



# Flatirons Facets

Flatirons Mineral Club of Boulder County, Colorado  
Volume 65, Number 5  
September-October, 2022

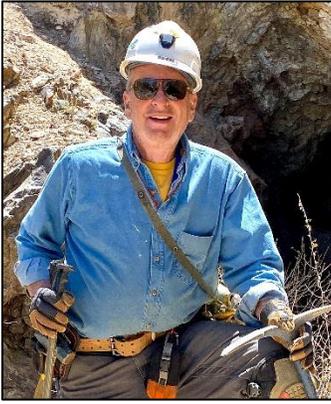


Tony and Emilyn Bubb panning for gold at the gold placer mining field trip last month. See the article about the trip on page 10.

Photo Credit:  
Brian Walko

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## President's Message

I would like to thank all of you who attended one or more of the FMC field trips this summer. Will and I had fun sharing our knowledge and getting to know you. This year we focused on local field trips, except Hartsel barite. Next season we will be expanding our range to exciting collecting spots throughout the state. If you have any suggestions for new places to collect, please let me know.

Now we look forward to the Denver Gem & Mineral Show, September 8–11<sup>th</sup>, and our club meeting on September 27<sup>th</sup>. Please read below to find out more.

Best regards,  
Brian Walko  
FMC President

**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.



### 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.

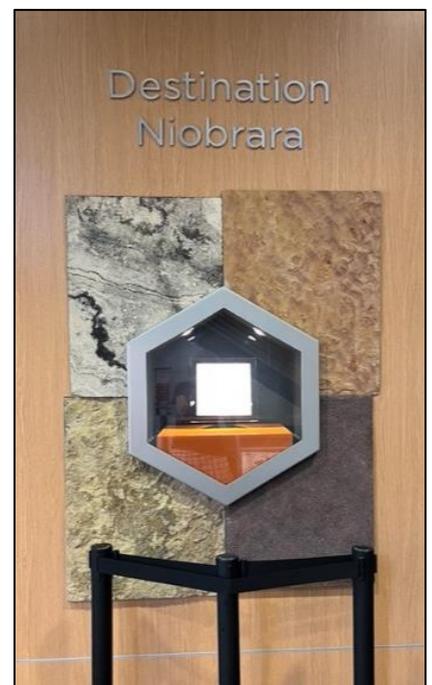
If you would like to help with this activity, please contact Dennis Gertenbach at [gertenbach1@gmail.com](mailto:gertenbach1@gmail.com) or 303-709-8218.

### September 27 Club Meeting Featuring Ed Raines How, When, Why, and Where of Hydraulic Fracturing

Our September club meeting features Ed Raines talking about “How, When, Why, and Where of Hydraulic Fracturing.” Because of the Denver Gem & Mineral Show, this month’s meeting is moved to Tuesday, September 27.

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

New exhibit at the Mines Museum of Earth Science.  
Credit: Susan Howard



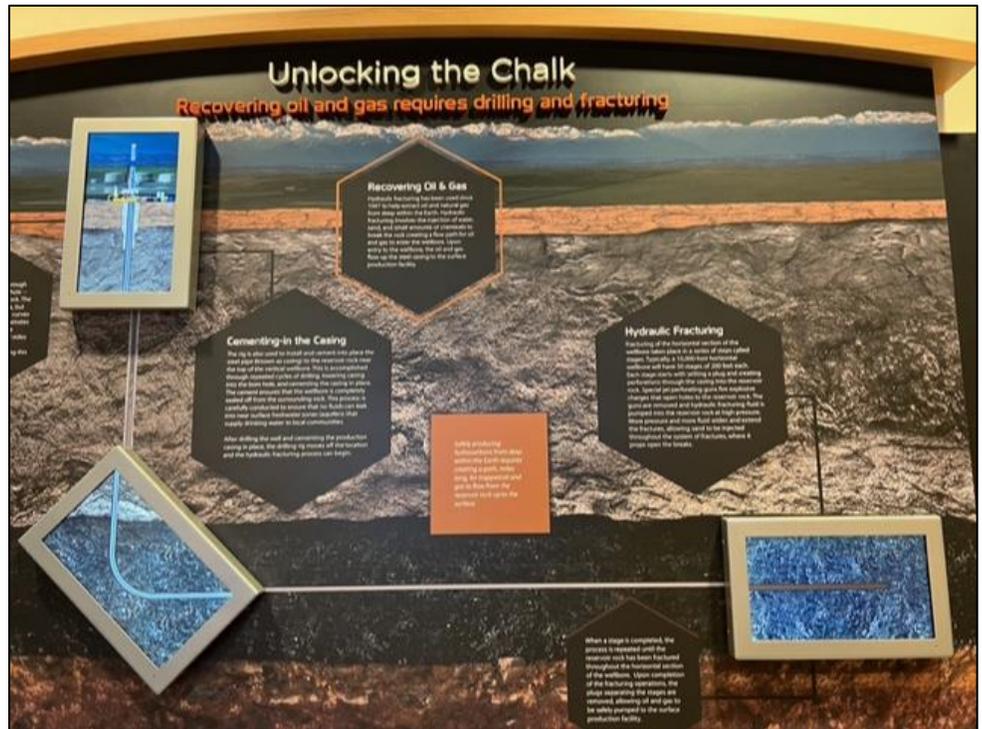
valuable materials from the Earth. Today the industry has turned to the use of new methods to release and recover valuable materials from the enclosing rock in a technology that involves the use of explosives and hydraulic processes.

