

Cedar Valley Gems



Cedar Valley Rocks & Minerals Society
Cedar Rapids, Iowa

cedarvalleyrockclub.org

CEDAR VALLEY GEMS

MARCH 2022

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Next CVRMS Meeting Tuesday Mar. 15

Hiawatha Community Center
101 Emmons St., Hiawatha - 7:15 pm

featured presentation by

Nicholas Murray

*and other Cornell College Geology Students
and*

Dr Emily Walsh, Chair

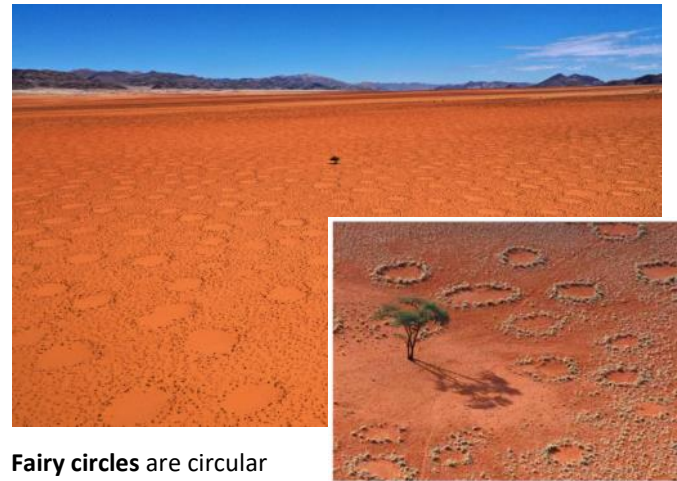
Cornell College Department of Geology

"Headwaters to Tidewaters; the Geology of the Pacific Northwest"

The students will discuss their spring break field trip to Oregon, where they will travel across the volcanic arc, forearc basin, and accretionary wedge to the coast. They plan to spend time at Mt. St. Helens, as well as exploring the Deschutes river, the remains of the Missoula floods, and the coastal geology



The Secret Science of Fairy Circles



Fairy circles are circular patches of land barren of plants, varying between 10 and 50 feet in diameter, often encircled by a ring of stimulated growth of grass. Until 2014, the phenomenon was only known to occur in the arid grasslands of the Namib desert in western parts of Southern Africa, being particularly common in Namibia. The origins of this desert grassland phenomenon have long confounded scientists. Millions of these circular spots also stretch across the fringes of certain deserts in western Australia, as well as Namibia (pictured above) and other parts of southern Africa. In 1979, South African botanist G.K. Theron suggested that dying shrubs may poison the sandy soil and curb grass growth, leaving the circles behind. But this theory doesn't hold water, according to researchers from Germany's University of Göttingen. The team visited four decomposed shrub locations once observed by Theron and failed to find fairy circles there. A more likely cause? Certain desert grasses build a perfect circle to maximize their water consumption and stave off competition, the scientists suggest, in a clever feat of natural engineering.

<https://www.discovermagazine.com/planet-earth/the-secret-science-of-fairy-circles>

—-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**

CVRMS Monthly Meeting, Feb. 15 — Minutes —

MEETING CALLED TO ORDER: 7:15 p.m. by Marv Houg president. **Attendance** total 34. 8 new members and/or guests.

MINUTES OF THE PREVIOUS MEETING: Motion to approve as published by Bill. 2nd by Julie. Minutes approved as published.

TREASURER'S REPORT: by Dale Stout. Checking account balance \$11,711.24. Scholarships for the past year have been paid. Motion to accept by AJ; 2nd by Bill. Report accepted.

PROGRAM: Video presentations of Scott Walter and Brian Costigan on Lake Superior Agates. Very popular topic and one we hold close to our hearts. Go check those landscaping rocks.

DOOR PRIZE: won by Melanie Saul, who chose a cracked geode from Marv's stash.

ROCK SHOW: Flyers are ready. Please pick some up and disperse. **Marv announced** that hopefully before the show *The Gazette* will do an article about Rock Collecting in Iowa. Watch for it. **We will provide** Friday lunch for workers. **Lots of people needed** for set up on Friday starting at 9:00a.m. **Ray will order staff shirts** for anyone who needs one. Let him know. Give him your name and size and no charge if you work. **Ray also reported** that the speakers for the show all lined up for their presentations. **We still need** pebble pit material, door prizes, and silent auction items.

MISCELLANEOUS: **Someone asked** about wire wrap classes, *Hound Dog Rock Shop* in Clarence, Iowa, conducts on a regular basis wire wrap classes. Call them for more info. (563)452-1150. **Freeze Fest Iowa City**, Ray and Bill gave presentations for rocks and dinosaurs. **Geode Fest** is coming up September 23-25 in Keokuk. **Paul from Iowa River Apparel** in Marengo will have a geode cracking day on February 26. Starting in the morning at the shop with Jeff Griffins and Glen Rocca helping. Great home school opportunity. **Blairstown Rock and Mineral Show** will include metaphysical dealers on April 30. Contact Paul at (319) 5606767 for more info.

