



# Flatirons Facets

Flatirons Mineral Club of Boulder County, Colorado

Volume 65, Number 4

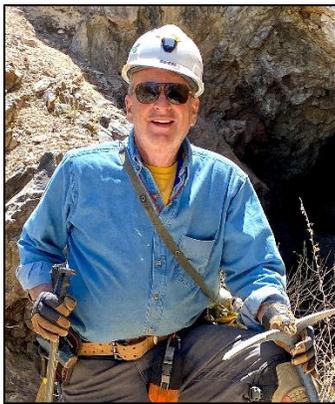
July-August, 2022



Jim Lyon chiseling a sample of pyritic gold ore in Capital Prize Mine near Georgetown. Brian Walko took this photograph during our club's field trip to the mine last month. Field trip reports start on page 6.

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## President's Message

Tips for cleaning your rocks and minerals.

You prospected, picked up, dug out, or chiseled your rock or mineral specimen. Now it needs to be cleaned to show off its beauty. Cleaning rocks and minerals is an art and a science (geochemistry). If you can find a copy, the book *Cleaning and Preserving Minerals* by Richard M. Pearl is an excellent resource. Searching the Internet for mineral cleaning articles or watching instructional YouTube videos can also be very helpful.

**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.



The two most common surface contaminants are limonite (iron oxide) and calcite (calcium carbonate). I generally start with one specimen. Let the specimen soak for an hour in soap and lukewarm water, then scrub it gently with a soft brush. Rinse and repeat. If this method does not clean it, you may need to resort to mechanical tools to scrape away the surface contaminant. I find used dental tools to be the best approach. Be sure the hardness of the tool is less than the hardness of the specimen. Otherwise, you'll scratch your specimen.

When these methods fail, you can resort to chemicals. Warning: chemical cleaners can be dangerous! Always wear safety glasses and acid proof gloves. Additionally, do your cleaning in a well-ventilated area, preferably outside. Start with one specimen in the cleaning solution. Check the specimen frequently. You don't want it to dissolve away. All these milder chemicals can be purchased at any hardware store or online. Be sure to do your research before using chemicals for cleaning.

Best regards,  
Brian Walko, FMC President

## Annual Club Picnic - Saturday, August 20

This year's annual picnic is at Harlow Platts Park, the same place as previous picnics. The park is located just south of the South Boulder Recreation Center at 1360 Gillespie Drive, Boulder, 80305. The picnic starts at 11:00 am. Folks with last names beginning with A-M are asked to bring a covered dish and folks with last names beginning with N-Z should bring a dessert. Roll-up sandwiches and beverages will be provided by the club.



Last year's picnic. Credit: Trick Runions

At the picnic, we will honor our Rockhounds of the Year. The next page has details about nominating an adult as this year's Rockhound of the Year.

## Nominate a Rockhound of the Year

Each year, the club honors an active member or husband-and-wife team who have contributed to the success of the Flatirons Mineral Club. Our first Rockhound of the Year was honored in 2002, and each year since, a club member has been selected as our Rockhound of the Year by the club membership.

Recipients for this honor are first nominated by club members. Please consider nominating someone this year - perhaps someone who leads field trips, helps organize the club show, assists with club meetings, or helps with the Jr. Geologists. A nomination form can be found on page 23.

Please return your nomination to Gerry Naugle by **July 15**. It can be mailed to Flatirons Mineral Club, P.O. Box 3331 Boulder, CO 80307-3331, or emailed to Gerry at [gnaugle@earthlink.net](mailto:gnaugle@earthlink.net).

## Wanted: Members Who Have Been in the Club 10 Years or More

Several of our older Jr. Geologists are working on earning all 20 badges. The Reaching across Generations Badge requires the juniors to spend six hours with older members, learning about their favorite rocks, minerals, and fossils, what they enjoy about rockhounding, and their memories about the Flatirons Mineral Club.

If you would like to help with this activity, please contact Dennis Gertenbach at [gertenbach1@gmail.com](mailto:gertenbach1@gmail.com) or 303-709-8218.

## Upcoming Field Trips

Two more club field trips are planned this summer.

- Saturday, July 16, is a trip to Jamestown to collect fluorite, gold ore and quartz.
- Saturday, August 13, is a gold panning field trip

You can find more details and sign up for these trips at the club website at <https://flatironsmineralclub.org/>. Click "Member Login" and sign in, then go to "Field Trips". From there, you can select the field trips you would like to join.



Don and Henry Poe collecting specimens on last year's Jamestown trip.

## Would you like to go on more field trips this summer?

For more field trips, we need more field trip leaders. If you would like to lead a trip or have an idea for a great trip, please contact Taneka Colon ([taneka\\_ringo@hotmail.com](mailto:taneka_ringo@hotmail.com)) or Brian Walko (303-931-4283, [earthextractions@gmail.com](mailto:earthextractions@gmail.com)).

## September 27 Club Meeting Featuring Ed Raines

We have added a special club meeting in September featuring Ed Raines talking about “The Coming of Age of Hydraulic Processes.”

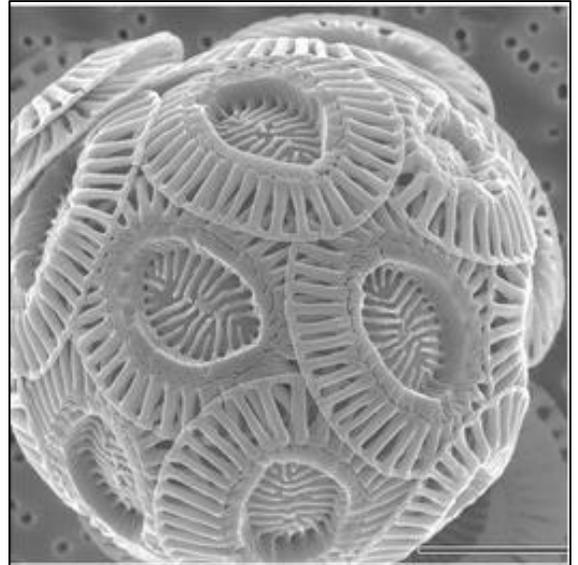
The definition of mining is extracting valuable materials from the Earth. The operation and use of pans, sluices, hydraulic giants or monitors, hydraulic elevators, and dredges are all a part of mining, even though they certainly are not carried on in underground mines. The petroleum industry has, since August 27, 1859 in Titusville, Pennsylvania, grown to a size that appears to have removed it from the mining industry. Nonetheless, the industry still involves extracting valuable materials from the Earth. Today the industry has turned to the use of new methods to *release and recover* valuable materials from the enclosing rock in a technology that involves the use of explosives and hydraulic processes.

This process, known as hydraulic fracturing, is vital to the recovery of the hydrocarbons used for fuels, chemicals, and an incredible array of “synthetic” products which shape our modern civilization.

