



Flatirons Facets

Flatirons Mineral Club of Boulder County, Colorado

Volume 65, Number 3

May-June, 2022



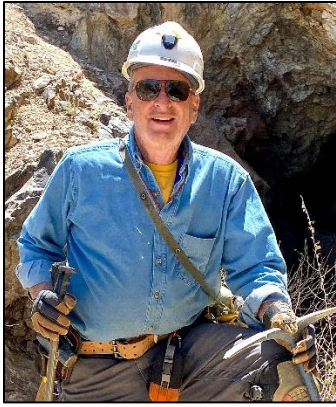
Beautiful rhodochrosite specimen offered at the 2022 Tucson Show. This specimen is from the Good Luck Pocket, Main Stope, Sweet Home Mine, Alma, Colorado. Photo by Brian Walko, Earth Extractions, LLC.

To see more fabulous minerals and activities from this year's Tucson Show, read Brian's article starting on page 13.

Dinosaurs, crocodiles, and turtles in Boulder? Learn more at our next club meeting on May 10th from Sue Hirschfeld and Beth Simmons. See page 2 for more information about the meeting.

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President's Message

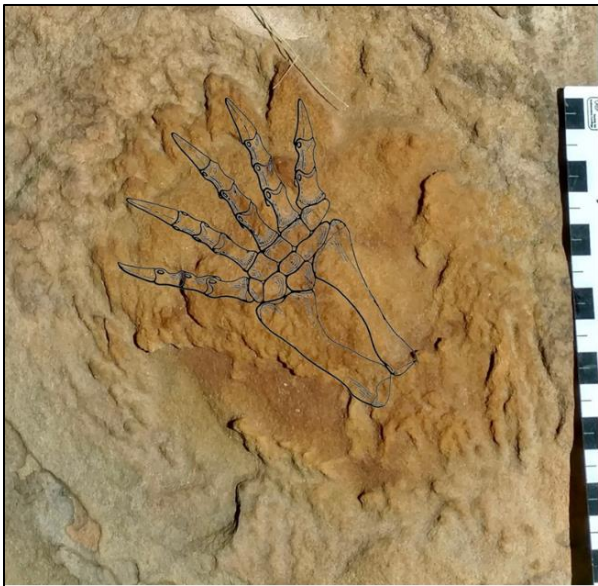
Our club functions, thanks to the help of volunteers. The Silent Auction was a good example of members pitching in to help. There are many ways to volunteer:

- Write an article for the newsletter
- Find an interesting speaker for a club meeting
- Provide a field trip location
- Guide a field trip
- Take photographs of field trips
- Help with the annual club picnic in August
- Donate extra mineral samples for grab bags
- Assist with meeting setup and takedown
- Help with our Rocks & Rails Show
- Help at the Denver Gem & Mineral Show
- Become a board member

If you have an idea to improve something, let me know. Any assistance will be greatly appreciated.

Thank you,
Brian Walko, FMC President

Club Meeting on May 10 Dinosaurs, Crocodiles, and Turtles in Boulder County?



Turtle track with claw marks (Beth's favorite track)

In 2016, animal tracks were discovered in the Late Cretaceous Laramie Formation near the town of Marshall in an area of collapsed coal mines. This turned out to be the largest and most diverse tracksite in Boulder County, containing theropod and hadrosaur dinosaurs, crocodile, and turtle tracks and traces. At our May meeting, Sue Hirschfeld and Beth Simmons will illustrate and discuss the tracks found and the coal mining history of the Marshall area.

Club meetings start at 7:00 pm at the Mountain View United Methodist Church, 355 Ponca Place in Boulder. Enter the building from the south side.

The Flatirons Mineral Club is a non-profit organization, which is dedicated to developing and maintaining interests in Earth science and associated hobbies. The purpose of this Club includes, but is not limited to, studying geology and Earth science, teaching others about our hobby, including young people, collecting gem, mineral and fossil specimens, and learning lapidary skills.

The Flatirons Mineral Club is affiliated with the Rocky Mountain Federation of Mineralogical Societies, the American Federation of Mineralogical Societies, and the Greater Denver Area Council of Gem and Mineral Societies.





Swim track by crocodile or turtle (Sue's favorite

Club Donates Fossils to the Smithsonian Institute

Several years ago, the club received a donation of minerals and fossils that included 16 brachiopod fossils from Pakistan. A letter found with these Permian/Carboniferous-age fossils indicated that they were sent to the United States in 1954 by the Geological Survey of Pakistan. After contacting a Paleozoic brachiopod expert, we learned that these fossils were important for researchers to access and we made arrangements to donate them to the Smithsonian.



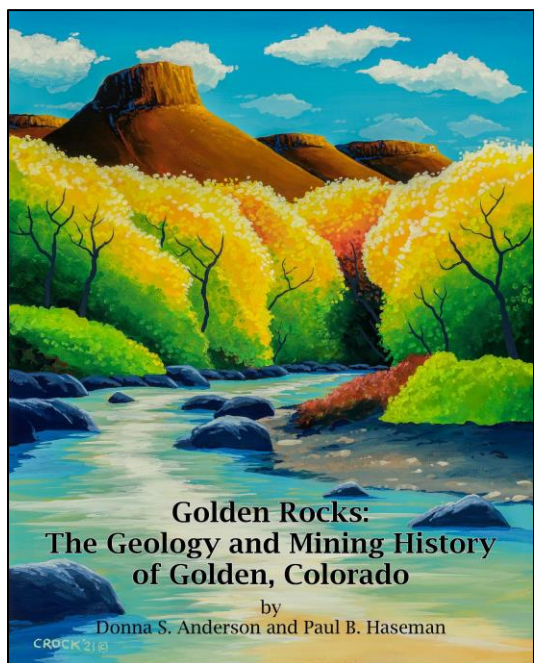
Sadie Johnson, Our Annual Scholarship Recipient

In 1991, FMC member Paul Ralston had a dream to give an annual scholarship to support earth science college students attending a Colorado university or college with tuition and other expenses. He fulfilled this dream by setting up a special fund for these scholarships, supported by the sale of grab bags and donations from club members. This is the 31st year of the FMC Scholarships. Sadie Johnson, a junior at the Colorado School of Mines in Geophysics, is the recipient of this year's \$1,000 scholarship from our club.

Since coming to Mines, Sadie has been active in many organizations both in the school and the community. She is currently treasurer for Blue Key Honors Society. She volunteers at events such as the Mitchell Elementary School STEM night, an event that tries to make STEM fun and engaging for elementary school kids. She is also a member of the Vanguard Scholars Program, a group of academic- and service-driven women on campus.

Since her freshman year, she has been involved in undergraduate research as a member of the FIRST program (First-Year Innovation and Research Scholar Training), and currently works as an undergraduate research assistant within the Hydrology Program. This work involves hypothesizing characteristics of underground aquifers, using surface geology and stream heterogeneity, in Manitou Experimental Forest. She has presented her research at the Virtual Undergraduate Research Symposium and hopes to present again this year at Mines.

Sadie has been on the Dean's List-Fall 2019-present. She is the recipient of the CPOW (Colorado Professionals in Onsite Wastewater) Scholarship Award and is a grader for the Petrology for Geological Engineers). We congratulate Sadie on her achievements at the Colorado School of Mines and are glad to award this scholarship to her to assist her education in the Earth Sciences.



