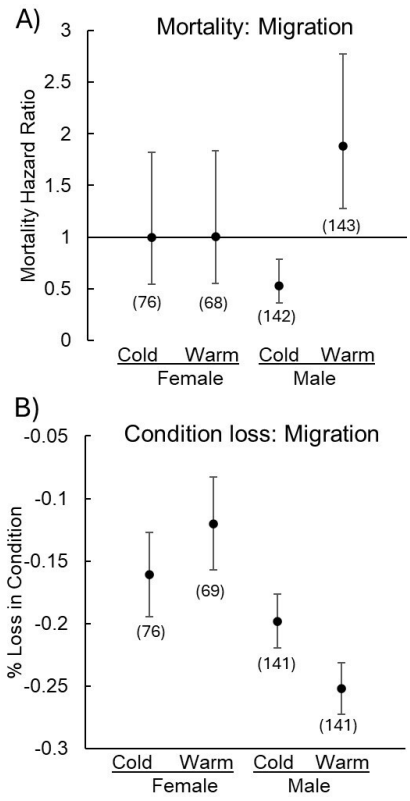
Weather

Russell Bowen, Hillsboro's resident meteorologist, provides a monthly email summary of what the weather was like in Hillsboro. In his report on the weather of August 2025 he noted: "The high temperature for the month was 102 degrees on the 5th . . . the low temperature for the month of 57 degrees was also on the 5th. The 45 degree temperature span was not due to a front in the area. Clear skies, light winds, and low humidity allowed for strong radiational cooling at night and clear skies, light winds, and strong high pressure aloft allowed for maximum afternoon heating." Large daily temperature variations are typically explained by weather fronts moving through an area. Here, things can be a little more complex than that.

Monarchs

On numerous occasions we have discussed the natural history of the Monarch butterfly. In "The impact of temperature on the reproductive development, body condition and mortality of autumn migrating monarch butterflies in the laboratory"

Michael Rich et al. (Michael Rich, Jasmine H. Kesselring, Amy Garcia, Danielle Wallin, and Kenneth Michael Fedorka, 13 August 2025, *Royal Society Open Science,* 12:250343 http://doi.org/10.1098/rsos.250343) found that "During the migratory phase, warmer temperatures reduced male body condition, increased male mortality, increased mating frequency and caused females to prematurely abandon their reproductive diapause/dormancy and invest in oocyte production in the absence of milkweed. Monarchs that experienced warm migratory conditions prior to overwintering also exhibited greater overwintering reproductive development and mortality. Overall, reproductive development and OE burden were the best predictors of death. These data suggest warm migratory temperatures significantly alter monarch physiology and fitness and provide a mechanism by which climate change could facilitate migratory failure, winter-breeding and overwintering mortality, all of which can decrease overwintering population size.



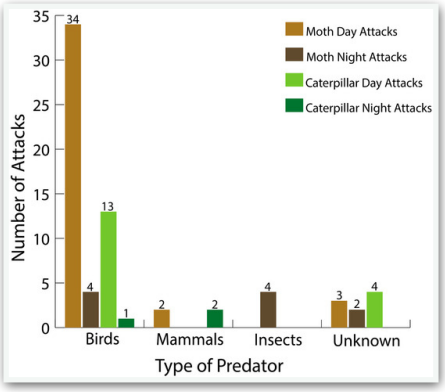
Above: Figure 2 from the cited study), shows the "Effect of migration temperature on mortality risk and change in condition".

"(A) Males from the warm migratory treatment exhibited a greater mortality risk than did males from the cold treatment. No effect of treatment was detected for females. A hazard ratio of 1 indicates no difference between treatments in the risk of dying, while a hazard ratio greater than 1 indicates a greater risk of dying. (B) Warm treatment males exhibited a greater drop in condition than cold treatment. Females exhibited no difference. Sample sizes appear in parentheses. Estimates are LSmeans + 95% CI."

Climate change is bad news for Monarchs.

White-lined Sphinx Moths

"Complete metamorphosis has been hypothesized to be advantageous for numerous reasons, including reduced predation between the different stages . . . We found that most attacks occurred during the day and that the chance of adult moths being attacked was more than twice that of caterpillars. Our study supports the hypothesis that non-adult stages may have reduced predation risk; however, our methodologies are only appropriate for assessing visually guided predators." (Sanchez, B.A.; Da Cunha, O.; Savage, J.W.; Horne, L.M.; Saenz-Arreola, S.; Pollard, K.; Neria, O.; Duffendack, S.; Terrazas, S.; Diaz, J.M.; et al., "The Dangers of Growing Old: Adult Moths Face Higher Predation Pressures than Caterpillars in Hyles lineata", *Insects* 27 March 2025, *16*, 347, https://doi.org/10.3390/insects16040347)



Above: Figure 3 from the above study. When birds are the predator, moths are at much more risk than the caterpillar of the species.

Social Learning in Birds

There are numerous research papers which describe the learning process in birds. In our yard, we have watched as multiple species have learned to access non-traditional foods by watching other species (not a controlled experiment obviously).

Barbara C. Klump, David Walter, John M. Martin, and Lucy M. Aplin report the learning of complex material manipulation by cockatoos in "Emergence of a novel drinking innovation in an urban population of sulphur-crested cockatoos, Cacatua galerita", 04 June 2025, *Biology Letters* (The Royal Society), 21:20250010, http://doi.org/10.1098/rsbl.2025.0010). In short these Sulphur-crested Cockatoos learned how to operate a drinking fountain, a process which required multiple steps to successfully complete. Apparently they first learned the process by watching humans and then by watching each other. Drinking from a fountain has become part of the culture of this group of birds - that is, the ability will continue within the society even after practicing individuals die.

Some of the conclusions in this study appear to overreach (to me) but the basic determinations are sound.

The following quotation from the text caught my eye: "Vladimir Pravosudov, a behavioral ecologist and expert on avian cognition at the University of Nevada, Reno . . . (who noted that) . . . Even though crows may be just as smart, they do not have the physical tools parrots have at their disposal to manipulate objects. . . . The way they can use both their beaks and feet makes them more equipped for this type of behavior." (Reported by Jack Tamsiea in *Science*, 03 June 2025.)

Everything we have done to the Earth may come down to the fact that we have opposable thumbs.

Evolutionary Processes

In "Adaptation repeatedly uses complex structural genomic variation" Zachariah Gompert et al. describe a process which has profound, and mind-bending, implications. (*Science*, Volume 388, Issue 6744, 18 April 2025.)

The starting point of this study was the identification of color morphs in a stick insect. "*Timema cristinae* is a wingless, plant-feeding stick insect that exhibits two color-pattern morphs that are divergently adapted to two different plant species. On the plant *Adenostoma fasciculatum*, one often finds a striped color-pattern morph of *T. cristinae* that is green but also bears a longitudinal, white stripe on its dorsal surface. Past work has shown that this morph is cryptic on the thin needle-like leaves of *A. fasciculatum*. On an alternative host, the larger and more tree-like *Ceanothus spinosus*, one often finds an unstriped morph that is green but lacks the dorsal stripe, making it cryptic against the broad leaves of *C. spinosus*. Thus, the color-pattern morphs are adaptations to different hosts that promote camouflage and survival in the face of visual predation by birds and lizards. Both these morphs are found on two different mountains (Refugio and Highway 154) near Santa Barbara, California."

In the case of the two study sites the populations are isolated from each other and the development of the morphs appears to have occurred after the populations became isolated.

The authors note that "The fit of organisms to their environment is a hallmark of adaptive evolution. Moreover, such local adaptation can lead to the emergence of new species and thus create biological diversity. The genetic basis of adaptation is of interest because it can affect the dynamics of evolution, including its rate, mode, and repeatability."

The authors performed an extensive genomic study which included an assessment of structural variants like inversion, translocation, and inverted translocation. They also assessed the genome position of samples from the populations. These assessments supported the concept that the morphs were of repeated origins, not from a single origin which then spread to all populations.

The authors note: "We hypothesize that structural variation plays a more important role in evolution than presently recognized, particularly because of its diverse effects on fitness, such as influencing meiosis, disrupting genes or gene expression at breakpoints, and capturing multiple segregating mutations within inversion haplotypes. Indeed, our findings suggest that structural variation could be an abundant, diverse, and widespread source of genetic variation, providing fuel for evolution. Moreover, such variation may arise repeatedly to provide an element of predictability to adaptive evolution."

A warning to those who wish to dive into this study: it is a bear - unless of course you have a background in this field of study. In the last few decades, there has been a significant increase in our understanding of evolutionary processes and in particular their complexity and diversity.

Increasingly, there are studies which argue that the structure and mechanics of evolution make it easier for some traits to evolve, and some argue that this is true to the point of being predictive. I do not agree with this line of thought and find it disturbing. Generally, I find that such studies suffer from a survivor bias.



Figure 1. Long-eared Owl wing under ultraviolet light, illuminating the fluorescent pigments visible on the underside of the wing.

Fluorescent Pigmentation in Long-eared Owls

Emily V. Griffith et al. reported on their study of fluorescent pigmentation in the feathers of Long-eared Owls in *The Wilson Journal of Ornithology* (E. V. Griffith, N. Mackentley, C. M. Neri, B. M. Canfield, and A. R. Lindsay, 2025, "Fluorescent pigment concentration correlated with age, sex, and size in Long-eared Owl (Asio otus) plumage", *The Wilson Journal of Ornithology,* 137(2), 133–143. https://doi.org/10.1080/15594491.2024.2444031).

The image above is from the cited study and shows the fluorescence of a Long-eared Owl wing when viewed with an ultraviolet light.

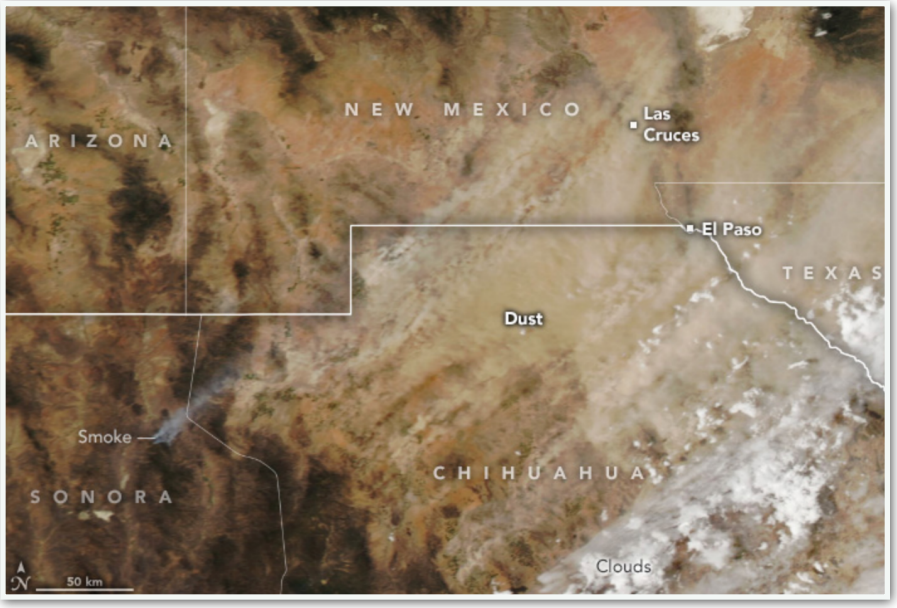
The study proposes several reasons these owls might have fluorescent wings. (As an aside, we should note that the prey [mammals] of these owls are not known to see in the ultraviolet spectrum, so they don't see the sky light up with fluorescence before they die. Other owls can, however, which leads to various hypotheses about dominance and sexual selection.)

Dust Storms

On 30 April 2025, Adam Voiland, writing for the NASA Earth Observatory, noted the assessment of Thomas Gill, an environmental scientist at the University of Texas - El Paso. Voiland wrote that "He said this latest event is the tenth 'full-fledged dust storm' of the year in El Paso, meaning it was dusty enough to restrict visibility to less than half a mile. For comparison, the average is 1.8 storms per year. 'You would have to go back to 1936 – during the Dust Bowl – to find a year with more,' Gill said. 'During the

Dust Bowl years of 1935 and 1936, El Paso had 13 and 11 dust storms, respectively. . . .' Unusual drought and windy conditions are fueling the surge in dust. 'We're in the worst drought we've seen in at least a decade, and this March was the windiest we've seen in more than 50 years,' Gill added.

The Aqua - MODIS array captured the image of one of these dust storms on 27 April 2025, shown at the right.



Charles Wright and a Cuban Anole

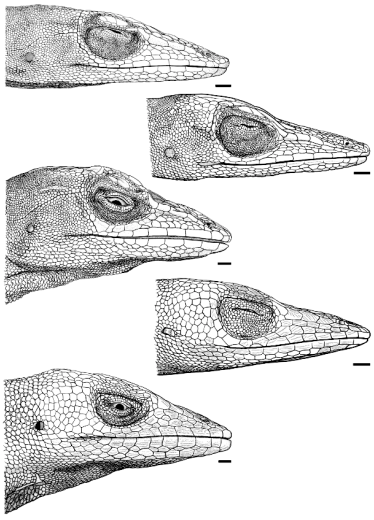
"In 1851-1852, Wright was associated with the United States and Mexican Boundary Survey. He joined Col. J. D. Graham in San Antonio, Texas, in May 1851 and traveled with that expedition to El Paso along the southern wagon road. In July he and Graham left El Paso to join Boundary Survey Commissioner Bartlett at the Santa Rita Copper Mines. On July 28, he was in the Rio Grande Valley at Doña Ana . . . ." Pages 62 - 66 of the Early Naturalists of the Black Range are dedicated to Charles Wright. He was, after all, one of "our" naturalists.

Apparently Wright had a life outside of the Black Range. In "How a 162-year-old Specimen Helped Prove the Existence of an 'Incredulous' Lizard Species", Benjamin Hack describes recent work at the Smithsonian with ties to our naturalist (*Smithsonian Magazine*, 09 April 2025).

Hack notes that "When American botanist Charles Wright collected what was to become USNM 5095, it was just another lizard. It was 1861 and Wright had already traveled everywhere from South Africa to the Bering Sea, documenting thousands of plants – and anything else he came across – along the way. So, when he noticed a three-inch-long green anole in the remote forests of southeastern Cuba, he merely scooped up the lizard for another expert to identify sometime later."

It took 162 years for the specimen to be identified as *Anolis incredulus*. And to be precise, only the second specimen of this species (and the first collected).

The graphic above center, by Nicole Kit, is from the referenced article.



