Cedar Valley Gems

Cedar Valley Rocks & Minerals Society

Cedar Rapids, Iowa

cedarvalleyrockclub.org

CEDAR VALLEY GEMS | APRIL 2022 | VOL. 49, ISSUE 04

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

Next CVRMS Meeting

Tuesday Apr. 19

Hiawatha Community Center

101 Emmons St., Hiawatha - 7:15 pm

featured presentation by

Ryan Clark, geologist

Iowa Geological Survey

"Searching for Critical Minerals in Iowa and Beyond"

In late 2017 the U.S. Geological Survey (USGS) published a report designating 35 mineral commodities that are critical to the economic health and national security of our country. This was in response to a Presidential Executive Order aimed at assessing our dependency on, and how to assess the potential for domestic sources of, critical minerals. The USGS has since been collaborating with almost every state geological survey in the country to identify and characterize all potential sources of these critical minerals within our borders. The Iowa Geological Survey (IGS) has been participating in the USGS program, called **Earth Mapping Resources Initiative** (Earth MRI), since 2019. Over the past three years, and continuing into the near future, the IGS has been collecting and analyzing samples of various rock formations that are identified as *"focus areas"* of research due to their potential to host critical minerals. IGS geologist Ryan Clark will highlight the rapid progress this program has made in advancing our search for critical minerals in Iowa and beyond.

—-Pandemic Precautions —-

to attend we recommend that you *BE VACCINATED*

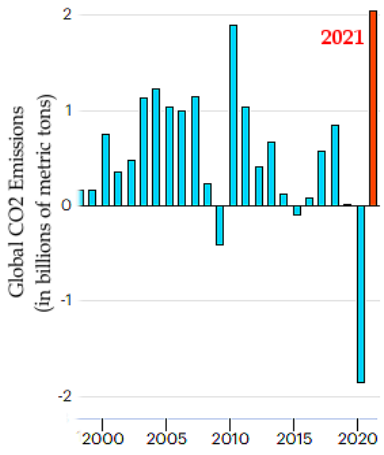
in the building you *MUST BE MASKED*

and *PRACTICE SOCIAL DISTANCING*

If you have a cough or cold STAY HOME

Humanity Just Produced the Biggest Increase in Global CO2 Emissions Ever Recorded

Global energy-related carbon dioxide emissions rose by 6 percent in 2021 to **a record 36.3 billion metric tons**, their highest ever level, the International Energy Agency said Tuesday. "*The increase in global CO_2 emissions of over 2 billion metric tons was the largest in history in absolute terms, more than offsetting the previous year's pandemic-induced decline,*" it said. It pointed to the widespread use of coal to power growth as the world economy rebounded from the COVID crisis. *"The recovery of energy demand in 2021 was compounded by adverse weather and energy market conditions – notably the spikes in natural gas prices – which led to more coal being burned despite renewable power generation registering its largest ever growth,*" it said. The IEA said the rebound of global CO_2 emissions above pre-pandemic levels was largely driven by China, where they increased by 750 million metric tons between 2019 and 2021. *"China was the only major economy to experience economic growth in both 2020 and 2021,*" it said. "*The emissions increases in those two years in China more than offset the aggregate decline in the rest of the world over the same period.*" In 2021 alone, China's CO_2 emissions rose above 11.9 billion metric tons, accounting for 33 percent of the global total. Https://www.sciencealert.com/humanity-just-produced-the-biggest-increase-in-global-co2-emissions-ever-recorded



Annual change in CO2 emissions from energy combustion and industrial processes

CVRMS Monthly Meeting, Mar. 15 — Minutes —

MEETING CALLED TO ORDER: 7:20 p.m. by Marv Houg president. **Attendance** total 34.

MINUTES OF THE PREVIOUS MEETING: Minutes of previous meeting reviewed. Motion to accept by Joel Smith second by Ray Anderson. Approved as published.

TREASURER'S REPORT: by Dale Stout. Current checking balance $11,210.66. Motion to approve by Carolyn ,second by Steve. Report accepted as written.

PROGRAM: Presented by NIcholas Murray, Cornell geology student, *"Headwaters to Tidewaters; the Geology of the Pacific Northwest :"* Powerpoint talk with videos about Spring Field Trip to the Pacific Northwest.

DOOR PRIZE:-won by Rodney Zimmerman, new member. Selected a very nice geode from Marv's stash.

2022 Rock Show: Reminder that setup begins on Friday at 9:00am. Marv requested show of hands from people who could help on Friday. **Green T-shirt's** are available for those work the show and can be picked up from Sharon at the show. **We still need transport** for the T-Rex skull. Rodney Zimmerman will help and has a proper transport vehicle. **Some dealers** will need help and hope that club members can help.

FIELD TRIPS: Matt Burns working on a current list of potential quarries. **MSHA training** will not be held this year.

MOTION TO ADJOURN: 8:50 pm motion to adjourn by AJ, second by Ray. Meeting adjourned.

Respectfully submitted,
Dell James, Secretary

CVRMS Board Minutes Mar. 22

MEETING CALLED TO ORDER: 7:15 by Marv at his house. Board members present Matt Burns, Kim Kleckner, Marv Houg, Dale Stout, Ray Anderson, Jay Vavra, Bill Desmarais, Dell James, Sharon Sonnleitner

MINUTES OF THE PREVIOUS MEETING: . Sharon mentioned a correction should be made to monthly minutes regarding the Science Fair awards. Instead of dividing the money between 1st and 2nd place for junior and senior participants that we would allow $80 for junior and senior winners with a $40 allowance to club making it a $200 total contribution. There will be no second place winners.

TREASURER'S REPORT: Nothing changed from last report. DVDs were delivered and available for use.

