

Cedar Valley Gems

Cedar Valley Rocks & Minerals Society

Cedar Rapids, Iowa

cedarvalleyrockclub.org



CEDAR VALLEY GEMS

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

Next CVRMS Meeting
Tues. October 17
7:15 pm

SPECIAL TOUR V.A.S.T.

Van Allan Science Teaching Center

The Grant Wood AEA Van Allan Science Teaching Center (VAST) furnishes elementary teachers with hands-on science units that enhance the classroom curriculum by providing science kits that allow students to try the activities studied in their textbook. VAST also provides on-site professional development where the educators complete every step of the kit-based experiments they'll be doing with their students, ensuring that they understand the concepts. VAST currently prepares and circulates 4,900 kits, which are updated yearly. The CVRMS assists in supporting VAST with a portion of the profit from our spring Rocks, Fossils and Minerals Show.

We will meet at the

Grant Wood Area Education Agency

1120 33rd Ave SW, Cedar Rapids

at 7:15 pm.

Meet *Moros intrepidus*: A Tiny Ancestor of Tyrannosaurus Rex

During the late Jurassic period, around 150 million years ago, a small tyrannosauroid called *Stokesosaurus* lived in North America. This tiny carnivore had to keep an eye out for the much larger *Allosaurus* while hunting and scavenging. But by the late Cretaceous period, around 66 million



Artistic model of *Moros intrepidus*.

years ago, *Allosaurus* was long gone and tyrannosauroids had evolved into hulking, ferocious top predators, like *T. Rex*. For many decades, scientists could not find any North American tyrannosauroid fossils between these two periods. It was as if these dinosaurs had disappeared in the late Jurassic and reappeared larger and more ferocious 84 million years later. Then, in 2019, a group of American paleontologists unearthed a remarkable specimen in the Utah desert. The team found leg bones and teeth from a tyrannosauroid that they named *Moros intrepidus*. The fossils dated back to the middle of the Cretaceous period, 30 million years before *T. Rex* showed up. *M. intrepidus* appears to have had powerful hind legs, suggesting that it was fast and agile. Like its Jurassic ancestors, however, it was not large. This realization, that tyrannosauroids were still small and unassuming during the middle of the Cretaceous, makes late-Cretaceous tyrannosauroids like *T. Rex* even more remarkable; the dinosaurs somehow evolved from marginal scavengers to top predators in just 30 million years. When *M. intrepidus* walked the Earth, present-day Utah was at the humid edge of a shallow sea that divided the west part of North America from the east. It lived in a lush ecosystem that supported many other animals.

<https://www.discovermagazine.com/the-sciences/meet-moros-intrepidus-a-tiny-ancestor-of-tyrannosaurus-rex>

CVRMS Meeting September 19 — Minutes —

MEETING CALLED TO ORDER: at 7:15p.m. by Marv Houg
Meeting called to order at the Hiawatha Community Center.

GUESTS WERE WELCOMED including Linda McDonald, Verna Dodson, Amy Christianson, Jim Christianson.

TREASURER'S REPORT by Dale. Apologies for its length since it includes 3 months of data to review. Also included auction report. It looks like CVRMS earned about \$12,300 for the club. Marv thanked everyone for their help. Julie raised the issue of someone who listed names and how much they were paid on some website. It wasn't the club and we did not know about it.

PROGRAM by Ray Anderson: Geology And Hydrology of the Iowa (and Cedar) River Watershed.

NEXT YEAR'S SHOW: Directors suggested "corals" as a theme. Julie made motion that next year's show will feature corals as a theme. A.J. seconded. Marv made a point that board will come up with clever name for the coral-themed show. All approved. Next show will feature corals.

NEXT MONTH'S MEETING: Next meeting will be held at the Van Allen Science Teaching Center (VAST) at 1120 - 33rd Ave. SW, Cedar Rapids. The meeting will include a tour and discussion of VAST activities, partially supported by CVRMS donations. Watch the announcement for directions.

SHERM'S FALL ROCK SALE: Glenn announced that Sherm Lunde will be hosting a garage rock, fossil, and mineral sale on October 14 from 8:00 am to 4:00 pm at his home, 1103 Ellen St. in Cedar Falls. Lots of rocks for sale.

TRAILER NEEDS CLEANING: Marv announced that the club trailer needs cleaning out. Volunteers will be welcomed.

WIRE WRAP CLASS: CVRMS hosted a wire wrapping class on August 17. Because of the demand and response we are adding an October 5th class at Hiawatha Community Center at 6:00 p.m. by reservation only. No charge to club members. Remember your tools.

MSHA TRAINING Various quarries are requiring proof of MSHA training specific to rock hounds. We have had classes prior to our Spring Show in the past, but new arrangements will have to be made. Marv will make calls .

MEETING ADJOURNED: At 9:25 p.m. a motion to adjourn was made by AJ second by Ray. Meeting adjourned.

Respectfully submitted,
Dell James, Secretary

CVRMS Board Meeting Sept. 26 — Minutes —

MEETING CALLED TO ORDER: at 7:15p.m. by Marv Houg at his house. Members present Dell James, Kim Kleckner, Marv Houg, Dale Stout, Ray Anderson, Jay Vavre, Bill Desmarais, Matt Burns and Sharon Sonnleitner.

MINUTES FROM PREVIOUS MEETING reviewed. Jay moved to accept minutes as published. Bill seconded. Minutes accepted as published.

TREASURER'S REPORT by Dale. Included the last year's report on the auction and this year's as comparison.