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.



Mines Museum exhibit explaining how gas and oil are recovered using hydraulic fracturing. Credit: Susan Howard

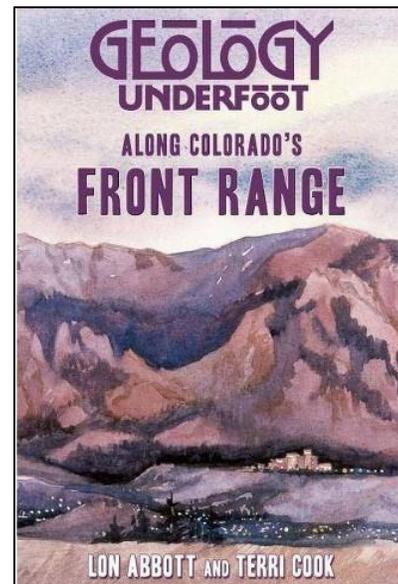
## October 11 Club Meeting Featuring Dr. Lon Abbott A Brief Geologic History of Colorado



Dr. Lon Abbott is a Teaching Professor of Distinction and is the Associate Chair of the CU Geological Sciences Department. In addition to teaching classes and publishing scientific articles, Lon strives to contribute to public understanding of and appreciation for geologic processes, the deep history of the planet, and the significance of geology in our everyday lives. He’s published three geology books and over 50 articles for general audiences and he’s given dozens of public presentations about Colorado’s geology. Lon’s research is focused on how mountains are built and sculpted into the beautiful landscapes we enjoy today. Chief among his research interests is trying to decipher why Colorado’s Rocky Mountains – which are among the world’s most enigmatic mountain ranges – exist at all. His presentation will take us

on a journey through Colorado's geologic history from the formation of the state's first continental crust 1,700 million years ago right up to today. We'll trace the rise and fall of several mountain ranges, watch deserts and seas encroach on the state and then recede, and get to know some of Colorado's early inhabitants.

Want to learn more about Colorado's geologic past? Pick up a copy of Dr. Abbott's book, *Geology Underfoot Along Colorado's Front Range*. It will guide you to 21 locations along Colorado's Front Range, where you will see and learn about many of our state's geologic wonders. (And, if you bring a copy to the meeting, Dr. Abbott will probably sign it.)



## The Original Denver Gem and Mineral Show

*Collecting*  
**COLORADO**

Amazonite and Smoky Quartz  
Smoky Hawk Claim, Colorado  
Photo courtesy of Joseph Dorris  
Photo by T Spann  
21 cm

**SEPTMBER 8 - 11, 2022**  
**DENVERMINERALSHOW.COM**

*The Original*  
**DENVER**  
**GEM & MINERAL SHOW**

**HARDROCK SUMMIT 2022**  
COLORADO CONVENTION CENTER

*Sphenodiscus pleurisepta* Conrad  
(coiled ammonite)  
Late Cretaceous Period: 70 mya  
Lower Fox Hill Formation  
Colorado Springs, CO  
Collected by Jack Null  
Photo by Nancy Kimber

Join Us  
for the 54th Annual  
**DENVER GEM & MINERAL SHOW**

in our New Location at the  
Colorado Convention Center  
700 14th St, Denver, CO 80202

**September 8 - 11, 2022**

Hours: Thur to Sat 9am-5pm, Sun 9am-3pm

For tickets and information, visit  
[denvermineralshow.com](http://denvermineralshow.com) and  
[hardrocksummit.com/tickets](http://hardrocksummit.com/tickets)  
(ticket price includes all Hardrock Summit Shows)

**Dealers**  
**Fabulous Exhibits**  
**Speakers**  
**Gold Panning**  
**Mr. Bones**  
**Fluorescent Room**  
**Educational Booths**  
**Door Prizes**  
**Grab Bags**

The 2022 Denver Gem & Mineral Show (DGMS) in conjunction with the Hardrock Summit will be held at the Colorado Convention Center from September 8 to 11, 2022. The Hardrock Summit has 4 shows at the Convention Center this year, including The Evolution Show, The Sparkle & Joy Jewelry and Gemstone Show, DGMS, and LLD DENVER Mineral Hall. Visit <https://hardrocksummit.com/#summit> and <https://www.denvermineralshow.com/> for more information and list of dealers.

Hours for the Show are Thursday through Saturday 9:00 am to 5:00 pm and Sunday 9:00 am to 3:00 pm. Tickets are \$10/day and can be pre-purchased on the Hardrock Summit's website or paid for at the ticket counter. Children under 12 years old are free.

The DGMS will occupy the same space as last year on the upper, entry level of the Convention Center. The Denver show will include about 30 dealers, fluorescent room, club tables, speakers, display exhibits, education and public sector tables, gold planning, Mr. Bones, and grab bags. The theme of the 2022 DGMS is **Collecting Colorado**.

### **SPEAKERS AT THE SHOW**

Here is the list of speakers scheduled as part of DGMS. All DGMS Speakers will be located in Room 401 near the entrance to the Hardrock Show.