2022 ROCK SHOW: All **programs** are lined up. **Posters** are done. **Rick** has been working on fluorescent display. Currently, have an issue with glass or plastic becoming foggy. Will trust people not to disturb display if solution not found. **Kim says** that pebble pit and silent auction have enough material. **Door prizes** are covered, too. **Masks** recommended but not required. **Raffle prizes** are lined up with 6 total. **Discussion about money,** should we have some of those counterfeit pens and how much change should we have. **Kim will take pictures** in CVRMS trailer so we can repack the same way to avoid balance issues. **She will also** will take pictures of Hall so that no issues about damage in the future.

MISC: Dale will be responsible for picking up show keys, sand for pebble pit, and trailer registration. **Bill Sonnleitner** judged the Science Fair and there was one participant who was awarded $80. **Matt Burns** is continuing his work on the quarry list that may give us more opportunities for field trips.

MOTION TO ADJOURN: made by Dale, 2nd by Ray. Meeting adjourned 9:15 pm.

Respectfully submitted,
Dell James, Secretary

Pebbles from Salt River. Arizona

Tiny New Species of Stegosaur Unearthed in China

A newly discovered fossilized stegosaur found in China is the most ancient ever found in Asia, and could be the oldest in the world. Treading the Earth some 170 million years ago, during the Middle Jurassic Bajocian age, the beastie was also small for a stegosaur, measuring just over 9 feet from its nose to the tip of its spiny tail; larger stegos could grow up to 30 feet long. It's unclear whether the specimen is an adult or baby, but its discovery could tell us more about how the stegosaurus genus. The remains consisted of bones from the shoulder, back, thigh, feet, spine, and ribs, as well as several armor plates. These enabled a team of paleontologists to make comparisons with other stegosaur species. They found that, while the newly found stego, named ***Bashanosaurus primitivus***, has features in common with other stegosaurs, some features seem to be unique. Its shoulder is smaller and less developed, its thighbone is slightly different, and its armor plates are narrower across, but thicker at the base. Interestingly, it also has some characteristics in common with the first armored dinosaurs, which lived some 20 million years earlier. This suggests that *Bashanosaurus* could be a "*missing link*" between these older dinosaurs and the later stegosaurs. *Bashanosaurus* can be distinguished from other Middle Jurassic stegosaurs, and clearly represents a new species, and it is one of the earliest stegosaurs. Stegosaurs are among the most beloved of the Jurassic dinosaurs. The herbivorous beast was protected by plates of armor down the length of its spine and wicked spikes protruding from the end of its tail, to be wielded like a club. Other characteristics include quadrupedal locomotion, and a tiny little head, surprisingly dainty on such a tank-like body. These physical traits are characteristic of the genus, and *Bashanosaurus* appears to have had them too. But it also bears some similarities with early thyreophorans, the armored dinosaurs from which stegosaurs emerged. These similarities can be seen in the tail vertebrae, which are more elongated; a narrower, but flaring shoulder blade; and a lack of deep depressions in the spinal vertebrae. These similarities and differences suggest that *Bashanosaurus* is placed quite early on the stegosaurus family tree, which means that it represents quite an important discovery for understanding the genus. https://www.sciencealert.com/tiny-newly-discovered-stegosaur-could-be-the-oldest-we-ve-found-yet

On almost all modern birthstone lists, diamond is recognized as the birthstone for April. Diamond is also the gem that marks the 60th and 75th wedding anniversaries. Diamonds are thought to have been first recognized and mined in India, where significant alluvial (river) deposits of the stone could be found many centuries ago along the rivers Penner, Krishna and Godavari. Diamonds have been known in India for at least 3,000 years, and probably 6,000 years. Diamond is the only gem composed of one single element: carbon. Each carbon atom shares electrons with 4 other carbon atoms in a face-centered cubic crystal structure called a diamond lattice. Because of the extreme rigidity of this lattice, diamonds can be contaminated by only a very few types of impurities, such as boron and nitrogen. Small amounts of defects or impurities (about one per million of lattice atoms) color diamond blue (boron), yellow (nitrogen), brown (lattice defects), green (radiation exposure), purple, pink, orange or red. Diamond also has relatively high optical dispersion (ability to disperse light of different colors). Diamonds are the hardest material on earth (9 on the Mohs hardness scale): 58 times harder than anything else in nature. Most diamonds formed more than a billion years ago, at high temperature and pressure found only at depths deep in the Earth's mantle, about 90 to 120 miles beneath the surface. Diamonds are brought close to the Earth's surface through deep volcanic eruptions of magma, which cools into igneous rocks known as kimberlites and lamprolites. The diamonds are recovered by mining deep into these "pipes" or from rivers and near-shore deposits that include diamonds that nature eroded from the rocks. Diamonds are graded in quality based on the "***4Cs***", *clarity, color, cut,* and *carat* weight. ***Clarity*** grades assess the number, size, relief, and position of inclusions and blemishes. The less ***color,*** the higher the grade. Even the slightest hint can make a dramatic difference in value. ***Cut*** (proportions, symmetry, and polish) is a measure of how a diamond's facets interact with light. ***Carat Weight,*** larger diamonds of the same quality are much rarer than smaller ones and are worth more per carat. Although diamonds are made synthetically, their cost of production averages $2500 per carat, as compared to a cost of $40 to $60 per carat to mine the stones.

What in the World?

What in the World is this 65 foot ball of fire doing in the ocean??

March's Photo

Last month's **What in the World** photo shows **Moeraki Boulders**, unusually large spherical boulders lying along a stretch of Koekohe Beach on the wave-cut Otago coast of New Zealand. These boulders (from 2 to 7 feet in diameter) are grey-colored septarian concretions, which have been exhumed from Paleocene mudstone of the Moeraki Formation and concentrated on the beach by coastal erosion.