2023 AUCTION: Ray will write something for the newsletter about the auction. **Discussion** regarding the complaints received about the auction. Mainly the length of time it took. Suggest that we stick to our 1200-lot limit. Also we could have second microphone and the guys could describe the next items up for bid. **Suggest that Craig's List** could be utilized for next year's auction.

BUS TRIP BY BILL. About 40 signed up so still have some room. Anyone interested call Bill or Dale and let them know. There will be a pickup in Anamosa at the Walmart parking lot about 6:30. Bring your own lunch. No big coolers. Dale sent the check for \$2,840.00. The club will give a \$100 tip to the driver.

NAME TAGS Dale is working on it. Jay got the name from the man who used to make our name tags.

FACEBOOK Kim said we have 2,600 members. And has a concern that are we still not interested in having foreign companies who want to use us to advertise and sell. Agreed that that wasn't the purpose of the Facebook page.

SUNDAY AT THE QUARRY will be held this weekend. Marv received a call from Glen, who wanted to know who was coming to the event. Matt, Ray, Joel, AJ, Marv, Kim have committed to be there. Geode cracking for kids and a display by Ray will be provided.

WIRE WRAPPING: October 5 is the day for second Wire Wrapping class. Dale will send out the notice to those registered.

BILL MADE A MOTION that \$200.00 as a memorial to all the members who have passed. Jay seconded. Passed. In the future we will donate \$25.00 per person who has passed.

NEXT MEETING will be at VAST center on 1120 33rd SW Cedar Rapids on October 17.

MOTION TO ADJOURN by Jay seconded by Ray. 8:48 adjourned

Respectfully submitted,
Dell James, Secretary

This 'Gnarly-Looking Beast' Terrorized Brazil 265 Million Years Ago

It sounds hard to believe, but even before dinosaurs were a thing, big, weird, and sometimes scary animals were wandering around the planet. A newly found example of such an odd creature



Artistic reconstruction of *Pampaphoneus biccai*.

was discovered in a rural part of São Gabriel in southern Brazil—the *Pampaphoneus biccai*. According to the researchers studying the 265-million-year-old

beast, it was likely the toughest, biggest, and blood-thirstiest carnivore that South America had seen at the time. "This animal was a gnarly-looking beast, and it must have evoked sheer dread in anything that crossed its path," Stephanie E. Pierce, a professor at the Museum of Comparative Zoology at Harvard and co-author of a new study describing the creature, said in a statement. "Its discovery is key to providing a glimpse into the community structure of terrestrial ecosystems just prior to the biggest mass extinction of all time. A spectacular find that demonstrates the global importance of Brazil's fossil record." The fossil, found in middle Permian rocks, included a complete skull and some skeletal bones such as ribs and arms. This specimen is only the second of the *Pampaphoneus* genus to be found in South America, though other similar specimens have been spotted in Russia. Its 15-inch-long skull is the largest of its kind ever found intact. In its prime, the *Pampaphoneus* would have weighed around 881 pounds (about the size of a full-grown cow) and reached around nine feet in length—a fearful Permian predator, to say the least. The *Pampaphoneus* belonged to the dinocephalian clade, which in Greek means "terrible head," a shout out to their thick cranial and skull bones. This large family of animals were the first non-mammalian therapsid to be scientifically described, and they largely died out before the Capitanian mass extinction event that predated the Permian extinction. Therapsids are a group of vertebrate animals that predate mammals and all of their ancestors. The Brazilian *Pampaphoneus* filled the same ecological niche as modern big cats. It was the largest terrestrial predator we know of from the Permian in South America. The animal had large, sharp canine teeth adapted for capturing prey. Its dentition and cranial architecture suggest that its bite was strong enough to chew bones, much like modern-day hyenas. Some of this potential prey has already been identified, such as the tusked *Rastodon* and the giant amphibian *Konzhukovia*. But there's still much to learn about this terrifying therapsid, and its life before the largest extinction event in the history of the planet. <https://mail.google.com/mail/u/0/#inbox/FMfcgzGtxKLnmxXbXdrzvFhWRzcDpQKh>

Spotlight Gemstones: Tourmaline / Opal

October's Birth Stones



If you were born in October you may choose from 2 birthstones, tourmaline or opal.

TOURMALINE is a crystalline boron silicate mineral compounded with elements such as aluminium, iron, magnesium, sodium, lithium, or potassium. It is a six-member ring cyclosilicate having a trigonal crystal system, occurring as long, slender to thick prismatic and columnar crystals that are usually triangular in cross-section, often with curved striated faces. The style of termination at the ends of crystals is sometimes asymmetrical, called *hemimorphism*. Tourmaline is distinguished by its three-sided prisms; no other common mineral has three sides. Prism faces often have heavy vertical striations that produce a rounded triangular effect. Tourmaline is classified as a semi-precious stone, and the gemstone comes in a wide variety of colors. Varieties include **schorl** (brownish-black to black), **dravite** (dark yellow to brownish-black), **rubellite** (red or pinkish-red), **indicolite** (light blue to bluish-green), **verdelite** or Brazilian emerald (green), and **achroite** (colorless). In all, 32 tourmaline group endmembers are recognized. **Bicolor** or **tricolor** tourmaline crystals are also found.