Golden Rocks: The Geology and Mining History of Golden, Colorado

A Free eBook to Download

Donna Anderson and Paul Haseman have written a new, free eBook, downloadable from the Arthur Lakes Library at Colorado School of Mines at https://libguides.mines.edu/ld.php?content_id=65441105. The 122-page book is written for the non-specialist. It is peer-reviewed and covers geology, water, mining, and mining legacies including railroads, mine hazards, pollution, and the transition from mining to open space. The book is illustrated with over 100 maps, photographs, and figures. "Golden Rocks" is the first guide to the geology of Golden since the 1938 version written by F.M. Van Tuyl and others for Colorado School of Mines students.

Silent Auction Was a Great Success

After two years, our club's silent auction was back on April 12. The club had accumulated major parts of two collections during the Covid shutdown, so the club had a lot to offer for sale. Over 45 people came to the auction to bid on nice minerals, fossils, lapidary material, rockhounding books, and tools. After all sellers were paid for their split, the club netted \$1008 to support our activities.

Many thanks from the FMC Board to those who helped organize and put on this year's auction.

One last note: We still have a lot more very nice specimens to offer for sale at next year's silent auction.



Bidders at this year's silent auction. Credit: Charlotte Bourg

Six Mile Fold Field Trip

William Rehm, Trip Leader



Field trip participants Interpreting the geology, geography and palynology of Six Mile Fold. Credit: William Rehm

The club's first field trip in 2022 was to Six Mile Fold, just north of Boulder, where club members learned about the Niobrara Formation and the echelon folds (most call them "hogbacks") located here, and elsewhere, along the front range of Colorado.

Managed by Boulder County and city open space organizations, the site preserves its geological heritage and does not allow disturbances, so our group focused on examining the formations, strata, and flora of the area.

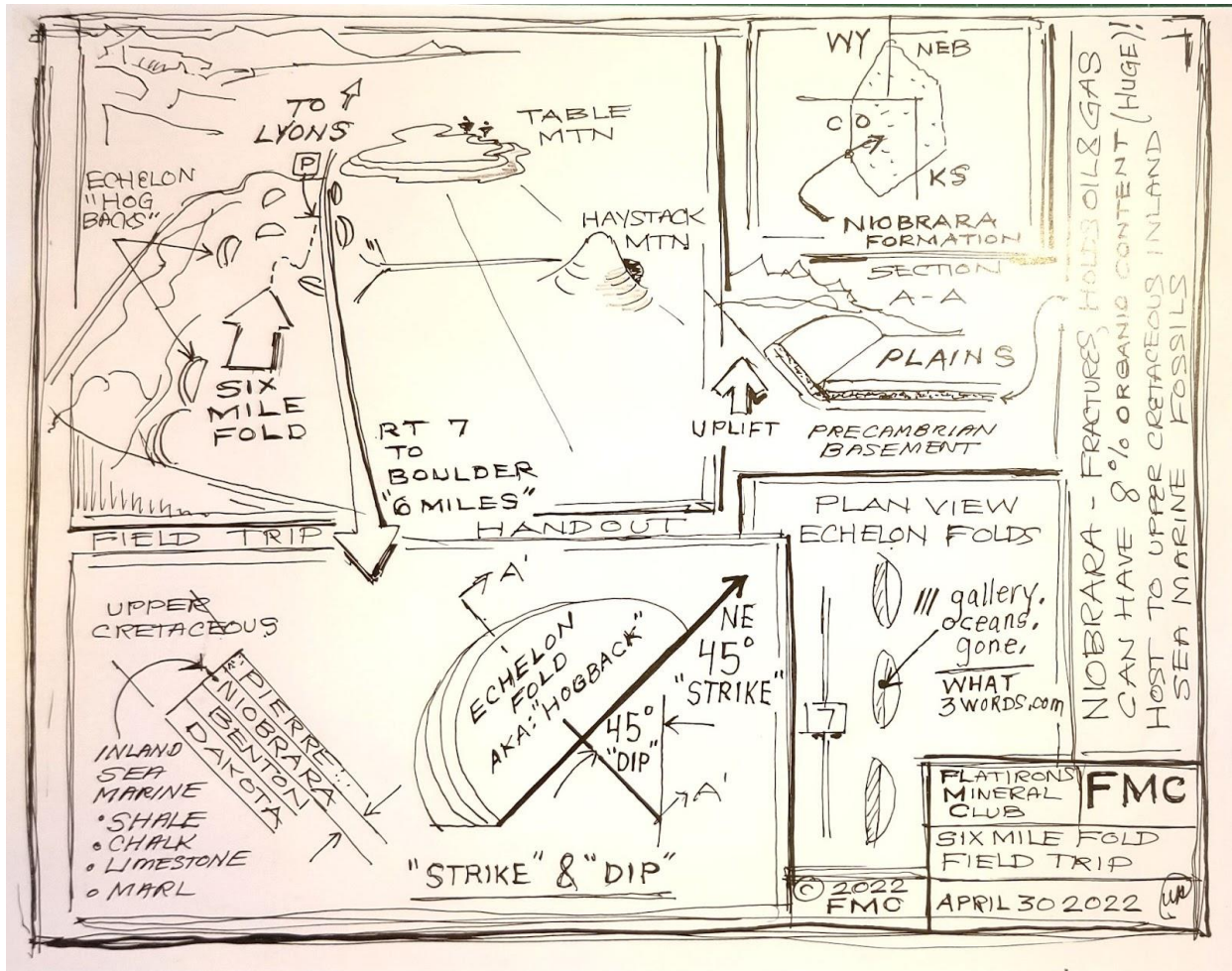
Belonging to the Late Cretaceous Period, shale in the Niobrara Formation contains many fossils of sea creatures from the Western Interior Seaway. The seaway - a host to many ancient life forms 70 million years ago - once covered our area, and extended to the Appalachian Mountains. Our group observed fist-sized clams in outcroppings, and other, smaller fossils of various sorts.

The shale here has remarkably high organic content- up to 8% - as a result of the sea life that was captured within the sediments of the formation. This shale also has unique fracture characteristics that make it a storehouse for oil and gas, which contributed to a short-lived oil boom, North and East of Boulder, in the early 1900s.

The Six Mile Fold area contains exceptional examples of uplift folding, including a rather famous anticline and syncline. Atop this, we surveyed the landscape in all directions. To the East, the sedimentary plains, to the west the uplifted mountains. To the North and South, a glorious array of echelon folds in various arrays, sizes, and juxtapositions. The group learned how to define the strike and dip of these folds.

Many thanks to Hazel Gordon, who helped the group identify flora and fauna that prospers here. Samples spotted by Hazel included *Prunus americana* Marshall (American or Wild Plum), *Viola nuttallii* Pursh (Nuttall's or Yellow Violet), *Leucocrinum montanum* Nutt. ex A. Gray (Common Sand Lily), *Oxytropis sericea* Nutt. var. *sericea* (White Locoweed) in full flower, *Ribes aureum* Pursh (Golden Currant) in full flower, *Nothocalais cuspidata* (Pursh) Greene (Sharp-point Prairie-Dandelion or Wavy-leaf False Dandelion), and *Musineon*.

Here is the handout from the field trip, giving an overview of the geology of Six Mile Fold.



Jr. Geologists Activities

The Jr. Geologists have been active these past two months, learning about gemstones, crystals, and how Stone-Age people used rocks and minerals. Last month, the Jr. Geologists toured the fossil preparation lab of Lost World Fossils in Berthoud. Charlotte Small wrote about the tour on page 9. A special thank you to Tom Caggiano for the great tour.

