



Flatirons Facets

Flatirons Mineral Club of Boulder County, Colorado
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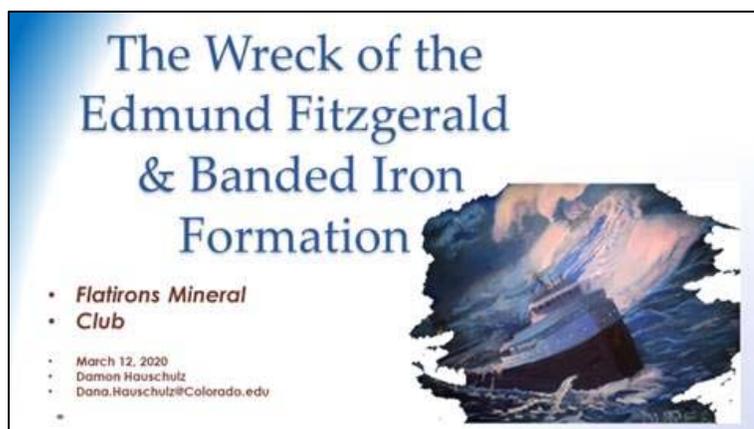
The Wreck of the Edmund Fitzgerald & Banded Iron - Damon Hauschulz

At our **March 12** meeting, Damon Hauschulz will join us again, this time talking about “The Wreck of the Edmund Fitzgerald & Banded Iron Formation”. The Edmund Fitzgerald sank in 1975 carrying a load of iron ore made from a deposit of Banded Iron Formation (BIF) mined near Lake Superior. The talk diverges from the tragic sinking of an ore freighter to follow the geologic origins of BIF only to find that an even greater tragedy resides buried in the rock record from over 2 billion years ago. Banded Iron Formation is found all around the world and is connected to the irreversible rise of oxygen in the atmosphere known as The Great Oxidation Event (GOE). The rise of oxygen leads to an ice house Snowball Earth climate disaster. However, single cell, carbon-based life does survive, paving the way for the evolution of multicellular life such as may be found listening to this story of double tragedy and genetic survival.



In this newsletter

- Field Trip Committee members and coordinator needed, page 3
- North Table Mountain field trip, page 3
- Jr. Geologists activities, page 4
- Field trip to the Mines Museum, page 4
- Two Northern Front Range Meteorite Falls: 80 Years and 10 Miles Apart, page 6
- Patricia Emerald, page 8
- Fossils in the News, page 11
- Rocky Mountain Federation Convention, page 13
- Other rockhounding events and activities, page 14
- Denver Gem and Mineral Show report, page 16



Club meetings begin at 7:00 pm at the Frasier Meadows Assembly Room, 350 Ponca Place, Boulder, CO 80303. When you enter the building, ask the receptionist for directions to the meeting room.

Silent Auction - Wednesday, April 8

Our annual silent action will take place during our April meeting at the **Left Hand Grange in Niwot** (195 2nd Avenue, Niwot, 80544). It's a fun event and is a great chance to buy and sell rock and mineral specimens, as well as equipment and other related items. The selection at this year's auction will be outstanding, featuring beautiful material from three collections recently donated to the club.

(continued on page 2)



President's Message

As the Flatirons Mineral Club enters its 63rd year, I'm proud to serve as your new president. Many thanks to Gabi Accatino for her years of FMC leadership. During the recent Tucson Gem and Mineral Show, we met at a Spanish Mission south of Tucson. Between eating Indian tacos and watching roadrunners scoot by, we discussed our transition. Starting in my role as president is not just a handoff. FMC members are known for helping each other. I'll be working closely with the Board of Directors, committee leaders, and you to continue to improve our club.

Brian Walko

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.



Silent Auction (continued from page 1)

The auction starts at 7:00 pm on Wednesday, April 8. Bring items to sell or just come to browse for treasures to add to your collection!

Sellers, email Eileen at elfitz891@hotmail.com to get your seller number ahead of time and then use the bidding slips that are available at our website (www.flatironsmineralclub.org) and attached at the end of this newsletter. Fill in the slips at home and then print them on your home printer. Set-up starts at 6:00 pm.

There is also a flyer that advertises the auction at the end of this newsletter. **Please help the club by printing out a few copies and posting them around your workplace or neighborhood.**



Just a small sample of the many items that will be at the Silent Auction

Field Trip Season is Approaching

Now that the weather is beginning to warm up, field trip season is just around the corner. We are looking for ideas of where the club can go on field trips 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 thoughts to Gabi at accatino@colorado.edu. Even better, if you would like to lead a field trip, just let Gabi know. We want a variety of places to go this summer, including several new sites.

Field Trip Coordinator and Committee Members Needed

The Field Trip Committee under the direction of the Coordinator to schedule field trips for club members during the warm weather months. This committee also works with other club members to identify new locations for trips and trip leaders to lead them. The Field Trip Coordinator is also the 2nd Vice President and a club Board member.

Please consider volunteering for the committee or as the coordinator. Gabi has agreed to help the field trip coordinator with this job. Plus, other Board members are more than willing to assist you. To learn more about the requirements, please contact Gabi at accatino@colorado.edu or Brian at earthextractions@gmail.com.

First Field Trip of the Season to North Table Mountain on April 18



A nice cluster of analcime crystals, surrounded by thompsonite crystals

North Table Mountain is a World-renown site for collecting zeolites. Dennis Gertenbach is leading this trip to collect thomsonite, analcime, chabazite, mesolite, and calcite, which are relatively common. Fluorapophyllite, levyne, garronite, and cowlesite occur less frequently, but are found each year. The article at http://www.minsocam.org/ammin/AM10/AM10_118.pdf describes some of the minerals found at the site. The site is a Jefferson County Open Space Park. The club has a special-use permit to collect minerals for this trip. **Our permit this year only allows 14 people to come, so sign up quickly on the club's website, <https://flatironsmineralclub.org/>.**

Write an Article for the Club Newsletter

One of the best features in each club newsletter are articles and other contributions by club members. Club members have a wide range of interest in earth science and rockhounding and are willing to share their interest with other members through articles, photos, poetry, and artwork. Be sure to read two articles written by club members on pages 6 and 8.