A scientific illustration comparing USNM 5095 (middle left) with four other Cuban anole species. Careful analysis of this specimen's features helped Kevin de Queiroz determine that it represented only the second known example of Anolis incredulus. Nicole Kit

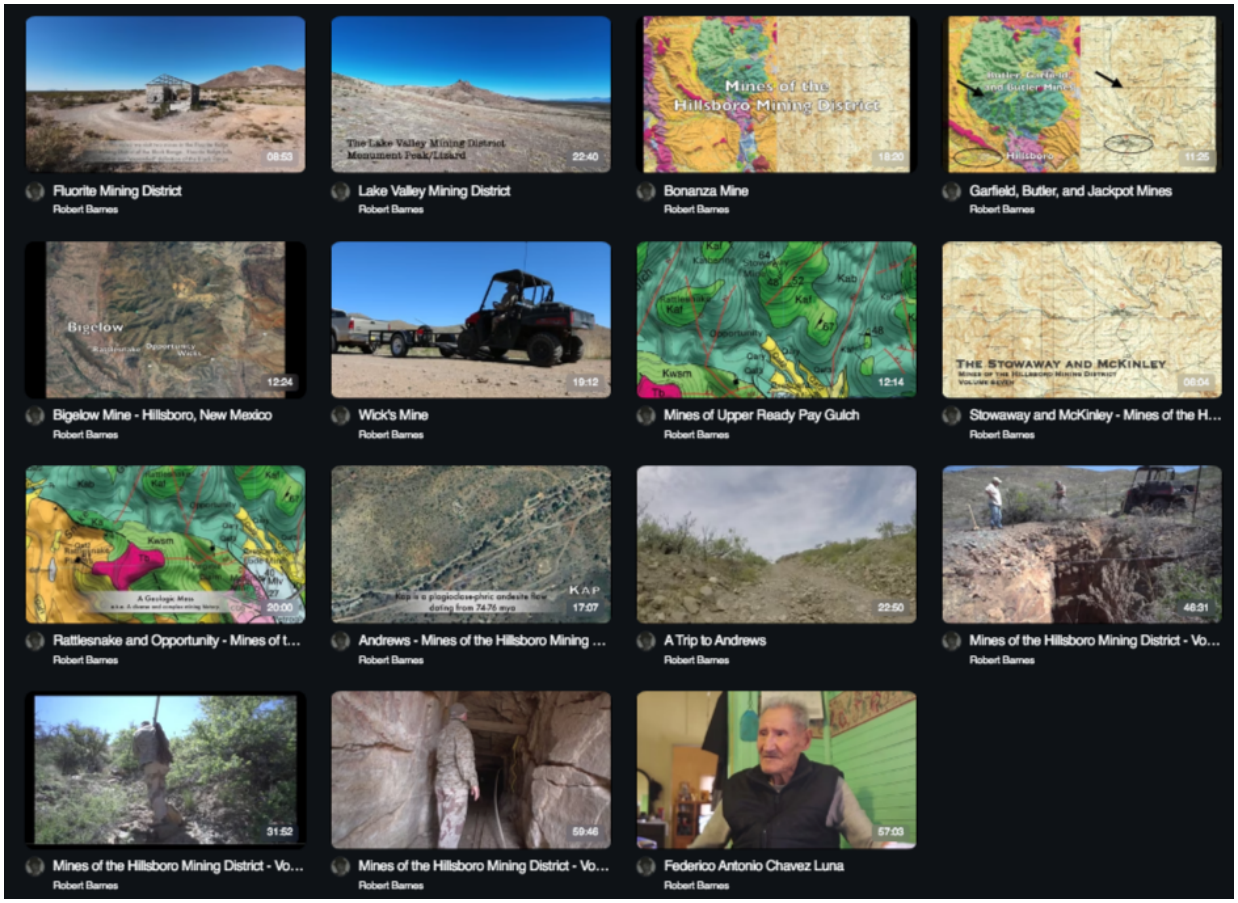
The only conclusion to be reached from all of this is that after your work and research in the Black Range you can go off to Cuba and have your efforts recognized 16 decades later.

Woodrats and Venom

Packrat is much the better name, but here we will confine ourselves to the term woodrat. In a study published in *Biology Letters* (The Royal Society publishing) on 16 April 2025, Matthew Holding et al. reported on their research on what effect temperature and diet had on the *Neotoma lepida's* ability to inhibit the effectiveness of rattlesnake venom. ("Ambient temperature and toxic diets constrain snake venom resistance in a desert rodent", Matthew L. Holding, Alexandra Coconis, Patrice K. Connors, Marjorie D. Matocq and M. Denise Dearing, https://doi.org/10.1098/rsbl.2025.0068). This species is not found in our area; it is restricted to the west coast from Oregon/Idaho south to Baja/Sonora.

Specifically they noted that "Woodrats raised at cooler temperatures, as well as those consuming diets with creosote resin, were significantly less able to inhibit snake venom, suggesting that they would be more susceptible to snakebite. These results suggest that temperature and dietary variation across the distribution over which these rattlesnakes and woodrats interact could structure the outcomes of these predator-prey interactions. Additionally, these results may help explain why ambient temperatures, rather than dietary differences, predict the presence of neurotoxic versus proteolytic venom phenotypes in some rattlesnake species."

The last sentence in this quotation is particularly significant. How rising temperatures affect the production of mammalian venom resistance proteins and how rattlesnakes respond may turn out to be very important.



Mines of the Black Range

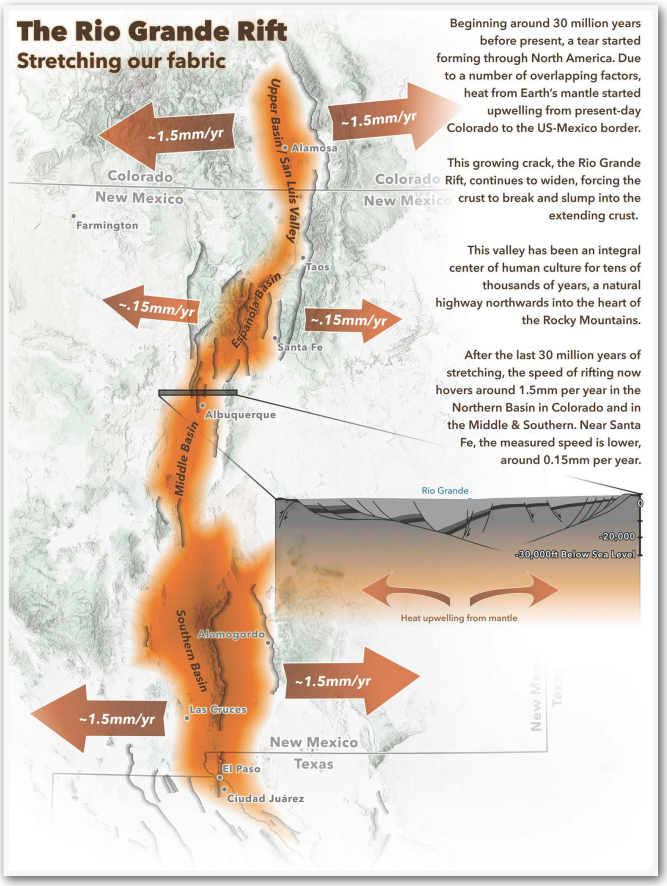
With the addition of two new videos (The Fluorite Mining District and The Lake Valley Mining District) the Mines of the Black Range video portfolio now includes 15 videos.

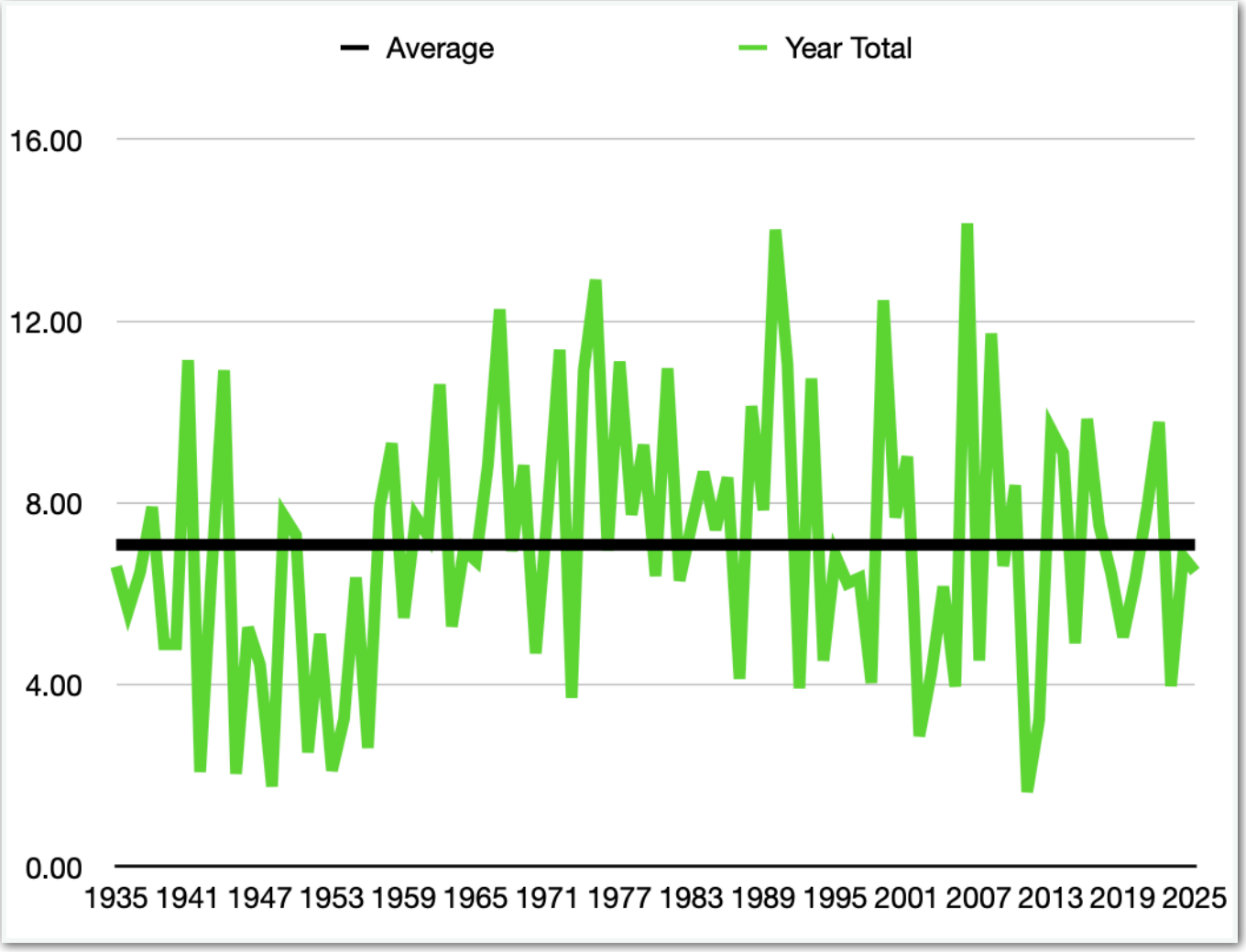
Rio Grande Rift

The Rio Grande Rift is one of the major geologic features of this planet. The fact that it is in our back yard and directly affects us does not diminish that fact. When we explore deeper, the common, the everyday, what we see out our window, can become exciting - even in a slowly evolving geologic timeframe. The Great Rift Valley of east Africa is justly famous; it too is a major geologic feature. Many a documentary has been made about the Great Rift Valley. Perhaps we should take to calling ours "The Enchanted Rift of the Rio Grande", adding some spice to the everyday.

The continental plate, where the Rio Grande runs through it in New Mexico, is separating. It is a major event in our geologic history, it's just that it is in super slow-mo. But the land on either side of the Rio Grande is moving away from that center line at the rate of 1.5 mm a year. Mms add up.

Jakob Ruffner created the map shown at the right as part of ArcGIS's monthly map making challenge (November 2025). If the Rio Grande Rift is of interest you may wish to read "Tectonic subsidence, geoid analysis, and the Miocene-Pliocene unconformity in the Rio Grande rift, southwestern United States: Implications for mantle upwelling as a driving force for rift opening" by Jolante van Wijk, Daniel Koning, and others, published in *Geosphere*, February 2018.





Monsoon Rainfall in Hillsboro

The chart above records the precipitation which occurred in Hillsboro during the monsoons (June 15-September 30) from 1935 to 2025. The average (mean) amount of precipitation over that period was 7.08". The median precipitation level was 6.85". The minimum amount of precipitation occurred in 2011 (1.64") and the maximum amount was in 2006 (14.15").

June 15-30: The average (mean) amount of rain between 1935 and 2025 (inclusive) was .56" during the last half of the month; the most rain fell in 2000 (3.85") and in several years there was no recorded rain.

July: The average (mean) amount of rain between 1935 and 2025 (inclusive) was 2.19"; the most rain fell in 1962 (5.65") and the least in 2023 (.03").

August: The average (mean) amount of rain between 1935 and 2025 (inclusive) was 2.35"; the most rain fell in 1993 (7.93") and the least in 1942 when there was no rain.

September: The average (mean) amount of rain between 1935 and 2025 (inclusive) was 1.98"; the most rain fell in 1975 (7.11") and the least in 1953, 1954, 1955, 1959, and 1998 when there was no rain.

If the 9 years with the greatest amount of rainfall during the monsoon (10% of the total years) are removed from the assessment then the average (mean) amount of rainfall during monsoon drops to 4.58".

If the 9 years with the least rainfall during the monsoon (10% of the total years) are removed from the assessment then the average (mean) amount of rainfall during monsoon only increases to 7.60".

The average (mean) amount of rainfall during this period is skewed upward by those years when there is significantly more rain than usual.

We live in a dry environment, and small amounts of rain can make a big difference in how the fauna (including humans) and flora of our area thrive or don't. When periods of low precipitation occur over several years in sequence the effect on fauna and flora is compounded and is much greater than the effect of a single year of low water.

Precipitation during years of more rainfall sometimes occurs in singular events. When this happens not only do we experience flooding but we lose the advantage we could have gained from that amount of water if it had been spread out over a longer period.

Here is looking forward to this year's monsoon. Special thanks to Russ Bowen (Hillsboro) for the data and analysis.

Giant Water Scavenger Beetle (*Hydrophilus* species) Oviposition/Reproduction/ Foraging Notes - by James Von Loh

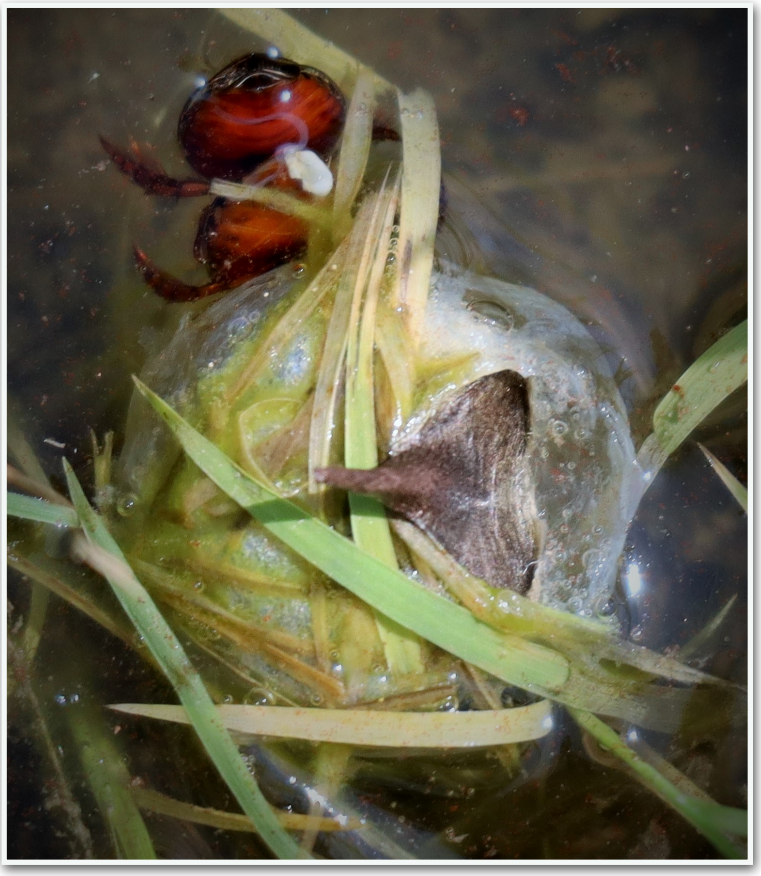


On July 25, 2024 I photo-documented an oval mystery structure (egg case) submerged at the surface of the Dripping Springs Visitor Center, Organ Mountains, Desert Peaks National Monument stormwater retention pond, near a mating pair of beetles. The mysterious ~3.0 cm ball of silk and Green Sprangletop grass leaves had a hard tube-like structure (mast [scale and siphon]) protruding above the waterline.

The pair of Giant Water Scavenger Beetles appeared to be mating/fertilizing eggs, immediately adjacent to the egg case. Initially, I wondered if they might be using this existing structure to deposit their eggs (at this writing, I believe the lower beetle is a female and that she is secreting her own protective egg case during/following the mating behavior).