SCIENCE FAIR 2022: Motion made by AJ, second by Ray that the club will donate \$200. To benefit the science fair with 1st prize of \$50 in both senior and junior categories, and \$30 for runner ups. and \$40 for the club. [A motion was made, seconded and approved to change prizes to \$80 1st prizes for both categories and \$40 for the fair. Ed] approved.

MOTION TO ADJOURN: 9:10 by AJ, second by Dale. Meeting adjourned.

Respectfully submitted,
Dell James, Secretary

CVRMS Board Minutes Feb. 23

MEETING CALLED TO ORDER: 7:15 by Marv at his house. Board members present Kim, Marv, Dale, Ray, Bill, Mark, Sharon, Jay and Dell.

MOTION TO APPROVE MINUTES as published by Kim 2nd by Ray. Minutes approved as published.

TREASURER'S REPORT by Dale. Motion to approve by Bill, 2nd by Matt. Report accepted.

ROCK SHOW MARCH 26-27: All vendors have paid. **Ray reported** that 5 of 7 programs are solid. Posters by Ray and will get them to Sharon. **Rick Austin** has been working on fluorescent booth. **We are still looking for a vehicle** to transport Don's T-Rex skull. Marv will call Dean for his input. Need to know the weight of trailer and more measurements about crate etc. **Kim reported** that they have lots of pebble pit and silent auction material but still need door prizes. **Sharon reported** that displays are full. **Raffle prizes** Marv will contact ZRS & PV's. **Kim has a big sign** from Terry's estate *ROCKS AND FOSSILS* and suggestion was made that it be placed on the silent auction for a prolonged period. Maybe all day on Saturday end on Noon or thereabouts on Sunday. **Masks required or not?** Highly encouraged, but could change depending on the current circumstances.

AUCTION: A lot of discussion regarding the disposal of Tom Whitlatch's estate. There is a lot of equipment that Julie would like to empty from storage sheds. Suggestion was that consignors may want to reduce their numbers to make room for extra equipment of Tom's. **Food for auction** will be the same Kalona food truck but can only do it on Saturday. Sharon has some ideas for Sunday. **Advertising** with some suggestions to check on Penny Saver, and it looks like all the others are covered. Encourage to share on Facebook and all social media.

MISCELLANEOUS: **Matt put together a list of quarries** that we could possibly have some field trips. A few more suggestions and thanks to Matt for going that extra mile. **Dale made a motion that the club purchase** the agate videos since they were universally enjoyed. 2nd by Ray. Club will purchase. **Discussion of offering classes in Wire Wrap and Flint Knapping.** Will check with are wire wrappers and Kim will check with flint-knapper.

MOTION MADE TO ADJOURN: by Bill, 2nd by Jay.
9:20 p.m. meeting adjourned.

Respectfully submitted,
Dell James, Secretary

240 million-year-old 'crocodile beast' was one of the largest of its kind

About 240 million years ago, a fearsome archosaur with "very powerful jaws and large knife-like teeth" stalked what is now Tanzania, a new study finds. Measuring more than 16 feet long from snout to tail, this newly described beast, called *Mambawakale ruhuhu*, which means "ancient crocodile from the Ruhuhu Basin" in Kiswahili, would have been a very large and pretty terrifying predator when it was alive



An illustration of the early archosaur *Mambawakale ruhuhu*. Paleontologists found only its skull, jaw and a few other bones, so the rest of the body, mainly the tail and limbs, are reconstructed based on the anatomy of its close relatives.

during the Triassic period. This apex predator walked on all fours with a long tail and was one of the largest predators that we know of from the Middle Triassic [247 million to 237 million years ago], about the same time that the first dinosaurs emerged. It took paleontologists nearly 60 years to properly describe *M. ruhuhu*. Its fossils were discovered in 1963. The fossils were taken from Ruhuhu Basin in southwest Tanzania to the Natural History Museum in London, where they awaited analysis. One specimen, a beast with a 2.5-foot-long skull as well as a preserved lower jawbone and a fairly complete left hand, was dubbed *Pallisteria angustimentum* by English paleontologist Alan Charig (1927-1997), who helped collect the creature's remains. But Charig, who named the Triassic terror's genus after his friend, geologist John Weaver Pallister, and its species name with the Latin words for "narrow chin," never formally published a description of the animal. So, scientists from the University of Birmingham in the United Kingdom examined the specimen decades later, they chose a **Kiswahili** name "to formally recognize the substantial and previously unsung contributions of unnamed Tanzanians" on the 1963 expedition, the researchers wrote in the study. *M. ruhuhu* is one of the largest known early archosaurs, a group that emerged following the end-Permian extinction about 252 million years ago. The archosaur clade includes living birds and crocodylians, as well as the extinct pterosaurs and nonavian dinosaurs. When *M. ruhuhu* was alive during the Middle Triassic, archosaurs "really start to diversify for the first time." For example, *M. ruhuhu* is just one of nine ancient archosaur species discovered at the Tanzania site. *Mambawakale* adds to this picture of a rapid early diversification of archosaurs and moreover was the largest predator within its ecosystem, researchers said. <https://www.livescience.com/archosaur-apex-predator-discovered-tanzania>

