Cedar Valley Gems

Cedar Valley Rocks & Minerals Society

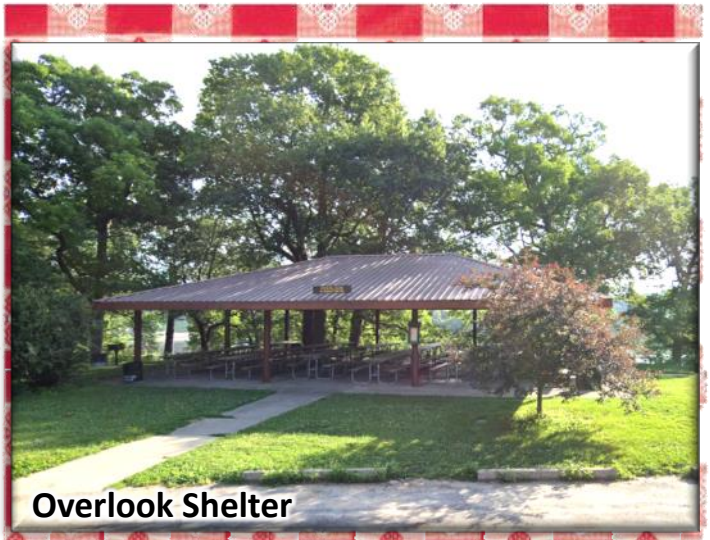
Cedar Rapids, Iowa

cedarvalleyrockclub.org

CEDAR VALLEY GEMS JUNE 2021 VOL. 47, ISSUE 06

Ray Anderson, Editor: rockdoc.anderson@gmail.com

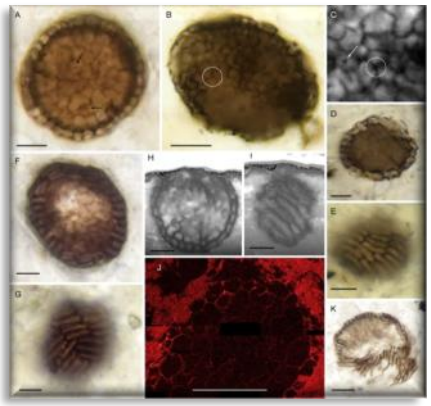
Next CVRMS Meeting
Tues. June 15
6:00 pm—Eat at 6:30
Picnics are Back !



Overlook Shelter

June 15 at Ellis Park
Rock Identification
Rock Show & Tell
for COVID Safety
- bring your own food and table service
- social distancing please

A teeny tiny fossil found in the Scottish Highlands could be a missing link in the evolutionary history of animals. Dated to around a billion years ago, the microfossil shows evidence of two distinctly different types of cells, and it seems to belong to an ancient organism somewhere between unicellular and multicellular animals. This makes it possibly the oldest fossil of its kind on record, a discovery that could provide insight into how and where animal life evolved. "*The origins of complex multicellularity and the origin of animals are considered two of the most important events in the history of life on Earth, our discovery sheds new light on both of these*," said palaeobiologist Charles Wellman of the University of Sheffield in the UK.



The fossils, measuring under 30 micrometers across, were found in the Diabaig Formation at Loch Torridon and include microfossils from a lacustrine (lake) setting dating to 1 billion years ago. The fossils were in a remarkable state of preservation, right down to the subcellular level. The new organism, named ***Bicellum brasieri***, was preserved so well in multiple fossils, that its structure was clearly visible. In its mature form, it appears to have consisted of a tiny sphere of tightly packed, roughly spherical cells (known as a *stereoblast*), surrounded by a differentiated outer single layer of elongated, sausage-shaped cells. Two populations, however, show a mixture of cell types throughout the stereoblast. The researchers have interpreted this as a more juvenile form of the organism during the process of differentiation, with the sausage cells developing and in the process of migrating to the exterior of the stereoblast. Single cell fossils found dating back 3.5 billion years make it likely that the very first microbial life appeared in marine environments, but *Bicellum* suggests that lakes were important too. https://www.sciencealert.com/ancient-fossil-could-be-the-oldest-multicellular-animal-on-record

CVRMS May. 18 Virtual Meeting

MEETING CALLED TO ORDER at 7:21pm by Marv Houg.
19 attendees signed in on to Zoom.

NO NEW MEMBERS OR GUESTS signed on.

MINUTES REVIEWED AS PUBLISHED. Motion to accept by Ray 2nd by AJ. Minutes accepted as published.

TREASURERS REPORT by Dale. Checking account balance $5088.06. Motion to accept by Glen and 2nd by Bill. Treasurer's report accepted.

PROGRAM: Videos on Jonas Tourmaline Mine, 15 Biggest Crystals, and 2020 Denver Gem and Mineral Show.

SUMMER PICNICS

June 15 Ellis Park Overlook—Show & Tell Rocks & get reacquainted with everyone. Bring your own food

July 20 Wanatee Park (formerly Squaw Creek) Meadowlark Pavilion—Geode cracking

August 17, Morgan Creek—Bingo

SEPTEMBER MEETING and future meetings will be at our usual date and time at the Hiawatha Community Center.
Some future meetings may be via Zoom meetings as a way of bringing in distant speakers.

AUCTION Dale and Sharon are working on getting the Kalona food truck. Still not sure.
In order to get a flyer for auction, we need pictures of items available. So far, we have only one contributor.
Suggestion that all workers be vaccinated. Dale will send out a memo.

SHOW Catered Saturday dinner instead of pot luck. Will wait to make arrangements.
MSHA training will not be held this year.

NEW BUSINESS

Show theme for 2022. Need input from club members.

FIELD TRIPS

Marv will arrange one in June.

CORESPONDENCE

Bill made a presentation to the Mid Prairie Home School in Kalona and shared an appreciation thank you for an excellent presentation.

Ray reported that Jane Gillotti will bring students after a field course is completed.

MOTION TO ADJOURN by AJ, 2nd by Dale. Meeting adjourned.

Respectfully submitted
Dell James, secretary

CVRMS Board Minutes May. 25

MEETING CALLED TO ORDER 8:15 by Marv. Members signed in Mav Houg, Dale Stout, Dell James, Kim Kleckner, Bill Desmarais, Jay Vavra, Sharon Sonnleitner, Ray Anderson, Toby Jordan.

MINUTES REVIEWED AS PUBLISHED. Motion to accept by Ray 2nd by Toby. Minutes approved as published.