Thursday, September 8

1:00 pm Jeff Scovil - Fabulous Colorado Minerals

Friday, September 9

11:00 am Joe Dorris - Collecting Adventures and Recent Finds from the Smoky Hawk Structure

1:00 pm Steve Jorgensen When Bad Things Happen to Good *Menuites* – Predation on *Menuites oralensis*

2:00 pm Pete Modreski - Some Famous, or Not So Much, Collecting Stories and Sites in Colorado

Saturday, September 10

11:00 am Ed Raines - Colorado Type Minerals

12:00 noon Mark Jacobson - Notable Minerals Collected from Colorado Localities: Uncommon Minerals to Uncommon Localities

1:00 pm Phillip Persson - Rare Earth Elements in Colorado: Pegmatites, Carbonatites and More!

Sunday, September 11

1:00 pm Brian Walko - Collecting Colorado Fluorescent Minerals

### **VOLUNTEERS NEEDED**

Your participation as a volunteer is the life blood of a successful show. Volunteers should work a minimum of 4 hours and will get a volunteer badge for free admission to all 4 days to all the Shows at the Convention Center and parking/public transit reimbursement (up to \$12 per day) on the day(s) you actually volunteer. We encourage you to take public transportation and there is a light rail station across the street from the Convention Center. An online volunteer sign up is located at the following link: <https://www.signupgenius.com/go/4090D45A5AD2EA2F94-denver>.

If you can only work a couple of hours on a specific day, put that in the comments. Also, if you are volunteering for a club table, put in which club table in the comments. If you plan to get reimbursed for parking, you should sign up on the volunteer list. If you can't get signed up online, please send Amber an email with days and hours you want to volunteer, email address, and phone number.

If you have any questions, please contact Amber Brenzikofer, 2022 DGMS Chairperson, at [amberbrenzikofer@gmail.com](mailto:amberbrenzikofer@gmail.com) or 720-480-5234.

### **VOLUNTEER AT THE CLUB TABLE**

You can sign up to help at the club table at <https://www.signupgenius.com/go/4090D45A5AD2EA2F94-denver>. At the table, we will have information about the club and the Jr. Geologists program to hand out to folks. There will also be mineral and fossil identification games to play with those visiting our table.

## **Come and enjoy the Show on September 8-11**

## Where in Colorado?

Each month, we test your knowledge of geological features in Colorado. These two pinnacles, found in southwestern Colorado, look down on an Ancestral Puebloan site that dates back to over 1,000 years ago. Where in Colorado is this? See page 17 for the answer.



## Satellite Shows

Along with the Denver Gem & Mineral Show, the Hardrock Summit features two other shows that can be visited with your admission into the Denver Show. See <https://hardrocksummit.com/#summit> for more details about these shows.

**Sparkle and Joy** features jewelry and gemstones

**Evolution** has minerals, fossils, meteorites, gemstones, and jewelry

During the week of the Denver Gem & Mineral Show, there are several other shows, each with different rocks, minerals, fossils, and gems for sale.

**Colorado Mineral & Fossil Fall Show** on Sept. 9-17 at the Crowne Plaza Hotel (near DIA), 15500 E. 40<sup>th</sup> Avenue in Denver. The show is open to the public and features both retail and wholesale vendors with minerals, fossils, meteorites, jewelry, slabs, and more. Admission and parking are free. For more information, see <https://www.coloradomineralandfossilshows.com/>.

**Miners Co-op Gem & Mineral Show** on Sept. 9-19, at National Western Stock Show complex (north side of I-70). The Miners Co-op is a show that is primarily made up of miners vending their self-collected finds. Free and open to the public. Wholesale and retail. Visit their website for more information at <https://www.rockandmineralshows.com/Search/ListingDetails/miners-co-op-denver-mineral-show/619/false/true>.

**Just Minerals and Crystal Show** on Sept. 10-13 at the Summit Conference & Event Center, 411 Sable Blvd., Aurora. Around a dozen high-quality dealers can be found selling off excess inventory at wholesale prices in this 3-day show. Details can be found at <https://xpopress.com/show/profile/1186/just-minerals-crystals-event-denver>.

## Scenes from the Club Picnic in August

Over 50 club members attended this year's annual picnic on Saturday, August 20. This year, we filled 840 grab bags for sale at the Denver Gem & Mineral Show in September and our club show in December. Proceeds from the sale of the grab bags helps fund scholarships for college students studying geology and other earth sciences at a Colorado college or university. The food was great and it was fun to catch up with everyone about their rockhounding adventures this summer.



Filling and packing grab bags. Credit: Trick Runions (left) and Brian Walko (right)



Enjoying the food and catching up. Credit: Brian Walko (left) and Trick Runions (right)

### **Awards for Newsletter Contributions**

Each year the Rocky Mountain Federation of Mineralogical Societies honors individuals throughout the Rocky Mountain region for contributions they have made to club newsletters. Several Flatirons Mineral Club adult and junior members received recognition for their contributions to our newsletter, including:

#### Adult Article

Trick Runions, Discovery of a Mosasaur Bone, certificate

#### Advanced Adult Article

Dennis Gertenbach, Where in Colorado? second place

#### Junior Article (under 12)

Adler Casson, Baculites, first place

Henry Poe, Emeralds, second place

#### Junior Article (12 to 17)

Charlotte Small, Fluorite, first place

Connel Casson, *Anomalocaris*, second place

#### Drawn Feature

Charlotte Small, Parts of a Trilobite, first place

First and second place winners go on to the national competition at the American Federation of Mineralogical Societies meeting this fall. We hope some of our members will place in the national competition.

