

Flatirons Facets

Flatirons Mineral Club of Boulder County, Colorado
Volume 62, Number 1

January-February, 2019

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.



Learn about the Indus River at January's Club Meeting

Bob Raynolds of the Denver Museum of Nature and Science is our speaker at the January 10th club meeting. His talk will be on the **Geologic History of the Indus River and the Future of Its Water.**



The Indus River is one of the world's largest rivers. Rising in the highest Himalayas, it flows west across the Indian Suture before turning abruptly to the south in the vicinity of Shangri La. Here it flows past the foot of Nanga Parbat in one of the deepest known gorges, then bursts out onto the foreland plains of the Punjab in Pakistan. This river nurtured some of our earliest civilizations at Mohenjodaro and Harappa, and flows to the sea near the modern city of Karachi.

Geological evidence suggests the river flowed into the Ganges system until as recently as 5 million years ago, then was abruptly pirated into its modern course. The traces of the river can be seen and mapped as channel systems and sandstone beds across the modern Potwar Plateau.

Today, the river barely makes the sea, as it is diverted for use by irrigation and municipal users. In Karachi a water tanker mafia has been established to dole out the final drops of the river to the 22 million thirsty inhabitants.

As in Egypt with the Nile, in Pakistan all live by the grace of the river. How sustainable is this in a time of varying climates and precipitation patterns? Are there lessons here for us in Colorado?

Bob did his PhD thesis on the Indus River sandstones in 1981, then taught at the Center of Excellence in Geology at Peshawar University on a Fulbright Fellowship. After 38 years of working as a geologist for oil companies and the Denver Museum, he returned to Pakistan last month to visit old friends and to learn what the current situation is on the ground. He will share these impressions with our group.

Highlights of past activities in this newsletter

- Rocks & Rails starting on page 6
- Towel Show starting on page 11
- Holiday Party starting on page 12



President's Message

Happy New Years FMCers!

I hope 2018 ended on a high note for you and 2019 will be a happy and fun year.

Our sweet little club chugs alone. The Rocks & Rails show in December was a wonderful success. Thank you to all of our members who volunteered their time for the show. You can't imagine how much I appreciate your help.

Speaking of volunteerism, I encourage you to join the Board of Directors. New faces, voices, and ideas would be helpful to keep the club young and responsive. Do you have something you'd like the club to consider? Reach out to the folks on the board. Our names and contact information are listed on the last page of the newsletter.

I highly recommend that you sign-up for the Mineralogy Class that Ed Raines is going to teach this Spring! This 10-meetings class is quite the exercise for the brain. And since the club is subsidizing the cost of the class, the member fee is only \$75. Log into our website and join up!

Best wishes, Gabi

Time to pay your 2019 dues!! This will be your last club newsletter, if you have not paid your dues. Dues are still \$18 per family - a bargain for all of the great meetings, field trips, and Jr. Geologists programs. You can pay your dues at any club meeting, or by sending your payment to P.O. Box 3331, Boulder, CO, 80307.

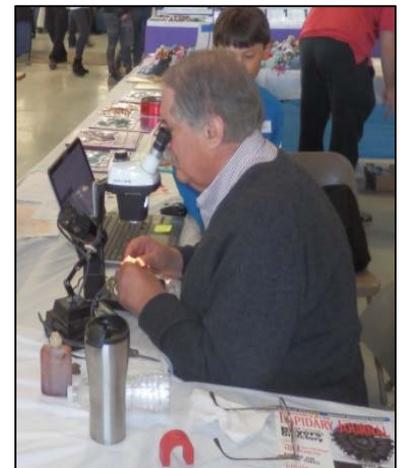
The 2018 Show Volunteers Party

As a thank you to all the club members who made this year's Rocks & Rails show a great success, we will have a volunteers party on January 17th starting at 7:00 pm. If you helped with the show for at least two hours, you are invited to join us at the Clover Building at the Boulder County Fairgrounds for the party. The club will provide refreshments and there will be great prizes for all who helped. A recap of the show starts on page 6.

Ed Raines' Mineralogy Class

Ed Raines is offering his ten-week mineralogy course to Flatirons Mineral Club members. The course is designed to help the student better understand the extraordinarily broad subject of mineralogy. Topics covered include:

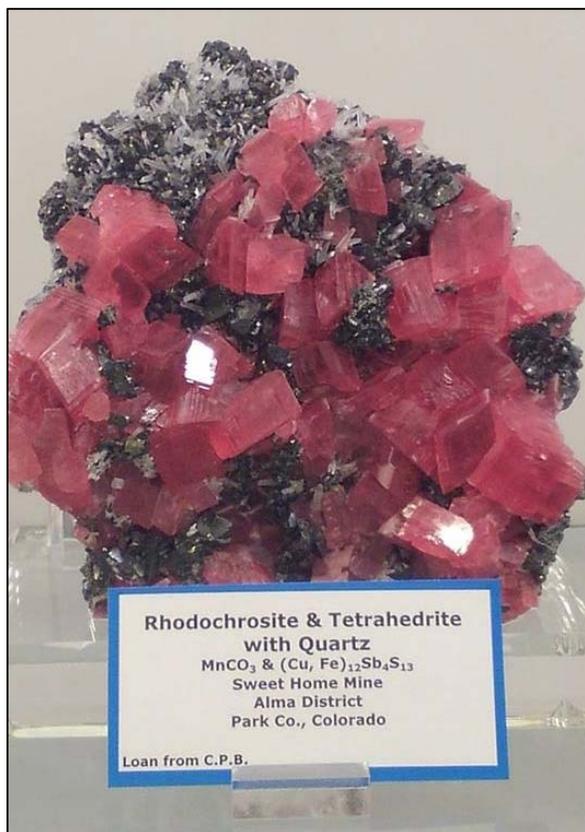
- Introduction to crystallography
- The physical properties of minerals and some basics of identification
- The chemical classification of minerals
- The three kinds of rocks--an introduction to what they are, what they are made of, and how they got there
- Pointers on the identification of various minerals will be scattered throughout the class



Each student will receive 13 flats of specimens to take home and study through the length of the class. Additionally, each student will be provided a binocular microscope, a small testing kit, an electronic balance, and a mineralogy book to take home and use throughout the class.