ROCK CALENDAR
CVRMS EVENTS OF INTEREST

2022

Apr. 10 — BGMS Gem, Min, & Fos. Show
Waterloo Center for the Arts
Waterloo, Iowa
(see Show Flyer on page 11)

Apr. 19 — CVRMS Monthly Meeting
Hiawatha Community Center 7:15 pm
Ryan Clark—Iowa Geological Survey
"Searching for Critical Minerals in Iowa and Beyond"
(see page 1 for details)

May. 17 — CVRMS Monthly Meeting
Hiawatha Community Center 7:15 pm
Program to be determined

Sept. 23-25 — Geode Fest
First Christian Church Parking Lot
3476 Main Street
Keokuk, IA
http://keokukiowatourism.org/event-calendar/geode-fest

Oct. 2 — Sunday At The Quarry
BMC Morgan Quarry
About 1 mile west of Dewer, Iowa
10:00 am — 4:00 pm

Oct. 8-9 — CVRMS Rock Auction
Amana RV Park and Event Center
Amana, Iowa

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.

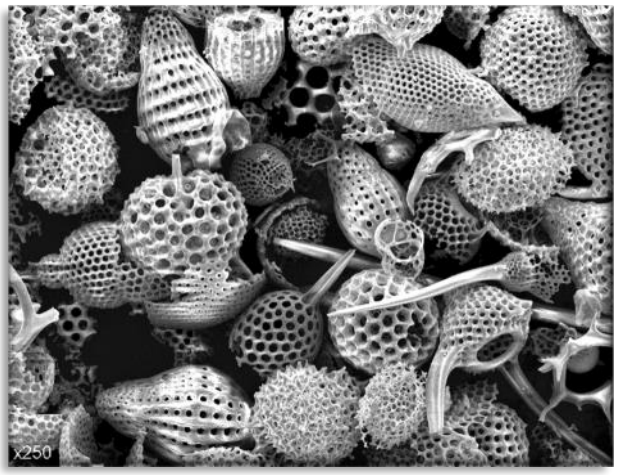
My rock polishing partner, Jack Gilmore, asked me the other day if I had ever heard of a **touchstone.** He said that **lydite** was a touchstone. Well, I had never heard of a *touchstone* or *lydite*, so I did a little research and I think you will find this interesting.

Testing gold on a touchstone.

It turns out that a **touchstone** is a small tablet of dark stone such as slate or **lydite,** used for assaying precious metal alloys. It has a finely grained surface on which soft metals leave a visible trace. The touchstone was first used during the Harappah period of the Indus Valley Civilization ca. 2600–1900 BC for testing the purity of soft metals. It was also used in Ancient Greece. The touchstone allowed anyone to easily and quickly determine the purity of a metal sample. This, in turn, led to the widespread adoption of gold as a standard of exchange. Although mixing gold with less expensive materials was common in coinage, using a touchstone one could easily determine the quantity of gold in the coin, and thereby calculate its intrinsic worth. ***Well, how does that work??*** Drawing a line with gold on a touchstone will leave a visible trace. Because different alloys of gold have different colors, the unknown sample can be compared to samples of known purity. This method has been used since ancient times. In modern times, additional tests can be done. The trace will react in different ways to specific concentrations of *nitric acid* or **aqua regia**, thereby identifying the quality of the gold: 24 karat gold is not affected but 14 karat gold will show chemical activity.

Lydite is the mineral name applied to *lydia stone* (a touchstone). It is *black, carbonaceous, radiolarian chert* (a recrystallized radiolarite) with low porosity (*photo below on right*). Radiolarians are protozoa of diameter 0.1–0.2 mm that produce elaborate skeletons, typically with a central capsule dividing the cell into the inner and outer portions. Their skeletons *(see below-left*) are usually made of silica. Lydite was once commonly used as touchstones for testing gold alloys. It consists mainly of chalcedony and/or microcrystalline quartz with minor organic matter and often trace pyrite. The fluctuating content of clay minerals and pyroclastic components commonly causes strong layering. During diagenesis, chalcedony recrystallization and remobilization as quartz may infill the porosity and form veins, while the organic components are highly carbonized. Lydite is sometimes found at the Silurian/Devonian boundary where black cherts (locally called lydites or flinty slates) developed from radiolarians, especially in the Frankenwald region and in the Vogtland in Germany. In America lidite can be found among the novaculites from Arkansas, Oklahoma and Texas, which were deposited at the close of the Devonian.

If anyone has a sample of lydite I (Ray) would be very interested in examining it.



Photomicrograph (250X) of radiolaria

Radiolarite Chert and Quartz from Lower Saxony, Germany

The Most Up-to-Date Scientific Reconstruction of a Prehistoric Ichthyosaur

A thorough review of 300 years of research, and an exceptionally preserved fossil, have given us what paleontologists say is the most up-to-date reconstruction yet of an ancient beast. Living alongside dinosaurs during the Mesozoic Era, ichthyosaurs were