TREASURERS REPORT by Dale. Checking account current balance in $5088.06. Kim made motion to accept , 2nd by Jay. Treasurer's report accepted.

AUCTION Jay reported that contracts sent out. One in question and needs an address or email address. Kim and Marv will help out.
Marv has a potential contributor donating some books and rocks.
Dale and Sharon Still working on Kalona food truck.
Still need lists of material to be auctioned. Up to the contributors to help out. So far one has been completed.
Sharon will need for flyers.
Square account has been set up.

SHOW Dell will take care of Collector's Journal. Kim will take of social media sites. Dale will take care of free stuff.
Most of vendors lined up. One 5 table set up is still available.
No pot luck on Friday but maybe a catered dinner. Will work on that.

FUTURE MEETINGS

Hiawatha Community center will be our first in person meeting in September.

PICNICS locations as discussed at Club Meeting.

JUNE BOARD MEETING at Marv in spite of his piles of boxes.

We will ask at picnic about having pot lucks for future picnics. Or having a few people bring select stuff like sloppy joes, salads, dessert.

MISC

TAKO still on hold. **Pebble Pit** any concerns about having it? Or should there be 2 boxes? Can we monitor the number of kids in the pits at one time? **Bus trip** cancelled till 2022.

501 (c) 3 still working on it. Nothing new on **State fossil** the crinoid. **Marv** had some correspondence from the Des Moines club about insurance. Jay has graciously volunteered to look over the fine print and will report back on findings. **Ray** has sent to the AFMS regarding our teaming up with other clubs for our guest speakers with programs. They thought it was a good idea to take it further. We will be able to get speakers from all over that way. **Marv** thanked Bill for his contribution to Mid Prairie Home school in Kalona with a thank you note. With schools opening up again, we will probably have more requests for programs.

8:15p.m. Motion to adjourn by Bill 2nd by Jay. Meeting adjourned.

Respectfully submitted
Dell James, secretary

Tiny Dinosaur That Looked And Hunted Like An Owl

A tiny, meat-eating dinosaur had superb low-light vision and hearing that was likely as good as an owl's. And like an owl, the wee dinosaur probably used those exceptional abilities to stalk and catch its desert prey under the cover of darkness. Owl-like ***Shuvuuia*** (*shu-VU-ya)* was a theropod (a three-toed and bipedal carnivorous dinosaur). There's only one known species, *Shuvuuia deserti*, and it was smaller than a domestic cat, measuring just 2 feet long. *Shuvuuia* lived about 75 million to 81 million years ago, during the late Cretaceous period (145.5 million to 65.5 million years ago), in what is now the Gobi Desert in Mongolia. Prior analysis of *Shuvuuia*'s fossilized eye bones revealed that it had large eyes that were specialized for seeing in dim light. But at the time, little was known about dinosaur adaptations for nocturnal activity. In a new study, scientists looked at skulls from dozens of species of extinct theropods and modern birds (the only theropod lineage that survived to the present). By comparing dinosaurs' fossilized eye and ear structures with those in living animals that have nocturnal habits, the researchers were able to see if a dinosaur was adapted for day or night activity. But nighttime hunting doesn't just depend on having good eyesight; specialized hearing is also key. So the researchers examined ear anatomy in 88 bird species and 17 extinct fossil theropods, using computed X-ray tomography (CT) scans to construct digital 3D models of the animals' skulls. They paid close attention to the cochlea, the part of the inner ear canal that holds sensory receptors for picking up sound waves. Decades of previous research had shown that the length of this canal is closely linked to how well animals can hear, and the length of *Shuvuuia*'s ear canal suggested that its hearing would have been "off the charts." "Shuvuuia had proportionally longer cochlear ducts than even the bird with the best hearing: the barn owl," researchers said. What's more, the size of *Shuvuuia*'s scleral rings showed that it also possessed incredible night vision, better than any living bird measured. The combination of light-sensitive eyes and superior hearing suggested that *Shuvuuia* would have been highly effective at detecting and ambushing prey at night, as owls do. It had a lightly built jaw, and its teeth look like tiny grains of basmati rice, a massive eye, but a very small beak. *Shuvuuia*'s forelimbs were powerful, tipped with a huge claw like an aardvark's. Capping off this hodgepodge of features was a pair of long, slender hind legs that were built for running. *Shuvuuia* could have operated at night and would fit into a desert ecosystem today.

An artistic reconstruction of two night-hunting Shuvuuia deserti emphasizes the dinosaur's resemblance to an owl.

https://www.livescience.com/owllike-dinosaur-night-hunter.html

Spotlight Gemstone: Alexandrite

June's Birth Stone

natural light *incandescent light*

June has three official birthstones, moonstone, pearl, and alexandrite. Of these, I think that alexandrite is the most interesting, so that is the birthstone that will be discussed this month. A relatively modern gem, alexandrite was discovered in Russia's Ural Mountain emerald mines. Legends claim that it was discovered in 1834 on the same day that future Russian Czar Alexander II came of age, hence the name honoring him. Because this unique gemstone changes colors from green to red (*see example above*), the national colors of Russia, alexandrite became Imperial Russia's official gemstone. Sometimes described as "*emerald by day, ruby by night*," alexandrite is a rare variety of the mineral *chrysoberyl (*an aluminate of beryllium with the formula $BeAl_2O_4$), a strongly pleochroic (trichroic) gem that will exhibit emerald green, red, and orange-yellow colors depending on viewing direction in partially polarized light. After Russia's mine deposits were exhausted, the popularity of alexandrite waned until new supplies were discovered in Brazil in 1987. Brazil, Sri Lanka and East Africa are now the main sources for alexandrite, though these are not as vividly colored as the original Russian stones.