The classes are on Monday evenings, March 4 through May 13, skipping April 1. The classes will take place in the North Community Room at Frasier Meadows. The club will subsidize half of the fee for the class, so club members only pay \$75 to attend. You can sign up on the club's website at <https://flatironsmineralclub.org/events/?type=classes>.

Winter Field Trip to the CSM Geology Museum in February



Join us next month for a field trip to the Colorado School of Mines Geology Museum in Golden. The CSM Geology Museum contains extensive displays of minerals, mining artifacts, meteorites, fossils and gemstones, as well as a walk-through mine. Founded in 1874, the displays now include over 2,500 catalogued specimens and occupy two floors in the modern General Research Laboratory building at Mines.

Highlights include an introductory video about area geology and displays about critical materials and ultraviolet minerals. Apollo 15 and 17 moon rocks as well as the Miss Colorado Crown can also be viewed. Murals originally exhibited at the Golden Gate International Exposition in 1939 by artist Irwin Hoffman depict the history of mining and can be seen in the main gallery. Rotating exhibits are also on display. If the weather is nice, we can walk the outdoor geologic trail featuring outcrops containing fossilized dinosaur tracks, logs and leaves.

The trip is tentatively scheduled for Saturday, February 2nd. Once the trip date is finalized, you can sign up for the trip at the club's website, <https://flatironsmineralclub.org/>.

Specimen on display at the CSM Geology Museum.
Credit: CSM Geology Museum

Field Trip Ideas for 2019

Although it is cold outside with snow on the ground, the field trip committee is already planning trips for this summer. What would you like to collect this year? Where would you like to see the club visit?

If you have an idea for a field trip location, please send your ideas to Char, our field trip chair, at rkhd4252@gmail.com. Even better, if you would like to lead a field trip, just let Char know. We would like to have a variety of places to go this summer, including several new sites.

Geological Videos Online

Are you getting cabin fever because it is too cold and snowy for field trips? While you wait for warmer weather to get outdoors, enjoy these geology-related online videos.

The Nova series, *Making North America*, is a three-part series narrated by Kirk Johnson of the Smithsonian Natural History Museum that explores the geology of our continent and how it influenced the evolution of life and human development. These videos can be streamed at:

- Origins: <https://www.pbs.org/video/nova-making-north-america-origins/>
- Life: <https://www.pbs.org/video/nova-making-north-america-life/>
- Human: <https://www.pbs.org/video/nova-making-north-america-human/>

The Interactive Geology Project has produced the video, A Brief History of Colorado Through Time. This 25-minute movie illustrates the geologic evolution of Colorado through time and can be watched at <http://igp.colorado.edu/library/video/143654356>.

If Colorado mining history is an interest of yours, be sure to check out Ed Raines' Ed Talks. Ed, Collections Manager at the Colorado School of Mines Geology Museum, has presented several in-depth looks at two of the most significant Mining Districts of Colorado with talks focusing on history and geology. These are available to stream via Mountain Scholar. Here are the links for these talks:

- [History of the Creede mining district](#)
- [Geology of the Creede mining district](#)
- [History of the Gilman mining district](#)
- [Geology of the Gilman mining district](#)