We are looking for items from all age groups, including adults and Jr. Geologists. Please consider sending a contribution to the newsletter to Dennis at gertenbach1@gmail.com. If you need help with your contribution, please contact Dennis. We have special specimens for all contributors.

Jr. Geologists Meetings

In January, the Jr. Geologists learned the wiggle-wrap technique for wire wrapping rocks, minerals, and fossils from Craig Hazelton. Their finished pendants looked fabulous. If you would like to learn this easy technique, see Craig's video at <https://www.youtube.com/watch?v=pqOzlsFyXvl>.

We learned about the geology on Mars at February's meeting from our special guest, Bill Farrand. It was surprising to see how much the images of rocks on Mars look so similar to those on earth. The juniors also selected several unknown minerals to identify. These same minerals are found on Mars.

Over the past few months, we have been polishing rocks in a rock tumbler, starting one step each month.



Craig Hazelton shows the Jr. Geologists his video on the wiggle-wrap technique



Craig helping one of the juniors with his wire-wrapping project

February was the last step where we added the polish to put a shine on the rocks. The kids are excited to see the final rocks and will select rocks to take home.

On March 18, we will learn more about gems, those beautiful stones that everyone admires. Several of the requirements for the Gemstone Lore and Legends badge. Gordon Howard will be joining us at our April 15 meeting, teaching us about geodes.



The Jr. Geologists program is open to all Flatirons Mineral Club families. 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.

Field Trip to the Mines Museum

On February 22, 28 club members were treated to a special tour of the Mines Museum of Earth Science. Located on the Colorado School of Mines campus, the Museum contains extensive displays of minerals, mining artifacts, meteorites, fossils, and gemstones, as well as a walk-through mine. Emily, our tour guide and student at the school talked about the rocks, minerals, and fossils in the collection, pointing out some of the rarer and more interesting



Emily, our student guide, talking about the critical minerals needed for our high-tech industries

specimens. Highlights included the gold collection, minerals and mining artifacts from Colorado's early mining days, Miss Colorado's crown, and minerals from around the world. Downstairs, Emily talked about the moon rocks, meteorites in the collection, and the display of critical minerals that are needed for our high-tech world. Afterwards, members could wander around the museum to look at the specimens and exhibits in more detail. Photos by Dennis Gertenbach



Club members examining some of the minerals on display



Terry O'Donnell and Carol Oakes discuss some of the meteorites on display

Looking at the beautiful amazonite and smoky quartz specimen on display at the Mines Museum



Two Northern Front Range Meteorite Falls: 80 Years and 10 Miles Apart

Gerry Naugle

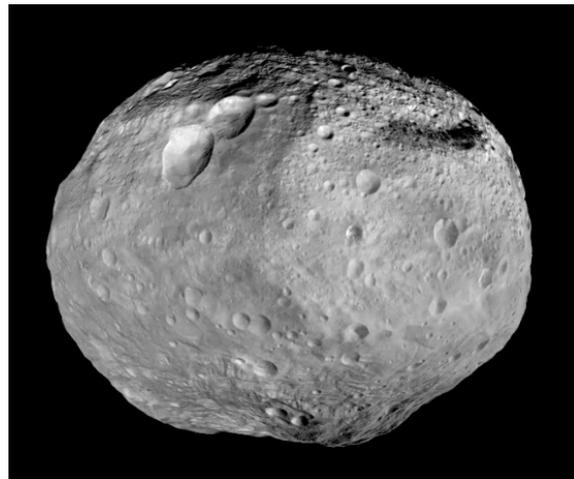
Johnstown, Colorado, July 6, 1924 at approximately 4:35 pm

A baseball game was in progress and a funeral procession was just underway that afternoon. Without warning, a large bolide (meteor) fell thunderously out of the sky. An air explosion shattered the bolide and was heard for miles around. Many pieces of the bolide rained down on the area, with the largest weighing 23.5 kg (51.7 lb). This event is one of only 11 witnessed air-explosion meteorite falls and is the most massive of these falls.

The bolide exploded at an estimated height of 20,000 feet at a calculated energy level of approximately two kilotons (2,000 tons) of TNT energy equivalent, based on observed glass-breakage damage patterns found in local ground structures. These damage patterns were mapped out by Denver Museum volunteers and researchers. The total mass of the bolide was estimated at 50.3 kg (111 lb), with 27 major stones and approximately 200 smaller stones found to date. The Museum has logged the stones found at the site, adding any new stones found in that area.

Geologists classify the meteorites recovered from the Johnstown explosion as diogenite, which is one of the three types of HED

(howardite-eucrite-diogenite) meteorites. Diogenites are stony meteorites composed of igneous rocks that cooled slowly, forming larger crystals. The term 'diogenite' refers to Diogenes of Apollonia, an ancient Greek philosopher who was the first to suggest an outer space origin for meteorites. The largest piece of Johnstown diogenite is the most massive of 300 plus recovered diogenites worldwide, and is the fifth most massive HED meteorite ever recovered.