**Consider writing an article or sending a contribution for our club's award-winner newsletter.** For more information, please contact Dennis Gertenbach, club editor, at [gertenbach1@gmail.com](mailto:gertenbach1@gmail.com).



First place newsletter awards, Adler and Charlotte. Credit: Eli Munson

### Rockhounds of the Year

The highlight of our annual picnic is the announcement of our Rockhounds of the Year. Each year we select both an adult and junior club member for this award in recognition of contributions they have made to our club. The adult recipient is selected from nominations from club members. The junior recipient is chosen by the Jr. Geologists adult leaders.

This year our adult Rockhound of the Year is **Will Rehm**. Will has been active at club meetings and for bringing specimens. He has been involved with planning field trips, and led the very well attended Six Mile Fold field trip in late May.

We had a tie for our Jr. Rockhound of the Year. **Maxwell Minson** joined the Jr. Geologists in 2015 and is a sophomore in high school. He has volunteered in the Kids' Area of our show for many years and put a display together several years ago. He oversaw the rock tumbling with the younger kids this spring. **Connel Casson** joined the Jr. Geologists in 2018 and is also a high school sophomore. He has contributed articles for the newsletter. He has also put together displays at the last three club shows and has helped in the Kids' Area. Connel also volunteers at the Mines Museum, helping to catalog the fossil collection once a month.

We congratulate our three Rockhounds of the Year. They will be further recognized in the Rocky Mountain Federation of Mineralogical Societies newsletter later this year.



Rockhound of the Year awards. Credit: Charlotte Bourq



Jr. Rockhounds of the Year, Maxwell with Brian Walko and Connel with Gerry Naugle. Credit: Eli Munson

## Gold Placer Mining Field Trip Report

Brian Walko

Twenty FMC members tried gold placer mining in upper Lefthand Creek near Ward. The water temperature was perfect for working in the creek. Everyone was equipped with gold pans and one group had a sluice box.

Gold has a specific gravity of 19.3, making it one of the heaviest minerals. In this creek, the second heaviest mineral is magnetite (black sand) with a specific gravity 5.2, while granite's specific gravity is 2.6. The panning uses gravity separation. Creek gravel and sand are scooped into a classifier screen to remove the larger gravel. Then the panning process begins, with the



Mike and Ron (Yam) Yamiolkoski. Credit: Brian Walko



agitation of the pan to allow the heavier minerals to sink to the bottom. The lighter minerals remain on top, to be washed out of the pan. Repeating this process until the pan is almost empty will result in black sand and possibly some gold.

Only a few flecks of gold were found, but everybody had a great time.

Tony Bubb and daughter Emilyn. Credit: Brian Walko

## Jr. Geologists Activities

This past summer, the Jr. Geologists toured the Cemex cement quarry to learn how cement is made. Howard Gordon arranged for the tour, where we learned that the manufacturing process for making cement starts with the mining of raw materials, mainly limestone and clay. The limestone being mined at the CEMEX site is part of the Niobrara Formation of the Cretaceous Period. This limestone was deposited in the Western Interior Seaway between 87 and 82 million years ago, when this sea covered Colorado and most of the interior states of our country. The limestone is excavated from open pit mines after drilling and blasting, and then transported to the hoppers of the limestone crushers.

We want to thank Michael Clausen of CEMEX for the tour of their quarry. Everyone learned how important cement is for our everyday lives. And, it was also nice that the juniors were allowed to collect fossils and calcite crystals from the quarry.



Viewing the mining operation at the CEMEX cement quarry outside of Lyons. Credit: Dennis Gertenbach



We are planning several Jr. Geologists activities for the next few months. As more activities are planned, information will be emailed to the Jr. Geologists families.

The Jr. Geologists is a program from Flatirons Mineral Club families with children six years and older. If your family would like to join the Jr. Geologists and you are not on our email list, please contact Dennis Gertenbach at [gertenbach1@gmail.com](mailto:gertenbach1@gmail.com) to have your name added.

The Jr. Geologists with one of the haul trucks at the quarry. Credit: Dennis Gertenbach

# Midnight Express Mine Field Trip Report

Brian Walko



Twenty-five FMC members hiked up a mountain west of Jamestown to the Midnight Express Lode Claim, prospecting for fluorite and gold. The trip had two dig sites, one a trench for fluorite and the other following a quartz bearing gold vein. Everybody found fluorite digging in the trench. Higher up on the claim we located the quartz vein. A few people found terminated quartz crystals, but no gold.

Even though there was not gold found, it was a beautiful day to hike and explore a new area.