February 14 Meeting Features Markus Raschke

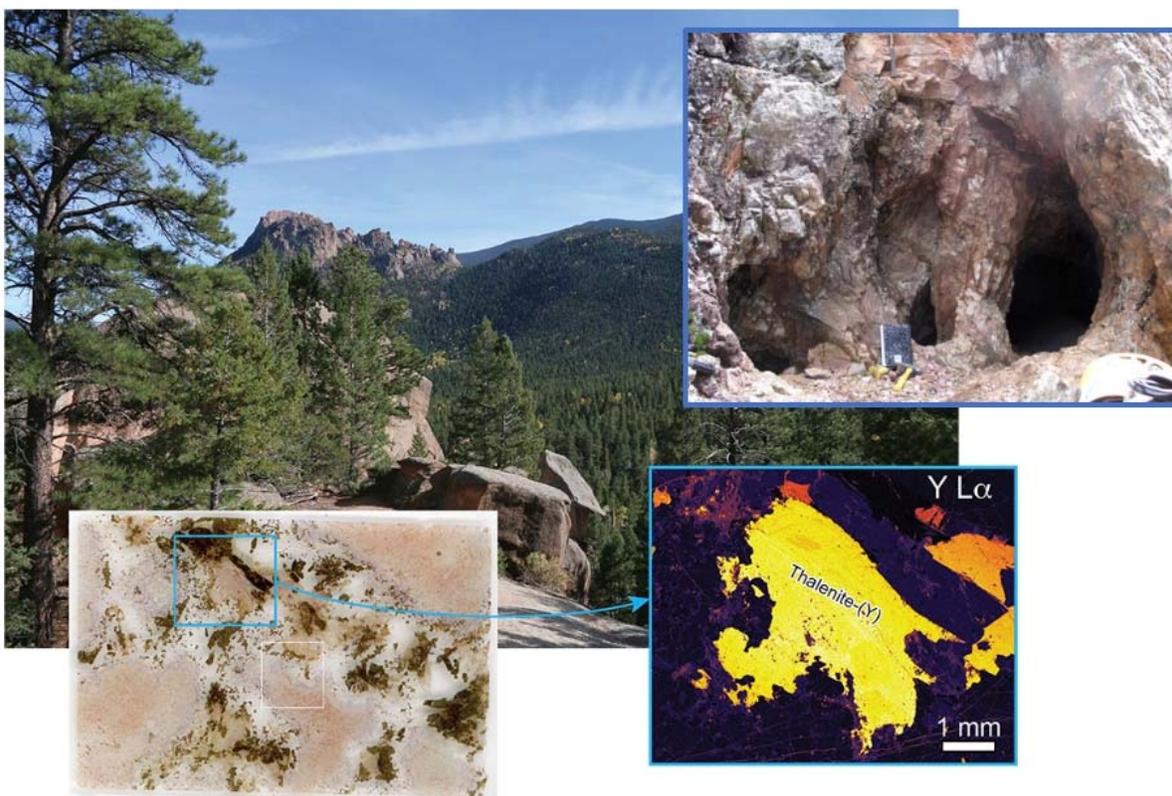


Markus Raschke of the University of Colorado will join us at our February 14th meeting to talk about **Mineralogy and Petrology of Rare Earth Pegmatites in Pikes Peak and Silver Plume Batholiths, Colorado, USA**. The rare earth elements (REE) have special magnetic, electronic, optical and quantum properties which make them essential in a variety of technological applications such as REE-magnets, lasers, lighting, or chemical catalysts. Understanding the formation of REE deposits related to igneous rocks and the role of different magmatic processes is thus highly desirable.

The Pikes Peak and Silver Plume batholiths have long been known for their large number of pegmatites, with many exhibiting locally unusual rare earth element (REE) enrichment. Although not of economic significance, these pegmatites represent globally significant examples of their kind. However, the specific origin and formation of the pegmatites and the mechanism of concentration of the REE have still remained unclear.

Markus will present a summary of recent petrographic and mineralogical studies of selected REE pegmatites and related REE-rich structures from the South Platte district and near Jamestown from a collaboration with participants from the Colorado School of Mines, the USGS, and the University of Colorado. The South Platte pegmatite district is characterized by large, well-zoned pegmatites producing many rare and some exceptionally large REE minerals. From studies of individual such minerals, e.g., the heavy-REE rich thalenite, new insight are gained into crystal chemistry of

such rare REE minerals and processes in the pegmatites which lead to their formation. From studies of entire pegmatites with mineral composition, fluid inclusions, and isotope analysis, models developed to explain whole pegmatite formation can be tested. For comparison, two most unusual REE occurrences near Jamestown of an aplite type in Silver Plume granite were studied. These occurrences have been known since the 1940's but the REE veins and globules received little scientific attention since then. These segregations are characterized by the coexistence of rare REE minerals of fluorbritholite-(Ce) and cerite, with more common bastnäsite, monazite, and allanite, as well as fluorite, quartz, uraninite, magnetite, and sulfides. Following an initial petrographic analysis, their recent isotope work suggests that the REE segregations have formed by melt immiscibility from an initially homogeneous silicate magma that intruded near the roof of the Silver Plume pluton, i.e., a process similar to the de-mixing of oil in water. Markus will discuss the scientific adventure from pegmatite (re-)discovery, field work, to data analysis, model building, and conclusions how such research is performed.



Colorado pegmatites. Credit: Markus Raschke

Markus Raschke is professor at the Department of Physics, Department of Chemistry, and JILA at the University of Colorado at Boulder. His research is on the development of novel nano-optical spectroscopy and microscopy techniques with applications to single molecules, quantum materials, and fundamental control of light matter interaction. Based on a long personal interest in field collecting minerals his research also ventured into geology and mineralogy, with projects in Washington, Colorado, and the Sichuan Mountains in Tibet/China. He received his PhD in 2000 from the Max-Planck Institute of Quantum Optics and the Technical University in Munich, Germany. Following appointments at the University of California at Berkeley, and the Max-Born-Institute in Berlin, he became faculty member at the University of Washington, followed by his appointment in Boulder in 2010. He is fellow of the Optical Society of America, the American Physical Society, and the American Association for the Advancement of Science.

Rocks & Rails - A Great Success

December's Rocks & Rails, our annual club show with the Boulder Model Train Club, was once again a great success. Club proceeds from the show were \$3,685, which supports our club's expenses for the year. The kids games and grab bag sales added \$786 to our scholarship funds, which support our annual college scholarship to a Colorado student seeking a geology-related degree.

The show would not be possible without all of you, our volunteers at the show. If you helped with the show, plan to attend the volunteers party on January 17th. Details about the party are on page 2.

Here are photos from our show.



The 2018 Rocks & Rail show. Credit: Dennis Gertenbach

Kids Area

Our kids area has games for kids, grab bags for sale, and information about our club. A special thanks to Char Bourg for organizing this.

One participant playing the mineral identification game.
Credit: Eileen Fitzgerald





Char Bourg selling gift bags and minerals. Credit: Brian Walko

Aden and Braden running the kids games at the show.
Credit: Dennis Gertenbach



Games and grab bags at the kids area. Credit: Dennis Gertenbach

Rocks R Magic Shows

New this year was the Rocks R Magic shows by the Jr. Geologists. The kids demonstrated eight rocks and minerals with “magic” properties, such as calcite double refraction, ulexite fiber optics, writing with graphite, and vermiculite “pop corn.” Our junior magicians all earned the Special Effects badge. The shows were a great success and will be back next year. Thanks to Jacque Mahan and Dennis Gertenbach for overseeing the magic shows.