OPAL is a hydrated amorphous form of silica ($SiO_2 \cdot nH_2O$). Its water content may range from 3 to 21% by weight, but is usually between 6 and 10%. Because of its amorphous character, it is classed as a mineraloid, unlike crystalline forms of silica, which are classed as minerals. It is deposited at a relatively low temperature and may occur in the fissures of almost any kind of rock, being most commonly found with limonite, sandstone, rhyolite, marl, and basalt. The internal structure of precious opal makes it diffract light. Depending on the conditions in which it formed, it can take on many colors. Precious opal ranges from clear through white, gray, red, orange, yellow, green, blue, magenta, rose, pink, slate, olive, brown, and black. Of these hues, the black opals are the most rare, whereas white and greens are the most common. It varies in optical density from opaque to semitransparent. Fossils are sometimes replaced or coated by opal.

What in the World?



What in the World is this geological feature and where can it be seen??

September's Photo



Last month's *What in the World* photo shows the Crowley Lake Columns, found near Bishop, California. The columns formed when falling snow melted on top of recently deposited volcanic ash. This still-heated porous material caused the melted snow to boil, which created the even spaces between the columns that exist today

ROCK CALENDAR CVRMS EVENTS OF INTEREST

2023

Oct. 14 — Sherm's Big Fall Rock Sale

1103 Ellen Street, Cedar Falls
8:00 am—4:00 pm

Oct. 17 — CVRMS Monthly Meeting

Tour of the VAST Center 7:15 pm
1120 - 33rd Ave. SW Cedar Rapids

Nov. 20 — CVRMS Monthly Meeting

(Wednesday) Hiawatha Community Center 7:15 pm
Program to be announced

Dec. 7 — CVRMS Christmas Party

Hiawatha Community Center 6:30 pm
Details to be announced

2024

Jan. 16 — CVRMS Monthly Meeting

Hiawatha Community Center 7:15 pm
Program to be announced

Feb. 20 — CVRMS Monthly Meeting

Hiawatha Community Center 7:15 pm
Program to be announced

Mar. 19 — CVRMS Monthly Meeting

Hiawatha Community Center 7:15 pm
Program to be announced

Mar. 23-24 — CVRMS Rock Show

Hawkeye Downs, Cedar Rapids
Show Theme: FOSSIL CORALS

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.

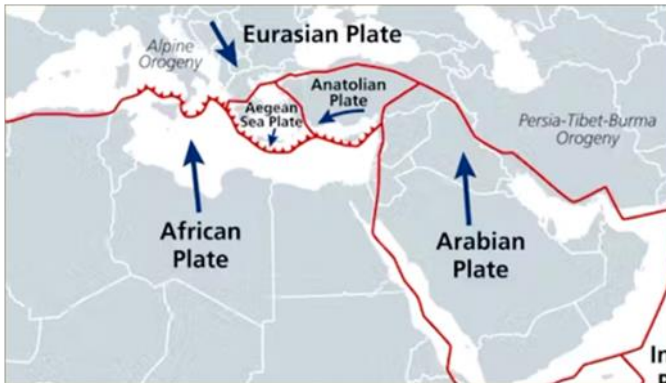
On September 8 a powerful magnitude 6.8 earthquake struck Morocco killing more than 2,500 people. This area has experienced many devastating earthquakes in the past, so I thought it might be interesting to look into the tectonic processes that lead to these devastating events. Following is a good explanation of forces involved in producing these earthquakes.

Here's why Morocco's quake was so deadly — and what we can do for the next one

by José A. Peláez Montilla

What geological factors contributed to this earthquake?

The tectonic activity in Morocco primarily involves the convergence of the Eurasian and the Nubian (African) plates. The Eurasian Plate pushing against the Nubian Plate is what led to the formation of the Atlas Mountains (the epicenter of this recent earthquake), which run through Morocco, Algeria and Tunisia. The collision between these plates is causing a shortening of the Atlas Mountains. GPS measurements show that they are moving about 1 millimeter closer to each other every year. This shortening and compression produces the faults that are the likely cause of this earthquake. In addition, as pointed out by various researchers, the High Atlas Mountains have a unique geological feature where the Earth's outermost and hard layer, called the lithosphere, is thinner than usual, combined with an unusual rise of the mantle. All these features could have influenced the occurrence of this high magnitude earthquake. Over the last thousand years, earthquakes affecting Morocco have tended to take place offshore, along the Azores-Gibraltar transform fault and along the Rif mountains in northern Morocco. Earthquakes along the Atlas Belt are smaller in number, but not unusual. The most significant, recent earthquakes affecting Morocco were in 1994, 2004 and 2016, with magnitudes ranging between 6.0 and 6.3. Further back in history the devastating Agadir earthquake in February 1960, (magnitude 6.3) killed between 12,000 and 15,000 people. In addition, near the location of the recent event, there was another earthquake in 1955, with an estimated magnitude of about 5.8. Even further back, the 1624 Fès earthquake, had an estimated magnitude of 6.7, and the 1731 Agadir earthquake a magnitude of 6.4. Earthquakes cannot be predicted, even with the current knowledge in seismology. What seismologists can do is establish the areas in which earthquakes are most likely to occur, even establish the probability of their occurrence and its uncertainty. This is that we call a long-term prediction, carried out from



specific seismic hazard studies in the region. They are based on knowledge of past seismicity in the area, both historical and instrumental, and on the existence and knowledge of active tectonic structures (faults) that could generate earthquakes. The best tool we have to mitigate the impact of earthquakes is to conduct reliable seismic hazard studies. The results of these must then be implemented into national building codes. This way engineers can incorporate seismic safety into building designs. Building codes need to take into account several factors, including the characteristics of the soil, the way seismic waves move and how the soil can amplify its movement during an earthquake. Also the expected shaking of the ground, which influences the behavior and damage of buildings. These factors vary from one city to another, and in some cases from one district to another. Seismologists know that earthquakes do not kill people, buildings do. Buildings with lack of regulation and lack of structural support are potential killers in high seismic hazard areas. Building codes must therefore be mandatory, and should be updated periodically. As more is learned about earthquake geology and the impact of earthquakes on buildings, building codes should be updated regularly. This is the best way to protect ourselves against these catastrophic phenomena. Territorial planners and rulers must know this and take it into account. <https://www.livescience.com/planet-earth/earthquakes/heres-why-moroccos-quake-was-so-deadly-and-what-we-can-do-for-the-next-one>