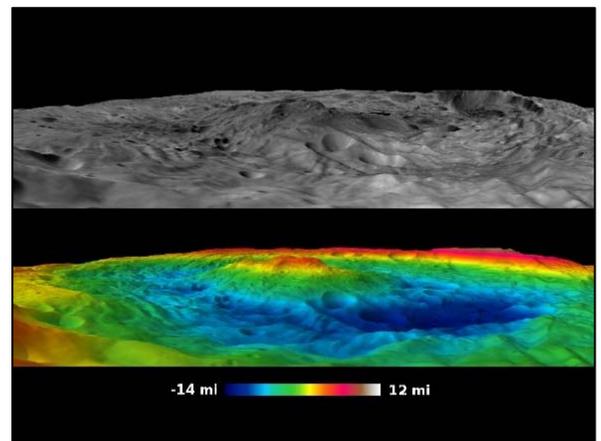
Side view of Rheasilvia Crater on Vesta. Rheasilvia Crater, 330 miles in diameter, is shown in the bottom area (designated south pole) of Vesta. Credit: NASA/JPL DAWN Spacecraft

Rb-Sr isotope age of about 4.4 billion years, and cosmic exposure age of about 20 million years are certainly consistent with this scenario. NASA's DAWN Spacecraft has further narrowed the source of this HED family of bolides to the Rheasilvia Crater on Vesta, due to nearly perfect matching of the spectroscopic survey fingerprint of that area on the asteroid and the spectral analysis of



A 136-gram diogenite fragment from the Johnstown fall and a 25-cent piece for comparison. Note the black glassy fusion crust. Credit: Colorado Meteorite Society/Mitterling Meteorites

As an HED meteorite, the original parent body of the Johnstown bolide is the asteroid Vesta. Vesta is the brightest and closest of the larger asteroids in orbit between Mars and Jupiter. Their brecciated (broken) texture,



Topographic image of the Rheasilvia Crater on Vesta. Credit: NASA/JPL DAWN Spacecraft

the HED material that has landed on the Earth. (Note: Rhea Silvia was the mother of Remus and Romulus in Roman mythology. Remus and Romulus founded the city of Rome.)

Diogenites — like other HED meteorites — were ejected from Vesta by an impact collision. As such, they are structurally weakened due to brecciation on an asteroid and after the impact. Because they are weak structurally, frequently only a few small, scattered stones survive the fireworks and noisy entrance of these meteors into the earth's atmosphere. They nearly always break up violently [explode] into very small pieces, due to intense deceleration as they come through our atmosphere. The Johnstown fall represented a pleasant exception to this trend, with some large fragments quickly recovered within hours and days.

Berthoud, Colorado, October 5, 2004 at 1:30 pm

Some 80 years later and 10 miles west of the Johnstown air explosion, a meteorite fall was witnessed over Berthoud. John, Megan, and Casper Whiteis had just walked out of their house when they were distracted by a whistling noise and a thump. Megan observed some dust kicked up in a horse pen about 100 feet away. A meteorite had embedded itself a few inches below the surface in a shallow crater, after traveling at an estimated 180 mph before impact.



An approximately 1-inch piece of Berthoud eucrite. Note the black glassy fusion-crust. Credit: Colorado Meteorite Society/Chris L Peterson

A single stone, 120 mm (30 inches) across and weighing 960 g (2.1 lb), was recovered while still very hot. Fresh, glossy, black fusion crust covered the stone except for a small broken corner. The interior is medium gray in color. Other fragments have been found in area. This meteorite is classified as an eucrite, another HED-type meteorite from the Vesta asteroid.



John Whiteis showing the small crater that the bolide made. Credit: Colorado Meteorite Society/Chris L Peterson

Two Meteorite Falls 10 Miles Apart from the Same Asteroid

Based on their composition, the material from both meteorite falls originated from the Rheasilvia Crater on Vesta. As the result of a titanic-scale impact some 20 million years ago, debris was ejected from the asteroid, creating the crater. This debris then traveled billions upon billions of miles in an orbital path before periodically entering our atmosphere and landing approximately 10 miles and 80 years apart in north-central Colorado.

Orbital mechanics (O-M), which governs the motions of the asteroids and comets in our solar system, can explain the periodicity of the HED falls to the Earth. However, O-M cannot explain the closeness of these two events on the Colorado Front Range some 80 years apart. That aspect has to be pure random chance.

Note: At least four pieces of the two HED meteorite falls discussed in this article are owned by four present FMC members, author included. Main pieces from both of these meteorite falls can be viewed at the Denver Museum of Nature and Science.

New Trilobite Collection at DMNS

The Denver Museum of Nature and Science recently obtained an extensive trilobite collection. Several specimens from this collection are now on display on Level 2 just past the Coffee Lab near the restrooms. Be sure to stop by the next time you are visiting the museum. Photo by Dennis Gertenbach



Patricia Emerald

Dennis Gertenbach



For thousands of years, men and women have admired gem-quality emeralds for their deep green color. One of the most spectacular of these gems ever found is the beautiful Patricia Emerald, showcased in the American Museum of Natural History in New York. Because of their value, most emerald crystals have been cut into gemstones and sold commercially. This emerald is one of the largest gem-quality emeralds in the world still preserved in its original natural crystalline state.

Measuring just over 2.5 inches tall and weighing 632 carats (over a quarter pound), it is the largest example recovered from the Chivor mines in Colombia, one of the world's most renowned emerald-producing countries. Not only is it one of the largest gem-quality emeralds in the world, but it is also dihexagonal, or 12-sided, rather than six-sided as are most emeralds.

The Patricia Emerald is one of the largest uncut emeralds in the world, weighing 632 carats. Credit: M. Shanley/American Museum of Natural History

Emeralds are gem-quality beryl, a beryllium aluminum silicate mineral with the formula $\text{Be}_3\text{Al}_2\text{Si}_6\text{O}_{18}$. (Aquamarine, Colorado's state gem, is also a gem-

quality beryl.) The deep green color of emeralds is caused by traces of chromium and/or vanadium atoms in the crystal structure which replaces the aluminum atoms.

So, how did the Patricia Emerald get its name and how did it get to the American Museum of Natural History? That story is part history and part legend.