One of the responsibilities of the Colorado School of Mines is to educate future engineers to execute the process of hydraulic fracturing safely and efficiently, to the benefit of the entire world. The Mines Museum of Earth Science has just completed a new exhibit that illustrates and explains the how, why, and where of the process to the general public as well as students and faculty.

In the Colorado Front Range area, the main source for oil and gas is at present found in the Niobrara Formation. The recovery process is technically challenging and terribly expensive. This presentation will cover many of the basics of producing oil and gas from the Niobrara formation in the Denver Basin.

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.



Scanning electron microscope image of a coccosphere, a blue-green algal particle made up of an assemblage of discs that usually disassemble when the organism dies. These individual plates, called coccoliths, are the main components of the extremely fine-grained limestone known as chalk. Coccoliths, according to species, range from 5 to 10 microns in size. Credit: A. R. Taylor, licensed under Creative Commons Attribution 2.5 Generic.

## Denver Show Volunteers Needed

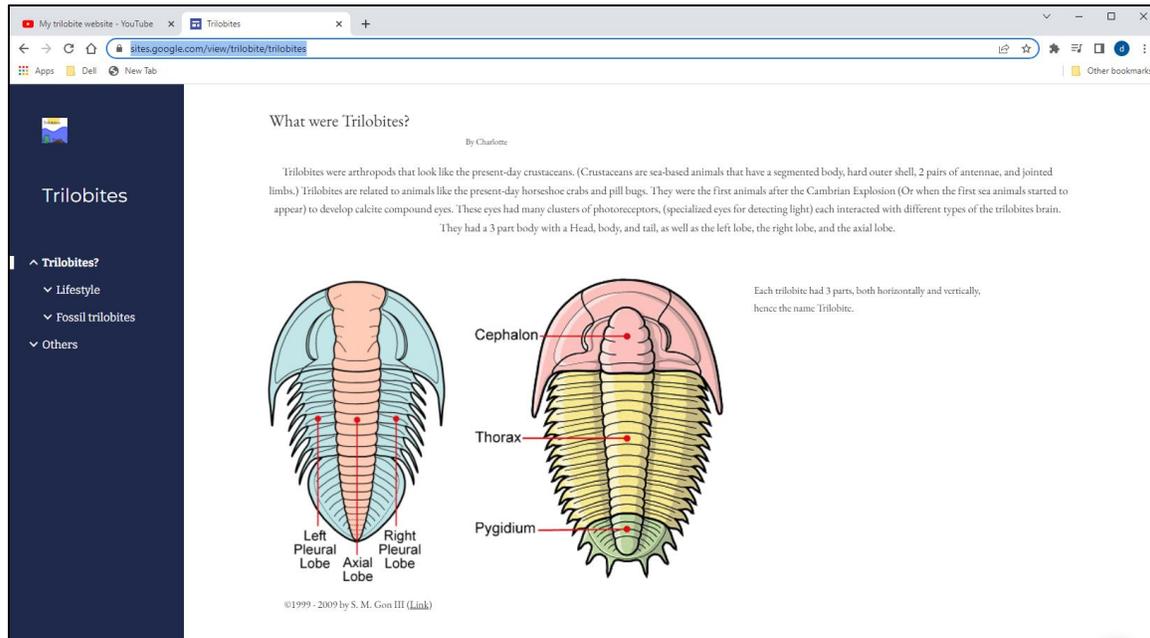
This year’s Denver Gem & Mineral Show will be September 8-11 at the Colorado Convention Center. This year’s theme is Collecting Colorado. The show needs volunteers to make this year’s show a success. Jobs include selling grab bags, pins, and posters; helping to set up before the show or tear down after the show; or volunteering to “work anywhere.”

By volunteering, you will get into the show for free and have your parking fees/bus expenses reimbursed. To find out more or sign up to volunteer, please contact Anita at [anitacolin@hotmail.com](mailto:anitacolin@hotmail.com).

## Charlotte's Trilobite Website

Charlotte Small, one of our Jr. Geologists and last year's Junior Rockhound of the Year, has made a website about trilobites. Her website is found at <https://sites.google.com/view/trilobite/trilobites> and talks about different types of trilobites, how they survived, their color and eyes, and where you can find them.

Charlotte also has a video explaining what you will find in her website and how to use it. You can watch her video at <https://www.youtube.com/watch?v=8re4DPxQ3zl>.



### Where in Colorado?

Each month, we test your knowledge of geological features in Colorado. Although this photo was taken in Utah, this canyon is in northwest Colorado and exposes these beautiful cliffs in the Weber Formation. Where in Colorado is this? See page 16 for the answer.

## Capital Prize Mine Field Trip Reports

On Saturday, May 28, our club toured the Capital Prize Mine at Georgetown. Here are two reports about the trip. If you missed the trip and would like to take a tour of the mine, visit their website at <https://www.capitalprizegoldmine.com/>.

### Capital Prize Mine Field Trip by Brian Walko, Trip Leader

Twenty-five FMC members ventured 1,000 ft underground at the Capital Prize Mine in Georgetown late May. We learned about old style and modern-day mining techniques from actual miners that operate the mine.



Safety briefing. Credit: Brian Walko



Capital Prize miners & tour guides. Credit: Brian Walko

Here is some of the equipment used to separate the gold from the host rock.



Miller table. Credit: Brian Walko



Jim Lyon chiseling a sample of pyritic gold ore. Credit: Brian Walko

The highlight of the tour was the ability chisel away at a real pyritic gold vein and keep the specimens.

### Gold Mine Tour by Charlotte Small, Jr. Geologists

The gold mine tour was one of the first field trips we went on with FMC. We arrived at 10:30 and gathered into two groups, one group for the families and one for the adults. Then we went into the mine.

The mine was mildly cold, but bearable. First, our tour guide talked about different types of mining equipment used for mining. When people first started mining in this area, they used chisels and hammers, as well as explosives, but later they came up with a drill. The drill proved more effective because it dug holes deeper than just a chisel.

Next, he showed us their modern ways of panning for gold. They had a tilted vibrating tray (Miller table) that would sort the gold from the other rock. Since the gold was heavier, it would come off the top.

After that we walked through the tunnel observing and following the veins. When we finally got as far in the tunnel as we could go, we started to chip out pieces of rock. But the shiny stuff was pyrite, not gold.

Overall, this field trip was very interesting. My favorite part was when the tour guide turned off the lights. It was pitch black.



Crystals of pyrite in host rock. Credit: Charlotte Small



### Hartsel Blue Barite Field Trip Report Brian Walko, Trip Leader

On Saturday, June 11, 27 FMC members made the three hour trek from Boulder to the booming metropolis of Hartsel, Colorado (Population 677). We met at the Bayou Salado Trading Post, signed their permission slips, and received a geology briefing from the barite claim owner, Dave. Then we headed a couple of miles to the claim. Fortunately, the ground was dry, and all the vehicles made it to the dig site.