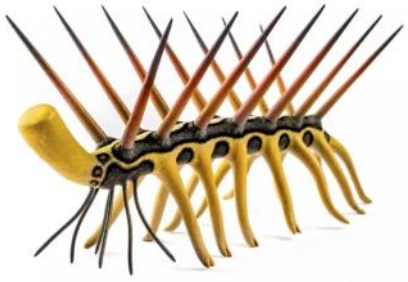
Because it's so scarce, fine quality alexandrite is practically unaffordable to the general public. Even lower quality stones are expensive and limited in supply. Since the 1960s, labs have grown synthetic alexandrite (not to be confused with simulated alexandrite, which is actually corundum or colored crystals infused with chromium or vanadium for color). Creating synthetic alexandrite is an expensive process, so even lab-grown stones can be costly. Color change is the most important factor when determining alexandrite's quality and value. The brighter the colors and the more dramatic the change from bluish green in daylight to purplish red under incandescent light, the more valuable the gem. Like most gems, alexandrite is weighed in carats. Higher clarity may weaken the stone's color change, so color is much more important than clarity in this case. Alexandrite is more expensive than most gemstones, including sapphires, rubies, emeralds and diamonds. Top-quality Russian alexandrite has sold for as much as $10,000 per carat. Most of the original Russian stones belong to museums or private collectors. The few gemstones that are produced today only fit the budgets of the most discerning gem experts. Alexandrite is a solid investment because of its rarity, durability and historical significance.

https://www.americangemsociety.org/en/alexandrite-overview

What in the World?

What in the World?
Is happening in this photo, and where do you think it is??

May's Photo



Last month's "*What in the World*" image was an artist's reconstruction of one of Earth's earliest animals, *Hallucigenia*. In 1977 British paleontologist Simon Conway-Morris came across a very weird-looking fossil that had been found in the Burgess Shale, in the Canadian Rockies, 66 years prior. He named it *Hallucigenia* — since it seemed like something a person might dream up during a trip gone wrong. Hallucigenia is now known to be an early member of the group Ecdysozoa, which includes arthropods (crustaceans and insects), nematodes, and several smaller phyla.

ROCK CALENDAR
CVRMS EVENTS OF INTEREST
2021

June 4 — Central Iowa Mineral Society
MONTHLY VIRTUAL MEETING - 7:15pm
speaker and topic to be announced

June 8 — Blackhawk Gem & Min. Soc.
MONTHLY VIRTUAL MEETING - 7:15pm
speaker and topic to be announced

June 15 — CVRMS Monthly Meeting
June Picnic - 6:00 pm
Ellis Park Pavilion
"Show and Tell Rock Treasures and Identification"
More details on Page 1

June 28 — 3 Rock Clubs Monthly Program
MONTHLY VIRTUAL PROGRAM - 7:15 pm
https://us02web.zoom.us/j/89524404665
speaker David Brenzel
"The Marion Peat Bed: Iowa peat mining in the 19th century and our lost path to energy independence"

Sept 18-19— CVRMS Auction
Amana RV Park and Event Center
Amana, Iowa
more details to follow

Sept. 24-26 — Geode Fest
Chaney Creek Boat Access
Illinois Highway 96 N
Hamilton, Illinois

Oct. 22-24 — MAPS 2021 Fossil Expo
Illinois State Fair Grounds
Springfield, Illinois
more details to follow

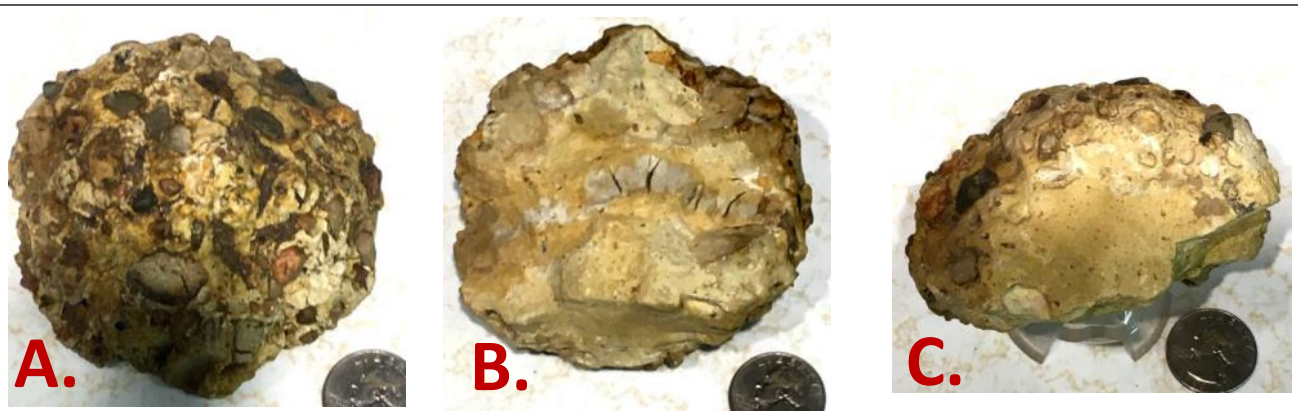
Nov. 6-7 — CVRMS Rks, Fos, & Min Show
Hawkeye Downs
Cedar Rapids, Iowa
more details to follow

Ask a Geologist

by Ray Anderson aka "Rock Doc", CVRMS Vice President

Ask a Geologist is a monthly column that gives CVRMS members an opportunity to learn more about a geologic topic. If you have a question that you would like addressed, please send it to rockdoc.anderson@gmail.com, and every month I will answer one in this column. Please let me know if you would like me to identify you with the question. I will also try to respond to all email requests with answers to your questions.

My geologist friend Jack Gilmore was visiting me at my barn "rock shop" last week, and we were trying to understand the histories of some of the unusual rocks that I have picked up over the years. I found a spherical ball of silty mudstone and claystone coated by rounded pebbles of various lithologies (rock types). After considering several possibilities I remembered seeing "**armored mud balls**." We did a little research and, sure enough; the rock was an armored mud ball. Jack said that I should make that my ask a geologist question for this month, because he didn't know what an armored mud ball was, and thought you might be interested.



Here are three views of the armored mud ball that Jack and I examined. A quarter is shown for scale. **A.** shows the outside of the ball, "armored with rounded pebbles. **B.** is a cross-section through the ball. The brownish material is siltstone and the cracked gray layer is claystone. **C.** displays another cross-section thru the ball showing the layer of pebble armor.