A Three-Eyed Organism Roamed the Seas Half a Billion Years Ago

A newly discovered three-eyed relative is disappointingly unrelated to the eerie three-eyed ravens of *Game of Thrones*. But this Cambrian-era beast is a relative of today's insects and boasts some fearsome limbs. The unique fossilized animal was described in a study published August 28 in the journal *Current Biology*. The animal, scientific name *Kylinxia*, was found in 520 million year old rocks in a fossil deposit called the Cambrian

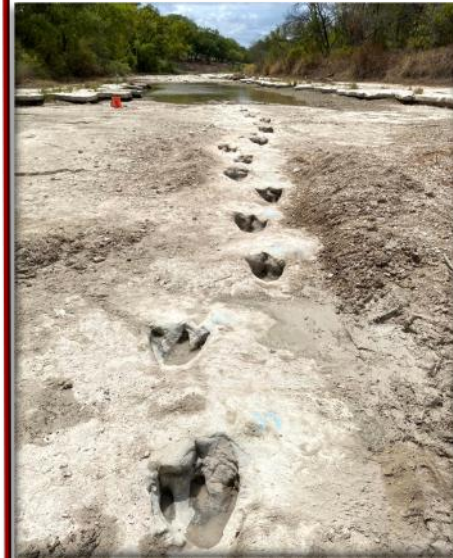


An artistic reconstruction of *Kylinxia*, a relative of present day insects and crustaceans.

Chengjiang biota near the town of Chengjiang in southern China. More than 250 species of exceptionally well-preserved fossil organisms have already been described from this location, which gives scientists a glimpse of what was going on in the world's oceans as they developed. Importantly, *Kylinxia* is filling in some evolutionary gaps in our understanding of the evolution of animals known as arthropods. This phylum of animals includes insects, crabs, shrimp, scorpions, spiders, and centipedes among others. Arthropods have an exoskeleton made of a tough material called chitin that is mineralized with calcium carbonate, as well as a body divided into segments and paired jointed appendages. They are considered some of Earth's most successful species and over 85 percent of all known animal species are classified as arthropods. *Kylinxia* was about the size of a large shrimp, had a pair of limbs that it likely used to catch prey, and a signature trio of eyes on its head. Discovering two previously undetected pairs of legs in *Kylinxia* suggests that living arthropods inherited a six-segmented head from an ancestor at least 518 million years ago. After its initial discovery, *Kylinxia* was imaged using a CT scanner. The scan revealed that more soft parts of the animals' anatomy were also buried in the rock. While there are plenty of species of arthropods preserved in the fossil record, most fossils only preserve the hard skeletons. As they spun the animal around, they could see that its head possesses six segments, just as in many living arthropods. This new specimen was nearly complete, which enabled the team to identify the six segments that made up its body: the head, a second segment with its grasping limbs, and the other four segments which have a pair of jointed limbs. Amazingly, they found that its head was composed of six segments, as are insects' heads. <https://www.popsci.com/environment/three-eyed-cambrian-arthropod/>

One of the Longest Dino Tracks in the World Revealed by Drought in Texas State Park

An ongoing drought has revealed about 70 dinosaur tracks at Dinosaur Valley State Park in Glen Rose, Texas. The footprints, which date back about 110 million years, had been hidden under water and mud in the Paluxy River, which cuts through the state park, according to the Chron.com. Experts think that the tracks, found in what is known as the state park's Ball Room site, belonged to two different species of dinosaurs. The three-toed tracks were likely from the giant carnivore *Acrocantinosaurus*, while the "elephant-looking" footprints were stomped into the ground by a massive long-necked *Sauroposeidon*.



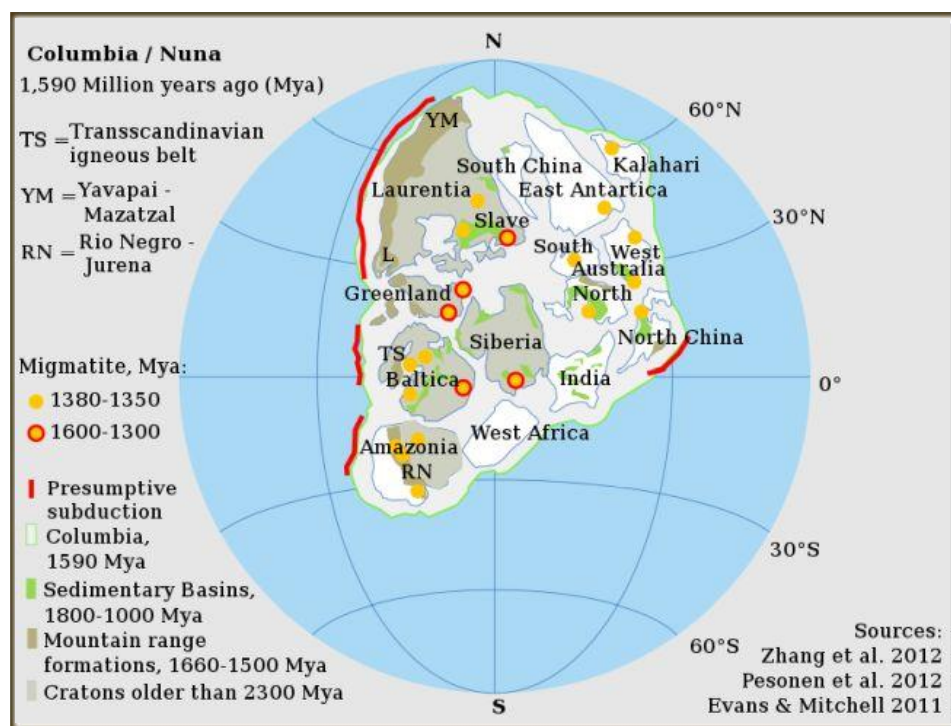
"Lone Ranger" dinosaur trackway near Glen Rose Texas