marine reptiles that swam and hunted in Earth's oceans. Resembling reptilian dolphins, these fascinating animals thrived for some 160 million years before going extinct, and their fossil record is rich and glorious. More recently, however, paleontologists have also been discovering preserved soft tissues, which gives a much larger pool of information to draw upon when trying to figure out what ichthyosaurs looked like. This information, in turn, can help us understand how the beasts lived. Led by paleontologist Mats Eriksson of Lund University in Sweden, a team has collated and analyzed previous research on ichthyosaurs – it means *"fish lizard"* – in a bid to make future research more accessible. They wrote in their paper, "*we present a review of ichthyosaur research and lifestyle iconography with particular focus on soft-tissue structures and inferences made from these, including aspects of coloration and thermoregulation.*" Of particular interest to the researchers was a fossil found in the Posidonia Shale, a Lagerstätte fossil assemblage in Germany. This almost complete Jurassic specimen is exceptional, and other researchers used it to gain insight into what ichthyosaurs looked like and how they lived. This fossil has previously been the subject of an extensive study on the biology and coloration of fish lizards, which was published in *Nature*. The team enlisted artist Esben Horn to sculpt a life-sized reconstruction of the ichthyosaur species *Stenopterygius quadriscissus* found in the Posidonia shale. The process took around a year and involved clay sculpture and 3D printing. The resulting animal is smooth-skinned, like leatherback turtles (*Dermochelys coriacea*), a present-day marine reptile. Previous studies concluded that, like other marine reptiles, this species had lost its scales during its evolutionary transition to the ocean. Ichthyosaur fossils have also shown evidence of melanosomes, cellular organelles that contain dark pigment that would have provided UV protection. The result, the researchers said, is a brilliant meeting of science and art, and the most up-to-date representation of an ichthyosaur yet. https://www.sciencealert.com/behold-the-most-accurate-reconstruction-yet-of-a-prehistoric-ichthyosaur

Patagonia Is Rapidly Rising Up in The Largest Glacial Adjustment Ever Recorded

Patagonian ice fields are among some of the fastest-melting glaciers on the planet. As these glaciers disappear, the earth that once lay beneath them is rebounding upwards at rates much faster than expected. Now, scientists have worked out that a gap in tectonic plates that began forming some 18 million years ago underneath now-shrinking ice fields is likely driving the recent rapid rock uplift seen in Patagonia, encompassing remote and sparsely populated areas in southern South America where few seismic studies have been conducted before. *"Variations in the size of glaciers, as they grow and shrink, combined with the mantle structure that we've imaged in this study, are driving rapid and spatially variable uplift in this region,"* says geophysicist Hannah Mark of the Woods Hole Oceanographic Institution, who led the study. When glaciers melt, the earth that once lay beneath them rebounds and rises, no longer burdened by the colossal weight of miles-thick ice sheets. This uplift, called glacial isostatic adjustment, usually occurs over thousands of years, not in decades, which appears to be happening in Patagonia. Along with the meltwater that gushes from glaciers, it affects how much global sea levels will rise under future climate warming scenarios that scientists are busy modeling. Rapid uplift of more than 1.6 inches per year has been measured in the thinning northern and southern Patagonian ice fields that are just a fraction of their previous size. A toe-length rise might not sound like much, but it's an extreme, unusual, and sudden change on a continental scale – and the largest present-day glacial adjustment ever recorded. In the new study, Mark and colleagues recorded seismic data around the Patagonian ice fields that straddle the Andes Mountains in southern Chile and Argentina, to map what was happening below the surface. Data collection ran 10 months longer than initially planned, because the seismic instruments were trapped in Patagonia during the first year of the COVID-19 pandemic. Those measurements, combined with other seismic data from local monitoring stations, revealed how a gap in the down-going tectonic plate almost 60 miles beneath Patagonia has enabled hotter, less viscous mantle material to flow underneath the continent. These lower-than-usual viscosities in the mantle beneath Patagonian ice fields could quicken the continental uplift associated with melting ice to decades or centuries, if the researchers' estimates are correct. *"Low viscosities mean that the mantle responds to deglaciation on the time scale of tens of years, rather than thousands of years, as we observe in Canada for example,"* says seismologist Douglas Wiens of Washington University in St Louis. *"This explains why GPS has measured large uplift due to the loss of ice mass [in Patagonia]."* https://www.sciencealert.com/here-s-why-glacier-melt-is-causing-patagonia-to-rise-up

Scientists Can Now Trace Earth's History in Individual Grains of Sand

Grains of sand on a beach can tell us more than you might think about the history of the planet, new research reveals – something to think about the next time you're heading to the coast for a swim or splash-around. Scientists have developed a new metric to determine what they call the *"age distribution fingerprint"* of the mineral zircon in sand. That fingerprint can then be used to reveal more about the evolution of the surface of the Earth across billions of years. Zircon is something that geologists look out for, because it can be formed when continents crash into each other. These crystals can in some cases be billions of years old, carrying a huge amount of history with them. Zircons are incredibly durable minerals. They have a high melting point (they melt at about **2190 °C**, and remain stable to **1750 °C**) so they remain a crystal in metamorphic situations where most other minerals around them melt. However, in these high temperature environments they can grow by adding new layers of zircon. Since uranium atoms are similar in size to zirconium atoms they sometimes substitute in the zircon crystal. As the uranium decays over time, the decay by-products are trapped in the zircon crystal. So, scientists can look at the concentrations of the decay products and the amount of original uranium left to determine how long the uranium atom has been in the crystal. This tells them when the new layer was added, when the original zircon was exposed to the metamorphic event. With this information they can determine when continents crashed together, when mountain ranges developed, and when igneous activity occurred. Zircons are also very hard (about **7.5** on Mohs hardness scale—harder than quartz) so they are resistant to abrasion when they interact with other sand grains in an erosional environment. So, the durability of zircon makes it resistant to geological erosion, and as it forms sediments, it stores information along with it. As the crust grinds together, forcing new rocks to congeal, a time stamp of the rock's age is preserved in its makeup. Even once it crumbles into tiny grains, it's possible to gather traces of this history. *"The world's beaches faithfully record a detailed history of our planet's geological past, with billions of years of Earth's history imprinted in the geology of each grain of sand, and our technique helps unlock this information,"* says sedimentologist Milo Barham from Curtin University in Australia. By figuring out the age distribution of zircon in a sand sample, from infants to the elderly, in geological terms, the new technique enables scientists to work out what mountain-generating events were taking place in the eons leading up to the depositing of that bank of sediment. The approach is even able to shed light on how Earth first developed a habitable biosphere, according to the researchers, peering back further in time than other methods of geological analysis. Another advantage that this new research technique has over existing methods is that it can be used to understand tectonic movements even when the age of the sediment deposit itself isn't known (a scenario that researchers often find themselves in). The team put their new method to the test with three case studies that highlighted how the age distribution fingerprint works, studying sediment in South America, East Antarctica, and Western Australia. *"For example, the sediment on the west and east coasts of South America are completely different because there are many young grains on the west side that were created from crust plunging beneath the continent, driving earthquakes and volcanoes in the Andes,"* says geochronologist Chris Kirkland from Curtin University. *"Whereas, on the east coast, all is relatively calm geologically and there is a mix of old and young grains picked up from a diversity of rocks across the Amazon basin."* The new analysis matched what previous research had uncovered about the sites. Even individual grains of sand can reveal the tectonic forces that created them, based on the age distribution of the sediment around them, the researchers say. The new technique can be used to reanalyze data from older studies, the researchers suggest, as well as to tease out more details from suitable sediment in future research. *"This new approach allows a greater understanding of the nature of ancient geology in order to reconstruct the arrangement and movement of tectonic plates on Earth through time,"* says Barham.