Club members digging in a fluorite vein.  
Credit: Brian Walko



Aubrey Wingo enjoying the wild flowers.  
Credit: Brian Walko



Andrew MacGregor & Tim  
Froehlich chiseling fluorite.  
Credit: Brian Walko

## Field Trip to Granite Pass, New Mexico

Terry O'Donnell

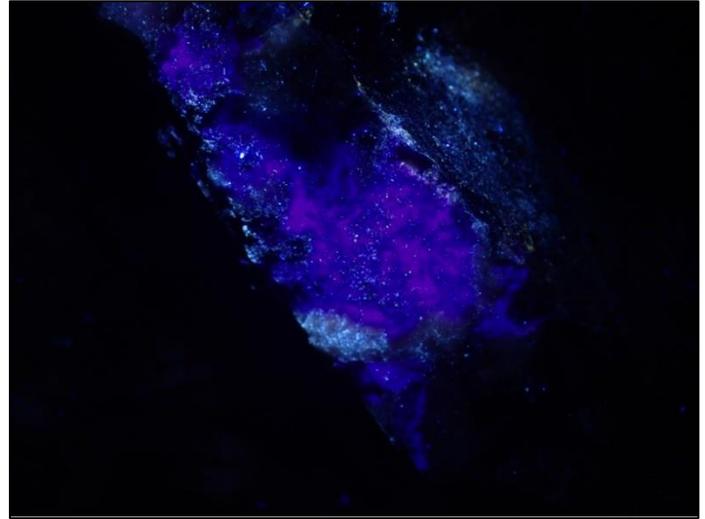
Tally and I were off collecting near Granite Pass in far southwest New Mexico. We found calcite and quartz crystals, banded jasper, and barite. Some of the calcite and quartz fluoresced quite nicely! Two of the pairs of pictures show specimens with normal light and then UV light.



Tally working at the lip of a jasper test hole



Quartz at another test hole



Quartz specimen under normal and UVA light



Calcite crystals under normal and UVA light.

## The World's Largest Geode

Club member Andrew MacGregor sent this link for an excellent BBC short video on the world's largest geode, the Pulpí Geode in Spain:

<https://www.bbc.com/reel/playlist/world-of-wonder?vpid=p0c05x2b>.



## Light and Minerals, Part 3: Do Rocks Need Sunscreen?

Mark H. Goldgeier and Daniel W. Bonvillian

For several billion years rocks and living things have co-existed on earth. Do rocks and people share a need for protection from solar radiation? Which wavelengths are hazardous and what are the consequences of radiation exposure? How do we protect ourselves from excessive solar radiation?



Iceland sun rising over ice field and spilling onto glacier and glacial lagoon

Crystals do “grow”. Minerals may maintain a “posture”. Mercury can “run”. Garnets “blush” and iolites are “blue”. However, rocks are abiotic. Therefore, the destructive impacts of sunlight do not interfere with rocks’ “essential life functions” - because they are not alive. Rocks are, however, subject to degradation from the effects of direct solar radiation, from heating and cooling, and from desiccating, wetting, and freezing. In general terms, they crumble.

There are some minerals that are specifically altered by solar radiation. Ultraviolet light may cause color to change (franklinite), fade (spodumene), or intensify (vanadinite). Alterations in color may be temporary or permanent.

For portable specimens, keep them in an environment that lends them physical stability. For favorite mountain ranges - well it would take gobs and gobs of sunscreen - and of course zinc oxide and titanium dioxide would be the geologist’s preferred sunscreen ingredients for both humans and rocks!

### Do We Need Sunscreens?

We are alive. We carry on certain processes in order to remain alive. Humans are vulnerable to three major insults from exposure to ultraviolet light. Because the atmosphere shields us from highly energetic UVC, it is mostly UVB and UVA ultraviolet light that reaches our exposed surfaces.

1. UVB and UVA lead to signature DNA damages, which in turn lead to apoptosis (programmed cell death), cell repair, or mutation. In fact, ultraviolet light is the number one cause of the world’s most common human cancers: skin cancers caused by ultraviolet-light-induced mutations.
2. Ultraviolet-light-induced cellular injuries are caused by damaged proteins and lipids, reactive oxygen species, and secondary inflammation and repair mechanisms. Sunburns hurt because they are bad for you. Suntans cause most of what we recognize as aged skin.
3. All UV light causes systemic immunosuppression. There are deleterious effects on the entire organism, not simply on sun-exposed surfaces (as is the case for ultraviolet-induced genetic damage and sunburn).

### How Shall We Protect Our Health?

If we protect our skin, eyes, and accessible membranes from excessive UV light, we expect to see less skin aging, fewer skin cancers, and fewer cataracts. Make avoidance of excessive UV light part of your each and every day routine.

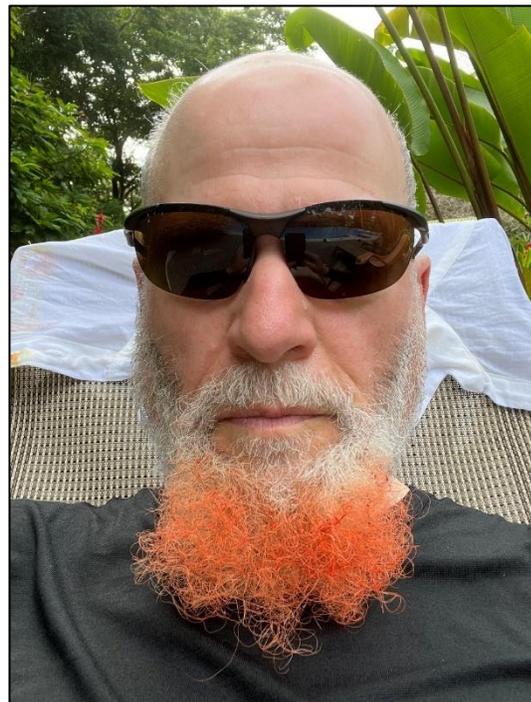
Reduce duration and intensity of exposure; be cognizant of season, latitude, and elevation, and time of day. Be aware of reflected light.