Early Emerald Mining in Columbia

The Patricia Emerald originated from the Chivor mines of Colombia, an historic and ancient emerald mining district of Colombia situated northeast of Bogota, high up in the Andes. The region is rugged and inaccessible with thick forest vegetation.

The Chivor mines, along with the Muzo and Coscuez mines (also in Columbia), were worked by the native Chibcha Indians, at least 500 years before the Spanish conquest. These stones were in great demand, and the Chibcha Indians traded the stones for other goods from Peru and Mexico.

The Spaniards first saw the brilliant green stones when they arrived in Peru and Mexico in the early 16th century. Considered sacred by Mesamerican Indians, emeralds were being worshiped, were used in jewelry, and played an important role as sacrificial offerings in ceremonies. When the Spanish conqueror Cortes met the Aztec emperor Montezuma in Mexico in 1519, it was said that the latter was bedecked with fine emeralds. Reportedly, Spanish conqueror Pizarro sent four chests of emeralds from Peru to the King of Spain in 1533.

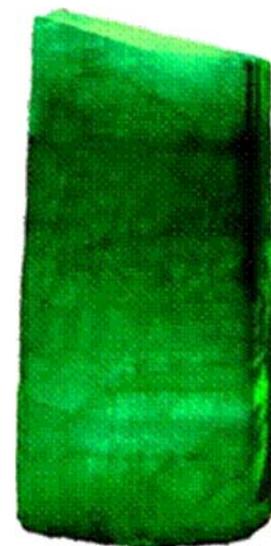
But, the early Spanish conquerors were not aware of the actual source of the emeralds. It was not until later that the Spanish rediscovered the Chivor and Muzo emerald mines in 1537 and 1559 respectively. The Spanish expanded and operated the Chivor mines using Indian slave labor under incredibly cruel conditions. Mining operations in the Chivor mines were intermittent, and the mines were closed from time to time due to various reasons such as the barbaric cruelty towards the workers resulting in frequent work stoppages, the lack of proper equipment for mining, and blatant corruption. Eventually conditions in the Chivor mines became so brutal and unbearable that the mine was closed down indefinitely in 1675 by royal decree issued by King Charles II. The abandoning of the mines led to the surrounding jungle reclaiming the area; its location eventually became a mystery.

In 1896, the abandoned Chivor mines were rediscovered, after studying documents written by a Spanish priest. In 1901, Francisco Restrepo and his associate Fritz Klein, successfully negotiated a deal with the government that bestowed perpetual title of the area to them. The agreement stipulated that title for the land would be conveyed to them only after the payment of an amount equivalent to the total of twenty years of taxes on the land. Accordingly, after payment was made, Francisco Restrepo and Fritz Klein were granted perpetual title for the area. The clearing of the jungle in the mine area and its immediate environs then began, and the mine was reopened and operations commenced in 1911.

Ownership has changed hands repeatedly since then, with intermittent production to this day.

The Discovery of the Patricia Emerald

Legend has it that around 1920, Justo Daza, an experienced mine worker, and Fritz Klein, a mining engineer, were exploring the area around the Chivor mines looking for new emerald veins. They were breaking rocks apart with long iron poles and using explosives packed into drill holes to uncover new pockets of crystals. However, their search had been futile.



The Emerald of Judgment presented to Cortez, by Montezuma II, the king who ruled the Aztec world.
Credit: Internet Stones.com



Justo Daza, the miner who discovered the Patricia Emerald with Fritz Klein around 1920. Credit: via Gonzalo Jara

Klein was ready to give up, but Daza pleaded for one more try. They upped the dose of explosives and blasted open a gaping hole that revealed promising glints of a mineral vein. When Klein reached into the hole, he fished out bits of quartz, feldspar, and apatite. Probing deeper, his hand closed around a large crystal with smooth surfaces. When finally extracted from the hole, the crystal was the fabulous emerald later named the Patricia Emerald.

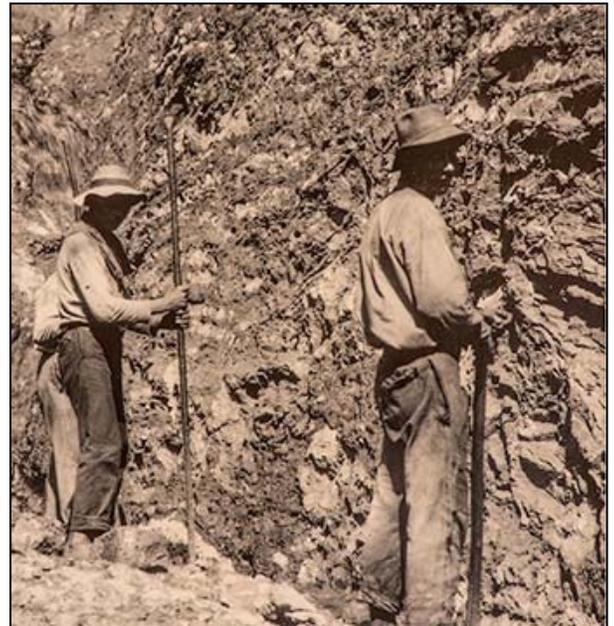
Historical sources say that the Patricia Emerald was part of a pocket that featured an even larger crystal. Unfortunately, miners attempted to extract the stones from the surrounding rock using dynamite, and the resulting explosion shattered the larger stone.

As for its distinctive name, it is thought that the Patricia Emerald was named after the daughter of an owner of

the Chivor Mine. Just who that owner was, though, is unclear: a German owner, numerous American investors, and a Canadian corporation all held rights to the mine around this time. Others credit Klein for naming it after his daughter. A third story claims that the stone was named after the patron saint of Ireland, St. Patrick, named Patrizius in the Spanish, which subsequently became the Patricia Emerald.

Klein sold the find for tens of thousands of dollars, while Daza was supposedly given ten dollars and a mule. Later it was donated to the American Museum of Natural History in New York. Another account has Klein donating it directly to the Museum.