Note that there appears to be a small, round hole in the egg case wall (see arrow in image below) perhaps a place to deposit new eggs? or from which larvae have already emerged?





I sought assistance from the iNaturalist online community to determine its origin and use, under the 'construction' category for entry.

A year later, Kylie Wirebach provided an ID and support images (https://www.inaturalist.org/observations/46057143 from a July 09, 2009 cocoon observation (21268, Lietuva; Vilniaus County, Lithuania) which described the observation as "hydrous species cocoon on water surface. Thanks to entomologist, Dr. Eduardas Budrys, for object identification". That observation is shown at the bottom right.



The online AI Query via the Google search engine, resulted in the following information and points; it appears that much of this information is from *The New Field Book of Freshwater Life* by Elsie Klots:

"The cocoon-like egg case of a giant water scavenger beetle, such as *Hydrophilus triangularis*, is constructed from silk and attached to floating vegetation. It is not a cocoon in the traditional sense, which is built by a larva to pupate within.

Construction process

Oviposition and case formation: In early summer, the female beetle deposits up to 140 eggs within a silken, waterproof case.

Case type: The female can either attach the egg case to underwater plants, leave it floating on the water's surface like a raft, or carry it on her abdomen, depending on the species.

Mast creation: In many species, a vertical, air-filled "mast" is built into the egg case that extends above the water's surface.

Hatching structure: The larvae hatch from the egg case by chewing their way out. The mast may serve as a potential escape hatch for the larvae, which are cannibalistic and will consume their siblings if they remain in the case. The mast is also likely involved in respiration for the developing eggs.

Life cycle

Hatching: The larvae hatch from the egg case and disperse. Due to high rates of cannibalism, not all larvae will survive to exit the case.

Pupation: The mature larva leaves the water and burrows into moist soil to pupate.

Adulthood: The adult beetle emerges from the soil after a few weeks and returns to the water."

The Giant Water Scavenger Beetle is a Colorado Species of Interest: https://webdoc.agsci.colostate.edu/bspm/Hexapoda%20(Insects)/Giant%20Water%20Scavenger%20Beetle.pdf in which the 'Life History and Habits' section states:

"Giant scavenger beetles winter in the adult stage, buried in the mud at the bottom of water bodies. They emerge in spring and eggs are laid in late spring or early summer. The female produces eggs in the form of a mass that is laid in a silken case that is attached to floating debris. The immature stage is a predator, working by ambush to lie in wait, seizing and crushing prey that comes within reach. Most of their diet is made up of small insects and other aquatic invertebrates. However, their jaws are quite powerful allowing them to consume snails whole as well as catch larger prey such as tadpoles and small fish. After completing development it leaves the water and pupates within a soil chamber produced a few inches deep in moist soil. Adults emerge in about 2-3 weeks.

"Adults also are predators but will scavenge dead animal matter in the water. Water scavenger beetles are excellent swimmers, with large hind legs feathered to propel them quickly. They are also able to stay under water for extended periods (including all of winter) by carrying with them air bubbles under the wing covers and along the underside, trapped by small hairs of the body. As the oxygen is depleted within the bubbles it is replenished from the oxygen in the water. This air supply is also periodically renewed by a brief visit to the water surface. When surfacing they go head first, extending the antennae to break the surface which allows fresh air to move over the body and form a new bubble."

Additionally, on August 24, 2025, I observed a Giant Water Scavenger Beetle (in iNaturalist, it was identified to the subgenus *Hydrophilus* by the contributor, "rzeczpospolita") repeatedly swim head-first into the edges of a floating mat of algae, which I initially interpreted as foraging/feeding behavior. (See photographs on following two pages.) When I later processed the images, there were bright white ovoid forms in the water near its abdomen tip, and I considered they might be new eggs emerging from this beetle. There were no observable attached or floating cocoons (egg cases) as shown on the previous page, connected to the algal mat.



James Von Loh iNaturalist observation of 04 August 2024. His note: "Large larvae hunting and foraging on a spadefoot toad tadpole/larva within the retention pond at Dripping Springs Visitor Center, Organ Mountains-Desert Peaks National Monument. Once captured, as many as 1-6 additional large larvae would join the tussle to consume the tadpole. The morning was warm, sunny, and under clear sky." Shown here under a creative commons license. (Identified as *Hydrophilus triangularis*.)

1. **Giant Water Scavenger Beetle swims around an algal mat near the edge of the stormwater retention pond (08/24/25), then regularly swims head-first into the floating algae, which I interpreted as foraging/feeding behavior.**

2. **While swimming into the algal mat, the beetle acquires a passenger, an Aquatic Long-legged Fly (*Hydrophorus* sp.) a species common to this and other regional ponds.**

3. **Typically, the beetle entered the algal mat head-first and did not use the vegetal mat for hiding cover during our encounter.**

4. **White oblong/orbs appear in the water near the beetle's abdomen tip and hind legs during its displayed behavior(s).**

5. **White orb present in the water near the beetle's abdomen tip.**

6. **As the beetle enters the algal mat again, what looks like newly released white eggs float in the water near and behind its abdomen tip.**

7. **It appeared to me that this beetle could be releasing eggs near to and possibly within this thick, floating algal mat and that perhaps the algal mat serves a nursery function as does an egg case until larvae emerge.**

   However, I read several references that stated that these large beetles do not deposit eggs directly in open water; the females all construct a silken egg case which may be attached to vegetation or detritus, allowed to float on the water surface, or is attached to the beetle's abdomen. As in our leading photograph, some egg cases may include a mast that protrudes into the air above the pond.

   Therefore, I concluded that the free-swimming Giant Water Scavenging Beetle is not ovipositing in open water or building an egg case, it is foraging from the algae, eggs deposited in the algae by several arthropod species, and small arthropods including their larval forms. Free-floating eggs next to the algae were likely placed by female

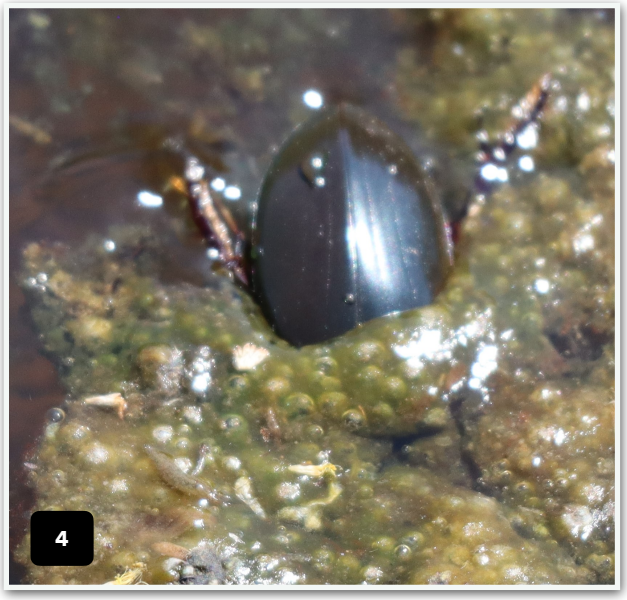


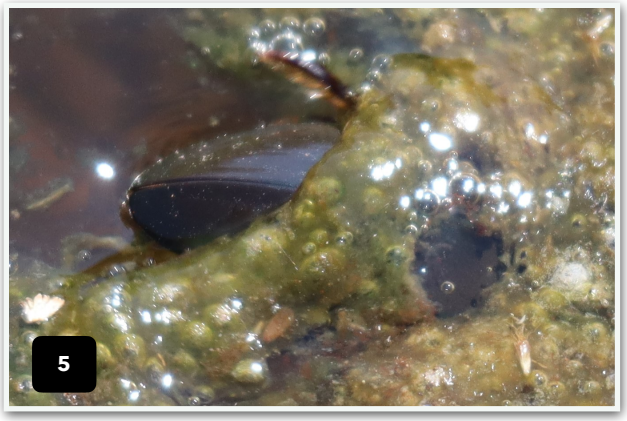




Spot-winged Gliders or Variegated Meadowhawks; both species were ovipositing into the pond water during the same time period.

If freshwater invertebrate eggs are (or might become) an area of interest you may find Kylie Wirebach's iNaturalist project on that topic of special interest









Hydrophilus triangularie
(Say, 1823)

See an excellent discussion of the natural history and life cycle of this species: Hallmark, M.D; Ward, C.R. 1972. *Life History and Life Process Studies of the Water Scavenger Beetle, Hydrophilus triangularie Say*. U.S. International Biological Program, Desert Biome, Logan, UT. RM 72-49. Provided under a Creative Commons license by Utah State University through the DigitalCommons@USU program.

From the Editor:
Other types of insect construction

8. **Tom Lander of Kingston submitted this photograph of a bit of insect construction. What's inside? Might be a moth caterpillar, might be a weevil, might be several things - it certainly looks cool.**









James Von Loh provided these photos of Bagworm Moth, Family *Psychidae*, cocoons. BugGuide notes that "Larvae (bagworms) construct spindle-shaped bags covered with pieces of twigs, leaves, etc., and remain in them -- enlarging the bags as they grow -- until they pupate (also in the bag). Adult females remain in the bag, emitting pheromones which attract adult males to mate with them. Eggs are laid inside the bag, and when they hatch the larvae crawl away to begin construction of their own individual cases. Some bagworm species are parthenogenetic; their eggs hatch without being fertilized."

9. On a Coyote Willow branch along the Rio Grande on 28 September 2019.

10. On 23 September 2019.

11. On an Arrow Weed shrub, 12 September 2025.

12. This *Polistes aurifer* (Saussure, 1853), Golden Paper Wasp nest (and wasps) was photographed by James Von Loh on 12 August 2022.

13. *Quercus* (like this Gambel's Oak, *Quercus gambelii* [Nutt.]) often have galls. On oaks these galls are sometimes called oak apples. A gall is a special type of insect construction. The gall is formed by the oak in reaction to a stimulus from an insect, often a wasp of some species. When a wasp, for instance, lays an egg in the plant, the plant "builds" a structure (the gall) around the egg and future larva. The insect subcontracts the construction of the gall out to the plant, with very precise instructions. (Although the most common cause of a gall, insects are not the only cause.) The gall is plant material and as such generally will look like the rest of the green vegetation. Once the insect departs the gall,



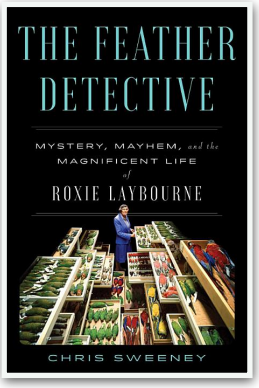


look for a small hole in the gall; the gall will turn brown. This photograph was taken on 15 September 2025 along the trail into Rabb Park, on the western side of the Black Range.



What People Are Reading and Listening To

The Feather Detective



The advantage of Google Books (at the link for this book) is that you can read several multi-page excerpts from a work. That gives you a better idea of the style and substance of a book than does many a book review. But for those who like reviews, this from the publisher:

- "A biography that reads like a novel." – *The Wall Street Journal*
- "Laybourne was a badass." – *Los Angeles Times*
- "Sweeney's biography must be read to be believed." – *The Millions*
- "Engrossing...Riveting...This entrances." – *Publishers Weekly*

An intriguing piece of natural history, this book explores an area of special interest (feathers) for anyone who has hiked along a trail and found bits of bird. It is also a commentary on our social structure and the social barriers which we erect to reduce our effectiveness.

Trail Updates: Special Request

We have published a draft of the third edition of Walks In The Black Range, probably publishing the final in July.

Please take a look at the draft. If you have more current material (maps, photographs, trail condition, etc.) which could be used in the third edition please consider sharing it with the community. And if you are motivated to rewrite an existing walk description or add a new one - that would be wonderful. Please send your material to rabarnes@blackrange.org.

Rabb Park Trail Update

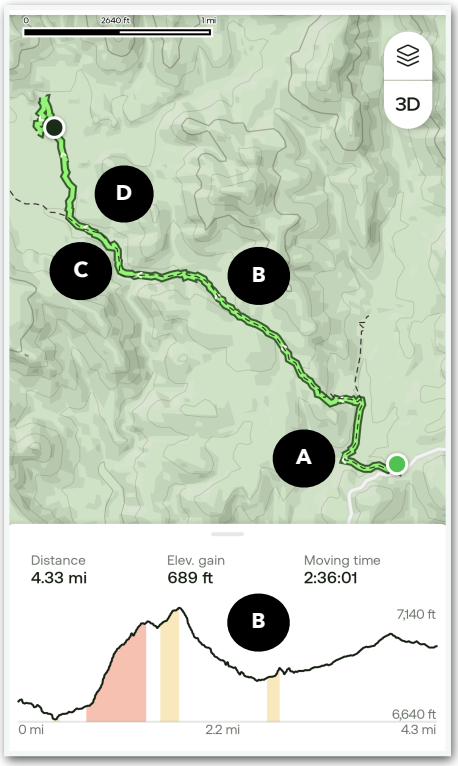
This entry updates Trail 58, "Rabb Park" in Volume 3 of Walks in the Black Range (second edition).

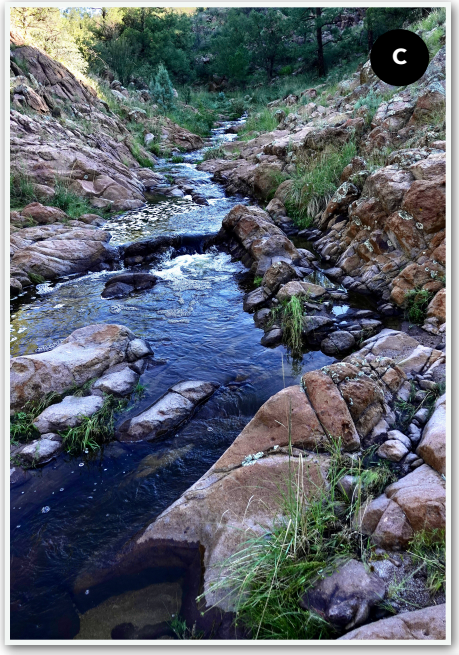
This update was made on 15 September 2025. As shown on the "one way" map at the right, this walk was a bit longer, at a bit over 8 miles round-trip) than that shown in Volume 2.

The features of the trail remain unchanged. In August we had walked up the trail to the fence gate at the high point of the trail, about a 3-mile round trip which manages to get in most of the steep part of the trail. At that time there was not a drop of water to be seen, none in the sky, none in the streams. Little in the way of flowers (but some) and few birds on that day (although several Wild Turkey feathers were found; apparently one of the large birds had met an untimely demise).

When we arrived at the parking area in September we found the ground wet and water on the road which is the first part of the walk. Indeed, this was a theme of the walk. Every water course we encountered had water flowing in it. When we got into Rabb Park we had to do some searching to find the best stream crossing, at times. The first stream crossing, which is along the road to the trailhead, was completely dry in August; on September 15 it was flowing nicely ("A" on the map, top center).







The trail was nice and soft (wet but not muddy, so that rock sank into the ground rather than slide as it does when dry).

From the trailhead to near the bottom of section ("B") there are no water crossings. From that point onward every low spot had flowing water and flowers were nicely displaying, not at their peak, but in what had been a very dry year, very nice.