Acrocantinosaurus was one of North America's largest predators during the Early Cretaceous period (145 million to 101 million years ago), with a length of about 40 feet. Yet the long-necked *Sauroposeidon*, a genus of sauropod, dwarfed it, stretching approximately 100 feet long and weighing a whopping 110,000 pounds (50 tons), according to the Natural History Museum

in London. One portion in particular, dubbed the "**Lone Ranger Track**," is believed to be one of the longest dinosaur tracks in the world, according to a video from WKYC Channel 3. Officials from the Friends of Dinosaur Valley State Park, a nonprofit organization that supports the park, first spotted the tracks on Friday (Aug. 25) and announced that the prints were "*the most tracks we have ever seen at this location*," according to a Facebook post. "*This is not normal for us, but due to two consecutive years of high temps and drought conditions it has given us the opportunity to uncover new tracks*," Paul Baker, retail manager at the Friends of Dinosaur Valley State Park, told the Chron.com. "*Once we receive a decent rain most of the tracks will be covered up again*." Members of the Dallas Paleontological Society plan to map and create casts of the tracks for future research purposes, according to the Chron.com <https://www.livescience.com/animals/dinosaurs/one-of-the-longest-dino-tracks-in-the-world-revealed-by-drought-in-texas-state-park>

We've Finally Figured Out The Secret of Stunning, Rare Pink Diamonds

It takes a few things to make a diamond. First, you need carbon. Then you need a bunch of pressure and heat deep below the crust. And time, up to billions of years of it, for nature to do its job and then cough them up somewhere close to the planet's surface. That's regular diamonds. If you want the rare pink kind a few more factors are required, not all of which are completely understood. A study led by researchers from Curtin University in Australia has now provided an important missing piece of the puzzle explaining how these uniquely stunning gems make their way to the surface. In addition to the pressure of colliding tectonic plates, pink diamonds require continents to stretch as they break apart. It's this taffy-like tugging that dredges the pink diamonds up from the depths of the mantle, where they can be discovered by humans scratching about topside. Before closing in 2020, Argyle mine in the remote East Kimberley region of Western Australia supplied 90 percent of the world's pink diamonds. Discovering a critical step in their journey means we might be able to locate other crustal deposits of the rare gems. "As long as these three ingredients are present – deep carbon, continental collision and then stretching – then we think it will be possible to find the 'next Argyle', which was once the world's largest source of natural diamonds," explains geologist Hugo Olierook of Curtin University in Australia. While diamonds in general aren't especially rare, pink diamonds are among the rarest gems in the world. We don't know what makes them pink, either. Yellow or blue diamonds are colored by the presence of other elements, but pink diamonds are as chemically pure as the white variety. What scientists do know is that they seem to require the immense forces involved in the collision of tectonic plates, deep in Earth's mantle. To figure out what else is needed to find pink diamonds, Olierook and his colleagues used geochronological techniques on rocks from the mine to identify the age of the deposits. They looked at ratios of uranium in apatite



and zircon that were part of the rocks in which pink diamonds are found. These rocks contain very, very small amounts of uranium and sometimes thorium, which decay over time into lead and helium. By measuring the ratio of uranium and its decay products in these minerals, scientists can obtain a very accurate age for the formation of the rock. "By using laser beams smaller than the width of a human hair on rocks supplied by Rio Tinto," Olierook explains, "we found Argyle to be 1.3 billion years old, which is 100 million years older than previously thought, meaning it would likely have formed as a result of an ancient supercontinent breaking apart. That supercontinent could be the ancient chunk of crust geologists call Nuna, which is estimated to have broken apart sometime between 1.3 and 1.22 billion years ago. The stretching of Nuna as it split might be a vital component of the delivery of pink diamonds to the surface."

"Argyle is located at the point where the Kimberley region and the rest of northern Australia smashed together many years prior, and that sort of collision creates a damaged area or 'scar' in the land that will never fully heal," Olierook says. While the continent that would become Australia didn't break up, the area where Argyle is situated was stretched, including along the scar, which created gaps in the Earth's crust for magma to shoot up through to the surface, bringing with it pink diamonds. This could help scientists figure out the formation process of pink diamonds, but also gives us clues about where to look for more. However, it may not be easy. All of the world's diamonds can be found in volcanic regions. It seems that magmatic upwelling is required to transport the gems from deep underground. This means, the researchers say, that most of them are found in the centers of ancient continents, where the volcanic regions are exposed on the surface. "Argyle is at the suture of two of these ancient continents," Olierook explains, "and these edges are often covered by sand and soil, leaving the possibility that similar pink diamond-bearing volcanoes still sit undiscovered, including in Australia." <https://www.sciencealert.com/weve-finally-figured-out-the-secret-of-stunning-rare-pink-diamonds>.