After the Patricia Emerald was presented to the American Museum of Natural History in New York, it has been displayed in the Morgan Memorial Hall of Gems, along with the Star of India (the world's largest blue star sapphire), the De Long Star Ruby from Burma, the Midnight Star Sapphire (a deep purple-violet star sapphire from Sri Lanka) and other famous gemstones. In 2019, the Hall of Gems was refurbished to better display the Patricia Emerald and these other gems in all their glory.



Workers search for emeralds at the Chivor mines in the early 1900s. Mineralized veins were pried open using long iron bars along terraces in open pits. Credit: P.W. Rainier Jr.

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- Larif, Shihaan, "Patricia Emerald," <https://www.internetstones.com/patricia-emerald-632-carat-uncut-colombian-origin-chivor-mine.html>.

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 for nametags several times a year for members.

If you would like a nametag, 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. Your first nametag is free!



Example of a club name tag

Fossils in the News

Dennis Gertenbach



The skull of the juvenile *T. rex*, Jane, was slender with knife-like teeth, having not yet grown big enough to crush bone. Credit: Scott A. Williams

Researchers Learn More about Teenage *Tyrannosaurus rex*

Without a doubt, *Tyrannosaurus rex* is the most famous dinosaur in the world. The 40-foot-long predator with bone crushing teeth inside a 5-foot long head is the stuff of legend. But, what was it like to be a teenage *T. rex*? Because museums focused on finding and collecting fossils from the biggest, most impressive dinosaurs they could find for display, much less is known about adolescent dinosaurs.

By examining the bones of two immature *T. rex* fossils, scientists now have a better picture of how these ferocious dinosaurs lived as teens. In the early 2000s, the fossil skeletons of two comparatively small *T. rex* dinosaurs were collected from Montana by the Burpee Museum of Natural History in Rockford, Illinois. Nicknamed "Jane" and "Petey," the tyrannosaurs would have been slightly taller than a draft horse and twice as long. By counting the annual rings within the bone, much like counting tree rings, scientists calculated that Jane and Petey were teenagers; 13 and 15 years old, respectively, when they died. The scientists

determined that small *T. rex* dinosaurs were growing as fast as modern-day, warm-blooded animals such as mammals and birds. They were fast, fleet-footed, and had knife-like teeth for cutting, whereas adults were lumbering bone crushers. By examining the growth rings of the bones, the team discovered that a growing *T. rex* could do a neat trick: if its food source was scarce during a particular year, it just didn't grow as much. And if food was plentiful, it grew a lot.

Information and figure from press release at <https://news.okstate.edu/articles/health-sciences/2020/researchers-learn-more-about-teenage-t-rex.html>

For the Death of Dinosaurs, It Was the Asteroid, not Volcanoes

Since paleontologists accepted that an asteroid was at least partially responsible for the demise of the dinosaurs (along with 70% of all species), they have argued if the asteroid alone was responsible, if massive volcanoes called the Deccan Traps in India were responsible, or if it was a one-two punch of both of these events that finished off the dinosaurs. A recently published study led by Yale assistant professor of geology and geophysics Pincelli Hull and her colleagues argue that environmental impacts from these massive volcanic eruptions happened well before the Cretaceous-Paleogene extinction event 66 million years ago and, therefore, did not contribute to the mass extinction.

“Volcanoes can drive mass extinctions because they release lots of gases, like SO₂ and CO₂, that can alter the climate and acidify the world,” said Hull. “But recent work has focused on the timing of lava eruption rather than gas release.” To pinpoint the timing of volcanic gas emissions, Hull and her colleagues compared global temperature change and the carbon isotopes from marine fossils with models of the climatic effect of CO₂ release. They concluded that most of the gas release happened well before the asteroid impact and that the asteroid was the sole driver of extinction.

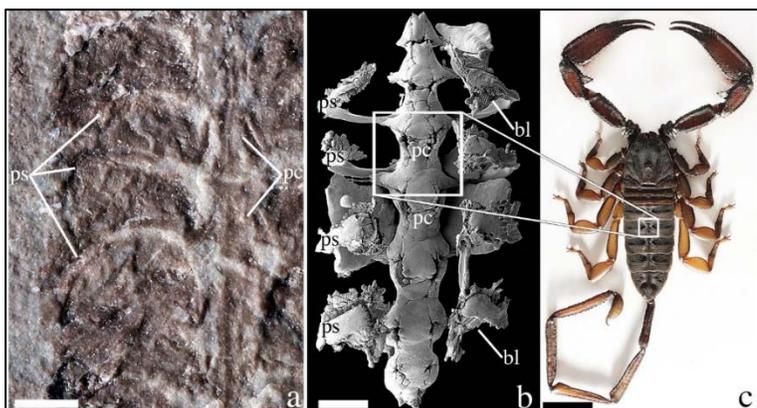


Volcanic activity did not play a direct role in the mass extinction event that killed the dinosaurs, according to an international, Yale-led team of researchers. It was all about the asteroid. Credit: stock.adobe.com

Information and figure from press release at <https://news.yale.edu/2020/01/16/death-dinosaurs-it-was-all-about-asteroid-not-volcanoes>

Fossil of the Oldest-Known Scorpion Discovered

Scientists studying fossils collected 35 years ago have identified them as the oldest-known scorpion species, a prehistoric animal from about 437 million years ago. The researchers found that the animal likely had the capacity to breathe in both ancient oceans and on land, making it one of the first animals that could spend time on land.



The researchers named the new scorpion *Parioscorpio venator*. The genus name means “progenitor scorpion,” and the species name means “hunter.” The “hunter scorpion” fossils were unearthed in 1985 from a site in Wisconsin that was once a small pool at the

The fossil (left) was unearthed in Wisconsin in 1985. Scientists analyzed it and discovered the ancient animal's respiratory and circulatory organs (center) were nearly identical to those of a modern-day scorpion (right).