Although there is little scientific literature, probably the best explanation for how armored mud balls form begins with a flash flood. The Indiana Geological Survey documents the formation of modern armored mud balls on their web site (https://igws.indiana.edu/RocksAndMinerals/ArmoredMudballs). They say,

> "*Following the torrential rains of June 2008, this group of small armored mud balls was found in a ravine in northeastern Monroe County, Indiana. They consist of a core of red clay armored by an assortment of granules and pebbles from 0.01 to 0.5 inches in diameter. The mud balls themselves are 1 to 3 inches in diameter.*
>
> *Though uncommon, armored mud balls are found throughout the world both on the ground and also enclosed within lithified rocks of various ages. Common to all armored mud balls are a source of the two distinct materials and formation by tumultuous water currents or waves. In these mud balls, the clayey core was derived from the red clay soil ("terra rossa") that caps the upland surface in this part of Monroe County. This was undermined and caved at the head of a gully by runoff during the torrential rains. The pebbles became stuck to the globs of mud were rounded as they were washed rapidly down the steep ravine. The mud balls descended nearly 200 feet and traveled about 1,500 feet horizontally, probably in only a few minutes.*
>
> *Lithified armored mud balls in red rocks of Triassic age are a source of considerable local pride in small towns in the Connecticut River valley, but unless mud balls are rapidly covered by protective sediment they are destined for a short life, as they disintegrate either through weathering processes or by further transport downstream*."

The armored mud ball that Jack and I examined (pictured above) was composed of lithified buff-colored, silty, calcareous mudstone (silty, sandy claystone) with scattered dark, fine - medium sized rock fragments (shale?) enclosing a bed of gray, desiccation-fractured calcareous claystone. The pebbles that armor the mud ball are fairly well-rounded and composed of multi-colored cherts and other siliceous rock fragments as well as limestone pebbles. One small indeterminate brachiopod (?) fragment was identified incorporated in the armor. The rock is interpreted as probably of Pennsylvanian age (ca. 250 million years old), deposited in a river during a marine low-stand. Similar Cretaceous armored clay balls would have been armored only with siliceous pebbles (no limestone), and Cenozoic or modern armored mud balls would not yet have lithified.

'I was looking at the bones of great beasts': Astounding discovery made in Calif. valley

It started with a petrified tree, half-buried in the mud of the Mokelumne River watershed in the Sierra Nevada foothills. The site intrigued Greg Francek, a ranger for East Bay Municipal Utility District, as he was walking the valley last summer. He inspected further, and what he discovered led to one of the most significant fossil discoveries in California history. "*I looked around the area further and I found a second tree,*" Francek said. "*And then a third and so on. After finding dozens of trees I realized that what I was looking at was the remains of a petrified forest.*" Petrified wood comes from trees that were buried in the fine-grained sediments of deltas, floodplains or volcanic ash beds, and turned to stone over millions of years. After three weeks of surveying the site, Francek made an even more curious discovery. "*I located the first vertebrate fossils*," he said. "*What I didn't comprehend at the time was the amazing fact that I was looking at the bones of great beasts that had roamed this landscape millions of years ago*." Francek reached out to experts in paleontology and geology from across the country to come inspect the bones, and they're still there today making historic finds. Those great beasts include mastodons, gomphotheres (ancestral elephants, but with four tusks) and, incredibly, 400-pound salmon with spiked teeth, among others still to be identified. They even found camel fossils. The bones are thought to be from the Miocene era, around 10 million years ago. The site, the Mokelumne River watershed, is where some 1.4 million Bay Area residents get their drinking water. "*The discovery is highly significant because of both the sheer number and diversity of specimens found. Few other fossil discoveries like this exist in California*," said Dr. Russell Shapiro of the Chico State Department of Geological and Environmental Sciences. *"The bones paint a clearer picture of life 10 million years ago when animals evolved from living in forests to grassland as the landscape changed."* Mastodon remains were last found in California by the agency in 1947 during pipeline construction in Contra Costa County. But the current trove of fossils is the largest and most diverse in the state's history. "*Since this is one of the more significant paleontological finds in California, researchers still have a lot of questions like why are all these fossils in this location? How did they die? What happened and when?*" researchers wrote. "*The study of this site may take years*."

The Camanche Reservoir in California, close to the location of the recent fossil discovery.

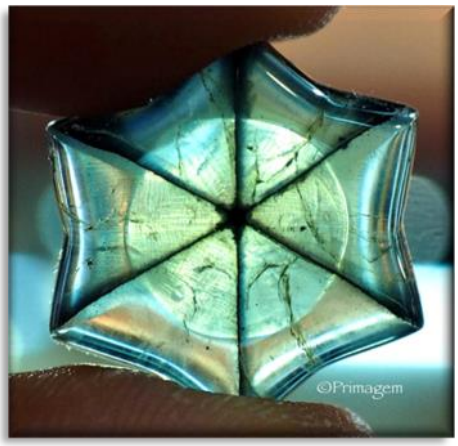
https://www.sfgate.com/local/article/fossil-find-california-ebmud-mastodon-bones-16192070.php

The Iconic Darwin's Arch in The Galapagos Is Gone Forever After a Collapse

The top of Darwin's Arch, the famous natural stone archway in the northern Galapagos Islands, has crashed into the waves, according to news reports. The arch, located less than 0.6 miles off the steep and rocky coast of Darwin Island, collapsed as "*a consequence of natural erosion*," on May 17, the Ecuador Ministry of Environment and Water wrote. The natural arch was named for the English biologist Charles Darwin, who studied evolution in the Galapagos during his voyage aboard the HMS Beagle in the early 1830s. Now that the arch's top is gone, one tour company, Aggressor Adventures, is calling the two stone monoliths that remain "***The Pillars of Evolution***," CNN reported. Darwin Island is a volcanic island that sits on a rocky platform about 32 feet underwater, according to a 2014 study in the journal *PLOS One*. This platform extends to the southeast, where Darwin's Arch once sat. The ministry noted in a second tweet that, "*at one point* [the arch] *would have been part of Darwin Island*," when sea levels were lower. The platform holding the island and the arch descends into a steep slope that goes down more than 328 feet, according to the *PLOS One* study. While Darwin Island is not open to visitors – the waters off its coast are open, and are "*considered one of the best places on the planet to dive and observe schools of sharks and other species,*" the ministry wrote in its second tweet. Research has shown that the waters around the arch were home to an extraordinarily high density of multiple species of sharks and other reef and pelagic [*open ocean*] fish that change on a seasonal basis. The Galapagos Marine Reserve was designated to protect sea life, and the Galapagos' 19 islands are also recognized as a World Heritage site by the United Nations Educational, Scientific and Cultural Organization (UNESCO). The islands won't look the same without the arch, but hopefully the sharks won't mind. https://www.sciencealert.com/darwin-s-arch-off-the-galapagos-coast-has-finally-collapsed-into-the-sea

What is a Trapiche Emerald?