Barite dig site. Credit: Brian Walko

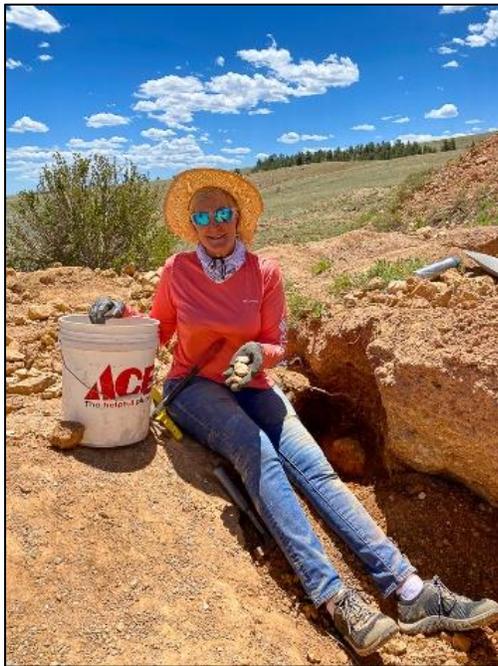
The dig site is in the red soil that is part of the Maroon Formation (Middle Pennsylvanian to Early Permian). Crisscrossing the red soil are veins of barite. A lot of the barite weathered out and is lying on the surface as small pieces. The good barite crystals needed to be excavated from the ground.

The trick was digging in an existing hole or starting a new hole to find the layer that contained the barite crystals. Then following the layer horizontally.

Patty Kozer and Kevin Notheis located "hot" pockets and found some great barite crystals. Everybody else had fun.



Brian explaining how to prospect & dig.  
Credit: Doran Adams



Patty Kozer. Credit: Brian Walko



Kevin Notheis. Credit: Brian Walko



Tim Froehlich. Credit: Brian Walko



Wade Waldrup. Credit: Doran Adams

## Jr. Geologists Activities

Here is what the Jr. Geologists have been up to the past two months.

### May Meeting about Dinosaurs

Who doesn't like dinosaurs? Just about nobody. And, the Jr. Geologists are no exception. Our May meeting was all about dinosaurs. We kicked off the meeting with the Name That Dinosaur Game, led by the GeoExplorers (middle and high schoolers). This tested everyone's knowledge of dinosaurs.

Next the youngest juniors decorated dinosaur mirrors for their rooms, while the older ones built wooden *Stegosaurus* models.

Over the past few months, the juniors have been learning the steps needed to polish rocks in a rock tumbler. The final results were ready for everyone to select a bag of polished rocks to take home.

We ended the meeting by awarding badges to the juniors who completed their requirements this spring.



Jasmine with her dinosaur mirror. Credit: Susanne Peach



Playing Name That Dinosaur.  
Credit: Dennis Gertenbach



Building wooden *Stegosaurus* models.  
Credit: Susanne Peach



Picking out polished rocks to take home.  
Credit: Susanne Peach



Jr. Geologists showing the badges they earned.  
Credit: Susanne Peach

## Big Thompson Canyon Field Trip by Charlotte Small

Niwot Park & Ride at 9:00 is where we started our ride to a mountain on the side of a road. We gathered the group, talked about precautions, and gave out badges. It may have looked like nothing, but just a 10-minute hike up a small path, there were dozens of minerals. There were mainly quartzite and mica. Quartzite is a metamorphic rock related to quartz. It is used for things like countertops, and glass. Mica used to be used to make windows, because of its transparency, but that use was discontinued because of the production of better and stronger glass made from sand. There was also black mica, a cooler-looking, but slightly rarer mica, with a completely black surface. Although this field trip was meant for younger and first-timers to the club, I still enjoyed it very much. It was very chill (*Ed: modern slang meaning cool*) and didn't require much knowledge of minerals.



Mica, black mica, quartz found during the trip. Credit: Charlotte Small



Photos from the trip. Credit: Dennis Gertenbach

## Update on Crystal Growing

This spring, the Jr. Geologists learned how to grow crystals at home. The GeoExplorers (middle and high schoolers) learned advanced techniques and were encouraged to continue growing their crystals at home. The longer you grow your crystals, the bigger they get. Charlie Bonvillian grew these large, beautiful copper sulfate crystals.

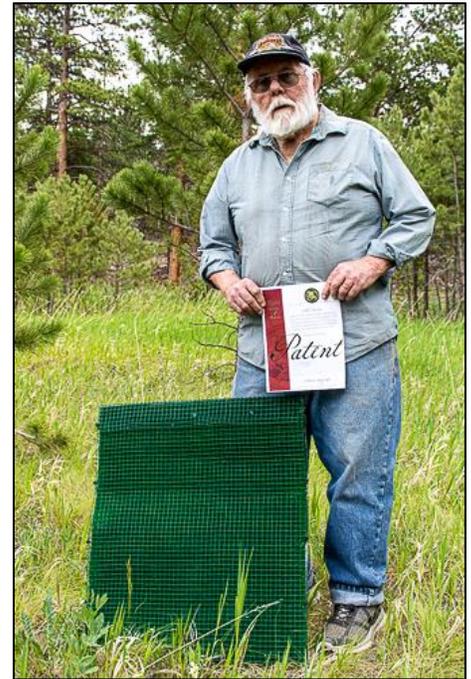
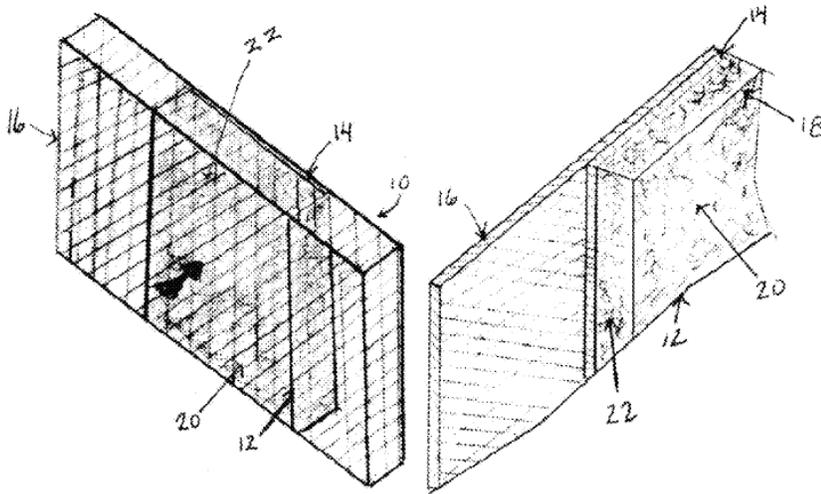
Home-grown copper sulfate crystals. Credit: Charlie Bonvillian



## Club Member Vic Norris Awarded Patent for Gold Collecting Device

Longtime FMC member, Vic Norris, was awarded United States Patent 11,305,214 for his invention of a “Submersible Sieve Apparatus for Minerals”. This is also known as a passive gold trap. The device sits on the stream bottom and traps placer gold as the water and gravel flows over it.