This Ancient Organism Crawled Onto Land Over 400 Million Years Ago

A close look at a mix of old and newly discovered fossils indicates that an ancient species of photosynthesizing bacterium was among the first of its kind to make its home on dry land more than **400 million years ago**. Characteristics of a microbe named *Langiella scourfieldii* place it into a category of cyanobacteria that would have lived, and thrived, among some of the first plants to grow on land, as well as in bodies of freshwater and hot springs as similar species still do today. "With the 3D reconstructions, we were able to see evidence of branching, which is a characteristic of Hapalosiphonacean



An artist's impression of the Rhynie chert landscape 407 million years ago.

cyanobacteria," said paleobiologist Christine Strullu-Derrien of the National History Museum in the UK. "This is exciting because it means that these are the earliest cyanobacteria of this type found on land." The discovery was made in flakes of rock representing the world's earliest known preserved terrestrial ecosystem, the Rhynie cherts in Scotland. While a diversity of life forms has been identified in the 407-million-year-old fossil beds, the role of cyanobacteria hasn't been clear. Also known as blue-green algae (even though they are not actually algae), cyanobacteria are marvelous things. They're pretty crucial to life as we know it today, having played a key role in changing Earth into the hospitable environment it is today, some 2.4 billion years ago. As they began to proliferate in Earth's waters, they pumped the air full of oxygen in what's known as the Great Oxidation Event. Whether you consider this a good thing or a bad thing depends where you are in Earth's history. From our happy, current, oxygen-breathing point of view, it's great. For all the other life that had adapted to Earth in low-oxygen conditions, it was pretty devastating. Mass extinction-levels were devastating. But cyanobacteria, which can be found thriving around the world today, didn't care. The photosynthetic microbes just kept on keeping on, inserting themselves into whatever ecological circumstances would take them.

<https://www.sciencealert.com/this-ancient-organism-crawled-onto-land-over-400-million-years-ago>

The Mysterious Origins of Zealandia Have Finally Been Traced

When the ancient supercontinent Gondwana was torn asunder 83 million years ago, a huge chunk of it sank beneath the waves as it drifted away. According to some geologists, this submerged chunk, called Zealandia, would be considered Earth's 8th continent if it weren't for a thick layer of ocean water obscuring our view. Instead, all that now peeks above the ocean's surface is New Zealand and surrounding islands, so Zealandia itself has long remained enigmatic. About 94 percent of the 1.9 million mi² continent is sub-



An artistic impression of Zealandia, east of Australia.

merged, hiding details of the northern part of the land mass. Using geochemical and isotope data from newly dredged samples of rocks as well as seismic readings, GNS Science geologist Andy Tulloch and colleagues created a refined map of that region to investigate how the continent came to be. Samples of rocks, some as old as the dinosaurs, were taken from exploration drill sites and a number of South Zealandia's exposed peaks, such as Chatham and Antipodes islands. An analysis of their chemical makeup, along with other geological clues, revealed similarities in patterns with geology in West Antarctica, suggesting a subduction of Zealandia's edge up to a quarter of a billion years ago, across what's now the Campbell Plateau off New Zealand's west coast. Subduction is when two edges of Earth's crust push against one another forcing one edge down into Earth's mantle. But contrary to previous suggestions, magnetic anomalies found in the same region are not related to this event. This removes the original argument for a strike-slip relationship between Zealandia and Antarctica, since both are substantially internally deformed. Instead, they propose, the Campbell Magnetic Anomaly System arose from extensive stretching between different parts of Gondwana that eventually snapped apart to create Zealandia's surrounding sea floors. **First** the combined areas of Zealandia/West Antarctica and Antarctica/Australia cracked, allowing the Tasman sea to rush in about 83 million years ago. **Next**, during the Late Cretaceous around 79 million years ago, Zealandia and West Antarctica ripped away creating the Pacific ocean. How Zealandia's crust managed to stretch so thin before breaking away, has long puzzled geologists. Similar thinness is also apparent in West Antarctica. Researchers found evidence that the stretching direction varied by up to 65 degrees between 100 to 80 million years ago. They think this may have allowed the extensive thinning of the continental crust. Together these findings create a solid foundation for a more detailed analysis for this strange stretching of the earth. <https://mail.google.com/mail/u/0/#inbox/FMfcgzGtxKRZqsSjxWSVfHCQXxTBPzTj>

What Are Organic Gemstones?



Almost all gemstones are minerals with a crystal-line structure. However, some gems are not really gemstones. Rather their origin is organic. This means that they formed from biological processes, whether animal or vegetable. Unlike other gemstones that are made of minerals, organic gemstones are renewable. There are typically four classes of organic gemstones that are sought after for their natural appeal and rarity. Though they are not as tough as gemstones made from minerals. The four classes of organic gemstones are amber, coral, jet, and pearl.

Amber is a hard sap or resin from aged pine trees and is a organic gemstone. Much valued from an-

tiquity to the present as a gemstone, amber is made into a variety of decorative objects. Amber is used in jewelry. Amber has been used as jewelry since the Stone Age, from 13,000 years ago. Amber occurs in a range of different colors. As well as the usual yellow-orange-brown that is associated with the color "amber", amber itself can range from a whitish color through a pale lemon yellow, to brown and almost black. Other uncommon colors include red amber (sometimes known as "*cherry amber*"), green amber, and even blue amber, which is rare and highly sought after. The most prized pieces contain inclusions of insects, plants or pyrite.