Spotlight Gemstone: Aquamarine

March's Birth Stone



Aquamarine, the blue variety of the mineral Beryl and birthstone of March, is a rich, medium- to dark-blue-colored stone produced in Brazil, Madagascar, Russia, and the USA, and it has long been a symbol of youth, health and hope. Recently, aquamarine from China and Columbia has come on the market, but they are generally a little bit more yellow. Aquamarine is a highly sought-after semi precious gem, which for centuries has been used in the creation and encrustation of jewelry and everyday items. Sailors of legend believed that mermaids' tails were made of Aquamarine. The lucky stone was thought to protect the sailors from drowning and ensure their safe return. The gem was believed to aid in digestion, and Roman physicians would employ Aquamarine to treat overeating and reduction of body fluid retention. Aquamarine was thought to possess the ability to reawaken the love in married couples. Roman legend also tells that it absorbs the atmosphere of young love; "*When blessed and worn, it joins in love, and does great things.*" It is also considered an appropriate gift for a Groom to give to his bride following the consummation of their marriage. To the Sumerians, Egyptians, and Hebrews, Aquamarine was the symbol of happiness and everlasting youth. Legend says that you should place your Aquamarine under a full moon to help restore its look and renew its energy. Aquamarine colors range from very light blue all the way through to a deeply saturated Ocean blue. The best color is often called Santa Maria Blue and recently there has been a new find in Madagascar called Double Blue. The name Aquamarine comes from the Latin words "aqua" (Water) and "marina" (Sea). The largest stone ever found is from Minas Gerais, Brazil; It weighed 242 pounds and measured 19 inches x 17 inches. The largest cut Aquamarine is the **Dom Pedro** which now sits in the Smithsonian Institute. It finished weighing in at 10,363 cts and measured 14 x 4 inches.

<https://www.gemrockauctions.com/learn/a-z-of-gemstones/aquamarine-information-the-blue-beryl>

What in the World?



What in the World are these unusual rocks and where can this beach be found??

February's Photo



February's **What in the World?** photograph was taken in the *Bisti/De-Na-Zin Wilderness*, near Chaco Culture National Historical Park. The surreal formations found in this little-known wilderness area in New Mexico rival those of Badlands National Park in South Dakota

ROCK CALENDAR CVRMS EVENTS OF INTEREST

2022

Mar. 15 — CVRMS Monthly Meeting

Hiawatha Community Center 7:15 pm
Cornell College Students

Mar. 26-27 — CVRMS Rks, Fos, & Min Show

Hawkeye Downs
Cedar Rapids, Iowa
"Iowa's Industrial Minerals"
(see Show Flyer on page 10)

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
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*

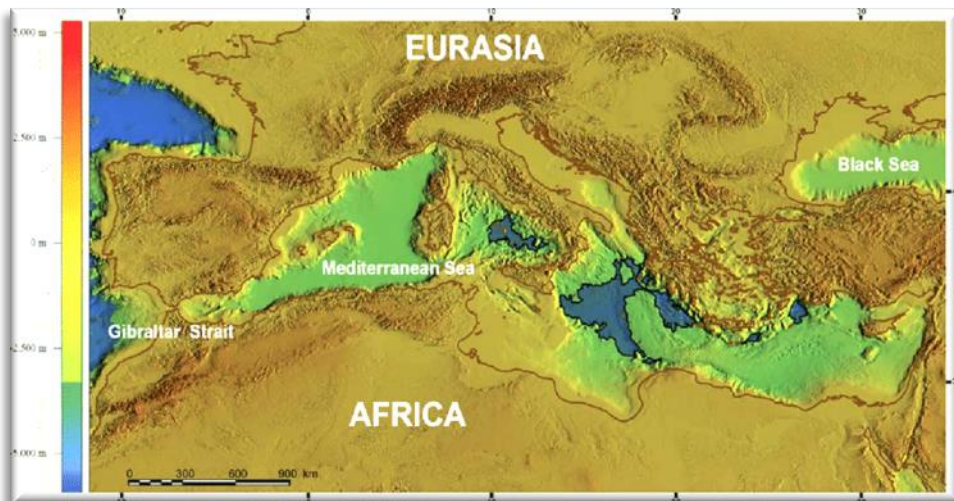
Ask a Geologist is a monthly column that gives CVRMS members an opportunity to learn more about a geologic topic. If you have a question that you would like addressed, please send it to rockdoc.anderson@gmail.com, and every month I will answer one in this column. Please let me know if you would like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

Dale sent me a note a few days ago, with a link to an article describing a geologic event that he found interesting, called the "Messinian salinity crisis." I couldn't recall the name, but when I followed his link I was reminded of the story that I thought you might also find interesting.