Credit: Andrew Wendruff

base of an island cliff face. These fossils remained unstudied in a museum at the University of Wisconsin for more than 30 years. By examining the fossils under a microscope and with high-resolution photographs of the fossils, bits of the animal's internal organs were found preserved in the rock. Most important were the remains of its respiratory and circulatory systems. "The inner workings of the respiratory-circulatory system in this animal are, shape-wise, identical to those of the arachnids and scorpions that breathe air exclusively," author Loren Babcock said. "But it also is incredibly similar to what we recognize in marine arthropods like horseshoe crabs. So, it looks like this scorpion must have been pre-adapted to life on land, meaning they had the morphologic capability to make that transition, even before they first stepped onto land."

Information and figure from press release at <https://news.osu.edu/fossil-is-the-oldest-known-scorpion/>

Boom and Bust for Ancient Sea Dragons

A new study by scientists from the University of Bristol's School of Earth Sciences, shows a well-known group of extinct marine reptiles had an early burst in their diversity and evolution, but that a failure to adapt in the long run may have led to their extinction. Ichthyosaurs were fish-like reptiles that first appeared about 250 million years ago and quickly diversified into highly capable swimmers. However, this rapid pace did not last long and an evolutionary bottleneck 200 million years ago, through which only one lineage of ichthyosaurs survived, led to much slower evolution in much of their long history. The study used state-of-the-art computational methods and looked at two types of data, one covering skull size and the other including many features of ichthyosaurs' skeleton. All methods show an early burst of evolution in ichthyosaurs, with high rates and rapid variation soon after the appearance of the group. Ichthyosaurs remained a common group after this, but had less variation between them.



The huge ichthyosaur, *Temnodontosaurus*, from the Early Jurassic of Germany. This specimen is about 7 meters (23 feet) long, but other ichthyosaurs grew up to 21 meters (69 feet). Credit: Ben Moon and Tom Stubbs

Coauthor Tom Stubbs said, "Ichthyosaurs really dominated early in the Triassic (252–201 million years ago), rapidly evolving in an ocean with few predators soon after the largest known mass extinction in Earth's history. However, the seas quickly became more crowded and competitive, and ichthyosaurs lost their top position in the Jurassic (201–145 million years ago) to other marine reptiles like plesiosaurs and pliosaurs. It may well have been the ichthyosaurs' decreasing evolutionary rates which made them less able to adapt quickly, and therefore less diverse and competitive, allowing other marine reptiles to take over as the top predators."

Information and figure from press release at <http://www.bristol.ac.uk/biology/news/2020/boom-and-bust-for-ancient-sea-dragons.html>

Rocky Mountain Federation Convention in Wyoming

Come one, come all to the Rocky Mountain Federation Convention on June 18-21 in Big Piney, Wyoming, the heart of Sublette County. Our club is a member of the Rocky Mountain Federation of Mineralogical Societies, which sponsors a convention each year. Everyone is invited to attend the convention.



This year's conference will be held in conjunction with the Wyoming State Mineral and Gem Society. Activities during the show are designed to inform and entertain at all levels of knowledge in the fields of geology and lapidary, from novice to expert. Planned field trips include collecting Blue Forest petrified wood, fish fossils (fee dig), and others.

The location in western Wyoming features friendly people, comfortable accommodations, fresh air, and amazing outdoor recreation opportunities. The convention at the Sublette County Fairgrounds is conveniently located near other towns, tourist destinations, rock hunting, fishing, museums, Fossil Butte National Monument, Grand Teton and Yellowstone National Parks, and major airports. Wyoming is a great place to explore and a place known for its wonderful rocks!

For more information, please download the registration packet at [2020 RMFMS Conference Registration Package](#). Come and enjoy the show!



Other Rockhounding Events and Activities in the Area

Here are other rockhounding-related activities 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, March 10, Dr. Russ Graham** talking about **The Last Mammoths: Holocene Extinction on St. Paul Island, Alaska**, the first of the 2020 Friends of the Mines Museum Lecture Series. Talk will be 6-7:30 pm in the room across from the Mines Museum entrance. See <https://www.mines.edu/geology-museum/events/>.
- **Friday, March 13, North Jeffco Gem & Mineral Club Silent Auction**, at the APEX Community Center, 6842 Wadsworth Blvd., Arvada. Setup at 5:30 p.m., auction begins at 6:45 p.m. All are welcome. For more info, Bill Jones, 303-503-6288, email sidewindermin@comcast.net. See the flyer for to the right more information.
- **Friday-Sunday, March 13-15**, is the **Fort Collins Gem & Mineral Show** in the Thomas M. McKee Building at The

**North Jeffco Gem & Mineral Club
Silent Auction**

Friday, March 13th, 2020
APEX Community Recreation Center
6842 Wadsworth Blvd, Arvada, CO 80003

Setup at 5:30 PM
Seller limits on number of items to sell:
Club Members – No limit
Non-members – Maximum of 30 items

Auction Begins 6:45 PM
Checkout Begins Immediately After Auction
No Early Checkout
Free Parking, Free Admission
Cash or Check only

♦ jewelry ♦ gems ♦ minerals ♦

♦ bake sale ♦ crafts ♦

♦ free refreshments ♦
♦ public invited ♦



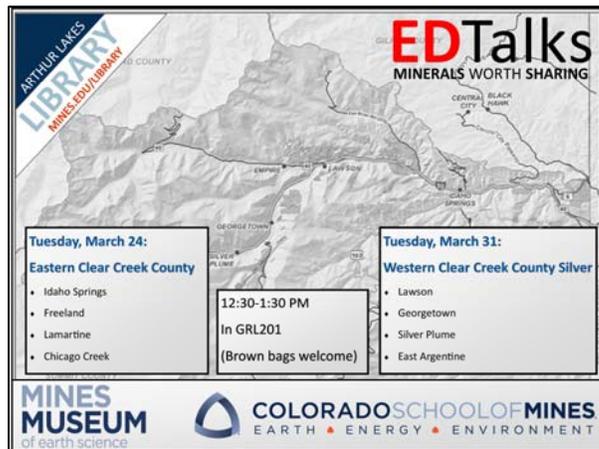
If you need a finished piece of jewelry,
rough material to fashion yourself,
a specimen for your collection,
or an interesting and fun evening,
this is the place.