Wear sun-protective clothing. Use your sunscreens as recommended. We strongly favor mineral based sunscreens, especially zinc oxide and titanium dioxide. For further information, read up on your sunscreen's particle size, absorption spectrum, durability and plasticity, environmental impact, and of course safety.

Dedicated shade should be made available at schools, playgrounds, backyards, and work sites.

Whatever your age, skin type, occupation, hobby - now is the time for Colorado rockhounds to enter a higher state of ultraviolet awareness.

Mark enjoying the sun  
suntan – check, sunglasses – check,  
sun protective clothing – check,  
beard on fire - check



The Spanish harvested these crystals in Egypt and sent them by ship back to Europe. It was then that it was determined how many quartz were in a galleon.

Credit: Viktor Lazić, licensed under the [Creative Commons Attribution-Share Alike 4.0 International](https://creativecommons.org/licenses/by-sa/4.0/)

## Safety When Mineral Collecting Near Old Mines

In Colorado, old mines provide a wonderful place to search and collect a wide variety of minerals. But these old mines can also be a dangerous place to be, if you are not careful.

As reported by the Mine Safety and Health Administration (MSHA) on <https://www.msha.gov/sosa>, there are approximately 14,000 active mines and 500,000 abandoned mines throughout the nation. Active and abandoned mine sites pose serious risks to people untrained and unfamiliar with the site. Each year, explorers, hikers, and off-roaders are injured or killed while exploring, swimming, or playing on a mine property.

Stay Out, Stay Alive is a nationwide public awareness campaign by MSHA to educate children and adults about the hazards of exploring and playing at active and abandoned mine sites. Furthermore, the safety initiative's primary mission is to remind people of the one and only key safety practice when encountering an active or abandoned mine site. That is: STAY OUT - STAY ALIVE.

The MSHA website has these examples of hazards at active and abandoned mines:

### Explosives and Chemicals

Active and abandoned mines may be housing explosives. These materials can become unstable overtime and explode spontaneously. Explosive housing containers can also leak toxic chemicals.



### Underground Tunnels

Many mines contain miles of underground tunnel. Without proper lighting, people can easily become lost and disoriented while inside. Publicly available maps are oftentimes outdated.



### Gases and Lack of Oxygen

Thousands of gas wells penetrate coal seams at active and abandoned mines. An inadvertent intersection with one of these wells could inundate the mining section with methane, carbon dioxide, and other deadly gases. These gases can displace oxygen with no visible sign, causing suffocation.



### Decayed Support and Unstable Rock

In a mine tunnel, roof and rib frameworks can decay over time, creating fractures. This weakens the support from unstable rocks and can cause the tunnel to collapse.

hundreds of feet deep and completely unprotected or hidden by vegetation, mine debris, dirt, rock, and water.

### Open Shafts

Many vertical shafts can be





## Where in Colorado?

Text and Photos by Dennis Gertenbach



Figure 1. Chimney Rock pinnacles, south of US-160 and west of Pagosa Springs

The two pinnacles shown in Figure 1 are known today as Chimney Rock, home the Ancestral Puebloans. A thousand years ago, this area had cultivated fields and settlements extending from the valley floors to the mesa tops. Chimney Rock was one of the largest Pueblo II (900-1150 AD) communities in southwestern Colorado, with economic, political, and religious ties to Chaco Canyon, New Mexico. At Chimney Rock, there are more than 150 documented archaeological resources, including pit houses, great kivas, and great houses (Figure 2).



Figure 2. Some of the Chimney Rock ruins, including a great kiva in the background

The Ancestral Puebloans who built the communities below Chimney Rock incorporated their knowledge of astronomy into the design of their community, using the pinnacles to frame multiple astronomical alignments. Today, Chimney Rock is one of the best recognized archaeo-astronomical resources in North America, marking the northern lunar standstill, summer solstice, equinoxes, and the Crab Nebula.

Although the site is best known for its archeological wonders, the geology of southwestern Colorado is also on display. Some one-hundred-million years ago, this part of Colorado was covered by a vast shallow sea, which accumulated over



1,000 feet of sediment formed from the erosion of the uplifting mountains to the west. These sediments eventually hardened into the Pictured Cliffs Sandstone we see today. Traces of this ancient ocean are preserved in the rocks at Chimney Rock, including *Ophiomorpha* burrows (Figure 3) made by an ancient shrimp-like animal.

Much later during the Ice Ages, the thick layers of the Pictured Cliffs sandstone were eroded by massive floods of the ancestral Piedra River, as the glaciers melted from the high mountains. The two towers that remain today are the result of sandstone that was thicker and harder than the surrounding rock.

This amazing site is preserved as Chimney Rock National Monument, encompassing 4,726 acres of the San Juan

Figure 3. *Ophiomorpha* burrow made by an ancient shrimp-like animal at Chimney Rock

National Forest between Durango and Pagosa Springs, in southwest Colorado. During your visit to the site, you can follow the same pathways that the Ancestral Puebloans walked 1,000 years ago. In addition to the remains of the Ancient Puebloans, the site is the home of many native plants and animals found in southwestern Colorado (Figure 4).