Here is a drawing of his patented gold trap from the patent.



Club member Vic Norris with his patented passive gold trap. Credit: Brian Walko

Vic’s patent can be viewed at

<https://patentimages.storage.googleapis.com/ce/f5/d7/a30289a1625e5b/US11305214.pdf>

## Safety: Drink Water

Colorado in the summer can be hot and dry. Remember to bring lots of water to drink throughout the day when you are on field trips.

Credit: Center for Disease Control and Prevention, public



## Light and Minerals: Part 2. Ancient Rocks, Seas, Life, and Light

Mark H. Goldgeier and Daniel W. Bonvillian

Before life on earth there was rock.

Planetary rock was formed through billions of years of galactic physical and chemical processes. The resulting planet Earth is our birthplace. Although the following theories about the origins of life on Earth are plausible, they currently lack the gravity of proven scientific truths.

We know that the first several billion years of planet Earth offered an inhospitable environment. Temperature extremes, winds, storms, desiccation, ultraviolet bombardment, lightning, meteorite strikes and volcanism were extant. Even if the building blocks of life formed, they might be quickly dispatched by the strenuous conditions on the planet. And if not destroyed, then winds, torrents, and oceans would dilute life's precursors and prevent them from interacting with one another . . . unless.

Rocks and clays might have been the cradles for life; the templates on which life's precursor molecules were protected, organized, concentrated, and propagated. If true, then the composition of all early life must have been "compatible with" and "influenced by" the hosting clays. Life's precursor sugars, amino acids, and lipids would have been "selected" for just the right pH, electrical charge, structure, concentration, temperature, and stability. Precursor molecule physical size, polymerization, and "handedness" all had to be compatible with the clays. As it turns out, life on Earth appears to demonstrate just such a compatibility with clays and muds.

So, the next time you slip on a clay (or mud) slope, show some respect for your great great . . . great "ancestor". The origins of life were thus not biologic. Rather, they were geo-photo-electro-chemical. The engines behind these processes were sunlight, lightning, volcanism, and erosion. The experimental surfaces were water, atmosphere, clay, and mud.

There is a dichotomy inherent between Earth's living and non-living, with contributions not only to genesis, but also to destruction and to metamorphosis. Biotic and abiotic evolve together in a complex planetary dance of mutual influence. This will be a recurring theme over billions of years of Earth evolution.

### **Mighty, Tiny Microorganisms Change the Planet**

Fast forward to Earth's shallow seas three and a half billion years ago. Abiotic physical events formed the earliest layered accumulations of minerals - stromatolites. As geologic time progressed, biotic microorganisms found the relatively gentle shallow seas conducive to explosive growth. These microorganisms in turn became the major architects and builders of layered accumulations. They not only changed the contours of the ocean floors, they went on to fundamentally change the entire planet.

"Biotic" shallow sea stromatolites are composed of alternating layers of photosynthetic microorganisms and sands. Sunlight was the force that powered these microorganisms. Water, sand, and rock "nurtured" them. Microbial



Living stromatolites in Shark Bay, Australia.

Credit: University of Wisconsin-Madison, Attribution-NonCommercial-ShareAlike 3.0 Unported



photosynthesis utilized sunlight to produce carbohydrates for cellular metabolism and generated oxygen for disposal as a “toxic” waste product.

By two billion years ago, these tiny microorganisms had produced enough “waste” oxygen to change the planet’s atmosphere. It is difficult to overstate the impact that these microorganisms had. Life on Earth, the chemical makeup of the Earth’s crust, atmosphere, and seas were fundamentally changed forever. Oxygenation led to dramatic changes in climate and weather on the planet. The very nature of surface (and ultimately deeper) rocks and minerals was forever altered, expanded, and energized.

What force, other than light energy from the sun, could have powered these planetary changes? The Great Oxidation Event caused some life to perish. But, because of the oxygen created by these early stromatolite-forming microorganisms through photosynthesis, we can enjoy the plants and animals that populate the Earth today. In a very real sense, we are nourished by sunlight.

In Earth’s oldest fossils, we see the intimate and ever-changing interactions between life and non-life, between sunlight and shadow, between oxidation and reduction. Red Rocks, the Grand Canyon, and banded iron formations are some of the many geologic formations that owe their existence to microorganism-

and plant-produced oxygen. Earth began with perhaps 1,500 minerals and now has over 5,400 recognized mineral species. Our planet continues to evolve.

*Editor’s Note: This is the second of three articles about light and minerals. Next month’s article will be about Do Rocks Need Sunscreen?*

## Club Member Recognized for Fire Prevention Efforts

Club member Howard Gordon was recently recognized for both his love of geology and for his efforts to create his Wildfire Partners Certified House in the Boulder foothills by Boulder Reporting Lab. By taking steps to decrease the potential of a wildfire destroying his home, his property is not only safer, but more beautiful.

You can read the article about Howard and his Boulder foothills home at <https://boulderreportinglab.org/2022/06/17/what-does-a-fire-resilient-property-look-like-one-boulder-county-residents-home-offers-a-glimpse/>



Howard Gordon showing the Jr. Geologists different types of geodes. Credit: Dennis Gertenbach

# Collecting Oklahoma Hourglass Selenite Crystals

Dennis Gertenbach



Figure 1. Twin Oklahoma selenite crystals.

On a car trip to Arkansas, my wife and I made a collecting stop in Oklahoma. Our goal was hourglass selenite, Oklahoma's state crystal (Figure 1).

Selenite is a crystal habit of gypsum, which is composed of hydrous calcium sulfate and is generally transparent. By the name, you might think that selenite contains the chemical element selenium, but that is not the case. Both selenite and selenium are derived from the Greek word for Moon. Historically, it was thought that this form of gypsum waxed and waned with the cycles of the Moon, thus was given this name.

These one-of-a-kind hourglass selenite crystals are found only at the Salt Plains National Wildlife Area near Cherokee, Oklahoma, a bit south of the Kansas border. The salt plains are at the edge of a large lake, which attracts nesting shore birds,

as well as birds migrating in the spring and fall. Because of its importance to nesting and migrating birds, the area has been set aside as the Salt Plains National Wildlife Range.

For mineral collectors, the attraction is the salt plains themselves. Although flat and barren with no vegetation (Figure 2), they hold a treasure just below the salt crust on the surface – hourglass selenite crystals. The crystals form in the clay layer below the salt crust from the mineral-saturated water within the clay. Over time, these crystals can grow quite large, up to 7 inches long. The reddish hourglass shape within the crystals is due to the gypsum crystals growing around the hematite-containing clay.