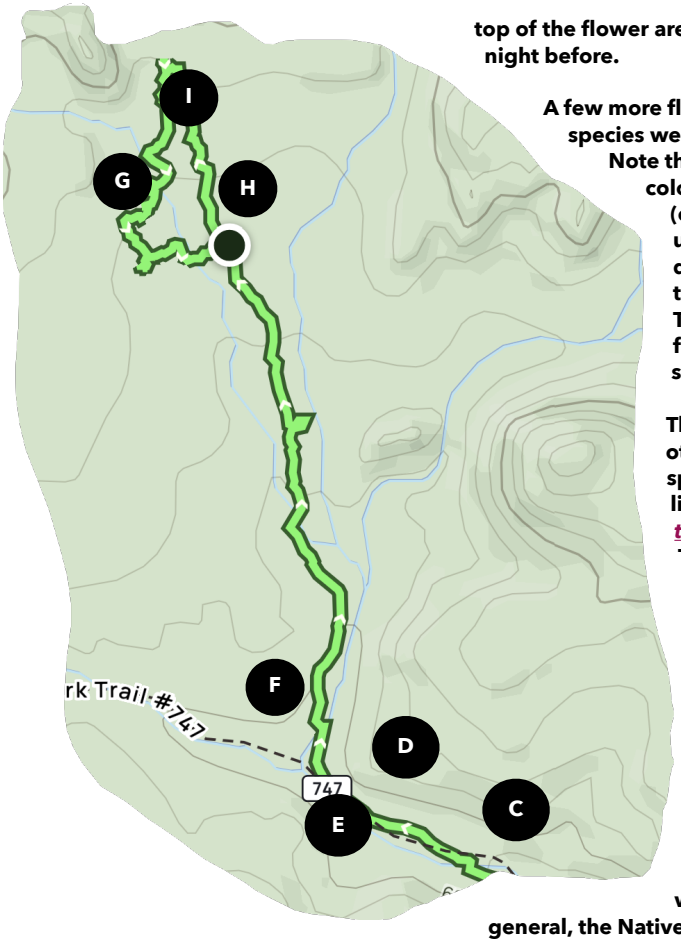
At the southern end of the park there is the first stream crossing of the main drainage for the park ("C"). In the times we have walked into this area this has always been a reliable place for water. In the past this area was full of sedge, on September 15 it had been scoured out. This stream winds its way south and west, down Noonday Canyon to the Mimbres river near the south end of San Lorenzo.

After crossing the stream the (current) trail follows the top of an outcrop on the west side of the stream. In the past, the route followed the stream northward into the park and, in fact, that is where topo maps and many trail apps indicate the trail is located, but this section of the USDA Forest Service trail is gone for the most part.

Coming down off the outcrop and into the park proper we saw how significant the rain event had been. Grass and sedge along the creek was flattened well above the stream bed ("D"). And in the southern part of the park, where the stream and its various "tributaries" meander about, finding a crossing spot through the vegetative mass broke the stride.

Farther into the park every oak, juniper, and pine had a mass of leaves below it. The rainstorm must





have come with a significant, perhaps large, amount of hail.

Penstemon virgatus ("E"), Wand-bloom Penstemon, was found in the trail where it descends from the outcrop and into the park proper. The grains of sand visible on the leaf of the larger photograph were probably knocked into the air by the heavy rain. The air was still fairly humid, and the water droplets on top of the flower are dew from the night before.



A few more flowers of the same species were found at "F". Note that the flower color and plant form (one much more upright) are different between the specimens. The dew on the flowers is the same.

There were several other blooming species in the area, like *Potentilla thurberi* (Bray), Thurber's Cinquefoil. Thurber's Cinquefoil has, what I characterize as the "typical" *Potentilla* leaf, fan-like.

Speaking of Penstemon in particular and wildflowers in general, the Native Plant Society of New Mexico (NPSNM) maintains the "Wildflowers of New Mexico" website, which is an excellent resource. The site was developed by George Oxford Miller and donated to the NPSNM.

At the northern end of the park there was a nice clump of cactus ("G") growing in a bit of soil between the large sections of bedrock ("H") which are found at the surface here. Without the benefit of a flower, this cactus consistently keyed to a species found at much lower elevations - so another time.

In this general area white moonstone ("I") was mined in the past, and specimens of this mineral can be found in the outcrops and in the stream beds which radiate from the area.

On the way out, as we started up the incline at "B" on the previous page, we found several specimens of *Potentilla crinita* (A. Gray), Bearded or Lemmon's Cinquefoil (see "J" at the end of this article). This plant has small pinnately compound leaves, with the leaflets "almost" alternate in placement. There may be as many as 17 leaflets per leaf. This species might be confused with *Potentilla anserina*, which has fewer leaflets, notched along their entire length.



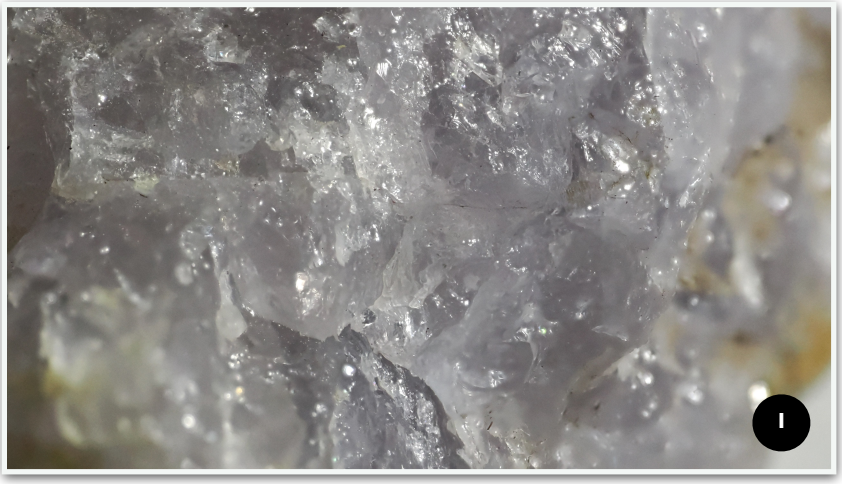

F


G


H


H







If the following is a bit boring you can just sit back and admire the sheen:

Moonstone is a sodium potassium aluminum silicate ($[Na,K]AlSi_3O_8$) in the feldspar group. A mineral may have several different forms. In the case of moonstone it may be composed of sodium or potassium (Na,K). Minerals are arrayed in a taxonomic tree something like the Linnaean system used in biology. Moonstone is a tectosilicate mineral in the feldspar group, alkali series, orthoclase variety.

Tectosilicate minerals include the quartz group (the silicas like chalcedony, agate, amethyst, "normal quartz", etc.), the feldspar group (which includes things like plagioclase and orthoclase), the feldspathoid group, the scapolite group, and the zeolite group. Many of these groups are further divided into subgroups. Moonstone is an orthoclase in the feldspar group.

Moonstone is known for its adularescence (or schiller/shiller). This is the bluish cast, best seen in the center photograph, which appears to emanate from inside the rock. This is an optical effect; it is a product of the crystal structure of the mineral, not of any particular type of inclusion.

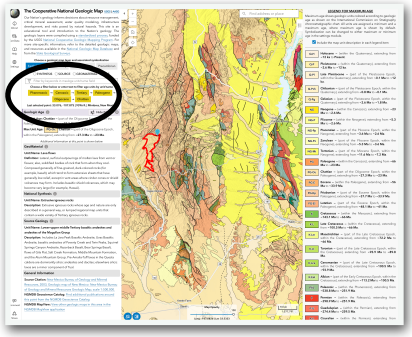
In "Preservation of primary magmatic features in subvolcanic pegmatites, aplites, and granite from Rabb Park, New Mexico" James D. O'Brient (*American Mineralogist*, Volume 71, 1986, pp. 608-624) describes the moonstone and its development. He notes that:

"Rabb Park moonstone specimens are well known to mineral collectors because of their gem-quality blue schiller, but could never be profitably mined because of widespread fracturing that has broken most of the pegmatite crystals into pieces less than I cm in maximum size. These fractures are commonly conchoidal, even in easily cleaved sanidine. They terminate or branch at crystal boundaries. A few are filled with groundmass or heulandite, but most are hairline cracks that lack any visible filling. In places, fracture density within single crystals varies systematically such that regularly spaced zones of intense shattering are separated by concentric domains of less fractured material. These bands define growth zones at a spectacularly coarse scale of several centimeters each in some of the meter-scale quartz euhedra. Nested quartz hexagons are separated from one another by 5-10-mm thick zones of intense shattering and more rarely, thin selvages of pumiceous glass. Subsequent growth bands of less-shattered quartz are individually 8-10 cm thick. Up to six such discrete fracturing episodes are preserved in the largest crystals. They are thought to record episodic thermal shocks to the growing crystals, probably caused by periodic venting, adiabatic decompressions, and rapid temperature changes in the throat of this subvolcanic system."

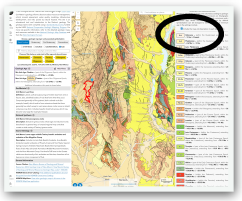
Cooperative National Geologic Map

The US Geological Survey and the Association of American State Geologists have worked together to produce a wonderful resource for those interesting in exploring the geology of our area - or of any part of the "lower 48" (when I lived in Alaska many years ago that term was more than a geographic description).

One product of the effort is shown at the top of the following page. It is the geologic surface of the United States arrayed by age. It like all other products is "zoomable". Zoom in on our area and you are able to see something like that depicted at the bottom of the following page. The map at the top of the following page is interesting, the one at the bottom is very interesting. It has a significant amount of information.

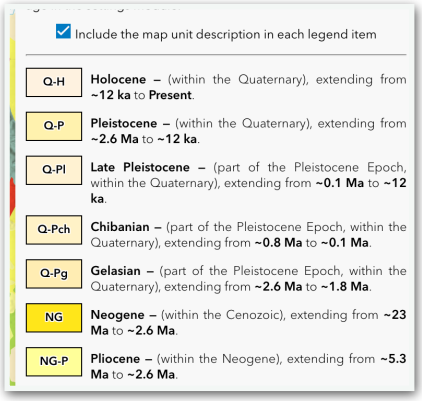


Using one of the filters within the ellipse on the map above it is possible to view just the surface rock from a particular age (Phanerozoic, Cenozoic, Tertiary, Paleogene, Oligocene, or Chattian).

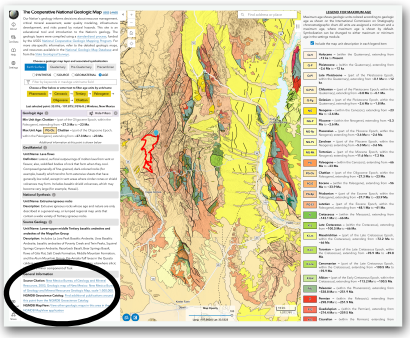


Check the small blue box within the ellipse at the right to include a unit description for each of the geologic units depicted on the map you are reviewing. An example of that feature is shown at the top center of this page and in the image at the bottom of the following page.

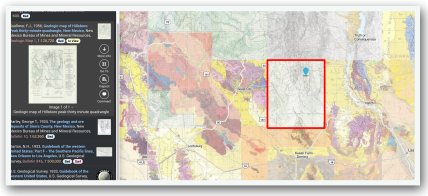
Reviewing original source materials is also possible with the application. This feature highlights two types of material, maps and scientific papers.



To access this material click the appropriate link in the ellipse at the bottom right of the page (see below).

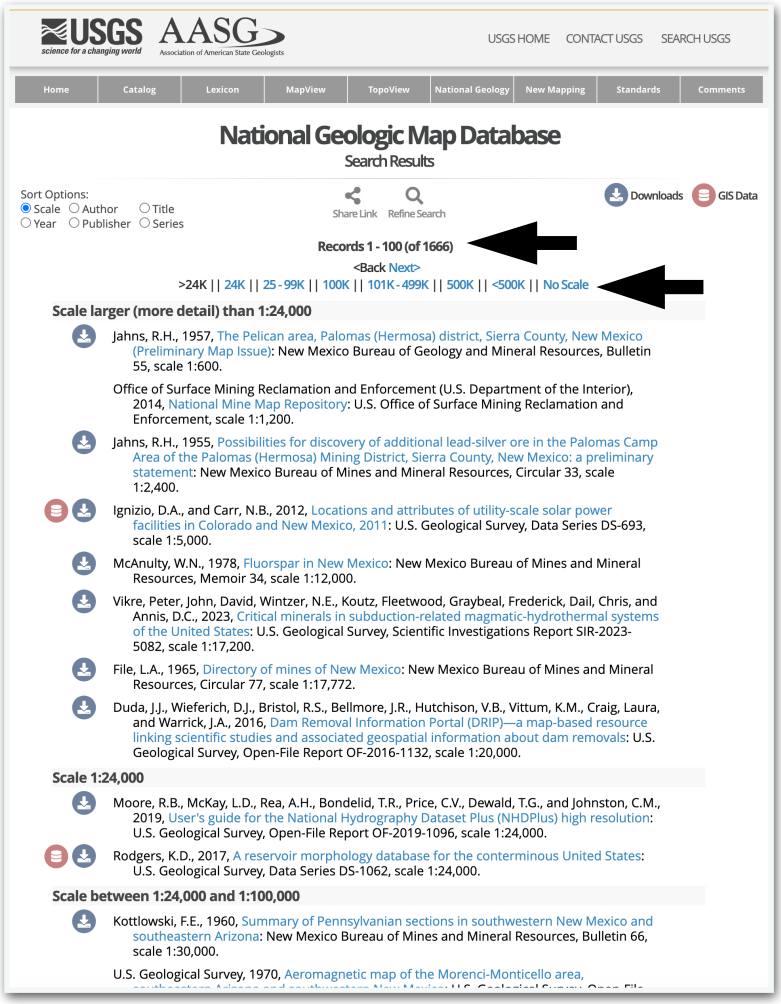


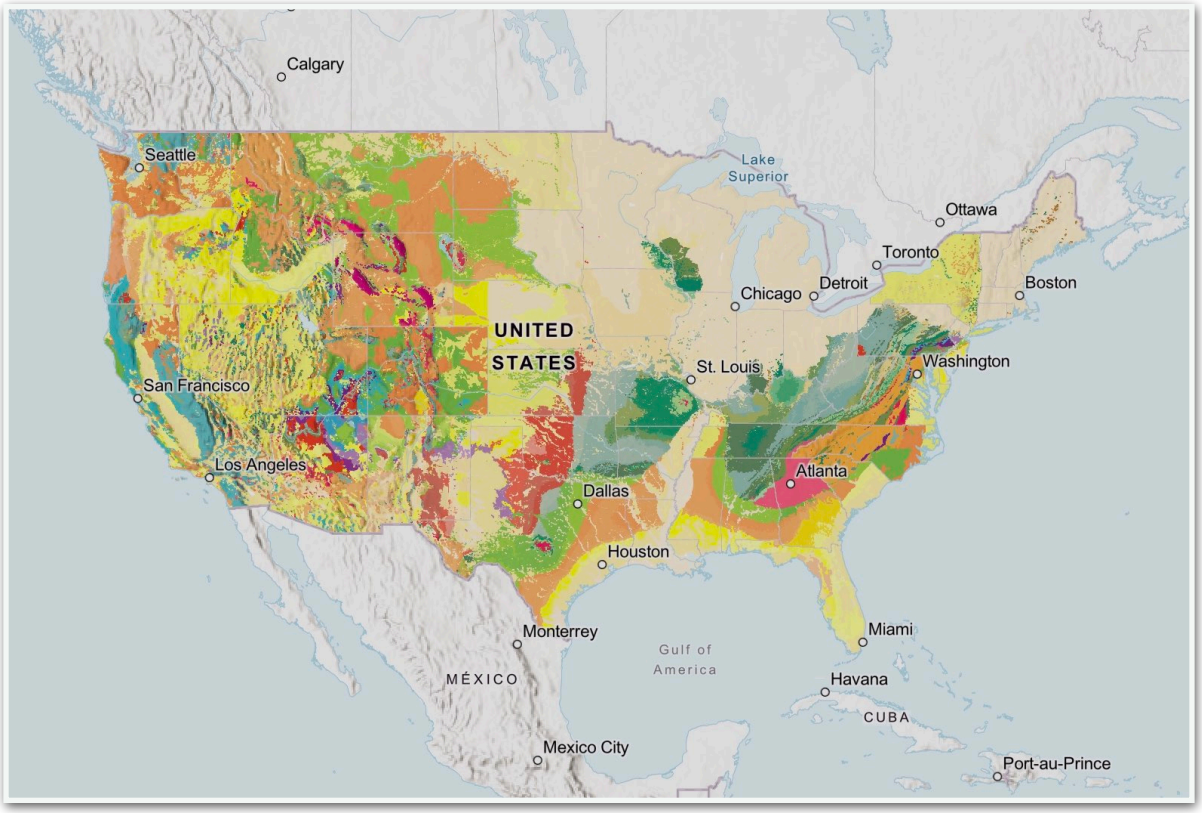
Clicking on the "Find additional. . ." link generates a listing like that shown at the bottom of the page. The listing is specific to the geographic area you are surveying and links are provided for all of the papers. In this case there are 1666 listings. Also note that you can screen the listing by the size of a geologic map which may be associated with it.