Gemstone Meeting

At our March meeting, we learned about gemstones, including researching our birthstones and famous gemstones. On the next page is what some of the Jr. Geologists learned about famous gemstones.

Eric Ruggles asks questions about gemstones with several younger Jr. Geologists. Credit: Susanne Peach



Logan Sapphire by Mabelle Goldgeier (age 6)

The Logan Sapphire is the color blue and violet. It is the size of a chicken egg. It came from Sri Lanka. It weighed 422.98 carats.



Andamooka Opal by Addy Goldgeier (age 7)

The Andamooka Opal is red, blue, and green. It weighs 302 carats. Andamooka is one of the oldest known opal fields in Australia. Sugar turns opals from Andamooka black and increases the colors. It was given to Queen Elizabeth as a necklace during her first visit to Australia.

Hope Diamond by Jaxsen Millard (age 9)

The Hope Diamond is a 45.52-carat diamond. The cut is Antique Cushion and the color is Fancy Dark Greyish Blue. The diamond was mined in the 17th century from the Kollur Mine in Guntur, India. The diamond has had several owners but is now in the National Museum of Natural History in the United States, where it is on permanent exhibition. The Hope Diamond's estimated value is \$200-350 million. People think the Hope Diamond was on the Titanic because of the movie, but it was not.



Delong Star Ruby by Jasmine Estes (age 6)

It was discovered in the 1930s. It weighs 100.32 carats. In 1964 it was stolen in a jewelry heist.

Gemstone photos used under the terms of the [GNU Free Documentation License](#)

Crystal Growing

Growing crystals is great fun, and the Jr. Geologists met last month to learn about growing several types of crystals. It involves carefully measuring different chemicals and water, heating the water, stirring to dissolve the chemical in hot water, and allowing it to sit overnight or several days until the crystals grow.



Coral and Hawkins measuring water to make crystals. Credit: Dennis Gertenbach



Charlie shows the GeoExplorers how to make bismuth crystals. Credit: Dennis Gertenbach

The younger Jr. Geologists made borax snowflakes, alum geodes, and edible sugar crystals. The older GeoExplorers made crystals with copper sulfate and monoammonium phosphate. Charlie Bonvillian, one of our GeoExplorers showed them how to make bismuth crystals. (Because the bismuth was contaminated, they did not make nice crystals. We will reschedule again with better bismuth.)



Copper sulfate and monoammonium phosphate crystals grown by Charlie and Daniel. Credit: Tara Bonvillian



Jr. Geologists grinding corn with a mano and metate. Credit: Jessica Estes

Stone Age Tools and Art

For this badge, the Jr. Geologists learned how Native Americans used rocks and minerals in their everyday life, from making tools for hunting and preparing food to their artwork. The juniors made paints from grinding



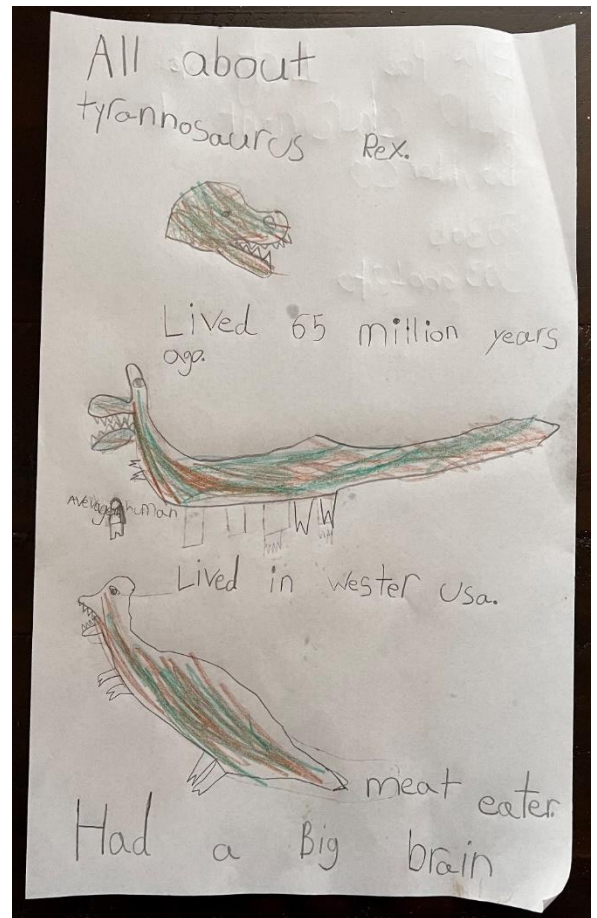
chalk, clay, and charcoal and used them to create their own pictographs. They also ground corn using a mano and metate, similar to how native peoples prepared seeds and grain for food. All of the juniors at April's meeting earned the Stone Age Tools and Art Badge.

Jasmine creating a pictograph using paints made from ground rocks and minerals. Credit: Jessica Estes

Poster Contest

Several of the Jr. Geologists entered a national poster contest. The theme was "All About Dinosaurs!" Here is the poster that Ella (age 6) entered.

If your family would like to join the Jr. Geologists and you are not on our email list, please contact Dennis at gertenbach1@gmail.com to have your name added.



Mr. Caggiano's Fossil Studio

By That One Rabbit

On Saturday, April 16th, the Jr. Geologists went on a trip to Mr. Caggiano's house to find out how he preps his fossils. He acquires his fossils to sell. Some of the fossils he sold were for decoration, while others were for collectors. Mr. Caggiano's tour had two parts. The first part was in a little hut to the right of his house. He works on cleaning the fossils there. The second part was in his garage. There he makes display stands for them and gets them ready to be sold.

When we first got there, he told us about how he got into fossil collecting. Then he showed us around. Inside there were MILLIONS of fossils. Some, he said, had been there for years. He told us about his sandblaster and air scribe. He said that preparing fossils was very tedious work. Mr. Caggiano talked about fake fossils, as well as some expensive little fossil teeth.

Next, we went into his garage. This was where he made sure everything was ready to be sold. For instance, he made stands for some or tables for others. He said that the stands were not glued to the fossil, so you could easily take them off. He had some big bison ribs on one table. Each of them was removable. On the other table, he had his blacksmith gear.

Overall, I learned a lot. I learned that some fossils (when prepped the right way) can be worth a lot of money. Another thing I learned is that it takes lots of persistence to get the fossils as you want them. Before I came to his workshop, I wondered how they polished individual fossils in a big piece of rock. He said, that he first had to take the fossil off. Prep it, making sure that the fossil can still connect to the rock it was taken off of, then puts it back. It is a very painstaking job. One question I have is how does he get the fossils so shiny? Does he polish them?

Here are a several of photos from his studio.



Mr. Caggiano shows us a large fossil bone. Credit: Dennis Gertenbach



Mr. Caggiano teaches us about polishing individual fossils from a rock. Credit: Dennis Gertenbach



Mr. Caggiano shows Connel how to use an air scribe to prep a fossil. Credit: Dennis Gertenbach

Editor's Note: That One Rabbit is the pseudonym of Charlotte Small. Charlotte is in 8th grade has been a Jr. Geologist for 6 years.

Light and Minerals: Part 1. What Are visible light, ultraviolet light, infrared light?

Mark H. Goldgeier and Daniel W. Bonvillian

The sun produces an enormous amount of radiation. Our human perception of light includes only visible light, as demonstrated literally by a rainbow of colors. Visible light extends from red through orange, yellow, green, blue, indigo, and violet. Beyond violet is invisible ultraviolet light. Beyond red is invisible infrared light.