Dale's link led to the [Wikipedia discussion of the Messinian salinity crisis \(MSC\)](#), "also referred to as the Messinian event, and in its latest stage as the Lago Mare event, was a geological event during which the Mediterranean Sea went into a cycle of partial or nearly complete desiccation (drying-up) throughout the latter part of the Messinian age of the Miocene epoch, from 5.96 to 5.33 Ma (million years ago). It ended with the Zanclean flood, when the Atlantic reclaimed the basin. Sediment samples from below the deep seafloor of the Mediterranean Sea, which include evaporite minerals (gypsum, salt, etc.), soils, and fossil plants, show that the precursor of the Strait of Gibraltar closed tight about 5.96 Ma, sealing the Mediterranean off from the Atlantic". Associated with this tectonic activity, global cooling and the accumulation of glacial ice was lowering sea level about 200 feet below today. "This resulted in a period of partial desiccation of the Mediterranean

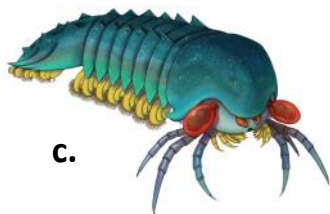
Sea, the first of several such periods during the late Miocene. After the strait closed for the last time around 5.6 Ma, the region's generally dry climate at the time dried the Mediterranean basin out nearly completely within a thousand years. This massive desiccation left a deep dry basin, reaching 1.9 to 3.1 miles deep below normal sea level, with a few hypersaline pockets similar to today's Dead Sea. Then, around 5.5 Ma, less dry climatic conditions resulted in the basin receiving more freshwater from rivers, progressively filling and diluting the hypersaline lakes into larger pockets of brackish water (much like today's Caspian Sea). In 1970, an undersea drilling project began taking samples of the Mediterranean's ocean floor. They discovered an area of salt up to 2 miles thick and located 300-500 feet below the current ocean floor, a feature previously identified by seismic exploration and named the M-reflector. The Messinian salinity crisis ended with the Strait of Gibraltar finally reopening 5.33 Ma, when the Atlantic rapidly filled up the Mediterranean basin in what is known as the Zanclean flood. Even today, the Mediterranean is considerably saltier than the North Atlantic, owing to its near isolation by the Strait of Gibraltar and its high rate of evaporation. If the Strait of Gibraltar closes again (which is likely to happen in the near future in geological time), the Mediterranean would mostly evaporate in about a thousand years, after which continued northward movement of Africa may obliterate the Mediterranean altogether. Only the inflow of Atlantic water maintains the present Mediterranean level. When that was shut off sometime between 6.5 to 6 Ma, net evaporative loss set in at the rate of around 800 cubic miles yearly. At that rate, the 900,000 cubic miles of water in the basin would dry up in scarcely more than a thousand years, leaving an extensive layer of salt some hundreds of feet thick and (since the water had to go somewhere) raising global sea level about 40 feet."

Palaeogeographic reconstruction of the Mediterranean coastlines during the Messinian salinity crisis, about 6 Ma. The reconstruction does not take into account the effects of erosion and tectonic displacement, and is therefore only indicative. Note the closure of the Gibraltar Strait, the separation of the Black Sea from the Mediterranean Sea, the continental link between Sicily and Africa and the drying of the Adriatic Sea. In blue is the estimated Messinian extension of the Mediterranean basin (coastlines are in black). Map is based on Shuttle Radar Topographic Mission (SRTM) data for surface topography and General Bathymetric Chart of the Oceans (GEBCO) data for bathymetry. In brown are the current coastlines. No allowance has been made for the isostatic rebound of the crust in response to the water unloading.



Teeny Tiny 500-Million-Year-Old Fossils Could Help Explain The Evolution of Spiders

Two tiny fossils, each smaller than an aspirin pill, contain fossilized nerve tissue from 508 million years ago. The bug-like Cambrian creatures could help scientists piece together the evolutionary history of modern-day spiders and scorpions. Still, it's not clear exactly where these fossils, both specimens of the species *Mollisonia symmetrica*, fit on the arthropod evolutionary tree, according to University of Arizona scientists. Some features, like the animals' eyes and nerve cords, can be clearly identified in the fossils. Other parts of the nervous system cannot be so easily spotted. In particular, it's unclear whether or not the animals carry a brain-like bundle of nerves called a synganglion, and without this key piece of evidence, their relation to other animals remains fuzzy. The researchers acknowledge this uncertainty in their new report, published Jan. 20 in the journal *Nature Communications*, and present a few different ideas as to how these fossils relate to ancient and modern-day critters. If more fossilized *M. symmetrica* are uncovered in the future, the species' place on the tree of life may eventually be resolved. Finding fossilized nerve tissue from the Cambrian period (between about 543 million and 490 million years ago) is a "rarity, ...it's really a stroke of luck." Since the initial discovery 10 years ago, preserved nerve tissue has been found in more than a dozen Cambrian fossils, most of them arthropods. The fossils featured in the new study were found not at a field site, but in the depths of the museum collections at the Harvard University Museum of Comparative Zoology in Cambridge, Massachusetts, and the Smithsonian Institution in Washington, DC. Both specimens were discovered in mid-Cambrian Burgess Shale deposits from British Columbia. The Harvard fossil measures about 0.5 inches long and 0.1 inches wide at its widest point; the fossil is oriented such that you're looking down at the arthropod from above. The Smithsonian fossil, on the other hand, offers a side-view of *M. symmetrica*; this specimen measures only 0.3 inches long and 0.06 inches tall.