Many books and articles cover the beautiful emerald, the most well-known member of the beryl family. You can learn about its rich green tones, the *jardin* or "garden" of inclusions that often help identify a stone's origins, its unique cutting properties, and the treatments it receives. However, you'll find very little information about the extremely rare **trapiche emerald**.



"Primagem trapiche emerald showing cat's eye in segments." Photo by Jeffery Bergman.

What Do Trapiche Emeralds Look Like?

These emeralds get their name from the *trapiche* (pronounced tra·PEE·che), a grinding wheel used in Colombia, South America. In the regions where these gems are often found, people use these wheels to process sugarcane. As you can see in the photo below, some of these gems resemble a spoked wheel with a hexagonal core. Please note, however, not all of these gems have that hexagonal "hub." Some enthusiasts believe trapiche emeralds from one mining area display the core, while those from another don't. Based on my research and conversations with dealers, the presence or lack of a core doesn't appear to indicate origin. Also, keep in mind that other gemstone species — such as rubies, sapphires, and aquamarines — can occur in rare trapiche shapes.

Are Trapiche Emeralds "Star Stones?"

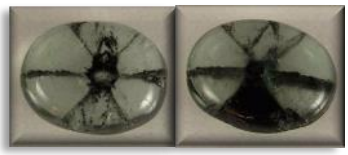
Despite its starlike appearance, this unique "spoked" pattern isn't a case of asterism (the "star stone" effect). However, trapiche emeralds may reveal chatoyancy, a "cat's eye" effect. Parallel growth tube inclusions can create a cat's eye in the "pie-shaped" sections as well as, rarely, along the length of whole cabbed trapiche emeralds. Expert lapidaries can orient and cut these stones to bring out this effect.

How Does a Trapiche Emerald Form?

During the formation of an emerald crystal, black carbon impurities may enter the gemstone mix. Because of emerald's hexagonal crystal structure, these impurities may fill in at the crystal junctions, forming a six-point radial pattern. In some trapiche emeralds, inclusions of albite, quartz, carbonaceous materials, or lutite may outline the hexagonal emerald core. From there, they extend in spokes that divide the surrounding emerald material into six trapezoidal sectors. The central, tapered emerald core first grows under hydrothermal conditions, but should these conditions slow or even stop for some time, impurities may enter the mix. As growth conditions resume, both emerald and, for example, albite may form. Although the hexagonal prism faces of the core crystal can maintain their uniform growth, producing pure emerald, albite fills the areas growing from the edges, between the prism faces. This results in six sectors of clear emerald and six of a combination, predominantly albite with some emerald. Thus, the central core and the six surrounding trapezoidal sectors of a trapiche emerald comprise a single, untwinned crystal. Although the hexagonal core may often be colorless, transparent beryl, it can also be green. In a 1970 analysis of Muzo, Colombia's trapiche emeralds in *American Mineralogist*, K. Nassau and K. A. Jackson found their principal coloring agent was vanadium.

Trapiche Emerald Gallery

With or without cores, trapiche emeralds make lovely gems. Let your imagination run free when you gaze upon these precious gems. For example, in the stones at right, I see a spider and a moth. Trapiche emeralds can get very large and may even weigh several grams.



"Wilma Van Der Giessen Collection," trapiche emeralds. Photo by Jeffery Bergman

Sources of Trapiche Emeralds

People long believed only Colombia produced trapiche emeralds, at the Muzo and Peñas Blancas mines, but these gems have also been found in Brazil. Also, a light grayish green beryl, 13.74 cts, with a trapiche-like structure was discovered in Madagascar.

Trapiche Emerald Treatments

Recent visitors to the Colombian mines have reported the sale of obviously treated material presented as natural. Keep in mind that emeralds commonly receive various treatments and enhancements, and trapiche emeralds are frequently oiled or impregnated with epoxy. You may also encounter imitation or simulated trapiches, such as a colorless beryl with a plastic coating imitating a trapiche pattern.

https://www.gemsociety.org/article/trapiche-emerald/

The Mystery Formation of Extremely Rich Gold Veins Might Finally Be Solved

Gold, for all its wonderful uses, isn't hugely abundant in Earth's upper layers. For each ton of crust material, there's an estimated just 0.004 grams of the precious metal. Yet somehow, there are regions that contain "*bonanza*" abundances - hyper-enrichment, in the scientific parlance. How these gold veins form in time spans as short as days from hydrothermal systems that only contain trace amounts of the metal has been a geological mystery. It's one that now has an answer, from the most unlikely of clues: the separation and clumping of fat particles in soured milk.

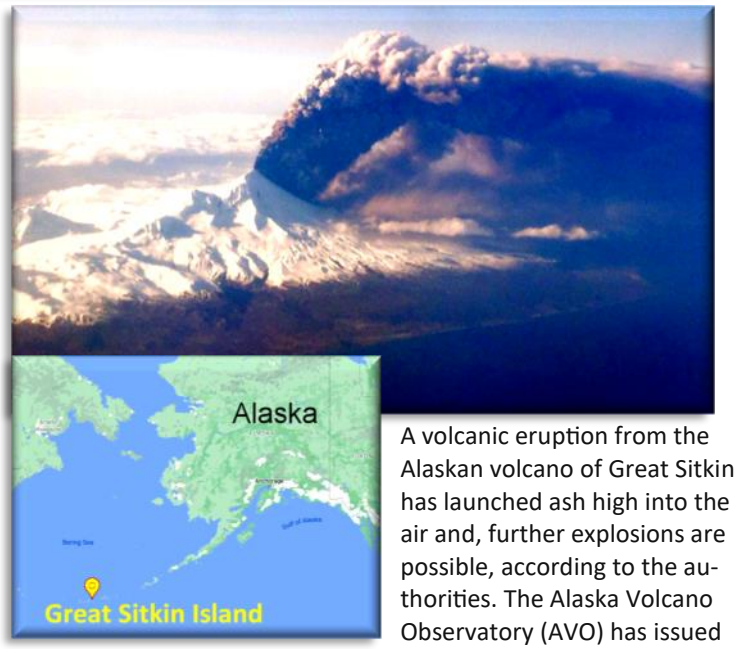
"*Scientists have long known that gold deposits form when hot water flows through rocks, dissolving minute amounts of gold and concentrating it in cracks in the Earth's crust at levels invisible to the naked eye,*" *say* geoscientists from McGill University in Canada. "*In rare cases, the cracks are transformed into veins of solid gold centimeters thick. But how do fluids with such low concentrations of gold produce rare ultrahigh-grade gold deposits? Our findings solve the paradox of 'ultrahigh-grade' or 'bonanza' gold formation, which has frustrated scientists for over a century.*"