Each and every color is described by a number - its wavelength. Two of the most important properties in identification of minerals are their color and their streak. Ruby is pigeon's blood red, sapphire is sometimes corn flower blue, padparadscha is - well, no one really has quantified what the color of the lotus flower is.

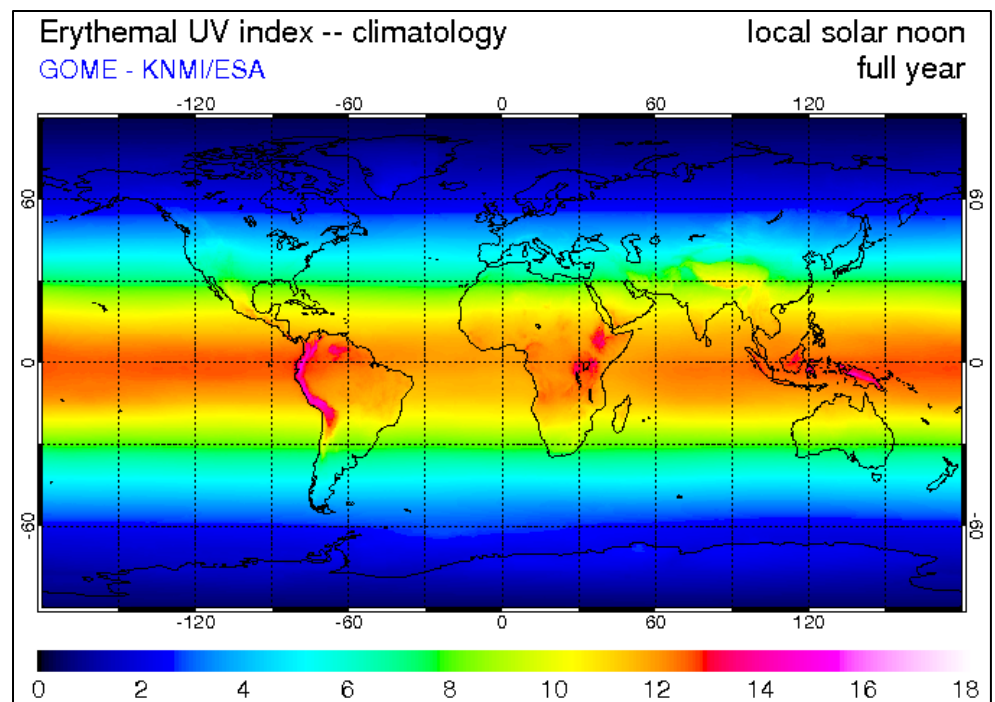
Ultraviolet light has a shorter wavelength and is therefore more energetic than is light of longer wavelengths. Ultraviolet light is divided arbitrarily into (and we are using photobiologic definitions) UVA (320-400 nm), UVB (290-320 nm), and UVC (100-290 nm). Oxygen, ozone, water molecules, and dust particles in the atmosphere absorb most UVC (almost all), a good portion of UVB (99.9% at equator), and relatively less UVA (95%). Were it not for our atmosphere, we could not survive unprotected exposure to the sun's ultraviolet radiation.

Negative Biological Effects and Strategies for Protection

Ultraviolet light, especially UVB light, is absorbed by structures that are essential to human life, such as DNA, RNA, proteins, and membranes. DNA that has been damaged by UV light is the major cause of sunburn, suntan, skin aging, and skin cancer. We all know that in addition to boots, hats, gloves, eye protection, a rock hammer, and lots of water, sun protection is an essential safety tool. As rock hounds, especially as Flatirons Mountain Club rock hounds, we should seek to minimize sun-induced damage to our eyes and to our skin.

Which factors influence our susceptibility to sun damage? Equatorial location, higher elevations, mid-day sunshine, reflection from snow, sand, structures, and water all increase the intensity of sunlight that impacts our bodies. The opportunities for sun damage increase where climate, occupation, clothing style, and outdoor activity expose us to more sun.

Some people sunburn more easily than others. Limiting time in the sun (especially mid-day sun), utilization of shade, wearing of protective clothing, and applying physical blocking sunscreens can greatly protect us from sunlight's harmful effects.



World Annual UV Index. The higher numbers indicate greater UV exposure. The Annual UV Index for Colorado is 8. Credit: KNMI, public domain

Editor's Note: This is the first in a series of installments about light. Next month will be about light and evolutionary biology.

PROTECT
ALL THE SKIN YOU'RE IN




U.S. Department of Health and Human Services
Centers for Disease Control and Prevention

Use a Layered Approach for Sun Protection.

-  Sunscreen works best when used with shade or clothes, and it must be re-applied every 2 hours and after swimming, sweating, or toweling off.
-  Use broad spectrum sunscreen with at least SPF 15 to protect exposed skin.
-  Wear a hat, sunglasses, and protective clothing to shield skin.
-  Seek shade, especially during midday hours.

CS27180

Credit: Center for Disease Control and Prevention, public domain

Where in Colorado?

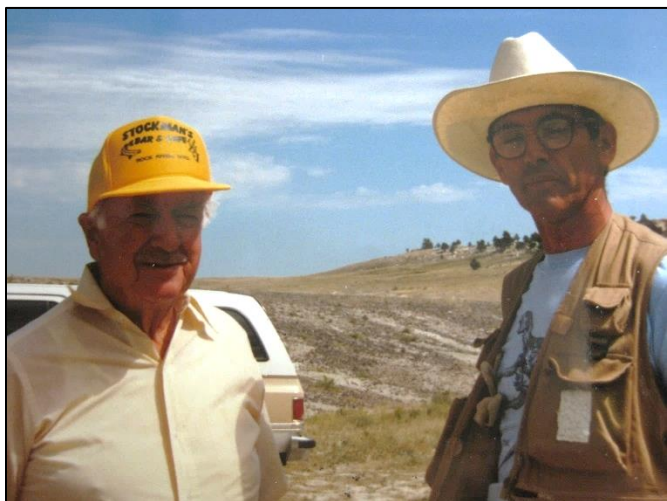
Each month, we test your knowledge of geological features in Colorado. The light gray layer pointed out in this photo was formed during the worst day on earth in the last 500 million years. Where in Colorado is this? See page 21 for the answer.



In Memoriam: Jim Siegwarth

Anita Colin

A longtime club member and former physicist at NIST, Dr. James Siegwarth passed away this spring after a very interesting and productive 88 years.



Jim in his early dino-hunting days (1990) enjoys a visit from Walter Cronkite.

Jim had been interested in dinosaurs since he was a child, but didn't go fossil hunting until he read The Dinosaur Heresies by Robert Bakker. He was 54 at the time and decided to head up to Wyoming to see if he could find some fossils for himself. Within a year he did, and was joined by Bakker on some of his expeditions. There was even a visit from Walter Cronkite during the filming of the TV special Dinosaurs, which aired in 1991.

Numerous dinosaur fossil deposits are found in an area of Wyoming called Como Bluff. Many of them are on the privately-owned Carlin Ranch. In 1990, Jim had discovered a new Jurassic deposit that would eventually be called the Nail Quarry and would prove to be very productive. With permission of the ranch owners, he would spend the next thirty years bringing co-workers and friends to the quarry to extract over 1,000 fossil bones from Stegosaurus,

Diplodocus, Allosaurus, and other dinosaurs that lived 150 million years ago.

FMC members have been visiting the Nail Quarry since 2011 and will continue to have that opportunity as the quarry is now co-managed by club member Anita Colin. The excavated fossils are donated to the Tate Museum in Casper, Wyoming.