Sellers & Buyers Welcome

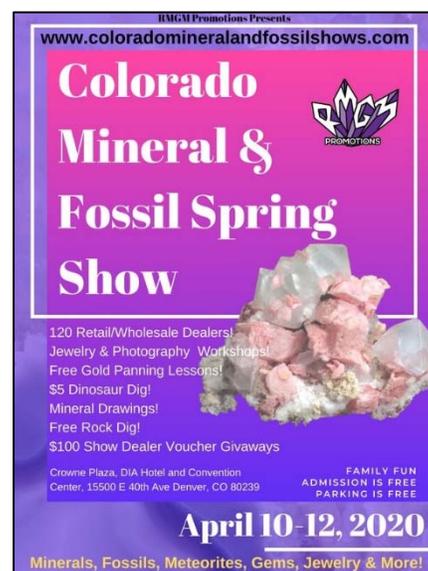


For more info call Bill Jones 303-503-6288
Or email sidewindermin@comcast.net

Ranch/Larimer County Fairgrounds, 5280 Arena Circle, Loveland, CO (I-25 exit 259); hours 4-8 Friday, 9-6 Saturday, 10-5 Sunday. Adult admission \$4. Sponsored by the Fort Collins Rockhounds Club. See the flyer below for more information.



- **Saturday, March 21, Walk with a Geologist at Dinosaur Ridge.** Join a professional geologist for a tour of Dinosaur Ridge – a 2½-hour walk and discussion of the geology and changes of the Denver area through time. <https://dinoridge.org>
- **Tuesday, March 24** is an EdTalk by **Ed Raines** about the mining history of **Eastern Clear Creek County (Idaho Springs, Freeland, Lamartine, & Chicago Creek)**, sponsored by the Mines Museum. Talk is 12:30-1:30 pm in GRL201, across from the museum entrance on the Mines campus. <https://www.mines.edu/geology-museum/events/>
- **Tuesday, March 31** is a second EdTalk by **Ed Raines**, this time about the mining history of **Western Clear Creek County (Silver, Lawson, Georgetown, Silver Plume, & East Argentine)**, sponsored by the Mines Museum. Talk is 12:30-1:30 pm in GRL201, across from the museum entrance on the Mines campus. <https://www.mines.edu/geology-museum/events/>
- **Thursday, April 2** is a Denver Museum of Nature & Science Earth Sciences Colloquium talk by **Blair Schoene** (Princeton University), **Dating the K-Pg Eruptions That Made Life Miserable for Dinosaurs**. 3 pm. In the third-floor community room. No museum admission required.
- **Friday-Sunday, April 10-12, Colorado Mineral and Fossil Spring Show**, Crown Plaza Hotel - Convention Center, 15500 E 40th Ave., Denver, Colorado, 10-6 Fri. & Sat., 10-5 Sun., free parking & admission. See flyer to the right or <https://www.coloradomineralandfossilshows.com/colorado-mineral-and-fossil-shows-2020.html>
- **Saturday, April 11**, the Friends of Dinosaur Ridge is sponsoring **Garden Park Field Trip Visit Canon City's Royal Gorge Regional Museum & History Center and historic quarries**. Open to the public. FODR members– \$79, non-members–\$89. <https://dinoridge.org/gardenpark-field-trip/>



- **Thursday, April 16**, is a Denver Museum of Nature & Science Earth Sciences Colloquium talk by **Anthony Maltese (Rocky Mountain Dinosaur Resource Center), To Xiphactinus and Beyond: The Savage Ancient Seas of Kansas**. 3 pm. In the VIP room. No museum admission required.
- **Thursday, April 16, Rise of the Mammals: Exceptional Continental Record of Biotic Recovery after the Cretaceous–Paleogene Mass Extinction** A talk about the Corral Bluffs fossil mammal find by **Ian Miller and Tyler Lyson**, Denver Museum of Nature & Science; at the CSS Annual Past Presidents' Dinner. Mount Vernon Canyon Club <https://coloscisoc.org/special-lectures/>.

Denver Gem & Mineral Show Mini Report

The Denver Gem & Mineral Show is September 18 - 20, 2020 and the theme is Fluorite. The show venue is the usual Denver Mart, 451 E. 58th Avenue. The Show Chair is George Daggett, who can be reached at geoddaggett@hotmail.com or 303-453-9651. George is always open to talking with club members regarding the show. Linda Burns has accepted the position of Show Chair Elect. Linda is a member of the Denver Gem & Mineral Guild and can be reached at 303-263-0391 or burns.henley@gmail.com.