Figure 2. The Salt Plains of Northern Oklahoma

Collecting selenite crystals is allowed in a designated area on the Wildlife Refuge (Figure 3). From time to time, the collecting area is rotated, allowing new crystals to form from the mineral-saturated

waters just below the crust of the

salt plain. This is truly sustainable mineral collecting. When we were there on a Saturday, there were nearly 100 people, mostly families, collecting crystals.



After walking out onto the salt flats in the designated area, dig down through the crust to the soupy muddy subsurface to make a hole about 2 feet across and 2 feet deep (Figure 4). Allow water to seep back into the hole, adding water you brought if

Figure 3. The selenite collecting site



Figure 4. A hole dug through the salt crust to the watery clay layer below

needed. Feel around in the mud with your fingers until you feel a crystal. By gently swishing the muddy water in your hole, wash away the clay surrounding the crystal until you can gently pull it out (Figure 5). Wash off the crystal with water and set it in the sun and wind to dry. The crystals are fragile when first removed, but quickly strengthen as they dry.



Figure 5. Selenite crystal we recovered

Here is a fun video about collecting Oklahoma selenite crystals:

<https://www.youtube.com/watch?v=1eIU3RRDFJU>

#### Directions

- From Jet, Oklahoma, take State Highway 64 west for 6 miles.
- Turn right at the Crystal Dig Area sign (Figure 6) and go north on the dirt county road for 3 miles.
- Turn right and go 1 miles east to the dig area.

#### What to Bring

- Water for drinking, washing your selenite crystals, and washing your hands when finished
- Sunscreen, sunglasses, and protective clothing. It is easy to get sunburned from the sun reflecting off of the white salt surface and there is NO shade.
- Shovel, gardening digging tool
- Gardening knee cushions to sit on
- Containers to take your crystals home, like egg cartons or plastic containers with lids

#### Things to Know

- This is a wildlife refuge. It is illegal to harass birds and destroy nests and eggs.
- There is no fee or permit needed to dig for crystals.
- Cars must stay on the marked road and parking area. The salt crust is very thin in areas with quicksand underneath.



Figure 6. Sign to the selenite collecting site

- The digging area is open April 1 through October 15, sunrise to sunset.
- There are pit toilets, but no running water at the site.
- Dig only in the posted areas.
- Each person is allowed to collect 10 pounds of crystals, plus one large cluster each day.
- Do not wear good clothes; the reddish-brown clay may not wash out.
- Right next door to the Wildlife Refuge is Great Salt Plains State Park with a beautiful lake, camping, nature trails, and fishing. For more information, see [https://stateparks.com/great\\_salt\\_plains\\_state\\_park\\_in\\_oklahoma.html](https://stateparks.com/great_salt_plains_state_park_in_oklahoma.html).

All photographs by author.

## Where in Colorado?

Dennis Gertenbach



Echo Park from an overlook along Harpers Corner Road in Dinosaur National Monument.

This overlook is accessed by the Harpers Corner Road, which leaves US 40 just east of Dinosaur, Colorado. The 31-mile road has a number of overlooks into several spectacular canyons both in and outside Dinosaur National Monument. (Note that dinosaur fossils are not located in this section of the National Monument.)

To learn more about the geology you will see along Harpers Corner Road, see <http://www.durangobill.com/HarpersCorner.html>.

### Worth Visiting in the Area

While you are at Dinosaur National Monument, you must stop at the Dinosaur Quarry Exhibit Hall. The wall within this center exposes over 1,500 fossils in the Jurassic Morrison Formation. Discovered in 1909, bones of *Allosaurus*,

If you guessed Echo Park in Dinosaur National Monument, you would be correct. This canyon was carved by the Yampa and Green Rivers, as they wind through rock layers that date from the Mesozoic and Paleozoic Eras.

Echo Park was first mapped and given its name by the Powell Geographic Expedition in 1869. In the early 1950s, it was proposed to dam this canyon and flood Echo Park for storing water. The outcry from the Sierra Club and other environmental groups convinced Congress to abandon this plan.



Another overlook along the Harpers Corner Road.

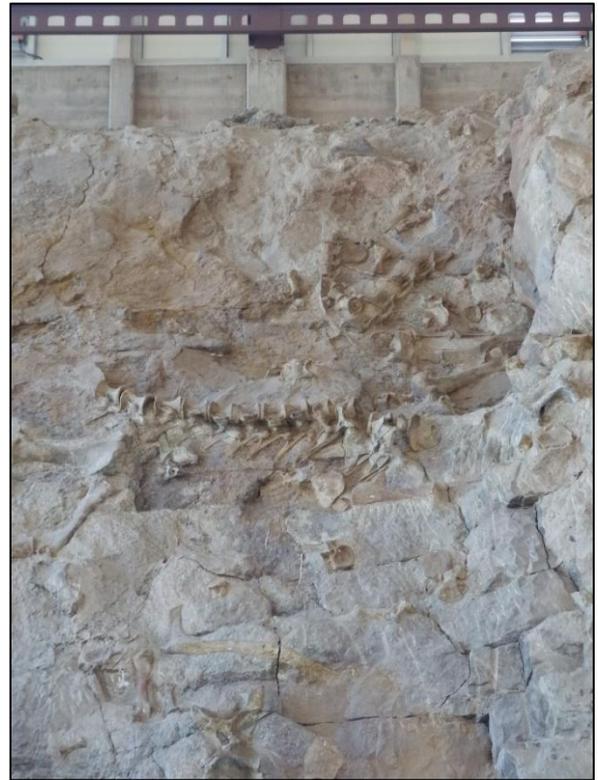


Monument paleontologist Rebecca Foster explains about the dinosaur bones at the Dinosaur Quarry Exhibit Hall.

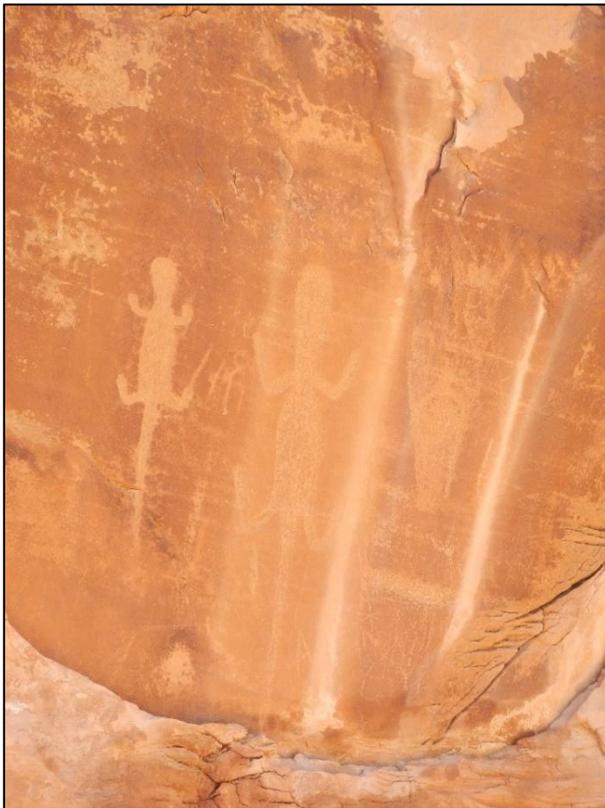
The National Monument also has several historic sites to visit, including petroglyphs and homesteads.