Photographs of *Mollisonia symmetrica* from Harvard (a.), the Smithsonian (b.) and an artist's drawing (c.).

<https://www.sciencealert.com/teeny-tiny-500-million-year-old-fossils-with-well-preserved-nerve-tissue-could-give-new-insights-into-evolution-of-modern-day-arachnids>

Sealed for 50 Years, Rare Apollo Lunar Sample Will Have Its Opening Day

In 1972, when geologist and Apollo 17 astronaut Harrison Schmitt spotted a patch of unusual orange soil on the moon, he knew it was special, but he wasn't sure exactly why. "Until it was possible to look at this material in the laboratory under high resolution and analyze it, we did not know that we had



Apollo 17 astronaut Gene Cernan collects lunar sample 73001, which has remained sealed for 50 years

found a deposit of volcanic ash," he says. Fifty years later, Schmitt still isn't aware of all the discoveries his mission will yield. That's because researchers in the **Apollo Next Generation Sample Analysis (ANGSA) program** are only recently beginning to study lunar samples that had been saved for future scientists. Their projects aim to answer critical questions about the moon's past and, as the **Artemis program** prepares for launch in the next few years, lunar exploration's future. Apollo 17's sample **73001**, which was collected from a pile of debris deposited by a lunar landslide, will be opened for the first

time in the coming weeks. This sample was stored in a Core Sample Vacuum Container (CSVC), an elaborate air-tight apparatus whose penetration has been plotted for over a year. Sample 73001 is especially valuable because it has been sealed in such a pristine state. Many of the other Apollo samples may have had various amounts of contamination from Earth, so a part of the lunar fingerprint was lost. Using a relatively new technique that identifies each substance in a material by its mass, the team can measure the volatile elements and additional compounds that decay over time in the sample. Collectively, this data provides clues as to when and how the landslide occurred. Solving the landslide mystery could also help predict the safety of human settlement on the moon. The researchers are also interested in understanding how lunar volatiles can be used as a resource to support human presence on the moon. Eventually astronauts might be able to "partially live off the land" when exploring and even venturing beyond the moon. For example, hydrogen and oxygen serve as the building blocks of water, and hydrogen and a light version of helium might be used as a rocket fuel source to power further space travel. Another researcher who studied the **orange soil sample** as a graduate student is characterizing volcanic glass beads in other samples to better understand the composition of the lunar interior. These pyroclastic glasses, which are smaller than a grain of salt and make up about 20 percent of the soil on the moon, shoot out from the lunar interior during volcanic eruptions. The water and oxygen content of the glass beads are a record of the environment of the lunar interior. <https://www.discovermagazine.com/the-sciences/sealed-for-50-years-rare-apollo-lunar-sample-will-have-its-opening-day>

NASA Says Tonga Eruption Sent Up Highest Ash Plumes Ever Captured by Satellite

When a volcano in Tonga erupted on January 15, it gave satellites their first glimpse at a plume of volcanic ash shooting into the mesosphere, the third layer of Earth's atmosphere. According to NASA, the Tonga event was the largest volcanic eruption since satellites began monitoring our planet. As the Pacific volcano shot a burst of ash and gases into the sky, with the force of about 10 megatons of TNT, two weather satellites were passing overhead. The spacecraft, the National Atmospheric and Oceanic Administration's GOES-17 and the Japanese Aerospace Exploration Agency's Himawari-8, captured the eruption in infrared every 10 minutes for about 13 hours. NASA scientists analyzed the satellite imagery to determine that the initial outburst of ash rocketed 36 miles (58 kilometers) high, breaching the mesosphere – the region where meteorites falling to Earth burn up and create shooting stars streaking across the night sky. It took the volcanic plume about 30 minutes to travel that high. Then a secondary plume rose more than 31 miles. Both are visible, in yellow, in the satellite imagery below. The upper part of those plumes turned to gas and dissipated almost immediately because of dry conditions in the mesosphere.