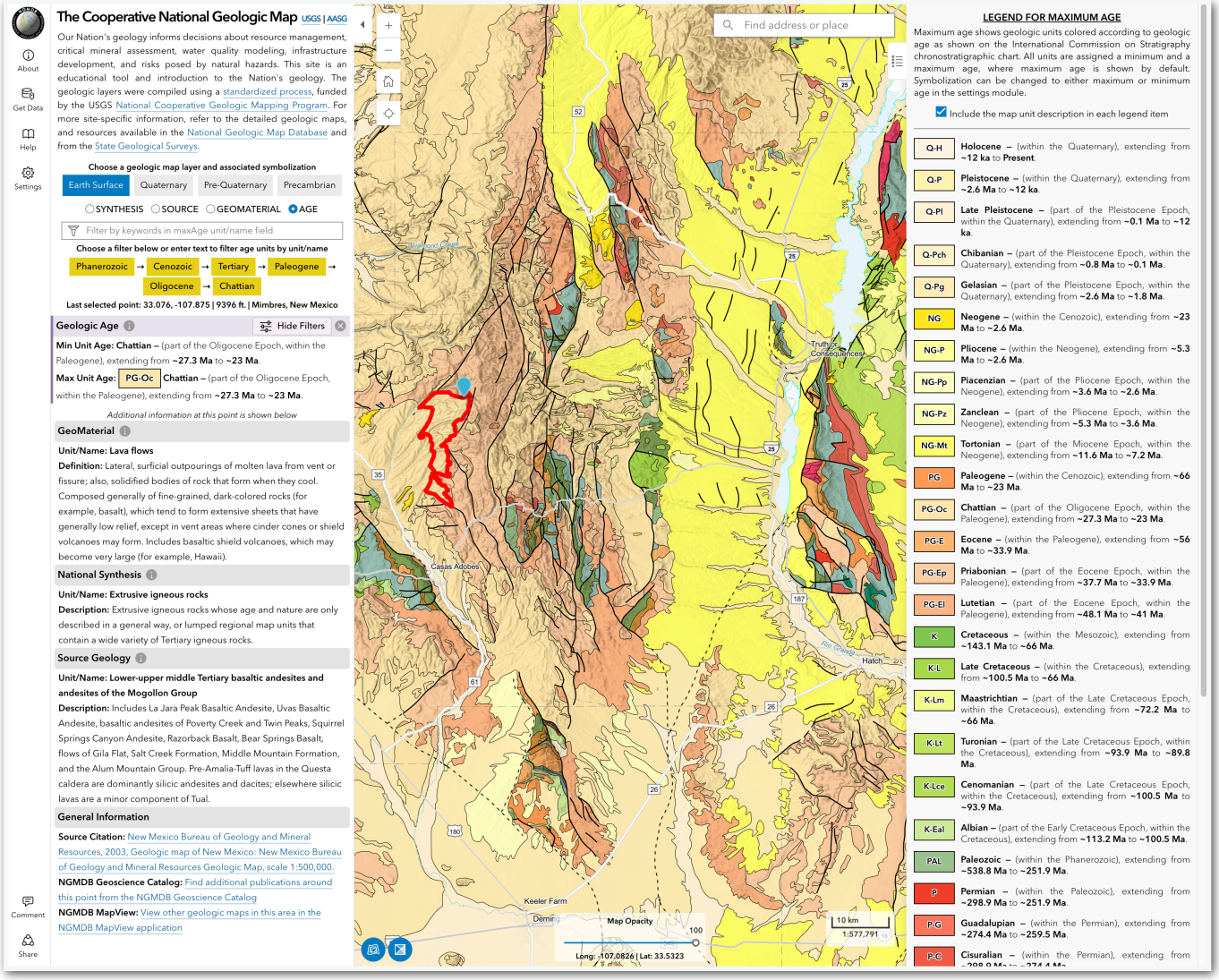


Follow the "other geologic maps in this area" link to generate something like that above. Highlight an area (red box on the right) and a reference map detail shows on the left. All of these maps may be accessed using this tool.

Access this resource at this link, and have fun. There is much more at this site than described here!




Calgary
Seattle
Lake Superior
Ottawa
Toronto
Chicago
Detroit
Boston
UNITED STATES
St. Louis
Washington
San Francisco
Los Angeles
Atlanta
Dallas
Houston
Monterrey
Miami
Gulf of America
MÉXICO
Havana
CUBA
Mexico City
Port-au-Prince


The Cooperative National Geologic Map
USGS | AASG
Our Nation's geology informs decisions about resource management, critical mineral assessment, water quality modeling, infrastructure development, and risks posed by natural hazards. This site is an educational tool and introduction to the Nation's geology. The geologic layers were compiled using a standardized process, funded by the USGS National Cooperative Geologic Mapping Program. For more site-specific information, refer to the detailed geologic maps, and resources available in the National Geologic Map Database and from the State Geological Surveys.
Choose a geologic map layer and associated symbolization
Earth Surface
Quaternary
Pre-Quaternary
Precambrian
SYNTHESIS
SOURCE
GEOMATERIAL
AGE
Filter by keywords in maxAge unit/name field
Choose a filter below or enter text to filter age units by unit/name
Phanerozoic → Cenozoic → Tertiary → Paleogene → Oligocene → Chattian
Last selected point: 33.076, -107.875 | 9396 ft. | Mimbres, New Mexico
Geologic Age
Hide Filters
Min Unit Age: Chattian – (part of the Oligocene Epoch, within the Paleogene), extending from ~27.3 Ma to ~23 Ma.
Max Unit Age: PG-Oc Chattian – (part of the Oligocene Epoch, within the Paleogene), extending from ~27.3 Ma to ~23 Ma.
Additional information at this point is shown below
GeoMaterial
Unit/Name: Lava flows
Definition: Lateral, surficial outpourings of molten lava from vent or fissure; also, solidified bodies of rock that form when they cool. Composed generally of fine-grained, dark-colored rocks (for example, basalt), which tend to form extensive sheets that have generally low relief, except in vent areas where cinder cones or shield volcanoes may form. Includes basaltic shield volcanoes, which may become very large (for example, Hawaii).
National Synthesis
Unit/Name: Extrusive igneous rocks
Description: Extrusive igneous rocks whose age and nature are only described in a general way, or lumped regional map units that contain a wide variety of Tertiary igneous rocks.
Source Geology
Unit/Name: Lower-upper middle Tertiary basaltic andesites and andesites of the Mogollon Group
Description: Includes La Jara Peak Basaltic Andesite, Uvas Basaltic Andesite, basaltic andesites of Poverty Creek and Twin Peaks, Squirrel Springs Canyon Andesite, Razorback Basalt, Bear Springs Basalt, flows of Gila Flat, Salt Creek Formation, Middle Mountain Formation, and the Alum Mountain Group. Pre-Amalia-Tuff lavas in the Questa caldera are dominantly silicic andesites and dacites; elsewhere silicic lavas are a minor component of Tual.
General Information
Source Citation: New Mexico Bureau of Geology and Mineral Resources, 2003, Geologic map of New Mexico: New Mexico Bureau of Geology and Mineral Resources Geologic Map, scale 1:500,000.
NGMDB Geoscience Catalog: Find additional publications around this point from the NGMDB Geoscience Catalog
NGMDB MapView: View other geologic maps in this area in the NGMDB MapView application
About
Get Data
Help
Settings
Comment
Share
Find address or place
Truth or Consequences
Casas Adobes
Hatch
Keeler Farm
Demir
Map Opacity
100
10 km
1:577,791
Long: -107.0826 | Lat: 33.5323
LEGEND FOR MAXIMUM AGE
Maximum age shows geologic units colored according to geologic age as shown on the International Commission on Stratigraphy chronostratigraphic chart. All units are assigned a minimum and a maximum age, where maximum age is shown by default. Symbolization can be changed to either maximum or minimum age in the settings module.
Include the map unit description in each legend item
Q-H Holocene – (within the Quaternary), extending from ~12 ka to Present.
Q-P Pleistocene – (within the Quaternary), extending from ~2.6 Ma to ~12 ka.
Q-Pl Late Pleistocene – (part of the Pleistocene Epoch, within the Quaternary), extending from ~0.1 Ma to ~12 ka.
Q-Pch Chibanian – (part of the Pleistocene Epoch, within the Quaternary), extending from ~0.8 Ma to ~0.1 Ma.
Q-Pg Gelasian – (part of the Pleistocene Epoch, within the Quaternary), extending from ~2.6 Ma to ~1.8 Ma.
NG Neogene – (within the Cenozoic), extending from ~23 Ma to ~2.6 Ma.
NG-P Pliocene – (within the Neogene), extending from ~5.3 Ma to ~2.6 Ma.
NG-Pp Piacenzian – (part of the Pliocene Epoch, within the Neogene), extending from ~3.6 Ma to ~2.6 Ma.
NG-Pz Zanclean – (part of the Pliocene Epoch, within the Neogene), extending from ~5.3 Ma to ~3.6 Ma.
NG-Mt Tortonian – (part of the Miocene Epoch, within the Neogene), extending from ~11.6 Ma to ~7.2 Ma.
PG Paleogene – (within the Cenozoic), extending from ~66 Ma to ~23 Ma.
PG-Oc Chattian – (part of the Oligocene Epoch, within the Paleogene), extending from ~27.3 Ma to ~23 Ma.
PG-E Eocene – (within the Paleogene), extending from ~56 Ma to ~33.9 Ma.
PG-Ep Priabonian – (part of the Eocene Epoch, within the Paleogene), extending from ~37.7 Ma to ~33.9 Ma.
PG-El Lutetian – (part of the Eocene Epoch, within the Paleogene), extending from ~48.1 Ma to ~41 Ma.
K Cretaceous – (within the Mesozoic), extending from ~143.1 Ma to ~66 Ma.
K-L Late Cretaceous – (within the Cretaceous), extending from ~100.5 Ma to ~66 Ma.
K-Lm Maastrichtian – (part of the Late Cretaceous Epoch, within the Cretaceous), extending from ~72.2 Ma to ~66 Ma.
K-Lt Turonian – (part of the Late Cretaceous Epoch, within the Cretaceous), extending from ~93.9 Ma to ~89.8 Ma.
K-Lce Cenomanian – (part of the Late Cretaceous Epoch, within the Cretaceous), extending from ~100.5 Ma to ~93.9 Ma.
K-Eal Albian – (part of the Early Cretaceous Epoch, within the Cretaceous), extending from ~113.2 Ma to ~100.5 Ma.
PAL Paleozoic – (within the Phanerozoic), extending from ~538.8 Ma to ~251.9 Ma.
P Permian – (within the Paleozoic), extending from ~298.9 Ma to ~251.9 Ma.
P-G Guadalupian – (within the Permian), extending from ~274.4 Ma to ~259.5 Ma.
P-C Cisuralian – (within the Permian), extending from

Records of Vivid Dancer from the Black Range in Grant and Sierra Counties, New Mexico

by Jonathan Batkin



Vivid Dancer (*Argia vivida*), Aztec, San Juan County, New Mexico, 7 July 2025. Photo by the author.

Vivid Dancer, *Argia vivida* (Hagen in Selys, 1865), is one of New Mexico's most poorly documented damselflies. Despite published range maps showing nearly statewide distribution, it has rarely been collected in the southern half of the state or east of the Sangre de Cristo Mountains. *Argia vivida* barely overlaps the range of the confusingly similar Springwater Dancer, *Argia funebris* (Hagen, 1861). In Arizona, Colorado, and New Mexico the two species have seldom been documented in proximity to one another.

A "western" form of *A. funebris*, with males exhibiting varying amounts of violet coloration (see top on the following page), occupies most of the species' range in New Mexico. An "eastern" form (see bottom on the following page), which can vary in tone from sky blue to a bright blue similar to that of *A. vivida*, is predominant in Eddy County, where it has been mistaken for *A. vivida*. The blue form is not dominant in other parts of New Mexico but does occur.

The intertwined histories of description of the two species reflect their similarities. *Argia vivida* was described by Hermann Hagen in 1865 (Hagen in Selys, 1865: 406–407). *Agrion funebre*, described by Hagen in 1861 (Hagen, 1862: 92), was redescribed by him as *Argia funebris* in 1865 (Hagen in Selys 1865: 398–399). In 1902, Philip P. Calvert, who acknowledged *Argia funebris* as a distinct species, described *Argia vivida* var. *plana* (Calvert, 1902: 96), treating what is popularly known as Springwater Dancer as a subspecies of Vivid Dancer.

In 1958 Leonora Gloyd defined differences between *A. vivida* and *A. vivida* var. *plana* based on examination of caudal appendages of more than 100 specimens – of the former from California and of the latter from Arizona and Texas. She elevated *Argia plana* to species rank and added that "all specimens taken in the region between the Mississippi River and Rocky Mountains, some of which have been recorded in the literature by various authors as *vivida*, are actually a blue form of *plana*" (Gloyd 1958: 19–20). Garrison and von Ellenrieder examined specimens on which Hagen and Calvert based their descriptions, plus more than 600 specimens of *A. plana* collected in the U.S. and Mexico, south to Guatemala, by themselves and others. They concluded that *A. plana* was "a junior synonym of *A. funebris*," restoring the latter as the scientific name for Springwater Dancer (2022: 87).

A. vivida is known roughly from southern British Columbia, southern Alberta, Montana, and southern South Dakota south to Baja California, southern Nevada, Arizona, New Mexico, and Nebraska. In Mexico it occurs only in Baja California.

A. funebris is known from Arizona, New Mexico, southeastern Colorado, and the northern plains south through Texas and Mexico to Honduras and El Salvador. It does not occur in Baja California, but there are scattered records further east in the United States.

Prather and Prather (2015: 16,17) reported that in Colorado, *A. vivida* and *A. funebris* were found near each other only on the southeastern plains in El Paso and Pueblo Counties, but in both counties the species were separated by 30 km. *A. vivida* occurs in northern and western Arizona, and sympatry with *A. funebris* was documented by Bailowitz et al. only on the Bill Williams River on the La Paz/Mohave County line (2015: 159). Rich Bailowitz explained to Rosser Garrison that "the species were allotopic, with *A. funebris* occurring at seeps where water oozed from the below-impoundment soil of the Alamo Lake dam, and *A. vivida* along the creek below the dam, perhaps a few hundred feet below these seeps" (Garrison and von Ellenrieder 2022: 88).

Perception of the distribution of *A. vivida* in New Mexico has been influenced by the Dot Map Project, initiated in 1994 by the late Thomas W. Donnelly. Data contributed by more than 100 odonatologists or derived from literature resulted in maps illustrating the distribution of every known species in the United States and Canada by county or its Canadian equivalent (Donnelly 2004).