Figure 4. Collard lizard, one of the many inhabitants at Chimney Rock today

The site is managed and staffed by the U.S. Forest Service and the Chimney Rock Interpretive Association. The site is open May 15 through September 30 from 9:00 am to 4:30 pm. For more information about the site, visit <https://www.fs.usda.gov/detail/sanjuan/specialplaces/?cid=stelprdb5390324>. You can view short video of the site at <https://www.chimneyrockco.org/>.

### Worth Visiting in the Area

Just 15 minutes away is the town of Pagosa Springs, home of one of Colorado's nicest hot spring pools. Discovered hundreds of years ago by the Ute Indians, these hot springs have long been known for their healing powers. A geothermal hot spring originating 6,000 feet underground feeds 25 individual hot spring pools. Each pool is a different temperature, so you can pick your favorite from a warm soak to the Lobster Pot.

The sulfur-rich water emerges from the “Mother Spring” at 144°F, heated from underground volcanic activity. The water contains a high mineral content, including calcium carbonate, resulting in the multi-colored travertine deposits at the hot springs. Evidence of the volcanic history of the area can be seen in the volcanic tuff and igneous dikes that surround Pagosa Springs.

When European settlers came to this area more than 150 years ago, they found that the Utes had been enjoying the hot springs for hundreds of years. The name Pagosa comes from the Ute word meaning “healing waters.”

As the area became more inhabited by the Army, railroad crews, and settlers, nonnatives began to visit the springs for health reasons in the 1870s. The first bath house at the springs was established in 1881 to accommodate the increasing number of visitors. When the railroad reached Pagosa Springs in 1900, many more travelers came to “take the waters.” With new advances in medicine, visitors to Pagosa Springs waned until the surge in popularity in the 1950s. Today, the Pagosa Hot Springs (<https://www.pagosahotsprings.com/>) is a wonderful place to soak and enjoy the mineral-rich water.



Figure 5. Enjoying the hot springs water at Pagosa Springs

## Fossils in the News

Dennis Gertenbach



*T. rex*, one species or three? The debate continues. Credit: myfavoritedinosaur.com, licensed under the [Creative Commons Attribution 3.0 Unported](https://creativecommons.org/licenses/by/3.0/)

### Splitting *T. rex* into 3 Species? Not So Fast

In this column in the last newsletter, it was reported that researchers had recently hypothesized that *Tyrannosaurus rex* was actually three species. Almost immediately, another team of researchers published a rebuttal. The initial study focused on the bulkiness of *Tyrannosaurus* femurs and on two sets of incisor teeth. In the rebuttal study, another set of researchers state that the differences claimed in the original study were actually overlapping.

Because there is no surviving dinosaur DNA (despite what you saw in the Jurassic Park movies), paleontologists rely on measurements of various traits to determine different species, such as the size and shape of certain bones. However, this is not an exact science, due to variations among different animals from the same species. Compounding this problem are differences between sexes and different ages, plus the distortion from the fossilization process. To settle this question, more *T. rex* skeletons are needed for study.

We certainly have not heard the end of this debate.

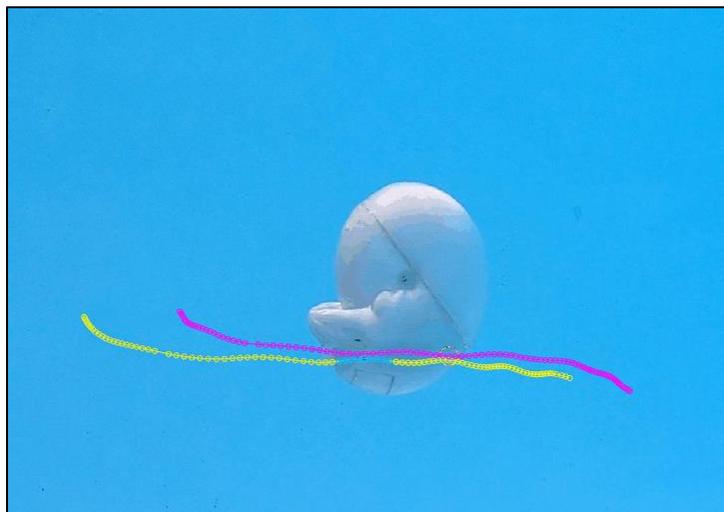
Information from <https://www.nytimes.com/2022/07/25/science/tyrannosaurus-rex-dinosaurs.html>

### Robotic Ammonites Bring These Animals Back to Life

What is the optimum shell shape for an ammonite? This question was not answered from a fossil found in the field or detailed study in a laboratory, but in a university swimming pool.

Ammonites were animals related to modern squid and octopuses, but with an external shell. They died at the end of the Cretaceous, along with dinosaurs and about 75% of other plant and animal species.

Because no ammonites are alive today, scientists have wondered about the optimum shape of their shells. To help answer this question, researchers at the University of Utah created three life-sized, robotic ammonite models of different shapes using 3D printing technology. Each of these models could propel themselves through water by jet propulsion, as do their modern relatives. Using underwater cameras, the researchers could watch and measure how each of these robots moved through the water. They found that narrower shells provided less drag and more stability while traveling in one direction. Wider, more spherical shells more easily changed directions, spinning on an axis. This increased maneuverability would have helped them catch prey or avoid slow predators. The results of this study concluded that there is no single optimum shell shape.