Coral is a marine based gemstone which is made of calcium carbonate. Corals are very small marine animals that live in huge colonies and extract calcium carbonate from the sea. The corals use the calcium carbonate to build its home up, around, and above itself. When a generation of coral dies it does so within its home, the new generation thus building on top of the old and so on. This process produces the massive coral reefs you see today! Gemstone corals appear semitransparent to opaque and the colors can be found are white, pink, orange, red, violet and sometimes gold and black (horny organic substances that are not calcium carbonate). Coral gems are used to make beads, carvings, cameos, and figurines.

Jet is a type of coal, a carbon and hydrocarbon mixed compound. Jet is not a mineral, but rather a mineraloid. It has an organic origin, being derived from decaying wood under extreme pressure. Jet is either black or dark brown, but may contain pyrite inclusions, which are of brassy color and metallic luster. Jet has also been known as black amber, as it may induce an electric charge like that of amber when rubbed. Jet has a Mohs hardness ranging between 2.5 and 4 and a specific gravity of 1.30 to 1.34. The refractive index of jet is approximately 1.66. Jet is found in two forms, hard and soft. Hard jet is the result of carbon compression and salt water; soft jet is the result of carbon compression and fresh water.

Pearl is an organic gemstone and has been used as jewelry for thousands of years. Pearls are made by mollusk animals (organic creatures enclosed within a shell) typically clams, mussels, and oysters. The soft tissue in the mollusk animal creates a mucus called nacre which hardens thus creating a pearl. Pearl bearing molluscs can be found in both salt as well as fresh waters. The saltwater molluscs create organic gemstones of much higher value. Whereas the freshwater mollusc (clams and mussels) produce pearls for less desirable jewelry and decorations. The perfect pearl is round but can come in any abstract shape (usually never rough shaped or with sharp edges). The color of a pearl varies from white, cream, light rose, cream rose, black, gray, bronze, blue, dark blue, green, dark green, purple, yellow, as well as violet.

Ammolite is an opal-like organic gemstone. It is made of the fossilized shells of ammonites, which in turn are composed primarily of aragonite, the same mineral contained in nacre, with a microstructure inherited from the shell. It is one of few biogenic gemstones; others include amber and pearl. Ammolite is also known as aapoak, gem ammonite, calcentine, and Korite. The chemical composition of ammolite is variable, and aside from aragonite may include calcite, silica, pyrite, or other minerals. Its crystallography is orthorhombic. Its hardness is 4.5–5.5, and its specific gravity is 2.60–2.85. Significant deposits of gem-quality ammolite are only found in the Bearpaw Formation that extends from Alberta to Saskatchewan in Canada and south to Montana in the USA.

Organic gemstones are formed naturally and are crafted into desired shapes. Because the most beautiful of nature's creations take time, the gemstones maintain their rare value. For thousands of years, the elegance of these organic gemstones grace jewelry and decorations all over the world.

<https://www.geologyin.com/2018/08/what-are-organic-gemstones.html>

CVRMS 2023 Auction: Our Most Successful of All Times!

Our 2023 CVRMS Fall Auction proved to be our most successful in Club history! The auction, held on August 9 and 10 at the Amana RV Park and Event Center, sold 1454 lots of rocks, minerals, fossils, and equipment. Even though it conflicted with the Denver Mineral, Fossil, Gem & Jewelry Show, which attracted a number of our usual consigners and bidders, a total of 98 people registered to bid at this year's auction. And they came with money in their pockets. The lots drew a total of \$53,051 from bidders with 98 lots selling for \$100 or more each. The highest bid went for a Dry Head Agate, which drew a bid of **\$1,340** (see photo below). Some lots were donated to the club for auction, and the club collected 20% of the final bid on lots consigned by club members; and 25% from non-member consigners. So, the club's share of the auction profits this year was \$12,566, over \$2,000 of which was used for securing the venue and related expenses associated with running the two-day auction. Many thanks to all of the green t-shirt club members, the consigners, and the bidders who helped make the auction our most successful ever !!



this Dry Head Agate drew the highest bid at the 2023 CVRMS auction, **\$1,340**.



this box of specimens sold for **\$800**



many lots of Lake Superior agates were sold



a portion of auction lots laid out for inspection



beautiful polished rocks



and other beautiful agates

a variety of fossils sold, like this turtle shell



rock working equipment was sold

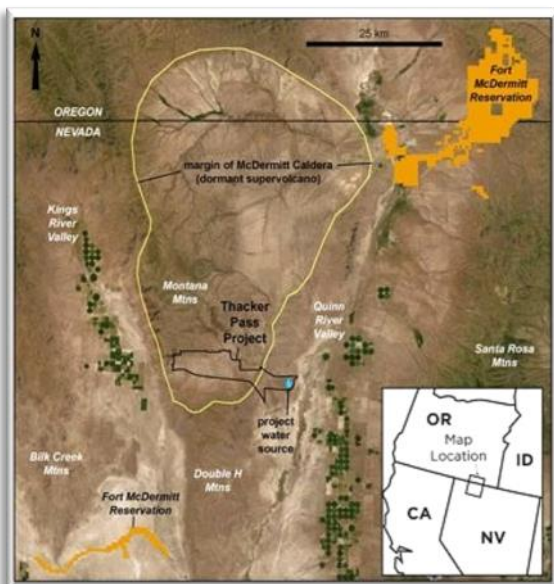
auctioneer Marv and our hard-working auction staff