Jim is survived by his wife, Regina, a son and daughter, and four grandchildren. He will be remembered by all his friends for his sharp wit and his ability to sing all the songs ever written by Gilbert and Sullivan.



Jim Siegwarth and Anita Colin enjoying one of their many trips to the quarry together.



Jim Siegwarth (foreground) at the quarry with long-time friend and dino hunter Glenn Doyle.

Tucson Gem & Mineral Showcase: Why You Should Make the Pilgrimage

Text and Photos by Brian Walko



Many people think the Tucson Gem & Mineral Show® as one large show held at the Tucson Convention Center. The main Tucson Gem & Mineral Show® sponsored by the Tucson Gem & Mineral Society has been going on for 67 years. Due to its popularity, there are now over 40 plus satellite shows that occur in the Tucson area. Each show is unique, and their dealers cater to specific interests and prices.

If you have not been to the Tucson shows, I highly recommend placing this event on your pilgrimage list. This article will entice you and provide the first-time visitor with a synopsis for planning the trip.

The shows start the last week in January and continue to the end of the second week in February. Serious collectors arrive early to seek out the best specimens. Casual collectors can visit anytime. The shows will always be there. During this time Tucson receives over 65,000 plus visitors plus the vendors for the shows. So, you will be competing for travel arrangements if you decide to visit. Some people fly directly into Tucson and rent a car. Sometimes it is cheaper to fly into Phoenix, rent a car and drive the 100 miles to Tucson. An alternative option is to drive. Another logistical hurdle is lodging. Hotels and motels are booked months in advance. I've had my best success staying at Airbnbs. Food is no problem. Tucson has lots of fine restaurants.



Map of Tucson Shows



Once you are established in Tucson, it will be time to plan visiting shows. You will not be able to visit all 40 plus shows in two or three weeks. Here are my top recommendations.

Kino Gem & Mineral Show

The show takes place at the Kino Sports Complex in south Tucson. This showcase offers a combination of a huge tent and lots of outdoor venues. You will find modestly priced beads, gems, minerals, fossils, finished jewelry, and bulk material. A great place for bargain shopping. Free admission and parking.



Clockwise from upper left. Kino Show: outdoor venues, bargains, more bargains, bulk dealers.



22nd Street Show

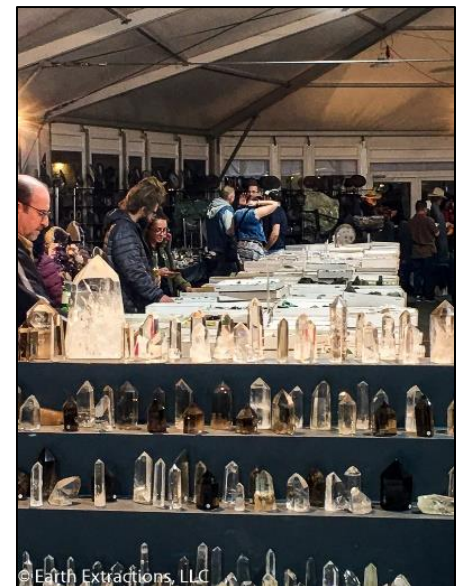
The massive main tent features an appealing balance of minerals, gems, fossils, dinosaurs, meteorites, jewelry, beads and art. There are admission and parking fees.



22nd Street Show

Mineral City Show

This is the place for purchasing minerals. Over 50 vendors are at the Mineral City Show. The show consists of seven buildings. You can walk through each building seeing vendors' rooms. They offer a variety of merchandise, such as fine minerals, museum-class minerals, rare gemstones, and fossils. If you are looking for rare or fine minerals, you should visit here.



Clockwise from upper left. Mineral City Show: fine specimens, Mineral City, Phil Persson's Room.

Westward Look Mineral Show

The show is in the beautiful Westward Look Resort nestled in the foothills of the Catalina Mountains overlooking the City of Tucson. This show features some of the finest dealers in the business with museum class mineral specimens you won't be able to see anywhere else. Dealers are in the resort's lodging rooms. Take note, most specimens are P.O.R., or price on request. For me, P.O.R. also means, if you have to ask, you can't afford it.



Left to right. Westward Look Show: rhodochrosite P.O.R., \$50,000 fluorite.

Tucson Gem & Mineral Show®

The largest, oldest and most prestigious gem and mineral show in the world sponsored by the Tucson Gem & Mineral Society. The main exhibition hall of the Tucson Convention Center has over 250 dealers, exhibit cases, lectures, and even a micro mineral room.



Left to right. TGMS: Convention Center main hall, Exhibit case with minerals of Bisbee, AZ.



Left to right. TGMS: jewelry dealer, mineral dealer

Other shows of note:

Miner’s Co-op

The best show for bargains. Purchase directly from the miners. Located in Marana just north of Tucson.



Miner’s Co-op



Oracle Road Shows

Oracle Road Shows

A new area hosting gem, mineral and fossil dealers in multiple small shows. Free parking and admission. Reasonably priced specimens.

I prefer to do a day of mineral shows, then a day of sightseeing. Some sightseeing recommendations are:

West Tucson

A popular scenic winding mountain pass road over the crest of the Tucson Mountains. Great views of saguaro cacti.



Gates Pass

Arizona-Sonora Desert Museum

A must-see museum. It is 98 acres of zoo, botanical gardens, walking trails, and a natural history museum.

Saguaro National Park

Another must-see national park. Explore the Sonoran Desert at its finest.



Saguaro National Park



Desert Museum iguana

Pima Air & Space Museum

The museum features a display of over 400 historical aircraft spread out in hangars and outside.



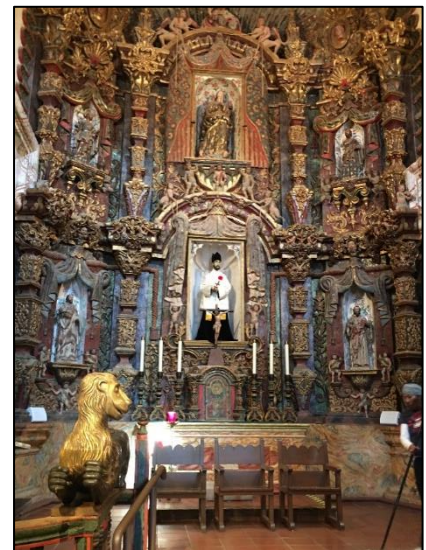
Pima Air & Space Museum entrance

Mission San Xavier del Bac

Mission San Xavier del Bac is a historic Spanish Catholic mission located south of Tucson on the Tohono O'odham Nation San Xavier Indian Reservation. It was built in the 1700s.



Mission San Xavier, outside and inside



Sabino Canyon

Sabino Canyon, one of the premier natural areas in southern Arizona, is located at the base of the Santa Catalina Mountains. Water flows all year. You can walk or ride a shuttle to the top and back.



Sabino Canyon

Mt Lemmon

The 27-mile Mt. Lemmon Scenic Byway is a stunning drive, with plenty of pullouts for photo opportunities. Drive from 2,000 to 9,000 ft and 70 degrees to 30 degrees to see snow.