"Bonanza" gold abundance from Brucejack Mine. (McLeish et al., PNAS, 2021)

Milk is an aqueous solution made up of several components, one of which is microscopic globules of fat. At the pH level of fresh milk - very close to neutral - these fat particles have a negative charge, which causes them to repel each other. The souring process involves bacteria in the milk converting lactose to lactic acid, lowering the pH level accordingly. This causes the surface charge on the fat particles to break down, and the fat particles separate from the milk serum and clump together with each other via coagulation, forming a sort-of gross decomposing milk fat jelly. The scientists found a similar process when using transmission electron microscopy to study gold deposits from the Brucejack Mine in British Columbia. This is one of the spots around the world where bonanza-grade mineralization can be found, up to 41,582 grams per ton. It's long been accepted that gold is transported by way of fluid through Earth's crust. However, in order to reach the abundances found in hyper-enrichment zones, previous studies suggested that the gold may have been dissolved in high concentrations in fluids containing chlorides or bisulfides, transported and deposited as a colloidal solution, with solid nanoparticles of gold dispersed throughout hydrothermal and geothermal fluids. Since the gold nanoparticles hold a charge (like milk fat), they repel each other. When the charge breaks down, the gold particles clump together in a process similar to coagulation, known as flocculation. This finding suggests that rich gold deposits may be more common than we thought, and may have occurred in several other contexts than previous estimates had allowed for.

https://www.sciencealert.com/mysterious-rich-gold-deposits-form-a-lot-like-soured-milk

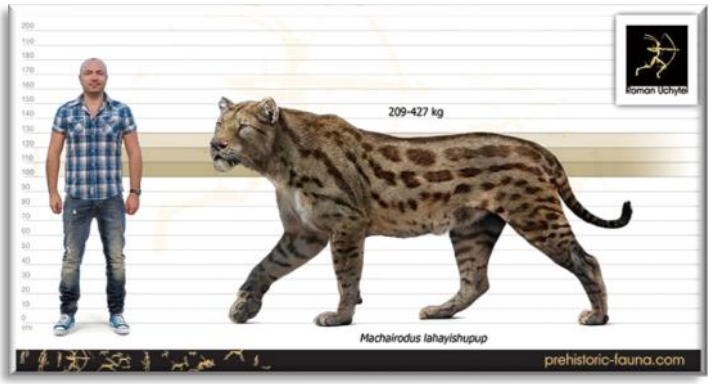
Alaska Volcano Eruption at Great Sitkin Island Sparks Red Warning



A volcanic eruption from the Alaskan volcano of Great Sitkin has launched ash high into the air and, further explosions are possible, according to the authorities. The Alaska Volcano Observatory (AVO) has issued a **red aviation alert** for ***Great Sitkin***, meaning "*significant emission*" of volcanic ash into the atmosphere is likely. The eruption does not appear to have sparked any evacuation warnings. The observatory issued a notice for aircraft at around 6 a.m. UTC on May 26 in which it warned an "*explosive eruption*" occurred about an hour prior, sending up a cloud of volcanic ash. The eruption is thought to have lasted between one and two minutes. Initial reports suggested the cloud from the eruption was 15,000ft high. Since that explosion the cloud has detached from the volcano and is moving eastward. AVO has warned additional explosions are possible. The Aviation Color Code warning remains red, and the Volcano Alert Level remains at "*Warning.*" It is unclear at the time of writing how the eruption may affect or has affected flights over the region. Volcanic ash is known to have damaging effects on aircraft because it can erode crucial components such as turbine blades in the engine and scratch landing lights and windscreens. It can also block fuel nozzles and air filters, set off fire alarms in the cabin, interfere with radio communication systems, and block sensors that let the pilots know how fast the aircraft is going. The continuous monitoring of airspace helps airline companies avoid volcanic ash clouds. Great Sitkin is a volcano that occupies most of the northern half of Great Sitkin Island, which is part of the Aleutian Islands chain. The volcano is oval-shaped, eight by 9 miles at its base, and 5,709ft tall. It is about 26 miles east of the community of Adak, and around 1,167 miles away from Anchorage, Alaska's most populous city, which is to the north east. The last time Great Sitkin erupted was in 1974, marking at least the third time it had done so during the 20th century. http://www.geologyin.com/2021/05/alaska-volcano-eruption-at-great-sitkin.html

Newly Identified Species of Saber-Toothed Cat Was So Big It Hunted Rhinos in America

Using detailed fossil comparison techniques, scientists have been able to identify a giant new saber-toothed cat species, *Machairodus lahayishupup*, which would have prowled around the open spaces of North America between 5 and 9 million years ago. One of the biggest cats ever discovered, *M. lahayishupup* is estimated in this new study to have a body mass of some 604 pounds or so, and possibly even bigger. It's an ancient relative of the well-known *Smilodon*, the so-called saber-toothed tiger. A total of seven *M. lahayishupup* fossil specimens, including upper arms and teeth, were analyzed and compared with other species to identify the new felid, with the fossils collected from museum collections in Oregon, Idaho, Texas, and California. "*One of the big stories of all of this is that we ended up uncovering specimen after specimen of this giant cat in museums in western North America*," said paleobiologist John Orcutt from Gonzaga University. "*They were clearly big cats*." "*What we didn't have then, that we have now, is the test of whether the size and anatomy of those bones tells us anything – and it turns out that yes, they do*." The age and size of the fossils gave the researchers a good starting point. Then they used digital images and specialized software to find similarities between the relics – and differences from other cat species, which was just as important. Points of reference on the specimens showed that they were from the same giant cat and that this cat was a species that hadn't been identified before. Additional evidence came from the teeth, although the researchers admit that the details of how early saber-toothed cats were related to each other is a little "*fuzzy*." Upper arms are crucial in these cats for killing prey, and the largest upper arm or humerus fossil discovered in the study was about 1.4 times the size of the same bone in a modern-day lion. That gives you an idea of just how hefty and powerful *M. lahayishupup* would have been. "*We believe these were animals that were routinely taking down bison-sized animals,"* said paleontologist Jonathan Calede from Ohio State University. *"This was by far the largest cat alive at that time*." Rhinoceroses would have been abundant at the same and may have been animals that *M. lahayishupup* preyed on, alongside camels and sloths significantly bigger than the ones we're used to today. While the discoveries made of this new species so far don't include the iconic saber teeth themselves, it's significant that *M. lahayishupup* has been identified mostly from humerus bones, showing what's possible with the latest analysis software added to many hours of careful study. Peering back so many millions of years into the past isn't easy, and the researchers say that a more detailed saber-tooth cat family tree is going to be needed to work out exactly where this species fits in. The findings also open up some interesting evolutionary questions about these giant cats. "It's been known that there were giant cats in Europe, Asia, and Africa, and now we have our own giant saber-toothed cat in North America during this period as well," says Calede. "There's a very interesting pattern of either repeated independent evolution on every continent of this giant body size in what remains a pretty hyper-specialized way of hunting, or we have this ancestral giant saber-toothed cat that dispersed to all of those continents. It's an interesting paleontological question."