So now that you know the details about the 2020 show, here are some facts you may not know about the show. The 2020 show will be the 53rd Denver show. The Denver show is owned by the Greater Denver Area Gem and Mineral Council, a 501(c)(3) non-profit organization, and is the Council's primary program. The Council was incorporated as a non-profit organization in 1985 and is the successor to the Denver Council of Gem and Mineral Societies, Inc., which was incorporated in 1971. The Council is made up of the eight local clubs: Colorado Mineral Society, Denver Gem and Mineral Guild, Flatirons Mineral Club, Friends of Mineralogy - Colorado Chapter, Littleton Gem and Mineral Club, Mile Hi Rock and Mineral Society, North Jeffco Gem and Mineral Club, Inc., and Western Interior Paleontological Society. Each of these clubs appoints a Trustee to represent their club. The Council elects the usual officers - President, Vice President, Secretary, and Treasurer- who along with the Trustees conduct the business of the Council. The Council was formed to promote exhibition, exploration and education in the earth sciences; for the discovery, development, and preservation of minerals and mineral deposits, and for the advancement, encouragement, and utilization of the principles of art and craftsmanship as applied to gems and minerals. Even though fossils are not mentioned specifically in the Council's mission statement, the Council fully supports the paleontological community and its activities as evidenced by grants that have been made for many paleontological projects. The Council has made approximately \$500,000 in grants to other non-profits in support of its mission statement over the years. That is an impressive history and it all results from the Denver Gem & Mineral Show. The Council also supports the local eight clubs with an annual grant of \$250 based on Trustee attendance at the quarterly council meetings.

For additional information, the Council published *The Denver Gem & Mineral Show - A Retrospective*, celebrating the 50th anniversary of the show. A copy should be available from your club. In addition, the Council publishes an annual report of the show and Council, which includes pertinent details about each show such as show theme, attendance, competition winners, exhibits, and grants made. The annual reports began in 1996 and many are still available.

So now you know! And now you know why it is so important that club members likewise support the show by volunteering. There are so many easy ways to support the show. Talk to your friends and fellow hobbyists. Find out more about the show and ways to help with the show. It is fun, interesting and educational. It will help you learn more about gems, minerals, and fossils. And after all, that is a goal for all of us, isn't it?

Respectfully submitted, Judy Knoshaug, Show Secretary

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3rd Vice President: Annual Show Chair

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open

Facebook Chair

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Meeting Door Prize Chair

Brad Willkomm, 303 249-8877
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Don Mock
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Other Show Committee Members

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accatino@colorado.edu

Denver Show Club Table

open

A friendly reminder to pay your 2020 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 2020 dues must be received by January 20, 2020 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 2020 FMC membership card.

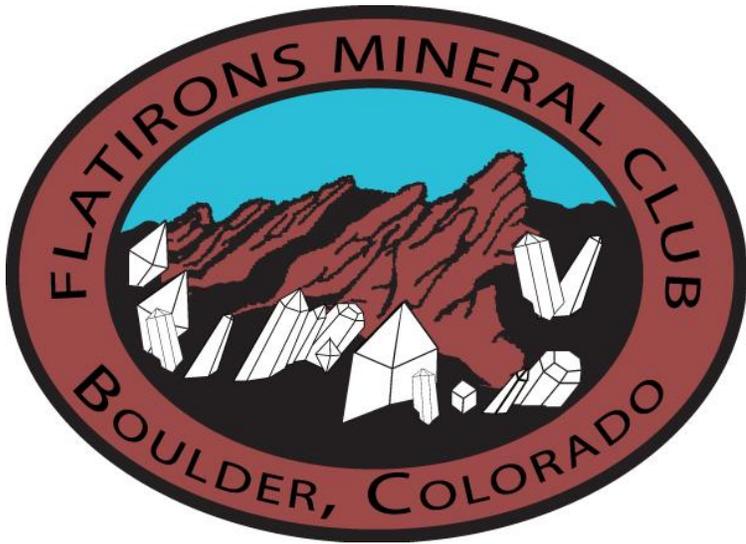


Flatirons Facets
P.O. Box 3331
Boulder, CO 80307-3331

First Class Mail

Upcoming Events

Thursday, March 12. 7:00 pm	Club meeting featuring Damon Hauschulz, The Wreck of the Edmund Fitzgerald & Banded Iron	Frasier Meadows Assembly Room, 350 Ponca Place in Boulder
Wednesday, March 18, 6:30 pm	Jr. Geologists Meeting featuring gems	Meadows Branch Library, 4800 Baseline in Boulder
Wednesday, April 8. 7:00 pm	Annual Silent Auction	Left Hand Canyon Grange, 195 2nd Avenue in Niwot
Wednesday, April 15, 6:30 pm	Jr. Geologists featuring Howard Gordon talking about geodes.	Meadows Branch Library, 4800 Baseline in Boulder
Saturday, April 18	North Table Mountain Field Trip to collect zeolites and other minerals	Golden, Colorado



ANNUAL SILENT AUCTION

Wednesday, April 8 7:00pm

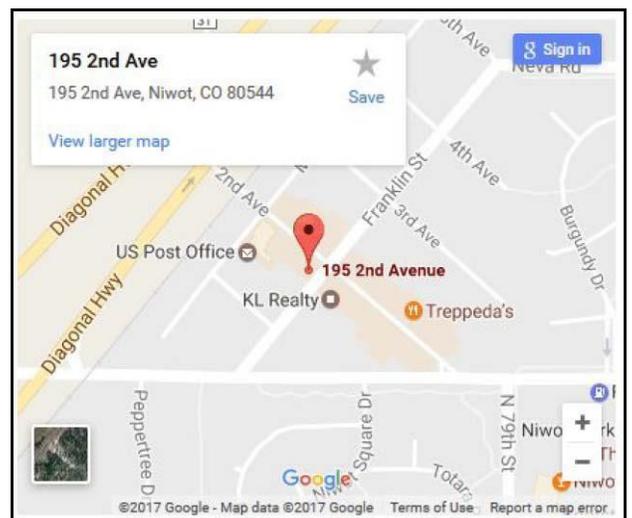
Minerals Crystals Fossils Lapidary

Bring items to sell or just come to browse!

Great Location!

**Left Hand Grange
in Niwot**

195 2nd Ave, Niwot CO 80544



Sellers: Set-up starts at 6:00pm

To get a seller number before the event
email Eileen at: elfitz891@hotmail.com

All sellers MUST use 2017 or newer bid slips

flatironsmineralclub.org