Henry and dad Don Poe explaining mineral properties at the Rocks R Magic Show. Credit: Gabi Accatino



The Jr. Geologists at the Rocks R Magic show. Credit: Dennis Gertenbach



Mineral Identification

Once again, Ed Raines brought his microscope and computer to identify minerals brought in by the public. We want to thank Ed for providing this service again.

Ed Raines identifying a specimen brought in by an attendee. Credit: Brian Walko

Display Cases

Six Jr. Geologists and three adults put together display cases for our show. The public voted on their favorite display cases, and the winners were awarded ribbons to the top two junior and adult displays. For the juniors, Jack O'Day took first place, and Karina and Maxwell Minson took second place. For the adults, first place went to Dennis Gertenbach and second place to Howard Gordon. We want to thank Aubrianna Wike, Connel Casson, Karina and Maxwell Minson, Morgan Mahan, Jack O'Day, Howard Gordon, Dennis Gertenbach, and Ray Gilbert for putting together displays this year.



Aubrianna with her geode display. Credit: Dennis Gertenbach

Maxwell and Katrina display minerals in their collections. Credit: Dennis Gertenbach



Howard Gordon with his beautiful geodes. Credit: Dennis Gertenbach

Ultraviolet Light Display

Always a favorite with the public is the display of ultraviolet minerals. Gerry Naugle and Brian Walko did a great job putting together this display.

Fluorescent mineral display. Credit: Dennis Gertenbach



November's Towel Show

This year's towel show, our annual show-and-tell, brought many great displays of specimens people collected over the year and lapidary and jewelry projects completed this past year. Everyone had a great time looking at what people displayed and voting for their favorites. Here are the winners in each category:

| Category | Junior, First Place | Junior, Second Place | Adult, First Place | Adult, Second Place |
|---------------------|----------------------------|----------------------|--------------------|---------------------|
| Personal Field Trip | Maxwell Minson | Aden Bicknell | Kevin Notheis | Herman Oehl |
| Club Field Trip | Aden Bicknell | Cole Duma | Mary Maxwell | Kevin Notheis |
| Lapidary/Jewelry | Noah Read | Maxwell Minson | Nadia Maxwell | Craig Hazelton |
| Best Mineral | Karina Minson | Owen Duma | Kevin Notheis | Damn Hauschultz |
| Best Fossil | Aubrianna Wike | Noah Read | Gabi Accatino | Dennis Gertenbach |
| Best Ugly Rock | Mason and Noah Hoffmeister | Maxwell Minson | Charlotte Bourg | Trick Runions |
| Best Towel | Aubrianna Wike | Karina Minson | Eileen Fitzpatrick | Karen Simmons |

And, here are photos from this year's towel show.



Some of the displays at the Towel Show.
Credit: Dennis Gertenbach



Nadia Maxwell showing one of her specimens.
Credit: Brian Walko



Two of the juniors with their displays. Credit: Brian Walko



Gabi Accatino's great fish collected on the club's trip to Kemmerer, Wyoming. Credit: Brian Walko



Voting for their favorites. Credit: Dennis Gertenbach

Annual Holiday Party

With the Rocks & Rails show over, it is time to relax at the club's annual holiday party. The gift exchange is great fun, and with all of the trading, you never know what gift you will end up taking home. Plus, the holiday goodies were a treat.

Here are some photos from the evening.



Seiji with his gift of agates and concretions. Credit: Dennis Gertenbach

A beautiful polished agate, one of the gifts at the party. Credit: Dennis Gertenbach





Karen Simmons brought home a mineral jigsaw puzzle from the holiday party.
Credit: Dennis Gertenbach

Jr. Geologists Activities



November's Jr. Geologists meeting kicked off a three-month program on fossils, where the kids will earn their Fossil badge. We learned about the geologic timescale and what plants and animals lived in ancient times. Learned about how an animal or plant becomes a fossil.

At our January 16th meeting, we will learn how to identify different fossils. The final meeting on February 20th is dinosaur night, featuring "Name That Dinosaur" and making your own dinosaur model to take home.

The Jr. Geologists program is open to all Flatirons Mineral Club families. Each month we learn about different aspects of geology, minerals, and fossils, plus earn badges for different earth science activities. Meetings are at the Meadows Branch Library at 4800 Baseline Rd, Boulder, CO 80303 (behind the Kaiser Permanente medical offices). For information about the Jr. Geologists program, please contact Dennis at gertenbach1@gmail.com or 303-709-8218.



Craig Hazelton talking with the juniors about how fossils formed. Credit: Susanne Peach



Juniors drawing fossils. Credit: Susanne Peach

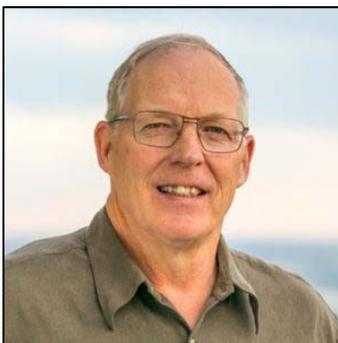


Karen Simmons showing the juniors different types of fossils. Credit: Susanne Peach



Connel deciding what animals and plants were found during earth's history. Credit: Susanne Peach

Simple Mineral Cleaning Techniques



The following techniques are from Joe Dorris' blog page at <https://pinnacle5minerals.com/simple-mineral-cleaning-techniques/>.