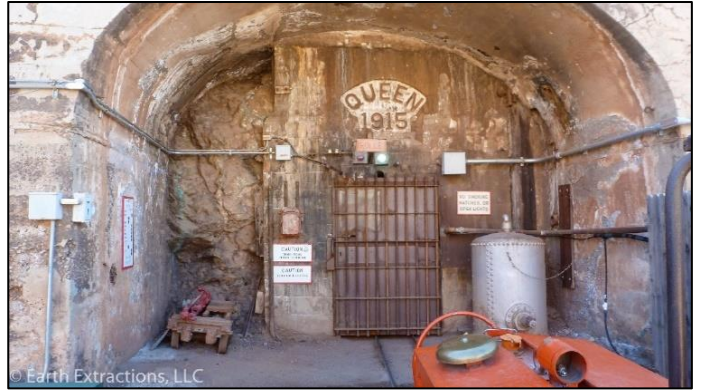
Mt. Lemmon



Historic Bisbee

A historical mining town that was known for copper, gold, silver and turquoise. The town's mines have produced world class copper mineral specimens.

The town of Bisbee



Mines in Bisbee

Conclusion

I hope this article will spark a bit of enthusiasm for visiting Tucson and the wonderful gem and mineral shows. I hope to see you there in future years.



Saguaro cacti



Roadrunner

Video: How the Grand Canyon Was Made

The Grand Canyon is nearly 300 miles long and over a mile deep. You could stack four Empire State buildings one on top of the other and they still wouldn't reach the lip of the Canyon. To learn the current thoughts on how this immense natural wonder was formed, watch this video: <https://www.youtube.com/watch?v=LaxaE7tcwu4>. Thanks to Trick Runions for sharing this link.

Where in Colorado?

Text and Photos by Dennis Gertenbach



Pointing out the iridium-rich layer of the K-T boundary

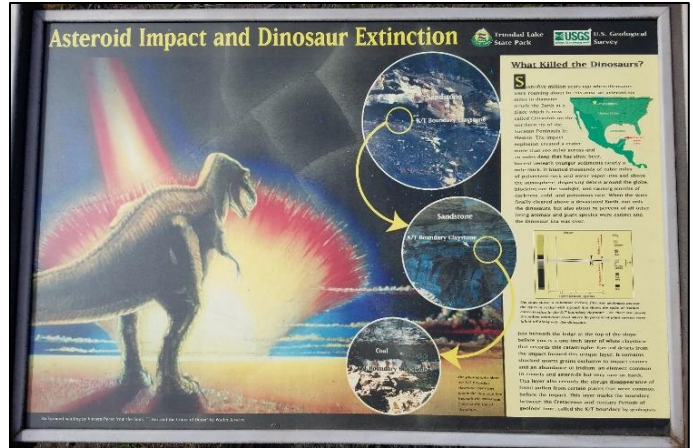
The site can be visited by walking or biking a gentle $\frac{3}{4}$ -mile trail. You will come to a sandstone ledge, with layers of shale underneath the ledge. Within this shale is the iridium-rich layer. Imagine putting your finger on the layer that marks the time that the dinosaurs went extinct.

The rocks below this layer were formed during the Cretaceous Period when dinosaurs ruled the earth. The rocks above were formed as the Earth recovered from the asteroid impact.



Examining the K-T boundary up close

Sixty-five million years ago, a large asteroid struck the earth near the Yucatan peninsula, wiping out the dinosaurs along with 75% of all species on Earth. The ash that formed from the impact blotted out the sun for months or perhaps years, raining down iridium-rich ash that formed a layer marking the K-T boundary (or more precisely, the K-Pg boundary). One of the best places to see the K-T boundary is right here in Long's Canyon in Trinidad State Park.



An easily understood explanation about the geology of the site is in the excellent book, *Geology Underfoot along Colorado's Front Range*, by Lon Abbott and Terri Cook. This book explores 21 important geologic sites up and down the Front Range.

The site is accessed at the west end of Trinidad Lake State Park, south of Highway 12. A park pass is required to visit the site, which can be purchased at the Long's Canyon trailhead. More information about the site and a map of the state park can be found at the links below.

<https://cpw.state.co.us/placestogo/parks/TrinidadLake/Documents/TrinidadBrochure.pdf>.

<https://cpw.state.co.us/Documents/CNAP/Visit a State Natural Area/Trinidad KT Boundary Visitable Area CNAP.pdf>.

Worth Visiting in the Area

Just to the east of the turnoff to Long's Canyon from Highway 12 are these interesting rows of coke ovens. A short drive to the north is the town of Cokedale.



Row of coke ovens at Cokedale.

Coal mining and coking (baking coal to produce coke used in steel production) formed a major part of Colorado's economy at the turn of the last century. In 1893 Colorado was the sixth-largest coal-producing state in the country. Cokedale, located in the Raton Basin coalfield, was a hotspot for coal production. Several competing companies had mines in the area.

One of these was the American Smelting and Refining Company (AS&R). AS&R recognized that coal from this area would be ideal fuel for its smelters in El Paso and Mexico, because the coal had low ash, sulfur, and phosphorus content and high coking qualities.

At that time workers lived in tent colonies, and AS&R recognized that adequate housing was necessary to attract and keep workers. Starting in 1906, construction of the town of Cokedale began, completing homes to house 1,500 residents in 1907. The company maintained the houses and buildings, which encouraged pride among the inhabitants. Each house had electricity provided by the company and rent was kept at \$2.00 per month, per room for forty years. AS&R provided schooling for children, as well as recreational activities for families. Because of the benefits provided by AS&R, few Cokedale residents participated in the southern Colorado coal strikes in 1913-14.

For more information about the history of Cokedale, see <https://coloradoencyclopedia.org/article/cokedale-historic-district>.

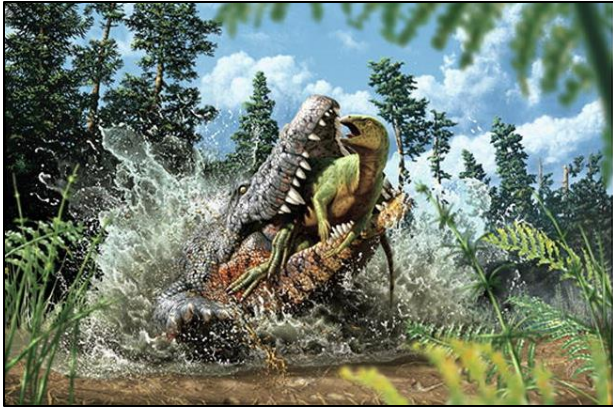
Fossils in the News

Dennis Gertenbach

Ancient Crocodile's Last Meal Was a Dinosaur

Many of us have seen ancient reconstructions like the one on the next page showing a large crocodile eating a small dinosaur. But, does the paleontological record support such an event? In this case, the answer is yes.

Researchers, led by the Australian Age of Dinosaurs Museum, recently announced the discovery of a new crocodile named *Confractosuchus sauroktonos* from western Queensland that lived approximately 95 million years ago. The



A life reconstruction of *Confractosuchus sauroktonos* capturing a juvenile ornithomimid. Picture credit: Dr Matt White/Australian Age of Dinosaurs Museum, used by permission.

fossil was discovered in a soft siltstone concretion, but the small, fragmented bones in the concretion were too fragile to be removed by conventional mechanical preparation methods. Instead, researchers used neutron and synchrotron x-ray micro-CT techniques to scan the concretion and create a 3-D image of the crocodile bones within the concretion. To their surprise, a juvenile ornithomimid dinosaur skeleton was found inside the crocodile. This is the first evidence of a crocodile eating a

dinosaur in Australia. It is not known if the crocodile killed the dinosaur or scavenged a recently died animal.