video of eruption: <https://youtu.be/sq-EQYvRfPw>

"The intensity of this event far exceeds that of any storm cloud I have ever studied," Kristopher Bedka, a NASA atmospheric scientist who specializes in extreme storms, said in a statement on Wednesday. "We are fortunate that it was viewed so well by our latest generation of geostationary satellites, and we can use this data in innovative ways to document its evolution." Prior to this, the biggest known volcanic plume ever captured by satellites was Mount Pinatubo's 1991 eruption, according to NASA. That plume shot 22 miles above the Philippines, well into the stratosphere, but fell short of reaching the mesosphere. The Tonga volcano was once completely underwater. It captured scientists' attention in 2015, when it erupted beneath the



ocean and suddenly rose, creating a landmass that connected two preexisting islands: Hunga Tonga and Hunga Ha'apai. Nearly a decade of low-level volcanic activity culminated in a series of violent eruptions in January, which wiped out the newborn island and took off large chunks of Hunga Tonga and Hunga Ha'apai. That land was uninhabited, but the eruption and the tsunami it triggered destroyed homes, boats, and fisheries in populated islands nearby, and severed the undersea internet cable that keeps Tonga online. Three people died in the aftermath of the eruption. The World Bank estimates that the event caused \$90.4 million in damages – 20 percent of Tonga's GDP. To map the ash plume from the initial eruption, Bedka and his NASA colleague, Konstantin Khlopenkov, used images from the two satellites, the same way our brains use images from our two eyes. They ran an algorithm that compared the images from the satellites, and the different angles at which they were taken, to construct a 3D profile of the plume. It's a technique they developed to study severe thunderstorms in the stratosphere. "The combination of volcanic heat and the amount of superheated moisture from the ocean made this eruption unprecedented. It was like hyper-fuel for a mega-thunderstorm," Bedka said, adding, "The plume went 2.5 times higher than any thunderstorm we have ever observed, and the eruption generated an incredible amount of lightning." According to a global lightning-detection network run by the Finnish company Vaisala, the eruption triggered 400,000 lightning strikes over the course of six hours. "That is what makes this significant from a meteorological perspective," Bedka added.

<https://www.sciencealert.com/nasa-says-tonga-eruption-sent-highest-ash-plumes-ever-captured-by-satellite>

A Cosmic Airburst May Have Devastated a Vast Native American Culture 1,500 Years Ago

More than 1500 years ago, a vast culture known as the **Hopewell tradition** (or **Hopewell culture**) stretched across what is today the eastern United States. The cause of the culture's decline has long been debated, with war and climate change two of the possibilities, but now a new avenue of inquiry has opened up: **debris from a near-Earth comet**. Researchers working across 11 different Hopewell archaeological sites covering three states have found unusual concentrations of iridium and platinum in their digging, telltale signs of meteorite fragments. Meanwhile, a charcoal layer in the sediment suggests an intense period of high heat. The hypothesis is that debris from a passing comet may have struck close to the Ohio Hopewell communities, causing an airburst that would have profound and potentially devastating effects on the local environment. Signs that the people collected meteorite fragments and incorporated them into their jewelry and instruments, along with hints of a calamity in local folklore, suggest there was certainly some significant event, one that the researchers suggest may have contributed to a significant upheaval in the social sphere. There are other clues too: the Hopewell built a comet-shaped mound near the epicenter of the meteorite rain region, which is today called the Milford Earthworks. What's more, a calamitous event way back in history is still spoken about today amongst descendant tribes. "*The Miami tell of a horned serpent that flew across the sky and dropped rocks onto the land before plummeting into the river,*" says anthropologist Kenneth Tankersley from the University of Cincinnati in Ohio. "*When you see a comet going through the air, it would look like a large snake.*" "*The Shawnee refer to a 'sky panther' that had the power to tear down forests. The Ottawa talk of a day when the Sun fell from the sky. And when a comet hits the thermosphere, it would have exploded like a nuclear bomb.*" The micrometeorites left behind in such events can reveal a chemical fingerprint, the researchers say. Cosmic events like asteroids and comet airbursts leave behind high quantities of a rare elements such as platinum. The problem is platinum also occurs in volcanic eruptions. So, researchers also looked for another rare element found in non-terrestrial events such as meteorite impact craters: **iridium**. And they found spikes in both iridium and platinum. At the same time, the material was also dated using radiocarbon and typological dating. The researchers estimate that the event took place **between 252 CE and 383 CE**. Historical records show that 69 near-Earth comets were documented across the same time period. **The explosion from space would have set off fires covering some 9,200 square miles, this latest study suggests.** <https://www.sciencealert.com/a-near-earth-comet-may-have-destroyed-a-north-american-culture-1-500-years-ago>