A robotic ammonite with its swimming pattern traced out.  
Credit: University of Utah press release



Dinosaur footprints at Dinosaur Valley State Park in Texas. Credit: DatraxMada, licensed under the [Creative Commons Attribution-Share Alike 4.0 International](https://creativecommons.org/licenses/by-sa/4.0/)

### Drought Exposes Dinosaur Tracks in Texas

Lower or disappearing water levels from drought conditions have revealed many previously hidden objects and artifacts during the past decade. One of the latest discoveries are 113-million-year-old dinosaur tracks in Dinosaur Valley State Park, Texas, which have been covered by the Paluxy River. Most of these footprints were made by the carnivorous *Acrocanthosaurus*, a dinosaur that walked on two legs, weighed 7 tons, and stood 15 feet tall. Other tracks were left by *Sauroposeidon*, a 60-foot-tall dinosaur weighing 44 tons. These dinosaurs lived about 115 to 105 million years ago in the Early Cretaceous period.

Scientists and volunteers are busy cleaning and measuring these newly exposed tracks, gathering data for further study. Once the rains return, these tracks will be covered by water and sediment by the river. A short video of the tracks is shown at <https://www.youtube.com/watch?v=RBpVfyO87Dc>.

Information from <https://www.smithsonianmag.com/smart-news/drought-exposes-dinosaur-tracks-in-texas-180980647/>

### Not One, But Two Asteroids Might Have Slain the Dinosaurs

Off the coast of west Africa, scientists have identified the possible remains of a 5-mile (8.5-kilometer) crater buried hundreds of feet beneath the ocean floor, which they named Nadir. The team estimates that the crater was formed roughly about the same time as



when the Chicxulub asteroid struck the Earth, the event thought by most scientists to have been responsible for the mass extinction at the end of the Cretaceous.

Additional study is needed to determine if indeed the Nadir underground structure is an impact crater, and if the time coincides with the Chicxulub crater. It well may be that the Chicxulub asteroid had a smaller sibling that struck the Earth at the same time.

Information from <https://www.sciencenews.org/article/two-asteroids-dinosaurs-impact-crater-nadir>

Asteroid striking the earth, ending the reign of the dinosaurs.  
Credit: Nasa, public domain

## Other Rockhounding Events and Activities in the Area

If you plan to attend any of these that have not been canceled, please check their websites for the latest updates before you go. Thanks to Pete Modreski for providing information on many of these activities.

- September 8-11 (Thursday-Sunday) is the **Hardrock Summit/Denver Gem and Mineral Show**, Colorado Convention Center, Denver. See page 4 for more information about the show.  
**Satellite Shows:** There are a number of other shows held in conjunction with the Denver Gem and Mineral Show. See page 6 for details.
- September 9 (Friday), 6-9 p.m., **Colorado School of Mines Museum Open House** showcasing new exhibits opening to coincide with the Denver Gem & Mineral Show. The Museum is at 1500 Illinois St. in Golden. All are welcome!
- September 15 (Thursday) is the **Colorado Scientific Society Annual Past Presidents Dinner**, with a talk about “**The White Sands footprints — humans in North America 23,000 years ago**”, by Kathleen Springer and Jeff Pigati, US Geological Survey. Dinner and presentation at the Mount Vernon Canyon Club; all are invited to make reservations and attend the dinner and program. See the website, [coloscisoc.org](http://coloscisoc.org).
- October 8 (Saturday), 9 am to 3 pm, is **Girl Scout Day at Dinosaur Ridge**. This event is designed for Scouts of all levels to finish requirements toward badges, belt loops, pins, and more. See <https://dinoridge.org/programs-and-events/dinosaur-discovery-days/> for more details.
- November 11-13 (Friday-Sunday) is the **New Mexico Mineral Symposium** in Socorro. The Symposium is organized each year by the Mineral Museum at the New Mexico Bureau of Geology and Mineral Resources. More information can be found at <https://geoinfo.nmt.edu/museum/minsymp/home.cfm>.
- November 18-20, (Friday-Sunday) is the **Denver Area Mineral Dealers Show** at Jefferson County Fairgrounds. See <https://xpopress.com/show/profile/621/denver-area-mineral-dealers-gem-mineral-show> for more information.

# Officers, Directors, and Other Volunteers

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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*

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<b>Date</b>	<b>Event</b>	<b>Location</b>
September 8-11 (Thursday – Sunday)	Denver Gem & Mineral Show, see page 4	Denver Convention Center, 700 14th Street in Denver
September 27 (Tuesday), 7 pm	Club meeting featuring <b>Ed Raines</b> with a program about “ <b>How, When, Why, and Where of Hydraulic Fracturing</b> ” See page 2	Mountain View United Methodist Church, 355 Ponca Place in Boulder
October 11 (Tuesday), 7 pm	Club Meeting featuring <b>Lon Abbott</b> talking about “ <b>A Brief Geologic History of Colorado</b> ” See page 3	Mountain View United Methodist Church, 355 Ponca Place in Boulder
October 19 (Wednesday), 6:30 pm	Jr. Geologists meeting, see page 11	Mountain View United Methodist Church, 355 Ponca Place in Boulder

Please check the club’s website at <https://flatironsmineralclub.org/> for the status of these activities, as they may be canceled because of safe COVID-19 guidelines.