This page contains a few cleaning tips for typical Pikes Peak batholith minerals that are likely to be found on our mining claims.

NOTE: I recommend hiring someone for professional cleaning and mineral preparation in the case you find some very special mineral specimens. We do professional cleaning and preparation at a reasonable rate. Unfortunately, any professional cleaning may

take a very long time due to the processes that are necessary. You may be aware that we spend well over a year on cleaning and preparing some of our pockets. We DO NOT do any cleaning during the mining season (roughly end of May through first part of August). There is no time and we cannot safely monitor the processes. There are many techniques for cleaning different types of minerals and for the conditions the minerals are found in. Many mineral clubs have presentations on mineral cleaning and have members who are knowledgeable. Also talk to other field collectors about the techniques they use. We use a combination of techniques and specialized equipment for our cleaning lab; however, there are some easy and inexpensive techniques you can use.

The tips I give are for microcline (amazonite) feldspar, albite (cleavelandite) feldspar, quartz, goethite, and fluorite. Where applicable, I will discuss special techniques for each species.

Initial Cleaning

Carefully wash all specimens. Try soaking them in a detergent solution such as a bubble bath solution or dish detergent solution. Soak for a day or more when possible. Use a soft (very soft) tooth brush and remove all clay and soil that is possible. When washing goethite blades or delicate crystals of any sort, you may want to just swish in the detergent solution and avoid the brush. Rinse and soak longer if necessary. A lot of clay and oxides can be removed with careful washing. Most people do not do a thorough washing. Rinse and lay out on paper towels to dry.

Using Super Iron Out

This is a commercial cleaning product that contains sodium hydrosulfite and sodium bisulfite. It is a skin and eye irritant and the vapor is harmful. DO NOT HEAT Iron Out. Read the caution label before using and follow all use and directions on the label. I CANNOT assume any liability or responsibility for your misuse. Always use long, chemical resistant gloves and eye protection. Always have good ventilation.

The action of this product on most minerals is gentle and causes little or no damage to the silicates normally found in the Pikes Peak batholith. In general, the Iron Out chemicals bind with the iron oxides and draw them off the minerals. It does little good on anything else, but most of the cleaning you will need to do is for the iron oxides. The one drawback to using Iron Out is that it usually takes a long time.

Fill a tub (that has a tight-fitting lid) with room-temperature water (the same temperature as your minerals). Carefully place your specimens into the tub, ensuring they are not in contact with each other (avoid damaging tips, etc.). Add about two tablespoons of Iron Out crystals (it comes in a white, dry crystalline powder) per gallon of water. You can mix it if you would like, but it is not necessary. It will diffuse into the water. Quickly place the lid on and place the tub in a safe place.

The Iron Out will smell like rotten eggs, and you may have some dust and vapors coming from the solution while mixing. I try to avoid breathing vapors and mix my solutions out of doors or with a fan going. After the lid is on, there is no problem.

Allow your specimens to soak in the solution for 2 to 3 days.

Now, here's the closely guarded secret. Iron Out is consumed rather quickly and needs to be recharged. Go ahead, after 2 to 3 days, and add more Iron Out, about the same amount as you used initially. Note the condition of your crystals at the same time. You can (using rubber gloves) examine one or two to see how they are progressing, but the specimens will rarely be done after one session. It will take several sessions. After adding more Iron Out, slide the tub back out of the way. Wait another 2 – 3 days.

You can recharge the Iron Out three to four times before changing out the water. Some specimens may be done after the first session. For those not done, change out the water and recharge with Iron Out as you did for the first session. It is important to rinse your specimens in same temperature water. I use a solution of water with baking soda to get rid of

the sulfur smell. Between sessions, I also use the tooth brush to get off the residues. This allows the Iron Out to have more access to the remaining oxides on the specimens.

For those complete specimens, go ahead and remove them. Rinse in baking soda solution, rinse in water, and allow to dry.

Depending on the amount of iron oxides on your specimens, you may need three to four Iron Out sessions. Now if you've been counting days, that's up to a month and a half.

Occasionally you will notice a black-green residue on the minerals you are cleaning. This is the iron oxide that has combined with the Iron Out. Generally, you can remove most of this with the tooth brush and a fresh solution of Iron Out. If not, where applicable, use a wire brush (avoid using wire brush on fluorite and goethite.) The black-green residue might need to be removed with a separate cleaning step using an acid.

When you need to dispose of the Iron Out solution, flushing it with water on open ground should be sufficient. It is a household cleaner. A small occasional amount should not be a problem.

Using Citric Acid

To remove the Iron Out black-green residue, try mixing a tablespoon of citric acid crystals with a quart of water. At room temperature, soak the specimens for a day or two in a covered crock pot. Do not heat. Neutralize in baking soda for an equal amount of time. This normally takes care of the black-green, but not always.

Both citric acid and vinegar will also remove the metallic brush marks.

A citric acid solution can be used for several Iron Out sessions. A small amount of citric acid can be disposed of as any household waste.

Silicate Residues

After cleaning in Iron Out, most specimens will show powdery silicate deposits on all the crystals. You can remove most of these mechanically.

The best method for a few specimens is a wire brush and elbow grease. Again, this can be problematic with goethite, fluorite, and some other sensitive minerals. Experiment with different types of brushes.

The wire brush marks can be removed in the same manner as the black-green Iron Out residues.

Better Yet...

If you have problems with Iron Out residues and silicate deposits, we can do these final cleaning steps for you at a very reasonable price. We also do repairs and can trim your pieces.

Good luck on your cleaning.