Some Dot Map records from New Mexico lack supporting voucher material and are now treated in the Odonata Central (OC) database (Abbott, J.C. 2006–2025) as declined. Some specimens reported to be at the Smithsonian National Museum of Natural History (USNM) by one author (Evans 1995) cannot be located, and still others in museum collections are strongly suspected to be incorrectly identified. All of those issues apply to records of *A. vivida*, several of which are still accepted on OC and have been the basis of misleading range maps.



Springwater Dancer (*Argia funebris*), western form, Cienega Creek, Pima County, Arizona, 13 March 2024. Photo by the author.



Springwater Dancer (*Argia funebris*), eastern form, Sitting Bull Falls, Eddy County, New Mexico, 21 August 2023. Photo by the author.

In early 2025 I began my own search for *Argia vivida* in New Mexico, which comprises two separate projects: collecting and identifying specimens, and locating specimens in institutions and private collections. Based on a suggestion from Bill Prather, I started collecting in San Juan County, in the northwestern corner of the state, and my records from there are in the Odonata Central (OC) data base (records 2962418–2962421, 2962364–2962368, and 2962372–2962375),* where I describe habitat and methods of identification. I did not encounter the species at several locations in other northern counties, and I will resume my quest in 2026.

Searching for specimens collected by others has been facilitated by datasets, some relating to the Dot Map Project; OC records; online databases of museums like the University of Michigan Museum of Zoology and USNM; and records from the Florida State Collection of Arthropods (FSCA) which were provided by William F. "Bill" Mauffray, curator of odonata and resident research associate. To date, those resources have yielded only 21 specimens of *A. vivida* collected in New Mexico between 1908 and 2024 and considered to be correctly identified. The suggestion is that the species is or was rare and local south of Interstate 40 and east of the Sangre de Cristo Mountains, where *A. funebris* is known to occur.

The paucity of records of *A. vivida* from the southern half of the state exists despite cumulatively extensive collecting by many of the leading odonatologists of the last 50 years; John C. Abbott, James E. Barr, R. Duncan Cuyler, Jerrel J. Daigle, Sidney W. Dunkle, Oliver and Carol Flint, Rosser W. Garrison, Paul D. Harwood, William F. Mauffray, John Michalski, Dennis R. Paulson, Fred C. Sibley, and others have worked in southern New Mexico, but apparently none have documented *A. vivida* in the southern part of the state.

Given the likely distribution of *A. vivida*, there were few surprises until I received photos of two specimens (see following page) that came in response to one of my requests from Bill Mauffray at FSCA: *A. vivida* was collected in Grant and Sierra Counties by noted lepidopterist Clifford D. Ferris in 1978. These appear to be the southernmost confirmed records of the species in the state, possibly by as much as 150 miles.

I was initially tripped up by details on the specimen cards. The Grant County specimen was said to be from Gallinas Canyon in the Gila National Forest, but the coordinates were for a location with the same name in Socorro County. The specimen from Sierra County was said to be from an unspecified milepost along New Mexico State Road 90, which ends about 30 miles from that county.

Clifford D. Ferris, professor emeritus, College of Engineering, University of Wyoming, wrote the foundational work on butterflies of Grant County (Ferris 1976) based on field collecting starting in 1965. He has collected primarily in Grant County, but also in Catron, northern Hidalgo, Luna, and western Sierra Counties. His "primary forest collecting sites" include the Black Range east of Silver City. His specific collecting sites include many locations in Grant County, among them Gallinas Canyon in the Black Range; and two locations in Sierra County: Emory Pass and Kingston (Ferris 1976: 38–40).

I located Ferris through my lepidopterist friend Steve Cary and sent him Bill Mauffray's photos of the two specimens with some questions. His response explained how he ventured outside the realm of lepidoptera and filled in the gaps on the Sierra County specimen's card:

> "For some years, Howard Weems (now deceased) at FSCA (DPI) recruited a network of volunteers around the country to collect insects. He supplied pins, vials, specimen boxes, etc. I was one of the volunteers. I did not retain any of the non-Lepidoptera specimens – all were sent to Weems. That's how the *Argia* specimens wound up there.
>
> I checked my 1978 field log book. The only Sierra Co. record that I have is for MP 95 SR 90, 3 July, 1978. I did not go to New Mexico in April. Some years ago, the NM Hwy. dept. changed the route number to 152.

In 1978, the western terminus of New Mexico State Road 90 was at US 70 north of Lordsburg. It went north to the junction with US 180 in Silver City (where it ends today). From the 180 junction the route headed east 7.5 miles to Santa Clara, then over the Black Range and through Kingston to Interstate 25 at Caballo (this is the section now known as NM-152). On NM 152 today, milepost 40 is at Kingston Campground (a USFS site), at the east end of the town of Kingston. In 1978 that was milepost 90 on SR 90 – five miles west of Ferris's location for the specimen of *A. vivida*.

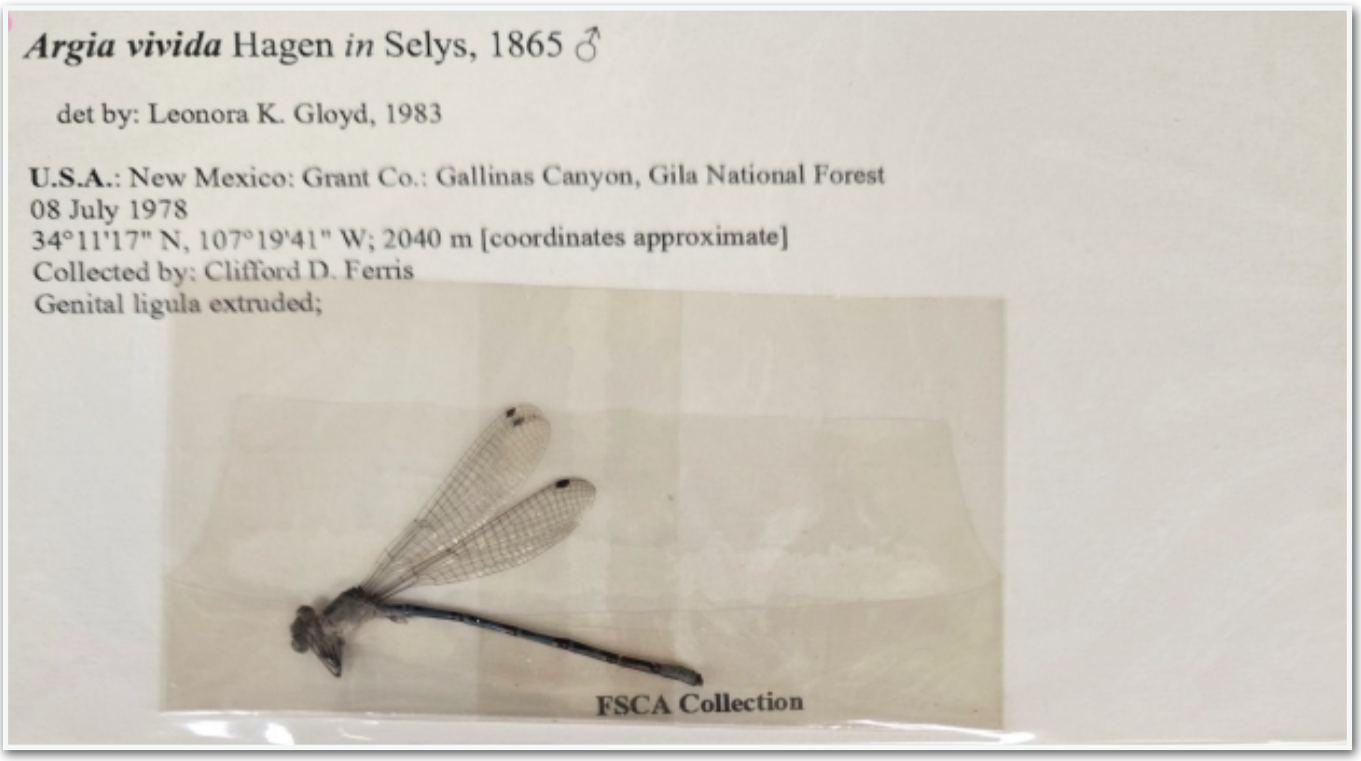
The campground had become of interest to me, and I emailed Ferris again asking, "When you collected in/near Kingston, do you recall if you collected only in the campground area, or if you also collected along Middle Percha Creek west and east of the campground?" His reply was, "It would not have been at the campground...I parked just off the highway and collected along the creek area" (emphasis mine).

On 3 August 1995, Bill Mauffray collected 41 specimens of *A. funebris* at the campground, but no specimen of *A. vivida*. His description of the location is "New Mexico, Sierra County, Kingston, E on SR-90, Kingston Rec Area, Middle Percha Creek, seepages, small pond" (emphasis mine). Most of the specimens are at FSCA today, but a few were deposited in other institutions, including USNM. Mauffray confirmed that the specimens still at FSCA are all *funebris* (pers. comm., 4 Nov. 2025), and Rosser Garrison concurred with that identification based on his own examination in 2022 (pers. comm., 11 Nov. 2025).

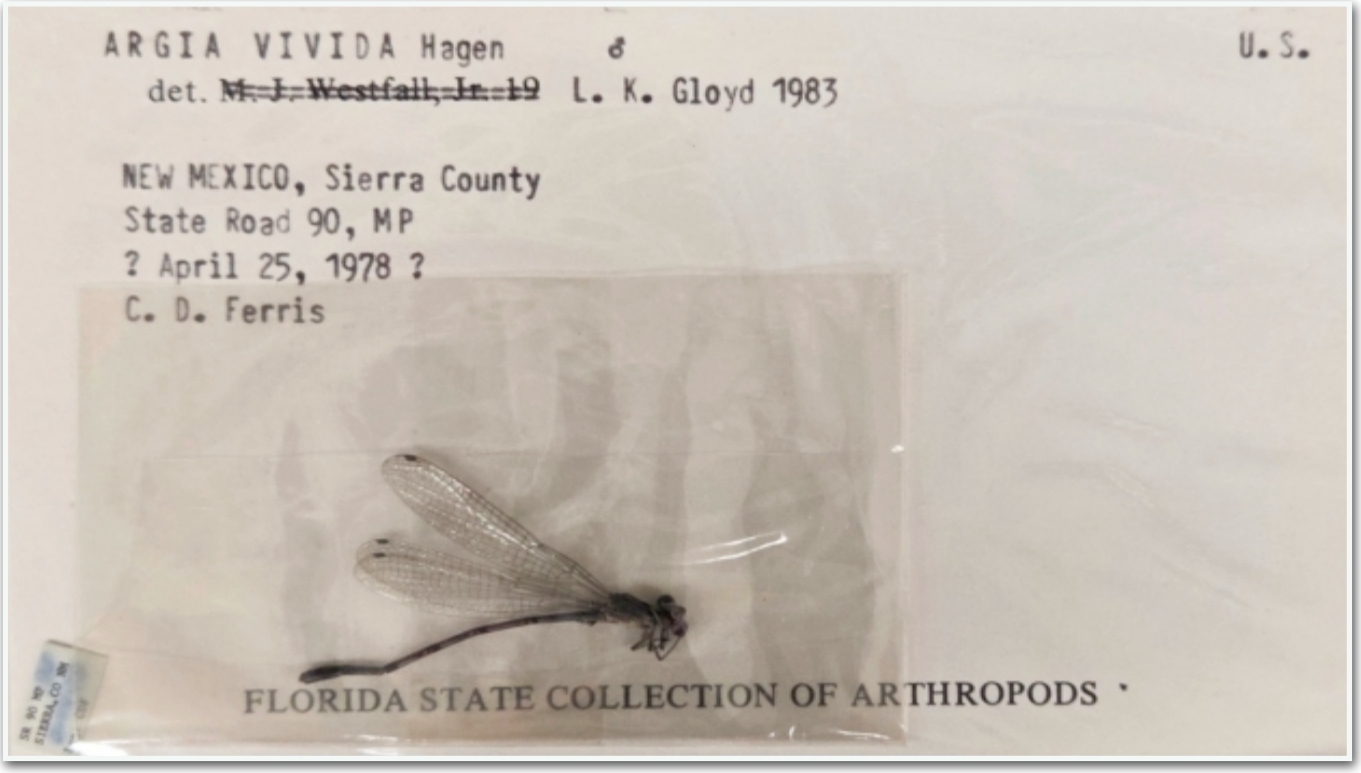
A sizable seep is still present at the campground, though a pond no longer exists (Bob Barnes, pers. comm., 31 Oct. 2025). So although the records were separated by 17 years, it is reasonable to surmise that

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*Links to other records in these series:
OC#2962419
OC#2962420
OC#2962365
OC#2962366
OC#2962367
OC#2962373
OC#2962374



This specimen of *Argia vivida* from Grant County may be unique. The coordinates were not assigned by Clifford Ferris and are for another location of the same name in Socorro County.



See the text for clarification of the location and date of this unique specimen from Sierra County.

A. funebris was present at the campground in 1978. Ferris's specimen from five miles east of the campground documents a rare instance of *A. vivida* and *A. funebris* in proximity to one another in New Mexico.

Heading west from Kingston, NM 152 goes over Emory Pass and down the west slope of the Black Range through Gallinas Canyon, where Ferris collected another specimen of *A. vivida* five days after collecting near Kingston. As he explained, the location was the now-closed Lower Gallinas Campground: "There used to be a dirt road that ran along the creek to the point where the canyon boxes in. I would have collected along the creek. Remnants of the road remain, but are being taken over by vegetation" (pers. comm. 11 Nov. 2025).

Ferris also collected a specimen of *A. funebris* at that location, now at FSCA. The date on the specimen card (like information on the Sierra County specimen, misread from a handwritten note), was printed as 24 May 1978, but Ferris confirmed that he began his road trip from Laramie that year on 23 June and collected the specimen in July, probably the same day he collected *A. vivida* (pers. comm., 12 Nov. 2025). Rosser Garrison examined both of those specimens in 2022, concurring with Leonora Gloyd's determination of the specimen of *A. vivida* and identifying the specimen of *A. funebris* (pers. comm., 11 Nov. 2025).

Here Garrison confirmed the only known instance of sympatry between the two species in New Mexico, documented by chance in what would seem to be a highly unlikely location.

Argia vivida and *Argia funebris* require much more study in New Mexico. Confirmation of collected specimens will continue to be necessary to distinguish between them, and many reports of both species on Odonata Central and iNaturalist may remain unconfirmed indefinitely.

Special Thanks To:

Datasets including Dot Map and other records from New Mexico were provided by John C. Abbott, Rosser Garrison, Bill Mauffray, Dennis Paulson, and James N. Stuart.

I thank Bill Mauffray for providing photos and redetermination of specimens at FSCA on several occasions; Rosser Garrison and Clifford Ferris for answering innumerable questions; Bill Prather for suggesting that I start my search for *Argia vivida* in San Juan County; Steve Cary for putting me in touch with Cliff Ferris; and John Abbott and Jim Johnson for their interest in and support of my pursuit of *Argia vivida* and other poorly documented species of odonata in New Mexico.

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Sometimes We Notice Things Outside the Black Range

Although the Black Range is "our patch", it is not our world. Sometimes we let the rest of the world intrude into our survey of the natural history of the Black Range.

At the end of last year we allowed two such intrusions, in the form of videos in our Vimeo portfolios.

One dealt with a human historical site (Fort Cummings, Cooke's Spring, and the Butterfield Express Stageline) and the other dealt with the geology of a nearby area (San Lorenzo Canyon, just north of Socorro).



Wasp of the tribe Pepsini, photographed on June 10, 2019, by Rebecca Hallgarth. Note the cell typography of the wings, a key to the identification of this group of insects.

Seepwillow - A Wasp Magnet

In late August and early September 2025 insects were swarming the *Baccharis salicifolia* ([Ruiz & Pavon] Persoon) in Warm Springs Wash, northeast of Hillsboro. The bushes, generally known by the common name of Seepwillow (also Seep Willow, Seep-willow, or Mule's Fat), were flowering and were major attractors for many species of butterflies, wasps, and bees.