For more information about visiting Dinosaur National Monument, see <https://www.nps.gov/dino/planyourvisit/index.htm>.

*Apatosaurus, Diplodocus, Stegosaurus,* and other dinosaurs were excavated and sent to Carnegie Museum and others around the country. To protect this unique paleontological wonder, it was set aside as a national monument in 1915.



Some of the dinosaur bones on the wall at the Dinosaur Quarry Exhibit Hall.



You can download a map of the National Monument at <https://www.usgs.gov/media/images/dinosaur-national-monument-map-0>.

All photographs by author.

Fremont Indian petroglyphs in Dinosaur National Monument.

## Research Confirms Eastern Wyoming Paleoindian Site as Americas' Oldest Mine

*Editor's note: This article first appeared online on May 19, 2022 on the University of Wyoming website. It is reprinted with permission from the University of Wyoming.*

Archaeological excavations led by Wyoming's state archaeologist and involving University of Wyoming researchers have confirmed that an ancient mine in eastern Wyoming was used by humans to produce red ocher starting nearly 13,000 years ago.

That makes the Powars II site at Sunrise in Platte County the oldest documented red ocher mine -- and likely the oldest known mine of any sort -- in all of North and South America. The excavations, completed shortly before the 2020 death of famed UW archaeologist George Frison, confirmed theories he advanced stemming from research he began at the site in 1986.

The findings appear in "In situ evidence for Paleoindian hematite quarrying at the Powars II site (48PL330), Wyoming," a paper published May 12 in the Proceedings of the National Academy of Sciences (PNAS), one of the world's most prestigious multidisciplinary scientific journals covering the biological, physical and social sciences.

The paper's lead author is Wyoming State Archaeologist Spencer Pelton, who became involved in the Powars II project in 2016 when he was a UW doctoral student.

"We have unequivocal evidence for use of this site by early Paleoindians as long as 12,840 years ago and continuing by early Americans for about 1,000 years," Pelton says. "It's gratifying that we were finally able to confirm the significance of the Powars II site after decades of work by so many, including Dr. Frison, who learned of the site in the early 1980s and was involved in the research until his death."

In fact, Frison -- who died in September 2020 as the only UW faculty member ever elected to the prestigious National Academy of Sciences -- is listed as a co-author of the new paper. Other contributors were George Zeimens, executive director of the Sunrise Historic and Prehistoric Preservation Society; Erin Kelley, a UW graduate and Office of the Wyoming State Archaeologist staff member; and UW Ph.D. students Sarah Allaun, Alexander Craib, Chase Mahan, and Charles Koenig.

Red ocher, also known as hematite, fulfilled a wide range of functions in Paleoindian societies, including as a pigment in rituals. It has been found at ancient graves, caches, campsites and kill sites in the Great Plains, the Rocky Mountains and beyond. The Powars II site is the only red ocher quarry identified in the North American archaeological record north of southern Mexico -- and one of only five such quarries identified in all of the Americas.

Among the artifacts previously discovered at the Powars II site are Clovis points -- believed to be from the first inhabitants of North America -- along with other projectile points, tools and shell beads.



UW Ph.D. student Chase Mahan inspects an artifact from excavation at the Powars II archaeological site in 2020. Mahan is one of the co-authors of a new paper that confirms the site at Sunrise in Platte County is the oldest documented red ocher mine -- and likely the oldest known mine of any sort -- in all of North and South America. The paper was published in PNAS. Credit: Spencer Pelton



This complete Clovis point was recovered from the Powars II site. Credit: Spencer Pelton

The 2017-2020 excavation led by Pelton -- a 6- by 1-meter trench bisecting a previously undocumented quarry feature -- yielded several thousand more Paleoindian artifacts, along with many well-preserved animal bones and antlers. The animal bones and antlers were used to extract the red ocher in the quarry.

The projectile points come from numerous locations in the region, including from as far away as the Edwards Plateau in Texas, according to the paper. That makes it likely that red ocher found at archaeological sites throughout the American midcontinent came from the Powars II quarry.

“Beyond its status as a quarry, the Powars II artifact assemblage is itself one of the densest and most diverse of any thus far discovered in the early Paleoindian record of the Americas,” Pelton says. “The site contains over 30 chipped stone tools per square meter, some of the oldest canid remains from an American archaeological site and rare or unique artifacts, among other distinctions.”

The researchers say the evidence discovered so far indicates the quarry was used in two primary periods. During the first, dating to as long as 12,840 years ago and lasting several hundred years, people not only quarried red ocher -- using bones and antlers as tools -- but also produced and repaired weapons, along with other activities. After a hiatus of a century or more, the site was

occupied by humans who mined red ocher and deposited artifacts in piles in a quarry pit.

“Further excavation of the estimated 800-square-meter remainder of the site will certainly reveal complexity not captured by our sample,” the researchers wrote.

Pelton nominated the Powars II site to the National Register of Historic Places in 2021.

## Invitation to Exhibit at the 2022 Denver Gem & Mineral Show

Dates: September 8, 9, 10 and 11, 2022

Location: The Colorado Convention Center, 700 14<sup>th</sup> Street, Denver.

Dear Club Member,

Your participation as a volunteer is the life blood of a successful show. Another outlet for your support would be to enter an exhibit in the show for the enjoyment of our visitors. For over 50 years, these displays have set us apart as unique from the rest of the area shows. We hope that this year’s theme will be especially appealing to club members and the general visitor.

This year’s Theme – **Collecting Colorado**

We encourage exhibits that feature Colorado minerals, fossils, agates, meteorites, notable collecting area history, mining history or ephemera like mining memorabilia, equipment, documents, etc. As always, though, you are invited to

enter a case that plays to your strengths, interests and special aspects of our hobby. Exhibited material need NOT be self-collected.

In addition, we are offering the following **competitive exhibit** options:

- **Both Adult and Junior Prospector Competitions**. Because of the pandemic, the collecting period for eligible specimens will extend from the end of the 2019 show to the beginning of the 2022 show.
- **The Species Competition** – Entries are Colorado mineral specimens (one per category) in the following categories: thumbnail, toenail, miniature, cabinet, oversize cabinet, self-collected, best of Colorado and lapidary/jewelry. You may enter one, some, or all the categories.
- **The Best of Fossil Competition** – Up to three specimens that need not be Colorado in origin.