Information from <https://d347awuzx0kdse.cloudfront.net/aaod/content-file/Ancient%20crocodile's%20last%20meal%20was%20a%20dinosaur%20press%20release-web1.pdf?v=a87e9606531058fc2cfc1eb8f85afca8acde79f0>



Tyrannosaurus rex. Credit: myfavoritedinosaur.com, licensed under the [Creative Commons Attribution 3.0 Unported](https://creativecommons.org/licenses/by/3.0/)

***Tyrannosaurus rex* - One or Three Different Species?**

Researchers analyzed bones and teeth from 37 *Tyrannosaurus* specimens, found in different layers, and came up with a startling conclusion. Some tyrannosaurs have heavy, robust femurs (thigh bones), while others have more gracile bones. Also, specimens have either one or two slender incisor teeth on each side of their jaws. When they compared these data from the rock layer where each tyrannosaur fossil was discovered, they found that:

- Only robust femurs were found in the lower rock layer. Their similarity indicated that they were from the same species.
- Robust femurs were also found in the middle rock layer, along with one gracile femur.
- A mix of robust and gracile femurs was found in the top layer. The robust femurs differed from those found in lower layers.

Based on these findings, the authors concluded that *Tyrannosaurus rex* was actually three separate species. They

named the one in the lower and middle rock layers *Tyrannosaurus imperator*, noting that it usually had two incisor teeth. The dinosaur with the more-slender femurs was named *Tyrannosaurus regina* and had one incisor tooth. *Tyrannosaurus rex*, found in the upper layer, had robust femurs and only one incisor tooth.

Information from <https://www.sciencedaily.com/releases/2022/02/220228220252.htm>

Large-Eyed Crab from the Cretaceous Seas Was an Active Predator

Most crabs are scavengers, requiring a keen sense of smell but not sight to locate food. Thus, crabs do not have large eyes. A newly discovered fossil crab, *Callichimaera perplexa*, which lived 95 million years ago, is

Callichimaera perplexa. Image by Oksana Vernygora, licensed under the [Creative Commons Attribution-Share Alike 4.0 International](https://creativecommons.org/licenses/by-sa/4.0/)



an exception. The exquisitely preserved fossil, found in the Andes of Columbia, preserves the external eye and internal optic neural tissue. With extremely large compound eyes, coupled with the paddle-shape legs, this crab was a highly visual, swimming predator. For comparison imagine a human with eyes the size of soccer balls.

Information from <https://oeb.harvard.edu/news/%E2%80%98platypus%E2%80%99-crab-world-was-active-predator-lurked-cretaceous-seas>



Life reconstruction of *P. cambria*, an early cephalopod. Credit: Entelognathus, licensed under the [Creative Commons Attribution-Share Alike 4.0 International](https://creativecommons.org/licenses/by-sa/4.0/)

The Granddaddy of All Cephalopods

A new study has reported the oldest known cephalopod - a group that includes octopuses, squid, cuttlefish, and nautilus. The fossils are from the Early Cambrian Period, dated to about 522 million years old, and were found on the Avalon Peninsula of Newfoundland, Canada. The new find extends the record for the oldest cephalopod by 30 million years.

Molecular studies of the genetic change of cephalopods over time suggested that these animals originated in the Early Cambrian, but fossils to support these studies had not been found. The new cephalopod, measuring just half an inch (1.4 centimeters), provides physical evidence for this early origin of cephalopods. The fossils show that this ancient creature had a cone-shape shell that was subdivided into different chambers, much like modern nautilus, that allowed the animal to control its buoyancy.

Information from <https://www.livescience.com/ancient-octopus-relative-fossil.html>

Come to the Rocky Mountain Federation of Mineralogical Societies Annual Convention

June 16 – June 19, 2022 in Las Vegas, NV

Hosted by 2022 Southern Nevada Gem & Mineral Society (SNGMS)

Welcoming message

I would like to thank the Rocky Mountain Federation of Mineralogical Societies for allowing SNGMS to host the 2022 Annual Convention in Las Vegas, Nevada. I look forward to seeing many Federation Friends and meeting new ones throughout the show!

The Show / RMFMS events are at The Orleans Hotel and Casino, located at 4500 W Tropicana Ave, Las Vegas, NV 89103, just a few short blocks off the famous Las Vegas Strip. The hotel features include plenty of restaurants, a bowling alley, movie theatres and of course, a casino. For a discounted room rate, use the ID Code **ASN2C06**. With 1800+ rooms available at The Orleans, I doubt they will run out. If you are planning to attend in an RV, the Hotel will allow you to dry camp in a designated area of the parking lot for free. Be sure to check-in at the front desk (tell them you are a part of the SNGMS / RMFMS Show).

We will have lots of vendors with all kinds of goodies, display cases, kids' activities, door prizes and much more. Admission to the show is \$5 / person / day. Children under the age of 12 are free with a paid adult.

Due to the time of year, it is a bit too warm for field trips. However, there are plenty of activities to do around the city before or after the convention. Some of my favorites include the Mob Museum, the Atomic Museum, and the Neon Museum (recommended to see at night). Some local free activities include:

- Welcome to Fabulous Las Vegas Sign – A must for any Las Vegas visitor
- Pinball Hall of Fame - Free, but quarters are needed to play the pinball machines
- Bellagio Lobby and conservatory - Lobby is covered in hand-blown glass flowers created by artist Dale Chihuly
- Bellagio Fountains - Very impressive fountains, best seen at dusk or in the evening
- Golden Nugget Casino (downtown, near the Fremont Street experience) - Largest Gold nugget in existence
- Fremont Street Experience - Lots going on and stuff to see, street performers, casinos, the canopy screen, and you can zipline (paid activity) under the canopy.

For anyone attending, we will have an informal “Cracker Barrel” meet and greet at The Orleans Food on Thursday, June 16th starting at 6:00 pm. Order your food and we will be at a group of tables in The Orleans Food Court (We will have signs). The show will be on the second floor in the Mardi Gras Room, and the RMFMS meetings will be in the room across the hall from the show. The Awards Banquet will be in true Vegas style with a buffet – Save room because there will be a LOT of food!

Finally (and this request is completely optional, please do not feel obligated), I would like encourage delegates to bring rocks / slabs / fossils from your area to exchange with your fellow rockhounds at the delegates meeting. Nothing big (some people do have to fly home and the airlines are very picky about weight limits) or fancy, just local rocks to share.

I look forward to seeing you all there!

Sheri Johnson

SNGMS Member and RMFMS President

Schedule of Events

Note the Mardi Gras and Esplanade Rooms are on the Second Floor of The Orleans Convention Center. The rooms are across the hall from each other at the north end of the Convention Center. The Food Court / Poker Room is on the west end of the Casino, on the first floor.