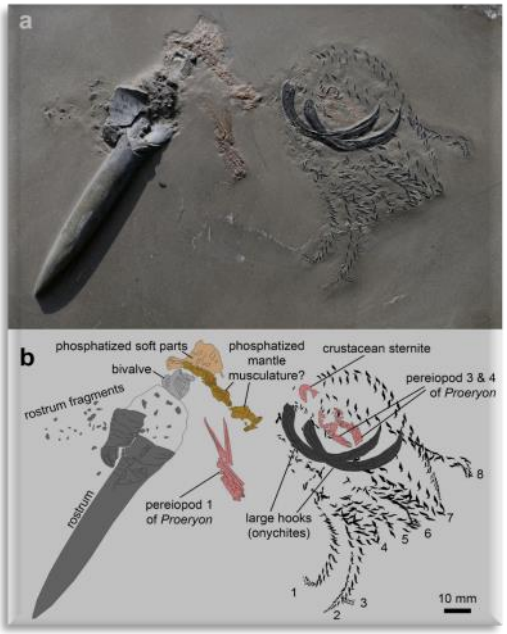


This research was published in the *Journal of Mammalian Evolution*

https://www.sciencealert.com/scientists-identify-a-giant-saber-toothed-cat-that-prowled-the-us-5-9-million-years-ago

Fantastical Jurassic Fossil Shows Crustacean Eaten by Squid Eaten by Shark

Sometime in the early Jurassic, an ancient squid-like creature speared a yummy lobster-like crustacean with its many hooked tentacles. Just as it began to dig into its meal, the eater became the eaten. According to experts, the extinct squid-like cephalopod, known as a belemnite, was most probably killed by an ancient crocodile, shark, or other large predatory fish. Whatever it was, the predator didn't stick around to finish its meal, likely because cephalopods have tough rostra - beaks that are hard, pointed and difficult to digest. The hunter probably wasn't an ichthyosaur, even though fossils of these extinct marine reptiles suggest they were particularly skilled at picking around the hard areas of belemnites. Fossilized stomachs of marine crocodiles and predatory fish, on the other hand, suggest these creatures gobbled everything down, swallowing both the mega-hooks and the hard beaks of squid. A large predator swooped in, tore a chunk out of the squid's soft middle and dashed off, leaving the leftovers of this three-way feeding fest sinking slowly to the bottom. Roughly 180 million years later, the fossilized scene has been discovered in a quarry in Germany, and after close analysis, archaeologists now think they've figured out who was at the top of the food chain. The authors suggest ancient sharks and crocs in the Jurassic learned to go after only the soft parts of their squid prey, choosing to drop the fins, rostrum, and mantle. In the current fossil, for example, the belemnite has retained its rostrum and arms, but everything soft in between is gone. *"Remarkably, most of the belemnite soft parts between the arm crown and the calcitic rostrum are missing,"* the authors note." *We suggest that this represents remains of a meal of a vertebrate predator, possibly of the Early Jurassic shark Hybodus hauffianus. This is remarkable, because it informs about the behavior of a cephalopod and a vertebrate predator."*



Preserved arm crown of belemnite and remains of its prey. (Klug et al., Swiss J Palaeontol., 2021)

https://www.sciencealert.com/jurassic-fossil-reveals-a-feeding-fest-between-a-shark-a-squid-and-a-crustacean

Vivid Violet Sugilite: A Rare Precious Stone

Gem **sugilite** is a polycrystalline aggregate: a massive gem material that is colored a very attractive purple-violet color, due to the presence of manganese. It is named for Ken-ichi Sugi, the Japanese geologist who discovered it in 1944 on an island in Japan. Sugilite is a relatively rare pink to purple cyclosilicate mineral with the complex chemical formula $KNa_2(Fe^{3+},Mn^{3+},Al)_2Li_3Si_{12}O_{30}$. Sugilite crystallizes in the hexagonal system with prismatic crystals. The crystals are rarely found and the form is usually massive. It has a Mohs hardness of 5.5 to 6.5 and a specific gravity of 2.75 to 2.80. It is mostly translucent. Sugilite occurs in bedded manganese deposits as an aegirine-bearing syenite stock in biotite granite. This uncommon cyclosilicate mineral displays violet to purple-red coloring. Although crystal specimens of sugilite are infrequently discovered, those that have been found are usually very large. Sugilite deposits are found in Australia, India, Japan, Canada and South Africa. Sugilite is popular in jewelry, in thin sections which can be polished or cut into cabochons and mounted in silver or gold in rings, pendants, and earrings. In the 1980s the gem was heavily promoted on home shopping channels and internet auctions sites. With a Mohs scale hardness of 5-1/2 to 6-1/2, sugilite is somewhat durable. However, be careful wiping dust from sugilite because household dust contains quartz, which may cause scratches. It is recommended to clean sugilite gemstones by using soapy water, rinsing well and drying with a soft cloth. Ultrasonic cleaners and steamers are not recommended. Always remove any jewelry or gemstones before exercising, cleaning or engaging in physical activities such as sports. Store sugilite gemstones away from other gemstones to prevent scratches, wrapped in soft cloth or placed inside a fabric-lined box. http://www.geologyin. com/2021/05/vivid-violet-sugilite-rare-precious.html

16kg Manganoan Sugilite from Wessels Mine in Northern Cape Province, South Africa