New Mineral Found inside Deep-Mantle Diamond: Davemaoite

Calcium silicate perovskite (CaSiO_3) is arguably the most geochemically important phase in the Earth's lower mantle, because it concentrates elements that are incompatible in the upper mantle. No one has ever successfully retrieved this high-pressure compound from the lower mantle before. This is because CaSiO_3 -perovskite is "**unquenchable**," meaning that it cannot retain its structure after being removed from its high-pressure environment. In a new study, U.S. geologists have finally found the first calcium silicate perovskite from Earth's lower mantle in a diamond from the Orapa kimberlite pipe in Botswana. Although theorized for decades, to date, no one has ever successfully retrieved a high-pressure phase silicate from the Earth's lower mantle, largely because they cannot retain their mineralogical structure after being removed from a high-pressure, high-temperature environment. The only other high-pressure phase silicate mineral confirmed in nature, bridgmanite, was found inside a highly shocked meteorite. In the new study, the researchers identified and characterized an inclusion of the high-pressure CaSiO_3 -perovskite within a deep-earth diamond using synchrotron X-ray diffraction. The unique diamond was unearthed from Botswana's Orapa mine, the world's largest diamond mine by area, in the 1980s. A gem dealer sold the diamond in 1987 to a mineralogist at the California Institute of Technology. For jewelers and buyers, the size, color, and clarity of a diamond all matter, and inclusions (those black specks that annoy the jeweler) for the scientists they're a gift. The crystalline compound the researchers found was named **davemaoite** in honor of the prominent experimental high-pressure geophysicist Ho-kwang (Dave) Mao and confirmed as a new mineral by the Commission of New Minerals, Nomenclature, and Classification of the International Mineralogical Association. The structural and chemical analysis of



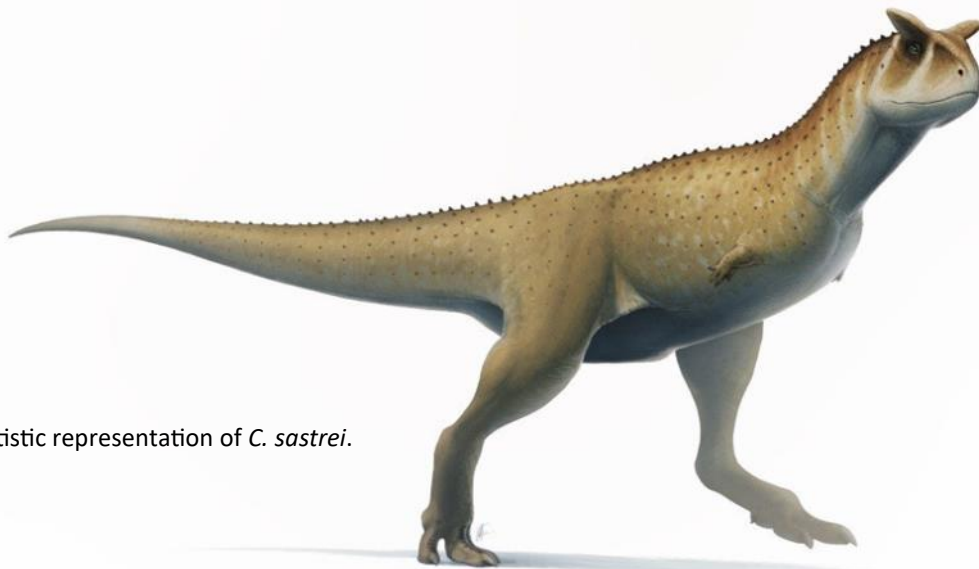
This diamond from Botswana contains tiny inclusions of davemaoite.

davemaoite showed that it is able to host a wide variety of elements in its structure, including potassium, thorium and uranium, three of the major heat-producing elements. Researchers believe that the davemaoite originated between 410-560 miles below the Earth's surface. The findings support the existence of compositional heterogeneity within the lower mantle and, given the mineral's overall abundance, suggest that davemaoite likely influences heat generation in the deep mantle. "The discovery of davemaoite inspires hope for finding other difficult high-pressure mineral phases in nature," said Dr. Yingwei Fei, a researcher in the Earth and Planets Laboratory at the Carnegie Institution for Science. <http://www.sci-news.com/geology/davemaoite-10274.html>



Newly Discovered Dinosaur From Argentina Belongs to a Rather "Armless" Family

Paleontologists in Argentina have identified a new species of dinosaur which likely had such feeble forearms, it would make *Tyrannosaurus rex* look like Popeye in comparison. The dinosaur, named *Guemesia ochoai* and identified from a single skull, is thought to belong to a clade of tiny-armed carnivores known as **abelisaurids**, which once tramped across Europe, Africa, South America, and India before they went extinct about 66 million years ago. The skull of *G. ochoai* is the only one of its kind to be found in northwest Argentina and it's about 70 million years old. Unlike other abelisaurids, its braincase is "remarkably small." In fact, it's one of the smallest-brained abelisaurids recorded to date, 70 percent the size of the famous *Carnotaurus* genus, which lived at the southern tip of South America and was recently featured in *Jurassic World*. If the newly discovered species' arms were anything like those of its Patagonian counterparts, they would have flopped uselessly onto its broad chest. Without ossified wrist



Artistic representation of *C. sastrei*.