zircon crystal

https://www.sciencealert.com/scientists-can-now-trace-earth-s-history-in-individual-grains-of-sand

Dinosaur-Killing Asteroid Aftermath Was Even More Brutal Than We Realized

When the dinosaur-destroying asteroid collided with Earth 66 million years ago, massive amounts of sulfur, **volumes more than were previously thought,** were thrown high above land into the stratosphere, a new study finds. Once airborne, this vast cloud of sulfur-bearing gases blocked the Sun and cooled Earth for decades to centuries, then fell down as lethal acid rain on Earth, changing the chemistry of the oceans for tens of thousands of years, much longer than previously thought. As a result, the climate change that was associated with it was much greater perhaps than we thought previously. The fact that sulfur continued pouring down on Earth's surface for so long may help explain why it took so long for life, especially marine life, to recover, as some of the sulfur that fell onto the land would have then been washed into the oceans. The researchers' finding was completely serendipitous. The team had originally planned to study the geochemistry of ancient shells near the Brazos River in Falls County, Texas, a unique place that was underwater during the end-Cretaceous extinction. It's also not too far from the Chicxulub crater in Mexico's Yucatan Peninsula, where the 6-mile-wide asteroid struck. The researchers took a few sediment samples at the site, which they hadn't planned on doing. These samples were brought to the University of St Andrews in Scotland, where they were analyzed to identify the different sulfur isotopes (variations of sulfur that have a different number of neutrons in their nuclei). The researchers found that the sulfur isotopes had unexpected tiny changes to their masses. Such mass changes occur when sulfur enters the atmosphere and interacts with ultraviolet light. Volcanic eruptions release sulfur high into the atmosphere, which can mix with snow and end up in high concentrations in ice cores at the poles, where there is no other sulfur or sulfate to dilute the signal. However, this signal doesn't appear in marine rocks, because the sea has its own isotopic signature which totally dilutes the tiny amount of sulfur from these volcanoes. The fact that this signal is present in marine rock from the Cretaceous shows that, "*there must have been a heck of a lot of sulfur in the atmosphere after this impact event*." And that has a huge implication for climate change related to the impact, because we know from modern volcanic eruptions that sulfur aerosols cause cooling. A lot of the sulfur came from the sulfur-rich rocks at the Yucatan Peninsula. If the asteroid had hit somewhere else, perhaps there wouldn't have been as much sulfur released into the atmosphere and the climate change that followed might not have been as severe, and therefore the extinction event might not have been so bad. https://www.sciencealert.com/dinosaur-killing-asteroid-aftermath-was-even-more-brutal-than-we-realized

Seraphinite Clinochlore

Sample of Seraphinite variety of Clinochlore

Seraphinite is a trade name for a particular form of **clinochlore**, a member of the chlorite group. The mineral clinochlore ($Mg_5Al(AlSi_3O_{10})(OH)_8$) was first identified in 1851 in West Chester, Pennsylvania. It has since been discovered in a number of other locales in the USA, including New York, Arizona and New Jersey. Clinochlore can also be found in other countries, including Spain, Switzerland, Russia, Turkey and Italy. **Seraphinite** apparently acquired its name due to its resemblance to feathers due to its chatoyancy (bright band of reflected light). Seraphinite is named after the biblical seraphs or seraphim angels. With some specimens the resemblance is quite strong, with shorter down-like feathery growths leading into longer *"flight feathers";* the resemblance even spurs fanciful marketing phrases like "*silver plume seraphinite."* Seraphinite is generally dark green to gray in color, has chatoyancy, and is quite a soft stone, with a hardness of only 2 to 2.5 on the Mohs scale. Like all the chlorites, seraphinite exhibits perfect cleavage in one direction. When polished, seraphinite displays a pearly to vitreous luster. It has a density of 2.55 to 2.75, which is approximately the same range as quartz or beryl. Its refractive index is 1.576 to 1.599, similar to emerald and aquamarine. Due to its softness, seraphinite is mainly a collector's stone. What makes it of special interest is the silvery chatoyant fibers, which form patterns similar to feathers. Seraphinite is mined in a limited area of eastern Siberia in Russia. Russian mineralogist Nikolay Koksharov (1818-1892 or 1893) is often credited with its discovery. It occurs in the Korshunovskoye iron skarn deposit in the Irkutskaya Oblast of Eastern Siberia. For the more metaphysical among us, the romantic name and the association of seraphinite with angels has gained seraphinite a reputation as a healing gem that is good for nerves and brain cells. https://www.geologyin. com/2017/07/the-feathery-gemstone-seraphinite.html

10 Extraordinary Dinosaur Discoveries from 2021

When it came to dinosaur discoveries, 2021 did not disappoint.