Club Lapidary Equipment Available

Now that you have collected petrified wood, agate, and other materials over the summer, you are probably anxious to cut and polish some of this material. The club has 2 locations where the club's lapidary equipment can be used by our members.

One of our big saws and a Genie are at Tim Ruske's house in Superior. To use this equipment, please call Tim at 303-807-4234 and leave a message to arrange a time.

Another saw is at Terry O'Donnell's house. His email address is whee0297@msn.com.

Member Nametags

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

Please log onto our website and choose the “Request a Nametag” 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. The cost is \$5 when you receive it.



Example of a club name tag



Get Your Very Own Flatirons Mineral Club Baseball Cap

The club now has baseball caps in a variety of colors for sale, sporting the new Flatirons Mineral Club logo. Buy them at any meeting. The member price is \$10 each, while the non-member price is \$15.

Fossils in the News

Dennis Gertenbach

Were Sponges the World's Oldest Animals?

Fossilized animals first appeared in abundance 541 million years ago, a time known as the Cambrian Explosion. But paleontologists continue to find clues of animal life before that time. A study, led by Gordon Love of the University of California Riverside Department of Earth Sciences, has found evidence of animals living on the ancient ocean floors 100 million years before the Cambrian Explosion. The evidence is not from fossils, but from molecular signs of animal life, called biomarkers, as far back as 660-635 million years ago. By examining rocks and oils from Oman, Siberia, and India, they found a steroid compound produced only by certain species of modern sponges called demosponges. Their findings demonstrate that these multicellular animals were thriving in ancient seas at least as far back as 635 million years ago.

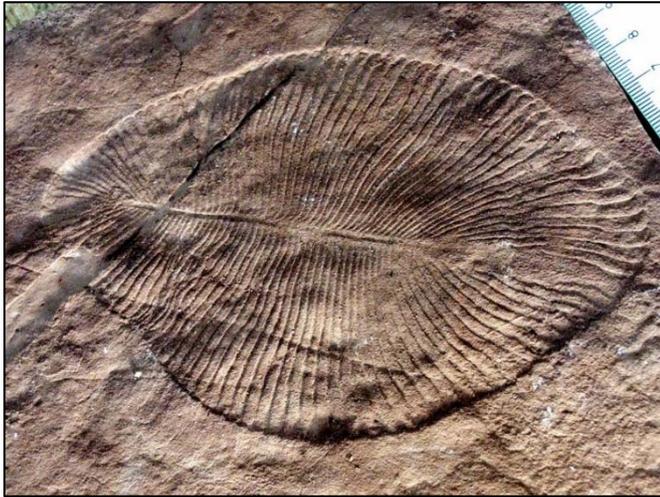


A modern demosponge species *Rhabdastrella globostellata*. Credit: Paco Cárdenas

Information from <https://news.ucr.edu/articles/2018/10/15/oldest-evidence-animals-found-ucr-researchers>

Or, Was the Oldest Animal a Blob-Like Sea Creature?

The 558-million-year-old fossil, *Dickinsonia*, has long puzzled paleontologists since their discovery in 1946. These mysterious blob-like organisms measured nearly four feet long and had rib-like segments on its surface. Because it was a soft-body creature, only their imprints are preserved in the rocks. Was it a fungus, plant, animal, or single-cell



Dickinsonia costata from Australia. Credit: Verisimilus, Wikimedia Commons

protozoa? Another study by Australian National University's Ilya Bobrovskiy extracted molecules known as sterane hydrocarbons from the fossils and the surrounding sediments. Cholesterol levels of up to 93 percent were found in the steranes in the fossil, compared to only 11 percent in surrounding sediment. These results suggest that, indeed, *Dickinsonia* was an animal. So, the jury is still out on which were the first animals.

Information from <https://www.smithsonianmag.com/smart-news/worlds-earliest-known-animal-may-have-been-blob-undersea-creature-180970379/#OxujwAW1J7ybBUZi.99>

Did a Supernova Kill Off Large Ocean Animals at the Start of the Pleistocene?

Approximately 2.6 million years ago at the boundary between the Pliocene and Pleistocene, 36% of the larger

marine animals become extinct. Included in the extinction was megalodon, the largest shark that ever lived measuring the size of a school bus. This extinction was concentrated along the coastal waters.

The cause of this extinction has long puzzled scientists. However, a new paper provides an explanation. Sediments from this time show elevated concentrations of iron-60. Because of the relative short life of this iron isotope, it could only have come from outer space, the product of a large supernova. This supernova would have also showed the earth with large doses of radiation from muons, high energy sub-atomic particles. Larger animals would have received much larger radiation doses, leading to a high rate of cancers and mutations. Deeper waters would have captures many of these muons, greatly reducing damage to animals. Researchers postulate that the supernova may be responsible for this mass extinction of marine animals that lived in shallow waters.

Information from <https://today.ku.edu/2018/12/05/researchers-consider-whether-supernovae-killed-large-ocean-animals-dawn-pleistocene>



Artistic impression of a megalodon pursuing two *Eobalaenoptera* whales. Credit: Karen Carr, Wikimedia Commons.

Rare Fossil Bird Deepens Mystery of Avian Extinctions

All birds evolved from feathered theropods – the two-legged dinosaurs like T. rex – beginning about 150 million years ago, and developed into many lineages in the Cretaceous, between 146 and 65 million years ago. Hundreds of different bird species lived with the dinosaurs during the late Cretaceous Period. But after the asteroid strike that wiped out the dinosaurs, only one group of birds remained. The question why is another mystery that scientists continue to try and answer. The most recent theory is that the enantiornithines were primarily forest dwellers, so that when forests went up in smoke after the asteroid strike at the end of the Cretaceous, the enantiornithines disappeared along with the dinosaurs.