Thursday, June 16th, 2022

5:00-8:00 pm Delegate Registration Seating area in The Orleans Food Court

5:00-11:45 pm Vendor Booth set-up Mardi Gras Room

5:00-11:45 pm Display case set-up Mardi Gras Room

6:00-8:00 pm Cracker Barrel Meet & Greet Seating area in The Orleans Food Court

Friday, June 17th, 2022

8:00 am-5:00 pm Delegate Registration Esplanade Room

8:00-9:00 am Vendor set-up Mardi Gras Room

8:00-9:00 am Display case set-up Mardi Gras Room

9:00 am Show Opens Mardi Gras Room

9:00 am Judges’ Meeting Esplanade Room

10:00 am Scholarship meeting Esplanade Room

1:00 pm RMFMS Executive Meeting Esplanade Room

4:00 pm Show closes Mardi Gras Room

Saturday, June 18th, 2022

8:00-10:00 am Delegate Registration Esplanade Room

9:00-11:00 am RMFMS Delegates Meeting Esplanade Room

9:00 am Show Opens Mardi Gras Room
4:00 pm Show closes Mardi Gras Room
5:00 pm Happy Hour (Cash Bar) Esplanade Room
6:00-9:00 pm Awards Banquet and Buffet Dinner Esplanade Room

Sunday, June 19th, 2022

8:00-10:00 am Breakfast with the Editors & Webmasters Esplanade Room
9:00 am Show Opens Mardi Gras Room
2:00 pm Show Closes Mardi Gras Room
2:00-6:00 pm Vendor Booth tear down Mardi Gras Room
2:00-6:00 pm Display case tear down Mardi Gras Room

For more information about the Rocky Mountain Federation convention, see <https://rmfms.org/index.php?mact=News,cntnt01,detail,0&cntnt01articleid=9&cntnt01detailtemplate=Simplex%20News%20Detail&cntnt01returnid=60>.

For information about the Rock, Gem, and Mineral Show, see <https://www.snvms.org/copy-of-upcoming-events-1>.

VIVA LAS VEGAS ROCKS
June 17 - 19, 2022 at the Orleans Hotel

Rocks, Gems & Jewelry Show
Presented By
Southern Nevada Gem & Mineral Society

Hosting The Rocky Mountain Federation & Mineralogical Society Conference

Daily
Admission 5.00
Children Under 12 Free
Tickets Entered in Drawing

Orleans Hotel & Casino
Reservations
800 675-3267
ID: ASN2C06

Exhibition Hours:
Friday 9am to 4pm
Saturday 9am to 4pm
Sunday 9am to 2pm

50 + Vendors
Displays
Speakers

Raffles
Kids Activities
Door Prizes

Silver State

SNGMS Contacts:
sngmspresident@gmail.com
sngmsshowchair@gmail.com
www.snvms.org



LAS VEGAS NEVADA
THE LAND OF ADVENTURE



Las Vegas and the surrounding areas have many adventures to explore. Many people who have lived in Las Vegas since the 1960's know, and they have changed little. Below are a few.

MOB MUSEUM: The Museum is in the old downtown post office, built in 1930's. It was scheduled to be torn down, but the leaders of Las Vegas found a better use for the building. <https://themobmuseum.org/>

ATOMIC MUSEUM: A history of Atomic Testing in Southern Nevada <https://nationalatomictestingmuseum.org/about/about-the-museum/>

NEON MUSEUM: A History of Las Vegas in Neon. Explore the Bone yard.
<https://www.neonmuseum.org/>

CLARK COUNTY MUSEUM: History of Clark County, with exhibits and old restored buildings.
https://www.clarkcountynvada.gov/government/departments/parks_recreation/cultural_division/musuems/clark_county_museum.php

"WELCOME TO FABULOUS LAS VEGAS" SIGN: The iconic visitors sign at the south end of the Las Vegas Strip. Parking available and a great souvenir picture site. <https://www.roadsideamerica.com/story/19187>

ETHEL M CHOCOLATE FACTORY: The iconic sweet tooth place. Just outside of Las Vegas in the arid Nevada desert is an unexpected oasis of fresh-crafted, gourmet chocolates. Here at Ethel M Chocolates, you will find deliciously fresh chocolates produced by our passionate Mars associates (and family!) www.ethelm.com

LAKE MEAD NATIONAL RECREATION AREA, HOOVER DAM AND BOULDER CITY, NEVADA: From the Overton Arm to Hoover Dam, great view of Lake Mead, and Boulder City – "the town that built the Hoover Dam".

RHOYLITE NEVADA: 123 Miles from Las Vegas to Beatty, Nevada, a ghost town that is maintained by the BLM. The town is a popular tourist destination and is called "one of the west's most photographed towns"

VALLEY OF FIRE STATE PARK: Outside of Logandale, Nevada. <http://parks.Nevada.gov/parks/valley-of-fire>

OTHER POINTS OF INTEREST: Search the web for more in-depth information on the following nearby Nevada sites. Potosi Mountain, Nelson and Eldorado Canyon, Red Rock Canyon and Scenic Loop, Goodsprings Mining District, close by National Parks (Death Valley, Grand Canyon, and Zion)


Please be aware, some areas have fees, and some accept park passes or Senior passes. Check websites before traveling. In June, Desert Heat is a concern, take plenty of water, a good vehicle, and some areas may require a four-wheel drive vehicle.

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Other Rockhounding Events and Activities in the Area

If you plan to attend any of these, please check their websites for the latest updates before you go.

- **Tuesday, May 10**, at 4 pm, the **Western Museum of Mining and Industry in Colorado Springs** will present a program about the ghost towns, mining camps, and mining sites through photos, engaging stories, and facts in south central and southwestern Colorado. See <https://fareharbor.com/embeds/book/wmmi/items/77494/calendar/2022/05/?flow=no&full-items=yes>.
- **Saturday and Sunday, May 21 and 22** is the **Dinosaur Ridge Seaway to Extinction Field Trip** for adults. Led by Erin LaCount and Dr. Louis Taylor, explore Baculite Mesa and the K/Pg Boundary in Pueblo and Trinidad, Colorado and Raton, New Mexico on this 2-day expedition. For more information, see <https://dinoridge.org/programs-and-events/travel-and-field-programs/>.
- **Saturday, June 4, from 9 am to 3 pm** is **Scout BSA Day** at Dinosaur Ridge. Members can earn geology-related badges, while learning about ancient Colorado. See <https://dinoridge.org/programs-and-events/dinosaur-discovery-days/>.
- **Friday-Sunday, June 10-12**, is the **Pikes Peak Gem, Mineral & Jewelry Show** at the Norris Penrose Event Center in Colorado Springs, sponsored by the Colorado Springs Mineral Society. See <https://pikespeakgemshow.com/> for more information.





WESTERN MUSEUM OF MINING & INDUSTRY
APPRECIATION DAYS
THANKING THOSE WHO SERVE
WITH FREE ADMISSION



MAY 2-7
TEACHER APPRECIATION WEEK
Free Admission for Teachers


MAY 6 - 12
NURSE APPRECIATION WEEK
Free Admission for Nurses





MAY 16 - 21
POLICE/EMT APPRECIATION WEEK
Free Admission for Police and all First Responders

MAY 21 ARMED FORCES DAY
Free Admission for Active Duty Military



225 NORTH GATE BLVD 719-488-0880 WMMI.ORG

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Denver Show Club Table

open

Member Name Tags

Would you like a Flatirons Mineral Club name tag to wear at club events and field trips? The club places orders for name tags several times a year for members.

If you would like a name tag, please log onto our website and choose the "Request a Name Tag" link in the Members Area. Add your name to the list as you want it to appear on your name tag, and it will be ordered for you. Your first name tag is free!



Example of a club name tag



Flatirons Facets
P.O. Box 3331
Boulder, CO 80307-3331

First Class Mail

Upcoming Events

Tuesday, May 10	Club meeting with Sue Hirschfeld and Beth Simmons presenting a program on the Cretaceous tracksite south of Boulder. See page 2	Mountain View United Methodist Church, 355 Ponca Place in Boulder
Wednesday, May 18	Jr. Geologists meeting on dinosaurs. See page 6	Mountain View United Methodist Church, 355 Ponca Place in Boulder

Several field trips are in the planning stage. Watch your email for announcements about field trips throughout the summer.