1. **First preserved dinosaur butthole is "perfect"** Researchers have found all kinds of dinosaur remnants, bones, teeth and impressions of skin and feathers, for instance, but they've never found a butthole - until now. This opening, known as a cloacal vent, which dinosaurs used for pooping, peeing, breeding and egg laying - isn't like any other on record, according to the journal Current Biology. *"It's its own cloaca, shaped in its perfect, unique way."*

2. **T. rex numbered in the billions** As many as 2.5 billion *T. rex* individuals existed over the last 2.5 million years of the Cretaceous period (145 million to 66 million years ago), before the dinosaur-killing asteroid collided with Earth. Researchers looked at all kinds of factors to determine this number, including the dinosaur king's population density, habitat size, generation time and total number of generations. That's a lot, since fewer than 100 fossilized *T. rex* individuals are known to science.

3. **Supersaurus is the longest dinosaur on record** The longest dinosaur on record is the aptly named *Supersaurus*, which exceeded 128 feet and possibly even reached 137 feet in length, according a presentation this year at the Society of Vertebrate Paleontology annual conference. *Supersaurus*, discovered in 1972, was always known to be long, with previous estimates putting the plant eater at 111 feet. But now, newly excavated and analyzed bones reveal just how super this dinosaur was.

4. **Dinosaurs young and old traveled in herds** Long-necked dinosaurs, from mouse-size hatchlings to gigantic adults, traveled together in herds 40 million years earlier than previously thought, a dinosaur graveyard discovered in Argentina revealed. Researchers unearthed more than 100 fossilized eggs and the bones of 80 *Mussaurus patagonicus* individuals dating to 192 million years ago, during the Jurassic period (201.3 million to 145 million years ago). Incredibly, there was even evidence that young dinosaurs hung out (and died) together, indicating that the herd had an internal structure.

5. **This dino died sheltering eggs** An ostrich-like dinosaur that died brooding a nest of eggs has become a one-of-a-kind discovery: It's the only known non-avian dinosaur specimen found sitting on top of eggs that still have embryos. This dinosaur, an oviraptorosaur, was likely incubating the eggs as it sat on them during the Cretaceous period in what is now China. Of the 24 eggs, seven still have fossilized embryos. That's not bad for eggs that are 70 million years old!

6. **Some dinosaurs, but not T. rex, were extremely fast** Meat-eating dinosaurs sprinted at speeds of nearly 28 mph (45 km/h), according to an analysis of two dinosaur trackways in northern Spain. The trackways were left behind by two different carnivorous individuals running in a squishy lake bed during the early Cretaceous, a December study in the journal Scientific Reports found. The discovery reveals that these beasts were about as speedy as the fastest human on record, Usain Bolt, who briefly reached 27.5 mph (44.3 km/h) at a race in 2009. But *T. rex*, the most famous carnivore of them all, was a slowpoke, with a preferred walking speed of just under 3 mph (5 km/h), according to a separate study, published in April in the journal Royal Society Open Science. That's about the average walking speed for a person. Is this embarrassing for the dinosaur king? Yes. But *T. rex* did have serrated, banana-size teeth and one of the most powerful bite forces on record, so it's not like we'd laugh in its face or anything (unless we were walking away at a brisk clip).

7. **A "shark-toothed" dinosaur was larger than its rival tyrannosaur** Imagine seeing a big tyrannosaur and thinking it must be the apex predator of its ecosystem. But nope, you'd be wrong, because an even larger dinosaur lumbers into view, and wow is it big! This beast, the newly described *Ulughbegsaurus uzbekistanensis*, was a so-called shark-toothed dinosaur, or carcharodontosaur, according to a September study in the journal Royal Society Open Science. Carcharodontosaurs were cousins and competitors of tyrannosaurs. *U. uzbekistanensis* lived in what is now Uzbekistan about 90 million years ago. It was 26 feet (8 meters) long and weighed 2,200 pounds (1,000 kilograms). Put another way, it was twice the length of, and more than five times heavier than, the ecosystem's previously known apex predator, the tyrannosaur *Timurlengia*.

8. **Tyrannosaurs had fight clubs** Fearsome tyrannosaurs bit each other's faces, but likely not with the intention to kill. Instead, these predators probably got bitey when they were battling for prizes, like territory, mates or higher status, a September study in the journal Paleobiology found. This insight into dinosaur behavior was made possible by studying 202 tyrannosaur skulls and jaws that had a lot of scars, 324 in total. Only about half of the older tyrannosaurs had these scars, so perhaps just mature members of one sex partook in these rumbles.