Reconstruction of a *Mirarce eatoni* perched on the horns of the ceratopsian dinosaur. Credit: Brian Engh

Rather than shedding light on this question, a newly described fossil from one of those extinct bird groups only deepens that mystery. The 75-million-year-old fossil of *Mirarce eatoni*, a bird about the size of a turkey vulture, is the most complete skeleton discovered in North America of what are called enantiornithines. Discovered in the Grand Staircase-Escalante area of Utah in 1992, the fossil sat on the shelf until examined by doctoral student Jessie Atterholt of the University of California, Berkeley, paleontologist Howard Hutchison, the fossil lay relatively untouched in University of California Museum of Paleontology at Berkeley. Her recently published study of the bone structure of this fossil showed that enantiornithines in the late Cretaceous were the aerodynamic equals of the ancestors of today's birds, able to fly strongly and agilely. Thus, a different explanation is still needed to explain why they went extinct at the end of the Cretaceous.

Information from <https://news.berkeley.edu/2018/11/13/rare-fossil-bird-deepens-mystery-of-avian-extinctions/>

Other Rockhounding Events and Activities in the Area

Here is a list of rockhounding-related activities in the area for both adults and juniors that you might be interested in. Thanks to Pete Modreski of the USGS for providing many of these notices.

- Tuesday, January 8, **Dr. Tom Casadevall** of the U.S Geological Survey will present a program on **Preserving and Promoting America's Geoheritage** at the Windy Saddle Café, 1110 Washington Avenue, Golden. This is one of a series of "Golden's grassroots version of TED talks, Expand your mind with a beer in your hand." see <http://goldenbeertalks.org/> for details.
- **Thursday, January 10**, 7:30 p.m., Friends of Mineralogy, Colorado Chapter, bimonthly meeting, **Exploring Mines and Mineral Collecting in the Magdalena Mining District of New Mexico in the 1970's**, by Bob Hembree. At the Lakeview Event Center, 7864 W. Jewell Ave. Lakewood CO. All are welcome! See <https://friendsofmineralogycolorado.org/>.
- **Thursday, January 10**, 7:00 p.m., the **Friends of the CSM Geology Museum's** monthly "First Thursday" lecture series (this month on the SECOND Thursday) on the Mines campus in GRL 201 (the large conference room across the hall from the Geology Museum), 1310 Maple Street, Golden, Colorado 80401. **Dr. Phil Nelson**, lecturer for Citizen's Climate Lobby will talk on **Climate Change – The Challenge for Geologists**. Socializing begins at 6:30 p.m. and the talk will start at 7:00 p.m. Admission is free and all are welcome. For more information, please contact Mike Smith (m_l_smith@earthlink.net) or Amber Brenzikofer (amberbrenzikofer@gmail.com).
- **Thursday, January 17**, 7:00 p.m., Colorado Scientific Society monthly meeting, two presentations on **Kilauea's 2018 eruption - new methods and perspectives for monitoring volcanic eruptions**. Don Becker, USGS, is a videographer who was sent to Kilauea to film and document the 2018 eruption and earthquakes; and Jeff Sloan works in the USGS UAS (Unmanned Aircraft Systems; i.e., "drones") program and will show how they were used at Kilauea. We may expect to see a lot of great video "footage" of the eruption. Shepherd of the Hills Church,

11500 W. 20th Ave., Lakewood; social time with refreshments begins at 6:30 p.m. Anyone is welcome to attend. See <http://coloscisoc.org/>.

- **Thursday, January 24**, 4:00 to 5:00 pm, Van Tuyl Lecture at the Colorado School of Mines. the **U.S. Geological Survey** is presenting on **Unconventional Rocks** recovered from the Moon during NASA's Apollo Program. After the presentation, audience members are invited to view the Moon rocks on short-term loan from NASA. Berthoud Hall, 1516 Illinois Street, Golden. <https://geology.mines.edu/events-calendar/lectures/>
- **Thursday, February 21**, 7:00 pm, Colorado Scientific Society monthly meeting with two presentations. **Ken Balleweg**, Consulting Geologist, will talk about **The Beulah marble: Ornamental stones of Colorado** and **Don McGurk**, Rocky Mountain Map Society will present a program on **Geographies Unrealized, The Story of Four Cartographic Myths of North America**. <http://coloscisoc.org/>
- **Saturday and Sunday, March 23-24** is the **11th Founders Symposium of Western Interior Paleontological Society (WIPS)**. This year's symposium is on **Lagerstätten**, sites with exceptional fossil preservation, and will feature two days of talks by paleontologists, educational exhibits, displays of fossils, paleo art show and sale with over a dozen artists, and the WIPS bookstore. The symposium will be at the Lowry Conference Center, 1061 Akron Way, Denver. Reservations can be made at http://www.westernpaleo.org/symposiums/2019_pages/about-2019.php.

Lagerstätten ✱
Exceptional preservation. Extraordinary fossils.
✱ Unique sites with remarkable fossil preservation
March 23-24, 2019
11th FOUNDERS SYMPOSIUM
• Talks • Fossil displays • Poster session
• Exhibits • Paleo art show & sale

Speakers

| | | |
|-------------------------|-------------------------------|----------------------------|
| William Ausich | Derek Briggs (Keynote) | Herb Meyer |
| Brent Breithaupt | Frank Krell | Roy Plotnick |
| John Foster | Martin Lockley | James Schiffbauer |
| Lance Grande | John Maisey | Blaine Schubert |
| James Hagadorn | Jim Mead | Hans-Peter Schultze |

Presented by the Western Interior Paleontological Society
Lowry Conference Center, 1061 Akron Way, Denver
symposium@westernpaleo.org
westernpaleo.org
Find us on Facebook

New venue with lots of free parking!