A few of the species found on four Seepwillows during that period are shown here.

Family *Pompilidae* (Spider Wasps)
Subfamily Pepsinae, Tribe *Pepsini*

It is often much easier to act like you know something than it is to actually know something. Such is the case with Tarantula-Hawk Wasps. I have always been happy calling those red-winged but otherwise all black big wasps, Tarantula Hawks. Well. . .

Let us assume, rightly or wrongly, that the wasps shown below and on the next page are in the tribe *Pepsini* and even within the Genus *Hemipepsis* or *Pepsis*. That is, they are correctly called by the common name Tarantula Hawk. As you may begin to suspect, all of the other genera in *Pepsini* are not Tarantula Hawks - although all hunt spiders.

Why all this waffling on my part? It's the veins, the cells, the fact that the wings overlie each other, the slightly out-of-focus images, and that if they sting you it really really hurts.

The number and shape of wing cells is used to identify a tarantula wasp to genus (see top left image on the following page). My failing eyes are simply not up to the task.



But one thing is clear, all of these wasps hunt spiders, paralyze them, drag them to a burrow, and lay their eggs on them. Each genus tends to specialize in a particular type of spider. I would say a particular genus of spider, but that does not seem to be correct. And, *Pepsini* wasps seem to prefer large hairy ground-dwelling spiders. I suspect that the fact that they are large and ground dwelling is important, the hairy attribute - not so much.

See this REFERENCE.







What Do Other Pepsini Prey On?

Antrodiaetus pacificus **(see below) is the prey of *Calopompilus pyrrhomelas*. It is one of the Folding Trapdoor Spiders, lives and hunts from a burrow, is large, hairy - kind of like a tarantula, but not. The prey of other wasps in *Calopompilus* are apparently not known. But based on C. *pyrrhomelas*, which paralyzes the spider, drags it back to a burrow, and lays an egg on the spider which becomes larva food - it is assumed that others in the genus also "act like" tarantula hawks.**

Wasps in the genus *Cryptocheilus* prey on wolf spiders (*Lycosid*); those in the genus *Entypus* also prey on *Lycosid* species but also on funnel weaver spiders (*Agelenids*); the prey of those in the genus *Epipompilus* is not known; and those in the genus *Minagenia* use wolf spiders (in particular those in the genus *Lycosa*) as larval hosts.

Pepsini wasps have a thing for large hairy spiders.





Family *Scoliidae* (Scoliid Wasps)
Tribe *Scoliini*

I am fairly sure that the black-winged, red-tailed wasps shown here are either *Scolia dubia haematodes* or *Triscolia ardens*. Both are in the tribe *Scoliini*. In late August 2025 these wasps were also swarming the *Baccharis salicifolia* in Warm Springs Wash, northeast of Hillsboro.

Distinguishing between *Scolia dubia haematodes* and *Triscolia ardens* is difficult. The nominate form of *Scolia dubia* has (generally) two yellow spots on the upper abdomen and can be dismissed as a possibility here.







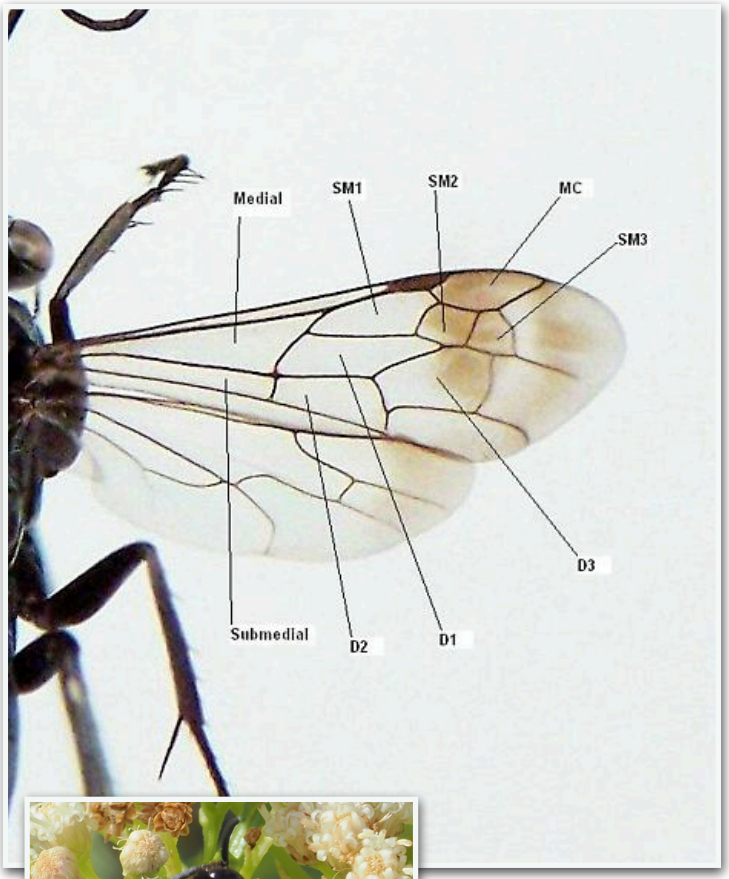




Per BugGuide: "Both *Scolia dubia haematodes* and *Triscolia ardens* have black bodies, blue wings, and red abdomens. They are easily confused in photography and are most reliably separated by wing venation. Both species have a single recurrent vein. *S. dubia haematodes* has two submarginal cells whereas *T. ardens* has three submarginal cells."

The male *Triscolia ardens* have a "pseudostinger with three narrow spines projecting slightly beyond the tip of abdomen; females lack such spines." (BugGuide) That may be what we are seeing within the white ellipses below.

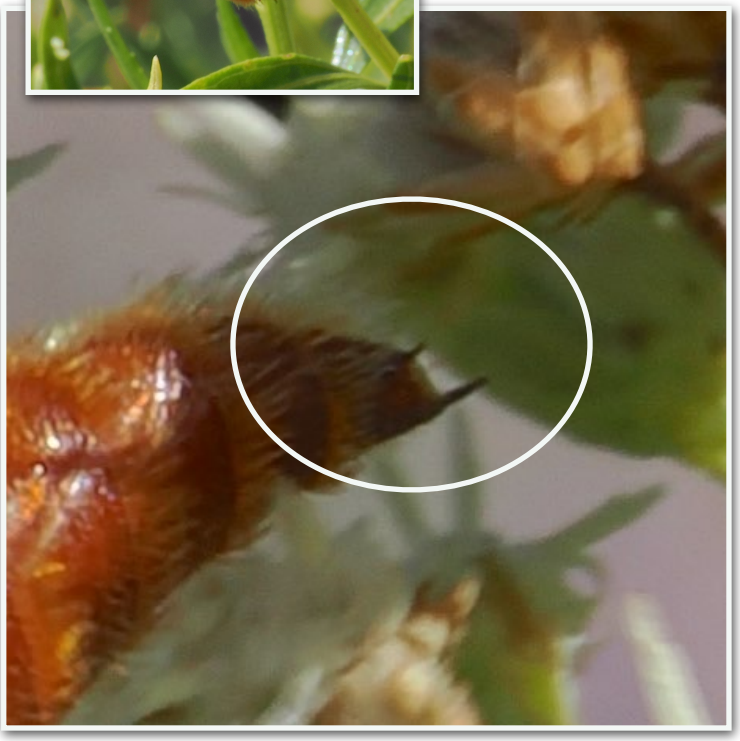
REFERENCE: See "The Scoliid Wasps of the Southwestern United States (Hymenoptera: Scolliidae)", *The Southwestern Naturalist* 32(3):357-362, September 28, 1987.











Tribe *Bembicini*
Sand Wasp

Not all of the wasps swarming these Seepwillows were large. There were also small yellow and black ("yellow jacket type" wasps) crawling around. These proved to be in the Tribe *Bembicini*, the Sand Wasps. There are roughly 200 species, in 27 genera, within this tribe, in North America north of Mexico. All of the species in this tribe prey on other insects ("A review of prey choice in bembicine sand wasps", *Neotropical Entomology* 31-1, March 2002). Wasps in this tribe immobilize prey and store them in their nests and lay eggs on the prey. Once the larvae hatch they eat the prey the adult left for them. Prey species varies depending on geographic range, prey abundance, and the prey species which are available for predation. Prey are typically, but not exclusively, fly species. The article cited above notes "That sand wasps learn sources of prey and return repeatedly to these sources is well known. . . . Females providing prey for larvae in a nest, or bearing a mature oocyte and having just finished digging a nest, are under pressure to find food quickly. Under situations of scarcity of the usual prey, as a result of climatic factors or competition from other species, females may undergo a lowering of the threshold of response or - to put it another way - a broadening of sensory focusing on images of a certain size - such that alternate prey are seized and utilized."

A significant reference for this tribe is *The Sand Wasps - Natural History and Behavior* by Howard E. Evans and Kevin M. O'Neill, 2007, Harvard University Press.

Stictiella pulchella

The common name for species in the genus *Stictiella* (J. Parker, 1917) is Butterfly-wolf Wasps. (BugGuide cites Parker as the original describer of this genus, Wikipedia cites Cresson, 1865 as the original describer of the species.) In North America, north of Mexico, there are 12 species in this genus.

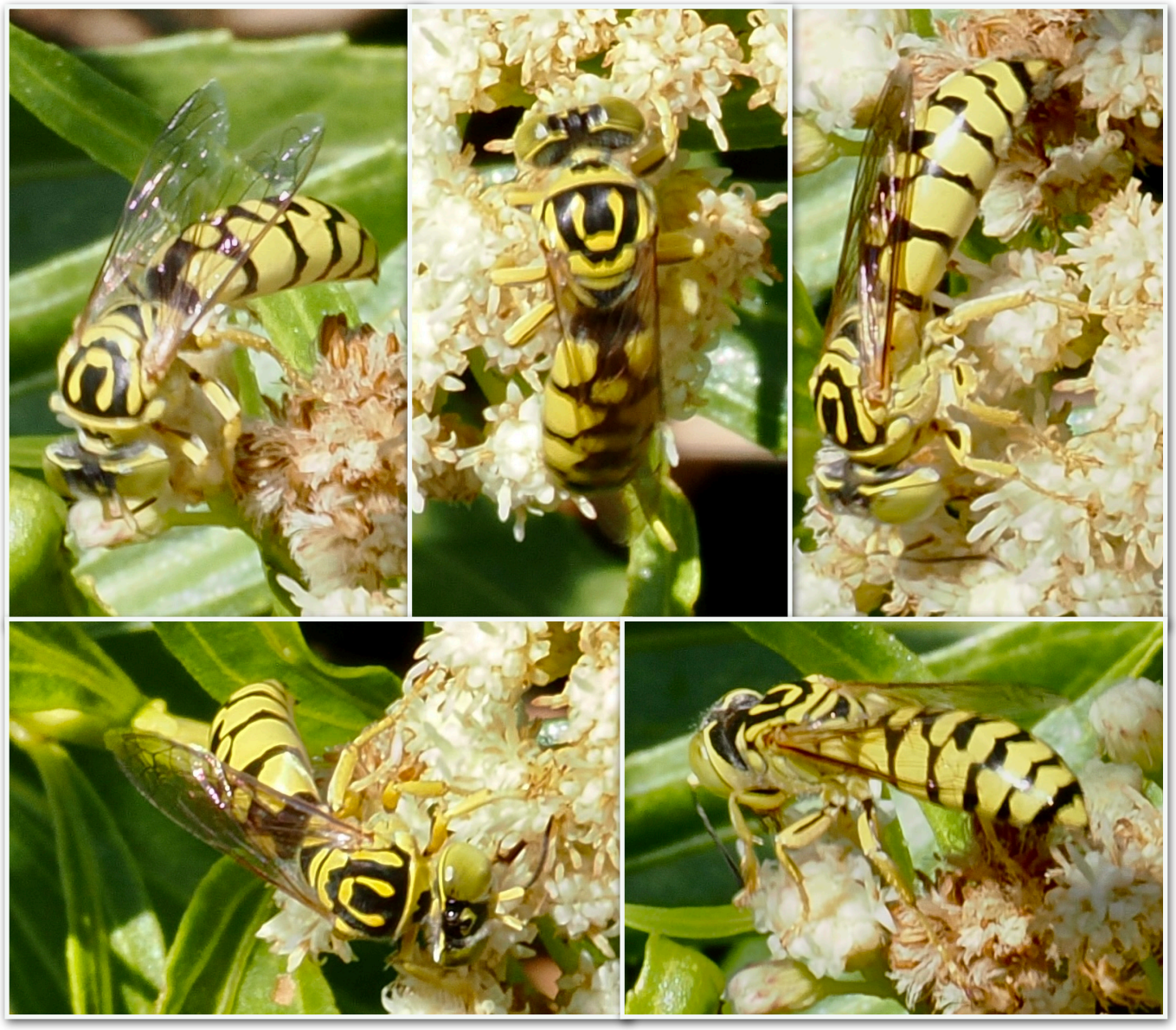
The original species description was based on a specimen from Colorado.

In "Observations on the Behavior of Digger Wasps of the Genus Stictiella", Gillaspy, Evans, and Lin note that this species appears to prey exclusively on *Lepidoptera* (*Annals of the Entomological Society of America*, Volume 55, Issue 5, pp. 559-566, 1 September 1962).

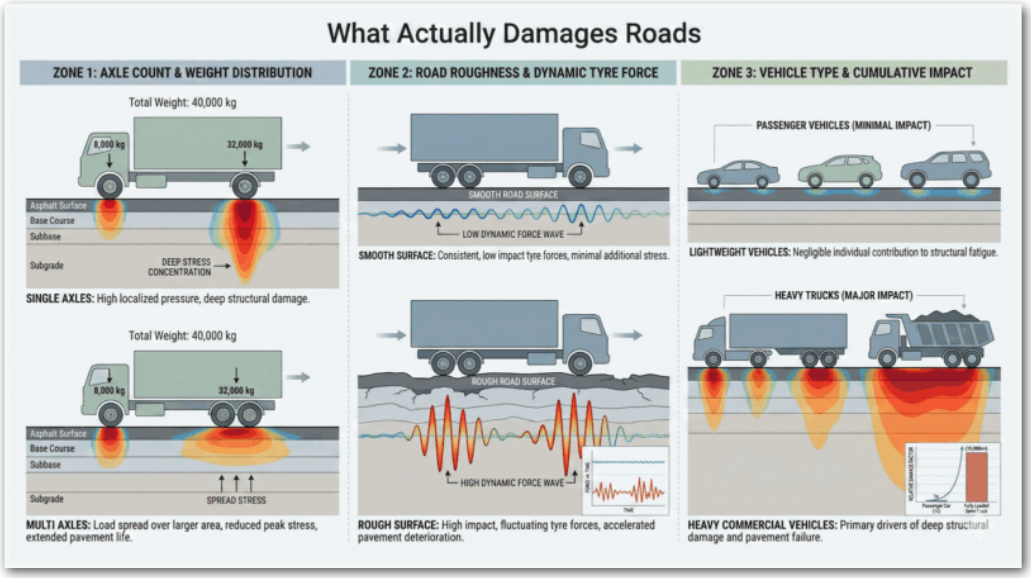
"Species of *Stictiella* attempt to level the mound of soil that accumulates in front of an entrance from burrow excavation. The species temporarily close the entrance with soil following burrow excavation and then make an orientation flight before going in search of prey. Species of *Stictiella* hunt and stock underground cells with adult *Lepidoptera* (moths, skippers, butterflies). *Stictiella* nests are one-, two- or many-celled depending on the species. The number of prey per cell is often inversely related to prey size. Most *Stictiella* species practice delayed mass provisioning; i.e., they lay an egg on the first prey placed in the cell before other prey are put inside." ("Nesting Behavior, Ecology, Seasonal and Geographic Distribution of the Sand Wasp, Stictiella emarginata [Hymenoptera: Sphecidae])" Kurczewski and Boyle, *The Canadian Field-Naturalist*, Volume 119, pp. 6-15.)