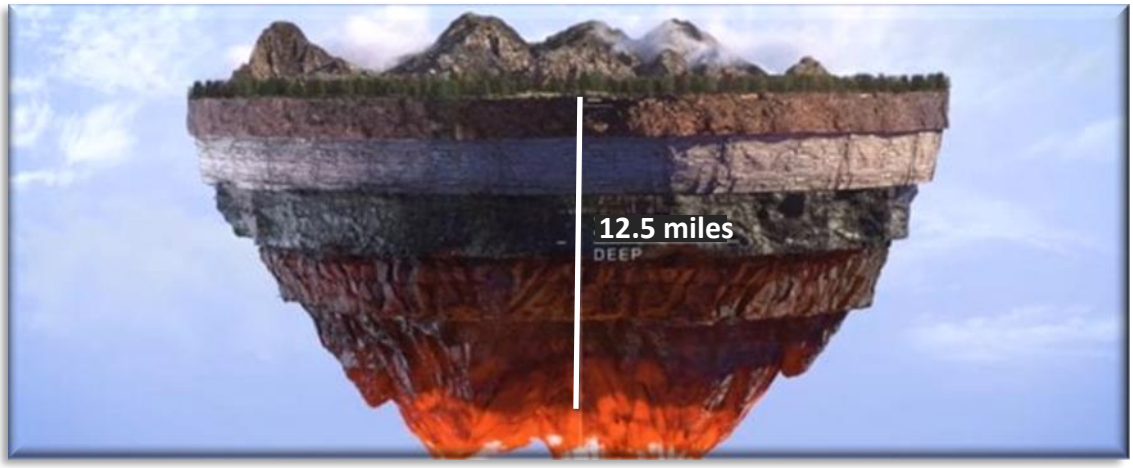
9. **Long-necked dinosaurs migrated long distances** How do you determine whether dinosaurs migrated? It's not like these beasts sent postcards that then fossilized. Well, one way is to look at gastroliths, or *"stomach stones"* used to grind food, that dinosaurs gulped down in one region and then deposited in another. In the Jurassic period, long-necked dinosaurs, called sauropods, swallowed pink quartzite gastroliths in what is now Wisconsin and later died in what is now Wyoming, leaving the stones in a new spot, researchers wrote in a February study in the journal Terra Nova. That's a distance of hundreds of miles, or *"one of, if not the longest inferred examples of [nonavian] dinosaur migration"* on record, the researchers said.

10. **Weird ankylosaur had an Aztec war club-like tail** This year revealed a totally unknown lineage of ankylosaurs in the Southern Hemisphere, and these dinos had unique tails. When Pangaea split up during the Jurassic period, the ankylosaurus in the northern supercontinent Laurasia grew weaponized tails with spikes and clubs. But now, the newly described *Stegouros elengassen*, found in Chile, shows that ankylosaurs in the Southern Hemisphere evolved to be very different. They developed their own kind of weaponized tail that looks like an Aztec sword, or macuahuitl. The newly discovered ankylosaur died more than 70 million years ago by a river, possibly in quicksand, which would explain why the specimen was so well preserved. Thank goodness, or that spectacular tail might have been lost!

https://www.livescience.com/dinosaur-discoveries-2021

Radical Plan to Make Earth's Deepest Hole Could Unleash Limitless Energy

Since its launch in 2020, a pioneering energy company called Quaise has attracted some serious attention for its audacious goal of diving further into Earth's crust than anybody has dug before. Following the closure of first round venture capital funding, the MIT spin-off has now raised a total of $63 million, a respectable start that could potentially make geothermal power accessible to more populations around the world. The company's vision for getting closer to the center of the Earth is to combine conventional drilling methods with a megawatt-power flashlight inspired by the kind of technology that could one day make nuclear fusion energy possible. Geothermal energy has become the forgotten renewable. With solar and wind increasingly dominating the mar-



ket of green energy, efforts to tap the vast reservoir of heat deep beneath our feet remain stubbornly well behind. It's not hard to understand why. Despite being a perfectly good choice of clean, uninterrupted, limitless power, there are very few places where hot rocks suitable for geothermal energy extraction sit conveniently close to the surface. Quaise aims to change that by developing technology that will allow us to bake holes in the crust to record depths. To date our best efforts at chewing our way through the planet's skin have bottomed out at around 7.6 miles. While the Kola Superdeep Borehole and others like it may have reached their limit, though, they nonetheless represent amazing feats of engineering. To push further, we'd need to find ways to grind away at material squeezed by dozens of kilometers of overhead rock, and then cart it back up to the surface. Digging tools would also need to still be able to grind rock at temperatures exceeding 356 degrees Fahrenheit. Turning the drill bits over such a long distance would also need some clever thinking. One potential alternative to the above obstacles is to drill less, and burn more. Born out of nuclear fusion research at MIT Plasma Science and Fusion Center, Quaise's solution is to use millimeter-long waves of electromagnetic radiation that force atoms to melt together. Devices called gyrotrons can efficiently churn out continuous beams of electromagnetic radiation by shaking electrons at high speed inside powerful magnetic fields. By hooking a megawatt-power gyrotron up to the latest in cutting tools, Quaise expects to be able to blaze its way through the toughest, hottest rock, down to depths of around 12.5 miles in a matter of months. At these depths, the heat of the surrounding rock can hit temperatures of around 1000 degrees Fahrenheit, enough to transform any liquid water pumped down there into a vapor-like supercritical state that's perfect for generating electricity. Using its seed and investment funding, Quaise anticipates having field-deployable devices providing proof-of-concept operations within the next two years. If all goes well, it could have a working system producing power by 2026. By 2028, the company hopes to be able to take over old coal-fueled power stations, transforming them into facilities powered by steam instead. It's a technology at once so old and yet so novel, we're bound to have plenty of questions on how, and whether, it might ever succeed. Lucky for us, Loz Blain over at New Atlas has listed a bunch of them for Quaise's CEO and co-founder, Carlos Araque, to answer. Even without this technology, roughly 8.3 percent of the world's energy could come from a geothermal source, supplying around 17 percent of the world's population. Close to 40 nations could rely completely on geothermal energy right now. Yet currently, less than half a percent of the world's electricity is provided by the heat beneath our feet. To remain on track for net zero emissions by 2050, geothermal energy should be growing at around 13 percent each year. Right now, its expansion is a mere fraction of that. That leaves a lot of room to grow, even if we don't find a way to expand its reach. Whether companies like Quaise will help invigorate interest in this underdog is left to be seen. What's certain though is that time to cut emissions and cap global warming to something less catastrophic is rapidly shrinking. We're hitting rock bottom, so maybe it's time for us to dig a little deeper . https://www.sciencealert.com/confidence-grows-in-mit-spin-off-aiming-to-make-the-deepest-hole-for-limitless-energy

2022

Blackhawk Gem & Mineral Society

GEM, MINERAL & FOSSIL SHOW

Featuring:

Iowa Rockhounds

Rock, Mineral, & Fossil Collecting!