Plate Tectonics Is 3.6 Billion Years Old, Oldest Minerals on Earth Reveal

Scientists led by Michael Ackerson, a research geologist at the Smithsonian's National Museum of Natural History, provide new evidence that modern plate tectonics, a defining feature of Earth and its unique ability to support life, emerged roughly 3.6 billion years ago. Earth is the only planet known to host complex life and that ability is partly predicated on another feature that makes the planet unique: plate tectonics. No other planetary bodies known to science have Earth's dynamic crust, which is split into continental plates that move, fracture and collide with each other over eons. Plate tectonics afford a connection between the chemical reactor of Earth's interior and its surface that has engineered the habitable planet people enjoy today, from the oxygen in the atmosphere to the concentrations of climate-regulating carbon dioxide. But when and how plate tectonics got started has remained mysterious, buried beneath billions of years of geologic time. The study, published May 14 in the journal Geochemical Perspective Letters, uses zircons, the oldest minerals ever found on Earth, to peer back into the planet's ancient past. The oldest of the zircons in the study, which came from the Jack Hills of Western Australia, were around 4.3 billion years old—which means these nearly indestructible minerals formed when the Earth itself was in its infancy, only roughly 200 million years old. Along with other ancient zircons collected from the Jack Hills spanning Earth's earliest history up to 3 billion years ago, these minerals provide the closest thing researchers have to a continuous chemical record of the nascent world. "*We are reconstructing how the Earth changed from a molten ball of rock and metal to what we have today,*" Ackerson said. "*None of the other planets have continents or liquid oceans or life. In a way, we are trying to answer the question of why Earth is unique, and we can answer that to an extent with these zircons.*" To look billions of years into Earth's past, Ackerson and the research team collected 15 grapefruit-sized rocks from the Jack Hills and reduced them into their smallest constituent parts—minerals—by grinding them into sand with a machine called a chipmunk. Fortunately, zircons are very dense, which makes them relatively easy to separate from the rest of the sand using a technique similar to gold panning. The team tested more than 3,500 zircons, each just a couple of human hairs wide, by blasting them with a laser and then measuring their chemical composition with a mass spectrometer. These tests revealed the age and underlying chemistry of each zircon. Of the thousands tested, about 200 were fit for study due to the ravages of the billions of years these minerals endured since their creation. "*Unlocking the secrets held within these minerals is no easy task,*" Ackerson said. "*We analyzed thousands of these crystals to come up with a handful of useful data points, but each sample has the potential to tell us something completely new and reshape how we understand the origins of our planet.*" A zircon's age can be determined with a high degree of precision because each one contains uranium. Uranium's famously radioactive nature and well-quantified rate of decay allow scientists to reverse engineer how long the mineral has existed. The aluminum content of each zircon was also of interest to the research team. Tests on modern zircons show that high-aluminum zircons can only be produced in a limited number of ways, which allows researchers to use the presence of aluminum to infer what may have been going on, geologically speaking, at the time the zircon formed. After analyzing the results of the hundreds of useful zircons from among the thousands tested, Ackerson and his co-authors deciphered a marked increase in aluminum concentrations roughly 3.6 billion years ago. "*This compositional shift likely marks the onset of modern-style plate tectonics and potentially could signal the emergence of life on Earth,*" Ackerson said. "*But we will need to do a lot more research to determine this geologic shift's connections to the origins of life.*" The line of inference that links high-aluminum zircons to the onset of a dynamic crust with plate tectonics goes like this: one of the few ways for high-aluminum zircons to form is by melting rocks deeper beneath Earth's surface. "*It's really hard to get aluminum into zircons because of their chemical bonds," Ackerson said. "You need to have pretty extreme geologic conditions.*" Ackerson reasons that this sign that rocks were being melted deeper beneath Earth's surface meant the planet's crust was getting thicker and beginning to cool, and that this thickening of Earth's crust was a sign that the transition to modern plate tectonics was underway. Prior research on the 4 billion-year-old Acasta Gneiss in northern Canada also suggests that Earth's crust was thickening and causing rock to melt deeper within the planet. "*The results from the Acasta Gneiss give us more confidence in our interpretation of the Jack Hills zircons,*" Ackerson said. "*Today these locations are separated by thousands of miles, but they're telling us a pretty consistent story, which is that around 3.6 billion years ago something globally significant was happening.*" This work is part of the museum's new initiative called **Our Unique Planet**, a public–private partnership, which supports research into some of the most enduring and significant questions about what makes Earth special. Other research will investigate the source of Earth's liquid oceans and how minerals may have helped spark life. Ackerson said he hopes to follow up these results by searching the ancient Jack Hills zircons for traces of life and by looking at other supremely old rock formations to see if they too show signs of Earth's crust thickening around 3.6 billion years ago.

http://www.geologyin.com/2021/05/plate-tectonics-are-36-billion-years.html

2021 Officers, Directors, and Committee Chairs

President	Marv Houg (m_houg@yahoo.com)	(319)364-2868
Vice President.	Ray Anderson (rockdoc.anderson@gmail.com)	337-2798
Treasurer	Dale Stout (dhstout55@aol.com)	365-7798
Secretary	Dell James (cycladelics@msn.com)	446-7591
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Liaison	Kim Kleckner (ibjeepn2@gmail.com)	560-5185
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Hospitality	Karen Desmarais (desmarais_3@msn.com)	365-0612
Webmaster	Sharon Sonnleitner (sonnb@aol.com)	396-4016

Club meetings are held the 3rd Tuesday of each month from September through November and from January through May at 7:15 p.m. During the COVID emergency meetings will be via ZOOM. When the emergency is over, meetings will return to the Hiawatha Community Center in the Hiawatha City Hall, 101 Emmons St., Hiawatha IA. The December meeting is a potluck dinner held on the 1st Tuesday at 6:30. June, July, and August meetings are potlucks held at 6:30 p.m. at area parks on the 3rd Tuesday of each month

CEDAR VALLEY ROCKS & MINERAL SOCIETY

CVRMS was organized for the purpose of studying the sciences of mineralogy, geology, and paleontology and the arts of lapidary and gemology. We are members of the Midwest (MWF) and American (AFMS) Federations. Membership is open to anyone who professes an interest in rocks and minerals.

Annual dues are $15.00 per family per calendar year. Dues can be sent to:

Dale Stout
2237 Meadowbrook Dr. SE
Cedar Rapids, IA 52403

CVRMS website:
cedarvalleyrockclub.org

Ray Anderson, Editor
2155 Prairie du Chien Rd. NE
Iowa City, Iowa 52240-9620