The images shown above and on the previous page were taken of an individual while it worked a flower head of one of the Seepwillows in Warm Springs Wash, northeast of Hillsboro, on 07 September 2025.

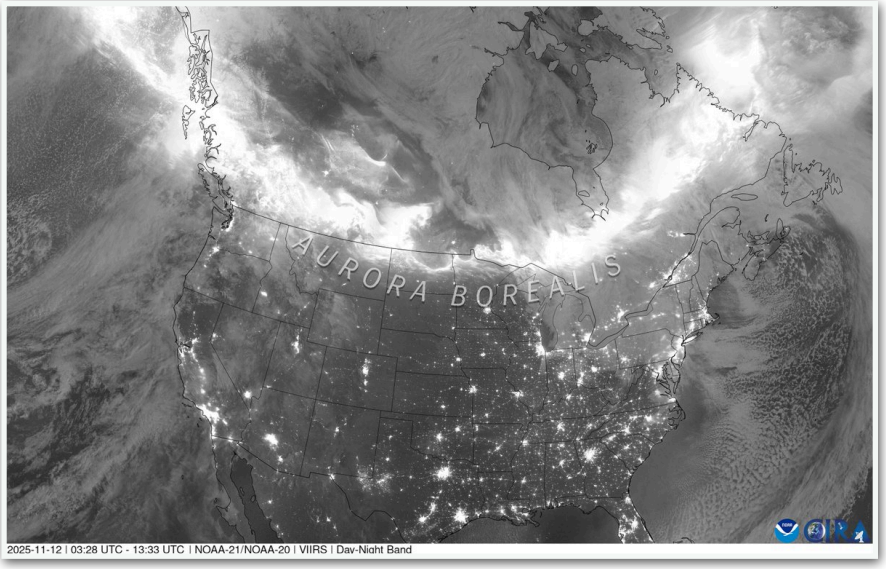


Societal Costs Associated With Road Use

A recent assessment of the societal costs associated with how we use roads provided some nuance to the debate about road financing and the financing of societal costs associated with the use of roads - two very different things.

The first finding, that heavy trucks not personal vehicles (of whatever size and regardless of how much they are used) damage roads. Secondly, larger and heavier, personal vehicles cause more harm to others than do smaller & lighter vehicles, when they are involved in an accident.

Aurora Borealis



Is it weather if it happens in the upper parts of the atmosphere? If so, the big weather event of 2025 occurred in November when there was a very strong coronal mass ejection (CME) from our star. These blasts of intense radiation are often associated with sunspots on the solar surface (corona). These radiation events can travel through space at about 1,900 miles per second but their speed is variable. The slowest CMEs travel through space at a leisurely 155 miles per second or so. Once a CME occurs, the radiation event may reach earth in as little as 15 hours, or it may take several days. The radiation from a solar flare, on the other hand, travels at the speed of light and reaches the earth in about 8 minutes.

CMEs occur when the sun's magnetic field trips all over itself, creating very strong localized magnetic fields which can erupt through the surface. When this effect of the sun's magnetic field reaches the earth it disrupts our own magnetic field, intensifying the geomagnetic storms which normally occur here. Radiation from the sun most easily penetrates the Earth's magnetic field at the magnetic poles. That is why the auroras, which are the "visual" manifestations of the Earth's geomagnetic storms, are common in the arctic and antarctic regions of the planet. In the north, the aurora is known as the aurora borealis, or more commonly as the northern lights.

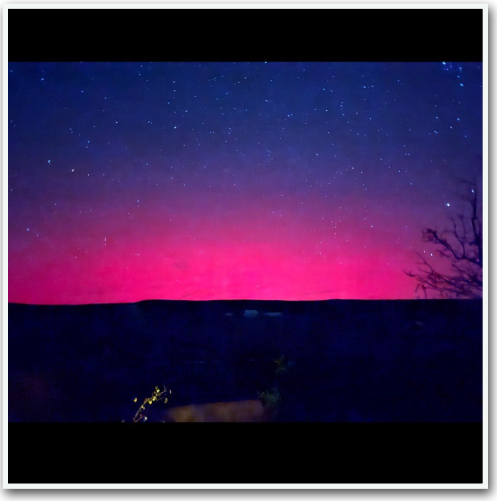
Although the aurora borealis has been seen as far south as El Salvador, Hawaii, and Cuba in the Western Hemisphere (the Carrington Event of 1859) and perhaps farther south during periods unrecorded by humans, it is generally seen only in the very northern part of North America (including southern Canada and the very northern part of the United States) in the Western Hemisphere.

The geomagnetic storm of November 2025 was quite intense (a G-4 class storm) with solar radiation penetrating more deeply into the atmosphere than is usually the case. Because of this the aurora borealis was seen in North America as far south as the northern states of Mexico.

At around 8 p.m. on November 11 John West, Therese Van Buskirk, and Debora Nicoll took the photos of the northern lights shown at the right. John's photograph is the first in the series, followed by one of Therese's, and lastly a photograph of the aurora behind Berrenda Mountain by Debora. Additional photographs were included in the Natural History Blog post about the event on November 12, 2025. Differences in color in the photos are a function of the cameras used and their settings.



The composite image above, from NOAA, was taken by the Joint Polar Satellite System (JPSS) on November 11-12. This image of the aurora borealis, as seen from space, is interesting from a number of perspectives: It shows the arrangement of the Earth's magnetic field (what we are seeing is the geomagnetic storm as it is confined by the planet's magnetic field); it shows how far south the geomagnetic storm occurred and hints at its intensity (note how bright it is); and given how far south the aurora was seen, it shows how high in the atmosphere these events occur.



The science of auroras is covered well in NOAA's (and specifically the Space Weather Prediction Center's) Aurora Tutorial.

The November event is not likely to be replicated anytime soon, but your chance of seeing such an event in the future is greatly enhanced if you follow the Aurora Dashboard. This NOAA site forecasts auroras.



We see the beauty of the aurora, but the geomagnetic storms that they highlight are very dangerous in a technologically driven world. They have the capability of seriously disrupting all sorts of electrical and electronic systems. Thus the need to predict their occurrence.

Results of the 2025 Hillsboro Christmas Bird Count

On December 18, seventeen people spent 52 hours in the field counting the number of individual birds of whatever species they encountered. Twelve spent 17 hours doing the same at bird feeders. All of this as part of the 2025 Hillsboro Christmas Bird Count.

The following tabulation lists the species seen and the number of individuals seen of that species. "cw" refers to "count week", meaning the species was seen during the three days prior or three days after count day - but not on count day (the number of individuals of a species sighted during cw are not counted). If a species is listed in red, the number of individuals seen was a record low for the species in the Hillsboro Christmas Count. If a species is listed in blue, the species has been seen on a previous CBC but not on this one. If a species is listed in CAPITAL LETTERS, it was not seen on previous CBCs.

American Wigeon
Mallard
Scaled Quail
Gambel's Quail - 174
Montezuma Quail - cw
Wild Turkey
Golden Eagle
Northern Harrier - 2
Sharp-shinned Hawk - 1
Cooper's Hawk - cw
Northern Goshawk
Red-tailed Hawk - 15
Ferruginous Hawk - cw
Sandhill Crane - 2
Killdeer
Rock Pigeon
Eurasian Collared-Dove - 35
Inca Dove
White-winged Dove - 155
Mourning Dove - 117
Greater Roadrunner - 2
Barn Owl (American) - 1
Western Screech-Owl - cw
Great Horned Owl - 2
LONG-EARED OWL - 1
Northern Pygmy Owl
Black-chinned Hummingbird
Anna's Hummingbird
Acorn Woodpecker - cw
Williamson's sapsucker
Yellow-bellied Sapsucker
Red-naped Sapsucker - 6

Hillsboro Christmas Count

Year	Participants	Hours	No. of Species	No. of Individuals
2019	15	45.85	86	
2020	31	52.85	93	
2021	15	43.13	82	
2022	14	60	83	
2023	21	60.4	94	4462
2024	20	61.85	82	2303
2025 (prelim)	17	~51	75	2588

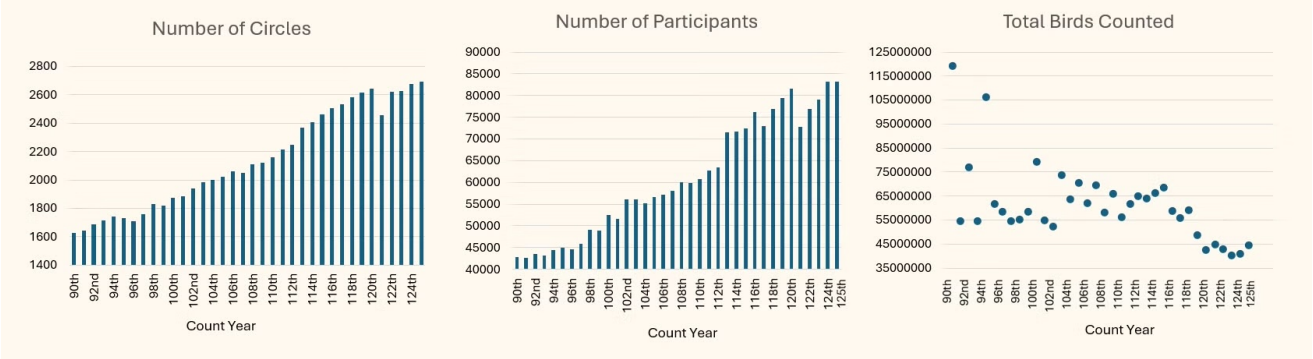
Ladder-backed Woodpecker - 18
Downy Woodpecker
Hairy Woodpecker - 2
Northern Flicker (Red shafted) - 34
American Kestrel - 5
Merlin
Prairie falcon
Black Phoebe
Say's Phoebe - 6
Vermillion Flycatcher
Loggerhead Shrike - 1
Hutton's Vireo - 2
Pinyon Jay - 4
Steller's Jay - 11
Woodhouse's Scrub-Jay - 81
American Crow - cw
Chihuahuan Raven - 10
Common Raven - 50
Horned Lark
Mountain Chickadee - 1
Bridled Titmouse - 4
Juniper Titmouse - 16
Verdin - 3
Bushtit - 33
Red-breasted Nuthatch
White-breasted Nuthatch - 13
Brown Creeper
Rock Wren - 8
Canyon Wren - 2
House Wren
Winter Wren - cw
Marsh Wren
Bewick's Wren - 2
Cactus Wren - 1
Blue-gray Gnatcatcher
Black-tailed Gnatcatcher
Golden-crowned Kinglet
Ruby-crowned Kinglet - 32
Eastern Bluebird - 6
Western Bluebird - 94
Mountain Bluebird
Townsend' Solitaire - 7
Hermit Thrush - 6
American Robin - 9
Gray Catbird
Curve-billed Thrasher - 6
Crissal Thrasher - 1
Sage Thrasher
Northern Mockingbird - 2
European Starling
Cedar Waxwing - 1
Phainopepla - 6
McCown's Longspur
OLIVE WARBLER - 1

Orange-crowned Warbler
Yellow-rumped Warbler (Audubon's) - 3
Wilson's Warbler
Painted Redstart
Yellow-breasted Chat
Cassin's Sparrow
Grasshopper Sparrow - 1
Baird's Sparrow
Chipping Sparrow - 223
Black-chinned Sparrow - 4
Field Sparrow
Brewer's Sparrow - 32
Black-throated Sparrow - 26
Lark Sparrow
Lark Bunting
Fox Sparrow
Dark-eyed Junco - 512 (New High Number)
White-crowned Sparrow - 277
HARRIS'S SPARROW - cw
White-throated Sparrow - 1
Sagebrush Sparrow - 2
Vesper Sparrow - 2
Savannah Sparrow - 7
Song Sparrow - 3
Lincoln's Sparrow - 4
Canyon Towhee - 34
Rufous-crowned Sparrow - 12
Green-tailed Towhee - 2
Spotted Towhee - 47
Northern Cardinal - 3
Pyrrhuloxia - 3
Red-winged Blackbird - 52
Rose-breasted Grosbeak
Western Meadowlark - 2
Eastern Meadowlark
Brewer's Blackbird - 87
Great-tailed Grackle
House Finch - 142
Cassin's Finch - 1
Red Crossbill
Pine Siskin - 4
Lesser Goldfinch - 47
American Goldfinch - 3
House Sparrow - 49

Take aways

In the seven years of the Hillsboro Christmas Count 130 species have been recorded. Over a third of those species (36%) were not seen on this year's Christmas Count. Of those seen on this year's count 9 species were seen in record low numbers, 12% of the species seen. Slightly over 40% of

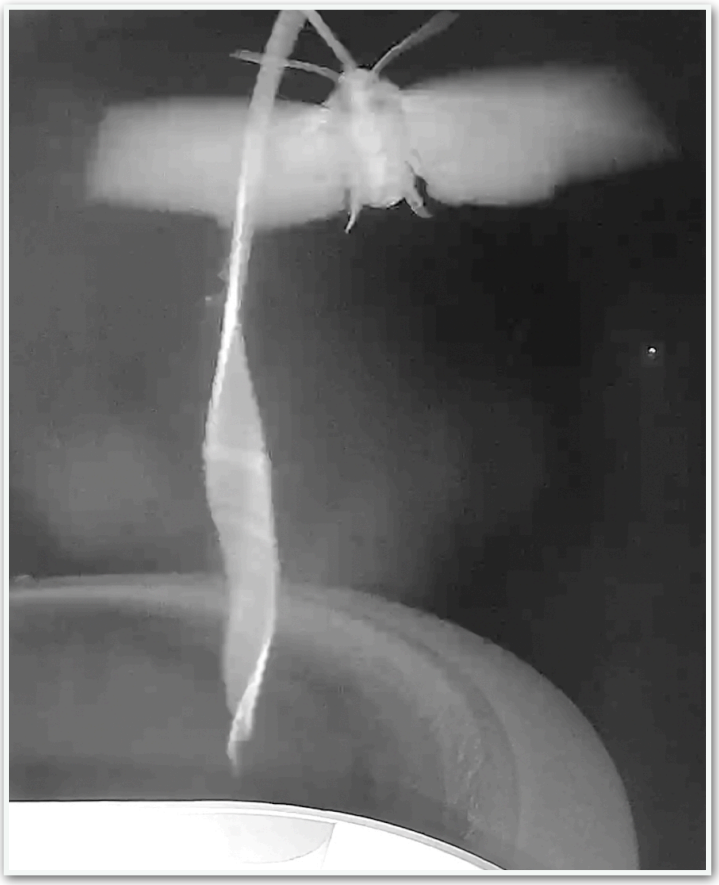
Total CBCs



the species seen in the history of the count were either not seen this year or were reported in record low numbers. The species count for this year (75) was the lowest in the seven years of the count.

On the positive side, 3 new species were added to the total Hillsboro Christmas Count this year: Long-eared Owl, Olive Warbler, and Harris's Sparrow (cw). Dark-eyed Juncos were seen in greater numbers than have been seen on previous Hillsboro Christmas counts.

These results are broadly reflective of both the most recent observational history in this area and national trends. All through the fall observers have been reporting fewer species and fewer individuals all along the east slope of the Black Range. Nationally, the number of individual birds counted on the total CBCs has declined even though the number of CBCs and the number of participating observers have increased (see graphs above).



Bird Cam Images of Sphinx Moth

Top Right: Sphinx Moth captured on a bird feeder cam on 22 May 2025, in Hillsboro. The funky looking proboscis is created by the fast movement of the moth and the relatively slow shutter speed of the camera.

Bottom Right: Sphinx Moth captured on a bird feeder cam on 27 March 2025. Hillsboro. Video at this link.