For full information and entry forms, contact Larry Havens at [lwrnchavens@comcast.net](mailto:lwrnchavens@comcast.net) or 303-757-6577. Click the links below for the forms and information. We will provide display cases and liners (if requested).

Larry Havens, Exhibits Chair

<https://denvergem.org/wp-content/uploads/2022/03/2022-Information-for-Non-Competitive-Exhibits-.pdf>

<https://denvergem.org/wp-content/uploads/2022/03/2-26-revision-2022-COMPETITIVE-EXHIBITORS-ENTRY-FORMS-PACKET.pdf>

## Fossils in the News

Dennis Gertenbach

### **After the demise of the dinosaurs, mammals got bigger, not brainier**

With the catastrophic asteroid impact 66 million years ago, the reign of the dinosaurs ended and the Age of Mammals began. A recently published study has shed light on the evolutionary changes in mammals, once dinosaurs were extinct.

Using CT scans, these researchers measured the brain sizes of mammals that lived during the first 10 million years after dinosaurs died out. These measurements were compared to the estimated body weight of these mammals. Much to their surprise, the researchers discovered that the ratio of brain size to body weight decreased, demonstrating that these prehistoric mammals bulked up, rather than developed larger brains. This contradicts the long-held theory that mammals dominated during this time because of their increasing brain size. After this initial 10 million years, early members of modern mammal groups began to develop larger brains, probably to improve their survival as food became scarcer.

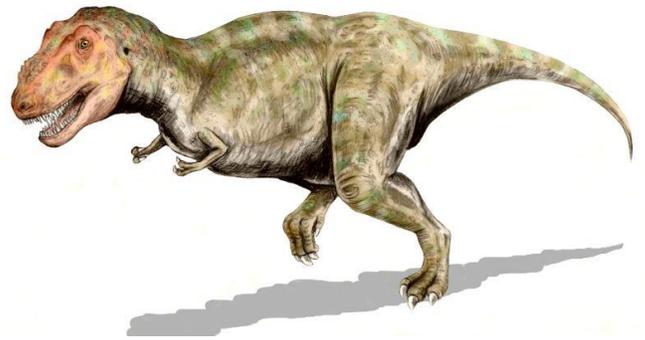


Artist rendition of *Arctocyon*, a mammal that lived soon after the dinosaurs went extinct. Credit: Dmitry Bogdanov, permission granted under [GNU Free Documentation License](https://www.gnu.org/licenses/)

Information from <https://www.ed.ac.uk/news/2022/mammals-put-brawn-before-brains-after-dinosaurs>

### What is with those short arms on *T. rex*?

Since their discovery over 100 years ago, paleontologists have asked, why are the arms of *Tyrannosaurus rex* so ridiculously short? Proposed hypotheses have included that they were used for mating, for holding or stabbing prey, for tipping over sleeping *Triceratops* (ancient cow tipping?), waving to mates, social signaling, helping *T. rex* to get up from the ground, stabbing enemies, and perhaps they had no function at all. However, their arms are so short, that none of these seems likely (with the exception of no function).



Did the short arms of *Tyrannosaurus rex* prevent injuries during feeding frenzies? Credit: Nobu Tamura, permission granted under [GNU Free Documentation License](#)

Paleontologist Kevin Padian approached this question by asking what might be the benefit of short arms. The recent discoveries that some tyrannosaurids hunted in packs provide another possible explanation. Feeding frenzies after a kill would have resulted in huge heads with powerful jaws feasting together. Any arm in the way would have likely been injured or even amputated; tiny arms would prevent these types of life-threatening injuries. Padian admits that any hypothesis, including his, is hard to prove after 66 million years.

Information from <https://news.berkeley.edu/2022/04/04/t-rexs-short-arms-may-have-lowered-risk-of-bites-during-feeding-frenzies/>



The large fruits of the *Manicaria saccifera* palm depend on large animals for dispersing their seeds. Credit: Roger Culos, permission granted under [Creative Commons Attribution-Share Alike 3.0 Unported](#) license

### How the dinosaur extinction changed plant evolution?

The extinction of the dinosaurs created a 25-million-year gap with no large herbivores. Without these large plant eaters, many plant features on plants changed. By analyzing fossil and modern palm trees as a model, researches demonstrated changes in plants when large herbivores disappeared.

During the time of the dinosaurs, many palm tree fruits were large and their leaves and trunks were covered with thorns. Large fruits attracted plant eaters, who dispersed palm seeds when eating the fruit. Spikes kept large animals from eating the palm leaves and trunks. With the absence of large herbivores, palms evolved many more species lacking defensive spikes. As large herbivores returned, more palm species developed spikes. However, large fruits persisted, indicating that even smaller fruit-eating mammals helped disperse seeds within the fruit.

Information from [https://www.idiv.de/en/news/news\\_single\\_view/2343.html](https://www.idiv.de/en/news/news_single_view/2343.html)

### Great white sharks may have contributed to megalodon extinction

Giant megalodon sharks were the apex predator in the oceans 23 to 3.6 million years ago, reaching a length of 60 feet. Great white sharks, which first appeared 6 to 7 million years ago, only grow to a third that length. So why did megalodon sharks become extinct, while great white sharks still swim in today's oceans?

Researchers have developed a method to determine how far up the food chain an animal lived by analysing zinc isotopes in the enamel of teeth of animals. They used this method to compare megalodon and great white shark teeth that coexisted in the Early Pliocene Epoch (5.3 to 3.6 million years ago). Their results showed similar zinc isotope concentrations in their teeth, indicating that both were apex predators during this time. This indicates that with a limited food supply, great white sharks may have outcompeted megalodon sharks, leading to their extinction.

Information from <https://www.mpg.de/18712873/0527-evan-megalodon-extinction-150495-x>



Tooth size comparison between an extinct megalodon (left) and a modern great white shark (right). Credit: © MPI for Evolutionary Anthropology, used by permission