Featured guests:

Glen & Mary Rocca

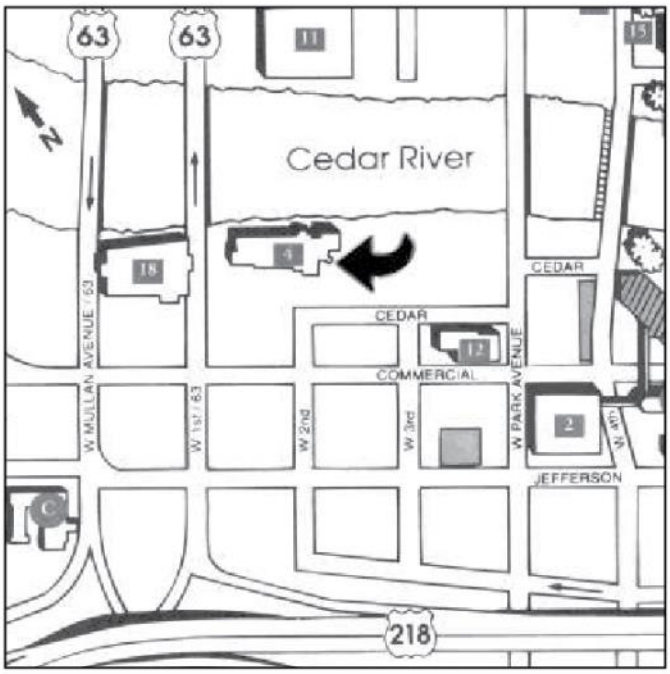
Iowa Rockhounds

APRIL 10th

11 am to 5 pm

Waterloo Center for the Arts

225 Commercial street • Waterloo, IA



Special 2022 Activities

Mystery Rock Identification
Have a rock, mineral, or fossil you are unsure about? Bring it for the experts to identify.

Iowa Rockhounds: Glen & Mary Rocca
Adventures in Rock, Mineral & Fossil Hunting and Collecting

Flint Knapping Demonstrations

Faceting Demonstrations

Fossil Plaster Casting
Make your own fossil replica to take home.

Fish Pond
Fish for a bag of polished rocks, agates and fossils.

- Silversmithing
- Agates
- Rock Tumbling
- Antique Marbles
- Faceting
- Crystals
- Geodes
- Fossils
- Hand-crafted Jewelry
- Gems
- Minerals
- Tumbled Stones
- Children's Pebble Pit

Free Admission • Donations Accepted
Membership Applications Available

Masks Recommended
We will follow the Waterloo Center for the Arts' covid safety protocols.

For additional information, contact Show Chairman Dave Malm, 319-266-6433, davidmalm@cfu.net, or Becky Stansbery 319-961-5792.

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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. Meetings are held at 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

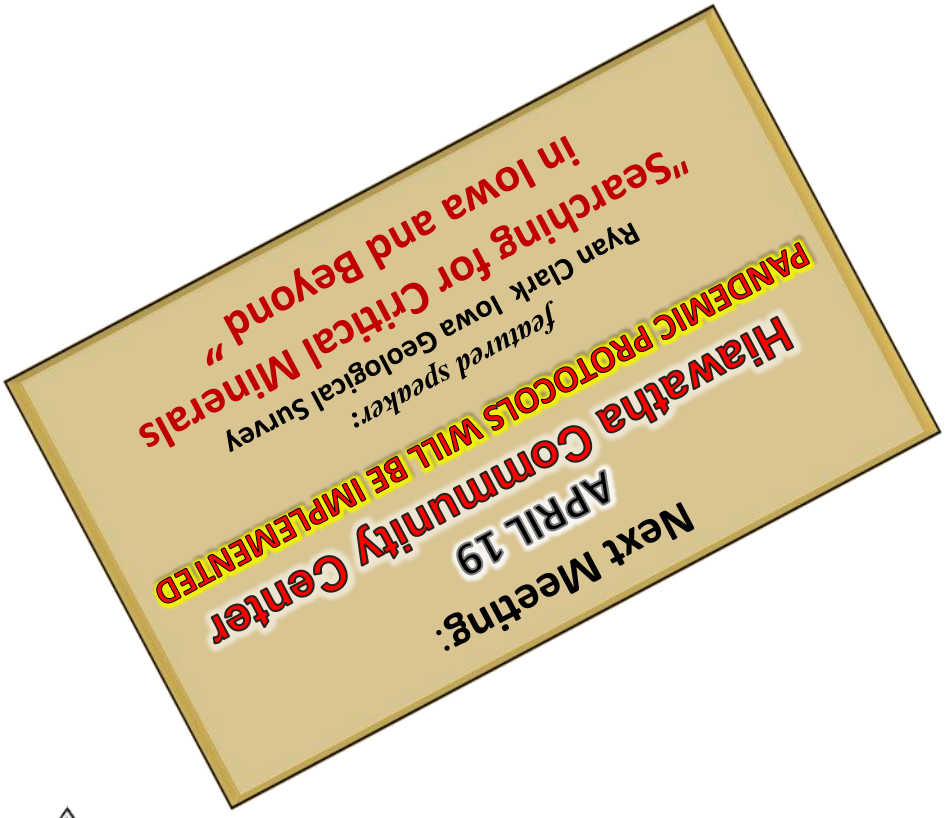
CEDAR VALLEY ROCKS & MINERAL SOCIETY

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



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