bones or mobile elbow joints, abelisaurids could not bend their upper appendages, let alone grasp something between their fingers. They didn't even have claws. But don't let that fool you. Even though the Northern Hemisphere's *T. rex* had longer and more muscular arms, abelisaurids could still take down prey much larger than themselves. Their strong jaws and blade-like teeth easily made up for their puny forelimbs. With just a skull, it's hard to say much about how *G. ochoai* measured up to other abelisaurids, but a press release from the United Kingdom's Natural History Museum compares it to *Carnotaurus sastrei*, shown above, but with a smaller head and no horns. "This new dinosaur is quite unusual for its kind," says paleontologist Anjali Goswami from NHM in the United Kingdom. "It shows that the dinosaurs that live in this region were quite different from those in other parts of Argentina, supporting the idea of distinct provinces in the Cretaceous of South America." The analysis supports other recent discoveries, which suggest abelisaurids were more diverse in South America than experts thought. As the southern supercontinent, Gondwana, began to split up, it seems abelisaurids were able to adapt to different isolated ecosystems. Why they evolved such tiny arms is still unclear. Experts suspect these are vestigial limbs, useless leftovers from ancestors who once benefited from their presence. Nearly all the abelisaurid fossils found in Argentina so far have been from Patagonia and they share many physical similarities, including comically small arms. But *G. ochoai* is the first to be found in the northwest, and its features are quite different, possibly reflecting life in a warmer climate. Its skull, for instance, shows a series of small holes that might have allowed the dinosaur to cool itself down by pumping blood to the skin's surface and releasing heat. Such a feature wouldn't be as useful further south. "During the Late Cretaceous, South America was divided into northeastern and southwestern realms by a sea corridor which acted as a filter for some vertebrates," the authors write. "The strong morphological differences exhibited by *Guemesia* in contrast to other abelisaurids, may be an additional proof of the biogeographic distinctiveness of northwestern Argentina during the late Cretaceous." Compared to other fossil rich parts of the world, Argentina is relatively unexplored, which means this probably isn't the last abelisaurid species we're going to find.

<https://www.sciencealert.com/if-you-thought-t-rex-had-small-arms-check-out-this-new-dinosaur>

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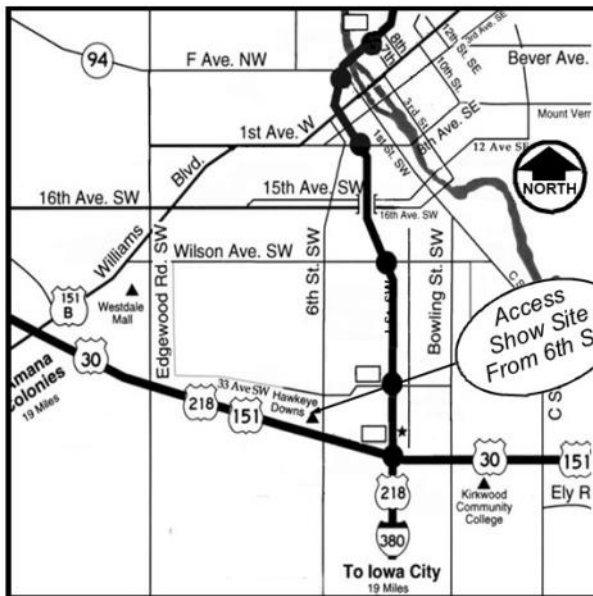
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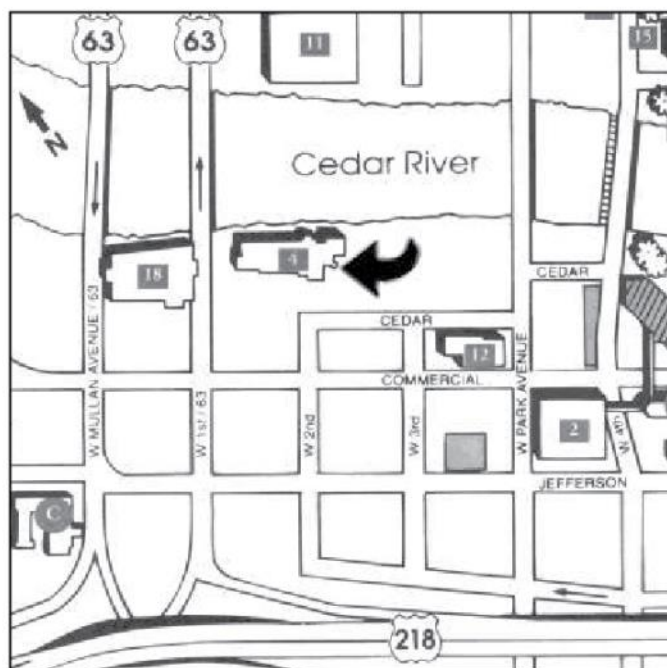
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Club meetings are held the 3rd Tuesday of each month from September through November and from January through May at 7:15 p.m. During the COVID emergency meetings will be via ZOOM. When the emergency is over, meetings will return to the Hiawatha Community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

CEDAR VALLEY ROCKS & MINERAL SOCIETY

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