## Other Rockhounding Events and Activities in the Area

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

- **Saturday, August 6**, is the **Western Saloon Night Fundraiser** for the **Western Museum of Mining and Industry** in Colorado Springs starting at 6 pm. For more information, see <https://wmmi.org/news-events/western-saloon-night-fundraiser.html>
- **Thursday-Sunday, August 11-14**, is the annual **Buena Vista Contin-Tail Gem, Mineral & Fossil Show** at the Buena Vista rodeo grounds. The show runs from 9:00 am to 6:00 pm daily. For more information, see <https://bvrockshow.com/>
- **Thursday-Sunday, August 18-21**, is the **Woodland Park Gem and Show** at the Ute Pass Saddle Club Grounds from 9-5 each day. No admission is charged. See <http://woodlandparkrockandgemshow.com/>.
- **Friday-Sunday, August 19-21**, is the **Lake George Gem & Mineral Show**, featuring over 30 vendors. The show runs 9:00 am to 5:00 pm daily. See <https://www.lggmclub.org/>.
- **Saturday, August 20**, is **Family Days** at the **Western Museum of Mining and Industry** in Colorado Springs. The day features hay rides, blacksmithing, gold panning, machinery demos, and more. See <https://wmmi.org/plan-your-visit/exhibits.html>
- **Wednesday, August 31**. **Dinosaur Ridge** will have **Behind-the-Scenes Collections Tours at three Colorado museums**: Dinosaur Ridge Discovery Center, Morrison Natural History Museum, and Denver Museum of Nature & Science. Experts at each site will lead special behind-the-scenes tours. See <https://dinoridge.org/programs-and-events/travel-and-field-programs/>
- **Thursday-Sunday, September 8-11**, is the **Denver Gem & Mineral Show** at the Convention Center. Information about the show is at <https://www.denvermineralshow.com/>.
- **Friday, September 9**, will be the **Mines Museum Open House** from 6-9 pm. Meet with other rock, mineral, and fossil lovers and see the new exhibits, while enjoying appetizers and drinks. See <https://www.mines.edu/museumofearthscience/> for the location of the Mines Museum on the CSM campus in Golden.



## Flatirons Mineral Club

P.O. Box 3331  
Boulder, CO 80307

### 2022 Ballot for FMC / RMFMS / AFMS 'Rockhound of the Year'

The club membership each year honors an active member, or a husband-and-wife team who have made substantial accomplishment during the past year in promoting and furthering the FMC goals, as per the club's Mission Statement which is outlined in the Club By-laws.

Since inception of this program in 2002, the annual FMC recipients have been: Charlotte Morrison (2002), Paul & Martha Ralston (2003), Ray & Dorothy Horton (2004), John & Jeanne Hurst (2005), Ray & Joyce Gilbert (2006), Chuck & Jan Buda (2007), Cory Olin co-tie with Hallie & Dot Cook (2008), Shaula Lee (2009), Anita Colin co-tie with Gabi Accatino (2010), Mel & Charlotte Bourg (2011), Deborah Knox (2012), Ed Raines & Silvia Pettem (2013), Mike Smith (2014), Tally O'Donnell (2015), Dennis Gertenbach (2016), Trick Runions (2017), Jean Orr (2018), Craig Hazelton (2019), Brian Walko in 2020, and Susan Peach in 2021.

Please list your 2022 nominee below. You can also vote by several electronic means. All voting information is confidential and will be tallied and is then erased /or/ shredded by Gerry Naugle. The FMC annual winners' names are sent to the RMFMS and AFMS offices for publication in their respective newsletters. Note: The annual FMC winner(s) are also inducted into and their names engraved onto the FMC Hall of Fame (HOF) Plaque.

Your 2022 nomination is: \_\_\_\_\_

The person (or) persons should be honored because of (brief summary):

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Submitted by, please print \_\_\_\_\_

Please return this paper ballot to Gerry Naugle (use the letterhead address above) by July 15th or (easier), you can vote by leaving a message or text to: 303-591-2830 or (the easiest) sending an e-mail to: [gnaugle@earthlink.net](mailto:gnaugle@earthlink.net).

Voting results will be announced at the 2022 annual club picnic at the **Pavilion at Harlow Platts Park**, 1496 Gillespie Drive, Boulder 80305, on Saturday, Aug 20<sup>th</sup>, starting at 11:00 am. More information about the picnic is in the club newsletter.

**Thanks for participating!**

# Officers, Directors, and Other Volunteers

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## President

Brian Walko, 303-931-4283  
[earthextractions@gmail.com](mailto:earthextractions@gmail.com)

## 1<sup>st</sup> Vice president: Program Chair

Jean Orr  
[jporr@mindspring.com](mailto:jporr@mindspring.com)

## 2<sup>nd</sup> Vice President: Field Trip Chair

Taneka Colon  
[taneka\\_ringo@hotmail.com](mailto:taneka_ringo@hotmail.com)

## Secretary

open

## Treasurer

Gerry Naugle, 303-591-2830  
[gnaugle@earthlink.net](mailto:gnaugle@earthlink.net)

## Board of Directors

Term expires in 2022

Tally O'Donnell, 303-494-6061  
[phantom@indra.com](mailto:phantom@indra.com)

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Term expires in 2023

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Charlotte Bourg, 970-278-0975  
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## Membership

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## Junior Geologists

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[phantom@indra.com](mailto:phantom@indra.com)

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[anitacolin@hotmail.com](mailto:anitacolin@hotmail.com)

## Field Trip Advisory Committee

Trick Runions, 970-213-7305  
[trickrun@gmail.com](mailto:trickrun@gmail.com)

## Facebook Chair

Gerry Naugle, 303-591-2830  
[gnaugle@earthlink.net](mailto:gnaugle@earthlink.net)

## Meeting Door Prize Chair

Brad Willkomm, 303 249-8877  
[bpwillkomm@yahoo.com](mailto:bpwillkomm@yahoo.com)

## Grab Bags

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[anitacolin@hotmail.com](mailto:anitacolin@hotmail.com)  
Charlotte Bourg, 970-278-0975  
[rckhnd4252@gmail.com](mailto:rckhnd4252@gmail.com)

## Mineral Specimens for Grab Bags

Don Mock  
[donmock@hotmail.com](mailto:donmock@hotmail.com)

## Club Show Committee Members

### Show Chair

Brian Walko, 303-931-4283  
[earthextractions@gmail.com](mailto:earthextractions@gmail.com)

### Show Volunteer Chair

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### Show Dealer Chair

Andrew MacGregor, 720-988-3259  
[andrew.d.macgregor@gmail.com](mailto:andrew.d.macgregor@gmail.com)

### Show Advertising and Admissions

Gerry Naugle, 303-591-2830  
[gnaugle@earthlink.net](mailto:gnaugle@earthlink.net)

### Show Kid's Corner Chair

Charlotte Bourg, 970-278-0975  
[rckhnd4252@gmail.com](mailto:rckhnd4252@gmail.com)

## 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*

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<b>Date</b>	<b>Event</b>	<b>Location</b>
Saturday, July 16	Field trip to collect fluorite, gold ore, and quartz. See page 3	Jamestown, Colorado
Saturday, August 13	Gold panning field trip. See page 3	Boulder County
Saturday, August 20	Club picnic. See page 2	Harlow Platts Park in Boulder
Thursday-Sunday, September 8-11	Denver Gem & Mineral Show. To volunteer to help, see page 4	Colorado Convention Center in Denver
Tuesday, September 27	Club meeting featuring Ed Raines talking about "The Coming of Age of Hydraulic Processes." See page 4.	Mountain View United Methodist Church in Boulder

Please check the club's website at <https://flatironsmineralclub.org/> for the status of these activities before you go.