Denver Gem & Mineral Show Mini Report December 2018

Planning for the 2019 show is already underway! The years just seem to keep rolling along. With many thanks to Lesley Sebol for her three years as Show Chair, the reins of the chairmanship have been turned over to George Daggett. George is excited about continuing the legacy of the show as the best show in the country bar none. The dates for the 2019 show are September 13 - 15, 2019. The theme is "Minerals of Canada". The venue is again the Denver Mart, 451 E. 58th Avenue, Exit 215 on I-25. George welcomes communication of ideas for the show with club members and can be reached at 303-453-9651 or geoddaggett@hotmail.com. George is a member of the Denver Gem & Mineral Guild.

The Show Committee is the group of dedicated club members who plan and operate the show. The committee meets the first Tuesday of each month except December, February and July at 7:30 p.m. at the Colorado School of Mines Geology Museum conference room. There is always a need for new faces on the Show Committee. George Daggett was the Grab Bag, Pins, Poster Sales Chair prior to accepting the Show Chair position so there is a need for a new Grab Bag, Pins, Poster Sales Chair. This is not a terribly difficult job and already enjoys the services of Mike Morian, a very capable assistant. Another position that needs to be filled is the Public Sector person under the Dealer Chair Regina Aumente. The Public Sector person arranges the presence at the show of groups such as the USGS, Colorado Geological Survey, Dinosaur Ridge, along with others. There are many other areas where willing volunteers could help with the show. None of the jobs are difficult and all have assistance available from seasoned committee members. It takes many volunteers to have a successful show each year. Each club has a representative to the Show Committee as follows: CMS - Amber Brenzikofer, Flatirons - Gerry Naugle, FM - Larry Havens, Guild - Kathy Honda, Littleton - Lynette Warren, North Jeffco - Ron Knoshaug, RAMS - Judy Knoshaug, and WIPS - Nancy Kimber. If you are interested, contact your club representative and let him or her know you are interested in helping with the show.

So if you love the show, and how could you not, consider widening your experiences in the mineral and fossil hobby by joining the Show Committee. You will meet new people and be exposed to many facets of the hobby you did not expect. The Denver Show is the most exciting and rewarding annual event for the mineral and fossil hobby in the Denver area.

Respectfully submitted, Judy Knoshaug, Show Secretary

Greater Denver Area Gem and Mineral Council



The Greater Denver Area Gem and Mineral Council, Inc., host of the Denver Gem & Mineral Show™, is a non-profit 501(c)(3) corporation organized exclusively for charitable, educational, and scientific purposes. Trustees from each of our eight member clubs sit on the Council Board. The Council oversees the annual show, and twice each year, the Council distributes proceeds from the show in the form of grants to not-for-profit organizations, particularly those based in Colorado, to promote activities that educate the public in the earth sciences.

The Council was formed to support:

- The exhibition, exploration, experimentation, and education in the earth sciences;
- The discovery, development and preservation of minerals and mineral deposits;
- The advancement, encouragement and utilization of the principal of art and craftsmanship as applied to gems and minerals;
- Conducting an annual, family orientated Gem and Mineral Show / Exhibition;
- The disbursement of grants and gifts in the form of money for the advancement of the arts and sciences within the field of interest of the Council. Annual giving ranges from \$20,000 to \$30,000.

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A friendly reminder to pay your 2019 annual dues

Dues are still only \$18 per individual and their immediate family. You can pay in two ways:

PAY Gerry Naugle, Treasurer and Membership Chair, at any FMC monthly meeting. Gerry is at or near the sign-in table when you enter the room for the monthly meetings.

SEND a check made to "Flatirons Mineral Club" or "FMC" to P.O. Box 3331, Boulder, CO, 80307. Please do not send cash in the mail.



Your 2019 dues must be received by January 20th, 2019 in order to stay current with the member benefits, which include electronic club newsletters containing the information about club activities, club field trips, annual show opportunities, silent auction opportunities, the annual club summer picnic, and access to the club website. Your receipt is your new annual 2019 FMC membership card.



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

First Class Mail

Upcoming Events

| Date | Event | Location |
|------------------------|--|---|
| Thursday, January 10 | Club Meeting featuring "Geologic History of the Indus River and the Future of Its Water" by Bob Reynolds. See page 1. | Frasier Meadows, 350 Ponca Place in Boulder, 7:00 pm. |
| Wednesday, January 16 | Jr. Geologists Meeting featuring fossils. See page 13. | Meadows Branch Library, 4800 Baseline Road in Boulder, 6:30 pm. |
| Thursday, January 17 | Club Show Volunteer Party. See page 2. | Clover Building, Boulder County Fairgrounds, 9595 Nelson Road in Longmont, 7:00 pm. |
| Saturday, February 2 | Field Trip to the CSM Geology Museum. See page 3. | Colorado School of Mines in Golden, 10:00 am. |
| Thursday, February 14 | Club Meeting, Markus Raschke speaking on "Mineralogy and Petrology of Rare Earth Pegmatites in Pikes Peak and Silver Plume Batholiths, Colorado, USA." See page 4. | Frasier Meadows, 7:00 pm. |
| Wednesday, February 20 | Jr. Geologists Meeting, dinosaur night. | Meadows Branch Library, 6:30 pm. |