Photos by Kim Kleckner

Ancient Supervolcano in US May Hide Largest Lithium Deposit Ever Found

An ancient supervolcano in the United States may be hiding the largest deposit of lithium found anywhere in the world. A new study hypothesizes that the **McDermitt Caldera**, which sits on the border between Nevada and Oregon, contains more than **double the concentration of lithium seen in any other bed of clay globally, around 20 to 40 million metric tons in total**. It's worth noting that the study was funded by a mining company, and current plans to mine the soft, silvery metal are steeped in controversy. Many scientists, environmentalists, ranchers, and First Nations people are concerned by the US government's recent decision to approve the **Thacker Pass Lithium mine** in the McDermitt Caldera, which sits on land that is sacred to several Indigenous tribes and contains precious wildlife habitats. Today, lithium is like liquid gold for car manufacturers. It's used to build the batteries in electric vehicles, and to meet rapidly rising demand, an estimated million metric tons of it will be needed by 2040. Transitioning away from fossil fuels is of the utmost necessity, but this particular climate solution is hardly perfect. In fact, the global rush to unearth more lithium could have some **serious adverse impacts** on nature and people. Lithium operations can destroy ecosystems, deplete groundwater, and produce masses of waste. During battery manufacturing, fossil fuels are also burned. At the moment, the US is largely reliant on China for its lithium, so there's been a recent push to mine more on federal



The McDermitt Caldera and the Thacker Pass mine

lands. If all goes ahead, the Thacker Pass Lithium mine will be the second large-scale mine of its kind in the nation. The project is owned by Lithium Nevada, LLC, a subsidiary of Lithium Americas Corporation (LAC), which funded the recent research. According to the company's latest review, the caldera's southernmost rim, including Thacker Pass, contains the highest concentrations of lithium in the region. When the ancient supervolcano erupted around 16 million years ago, hot liquid magma gushed through the ground's cracks and fissures and enriched the clay soil with lithium, according to experts from Lithium Nevada, the University of Oregon, and the New Zealand research institute GNS Science. Most of the caldera's clay is called magnesium smectite, which is a known source of lithium elsewhere in the world. But towards the southernmost rim of the caldera, researchers have found an unusual type of clay, called illite, that is especially concentrated with lithium. This mining hotspot, the team argues, is likely the result of another resurgence of magma after the caldera's ancient lake had dried out. The chemical reaction that ensued from this event would have replaced lithium-smectite in lake sediment with an even richer lithium-illite claybed, but only near Thacker Pass, not throughout the caldera. Their back-of-the-envelope estimation implies a very, very significant deposit of lithium. It could change the dynamics of lithium globally, in terms of price, security of supply, and geopolitics. But it also comes at a significant cost. Ranchers are concerned that the lithium project will cause groundwater levels to drop to precipitous levels, and an environmental review by the US Interior Department highlighted possible dangers to native pronghorn antelope, sage grouse, and golden eagles, which are particularly sacred birds to local First Nations people. **Thacker Pass**, also known as **Pee-hee Mu'huh**, is the traditional homeland of several Indigenous nations, who hunt deer there, tend to native cherry orchards, and forage for traditional medicines. It is also the place of a bloody massacre, in which American soldiers killed 31 members of the Paiute tribe in 1865. The many caves in Thacker Pass are said to have saved the Fort McDermitt tribe from being rounded up by soldiers and sent to faraway reservations over a century ago. Building a mine on these lands, some tribal members say, is equivalent to desecrating Pearl Harbor or Arlington National Cemetery. *"We understand that all of us must be committed to fighting climate change,"* wrote the People of Red Mountain in a Statement of Opposition to the mine in 2021. *"Fighting climate change, however, cannot be used as yet another excuse to destroy native land. We cannot protect the environment by destroying it."*

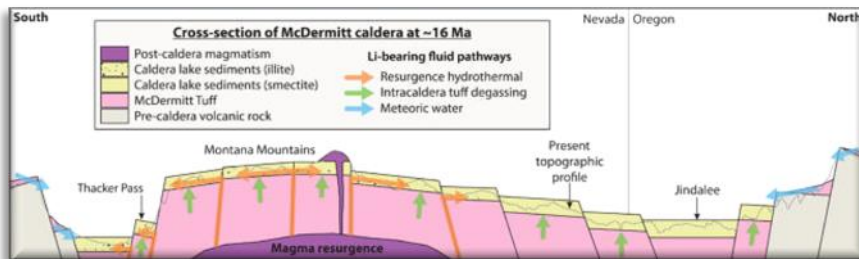


Diagram of possible magma resurgence in the McDermitt Caldera

<https://www.sciencealert.com/ancient-supervolcano-in-us-may-hide-largest-lithium-deposit-ever-found>

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



Next Meeting:
OCTOBER 17
V.A.S.T. TOUR
Van Allan Science Teaching Center
Grant Wood VAST Center
1120 33rd Ave SW, Cedar Rapids
7:15 pm

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Vice President.....	Ray Anderson (rockdoc.anderson@gmail.com).....	530-2419
Treasurer	Dale Stout (dhstout55@aol.com)	365-7798
Secretary.....	Dell James (cycladelics@msn.com).....	446-7591
Editor	Ray Anderson (rockdoc.anderson@gmail.com)	337-2798
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. Meetings are held at 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