

Cedar Valley Gems

Cedar Valley Rocks & Minerals Society

Cedar Rapids, Iowa

cedarvalleyrockclub.org

CEDAR VALLEY GEMS

APRIL 2023

VOL. 49, ISSUE 04

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

Next CVRMS Meeting Tuesday April 18

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

featured presentation

by **Jason Vogelgesang**
Iowa Geological Survey

**"Adventures in Geophysics:
How the Iowa Geological Survey
Uses Geophysics to Image
Beneath the Ground"**

Jason Vogelgesang, a geophysicist with the Iowa Geological Survey, will discuss geophysical technology currently used at the IGS. He will share case studies of recent work, including a few unique and exciting projects that he's experienced through his career.



Jason collecting geophysical data on a levee in Iowa.

BREAKING NEWS

New Attendance Record for the 2023 CVRMS Rock Show

5,016

The Fish That Ate Our Ancestors

As life was first struggling to set foot on land in the Late Devonian Period, there was a predator waiting to snatch it back to the depths: the recently discovered *Hynertia udlezinye*, a toothy prehistoric fish estimated to have reached up to 9



feet long. It represents the largest monster fish yet uncovered from this period and appears to have lurked in the brackish waters of the modern-day South Africa, in wait for its prey. An excavation exposed a wall

of fossils there in 2016, during road construction, and led to this and a number of other discoveries, including the fossil of an early tetrapod, the massive fish's likely prey. These early genetic forebears of modern humans resembled large salamanders or small alligators and walked on four feet. Thanks to continental drift, the world was a different place some 360 million years ago, when *H. udlezinye* ruled lakes and estuaries. South Africa was part of a large landmass, Gondwana, that reached up from the Antarctic. And while researchers have identified several of *H. udlezinye*'s relatives, this one remains the largest, with its long jaws and fangs. The fish's fins enabled it to bolt up at prey and surprise them. While other members of the species might have reached 9 feet long, the team estimated the unearthed *H. udlezinye* at about 6 feet and said it was covered in "elongated scales" that measured up to 3 inches. The skeleton also revealed a larger-than-expected branchial chamber, the area used to cycle water through the gills, suggesting the fish had evolved to linger in oxygen-poor waters while waiting to strike. This and other giant tristichopterid fishes once terrorized the fresh and brackish waters of the world. But, like many species, they died out during the mass extinction that concluded the period and still **invites debate**.

<https://www.discovermagazine.com/the-sciences/the-fish-that-ate-our-ancestors>

CVRMS Meeting March 25 — Minutes —

MEETING CALLED TO ORDER: by Marv Houg President at 7:30 pm; Attendance-42 people.

GUESTS WELCOME AND INTRODUCED; Gabriel Eggers and Reanna Jones and welcome to a member we have not seen in a while, Bob Roper.

MINUTES FROM PREVIOUS MEETING: Published in March Newsletter; motion to approve by Scott, 2nd by Kim Kleckner. Minutes approved as published.

TREASURER'S REPORT by Dale - checking account balance \$16,245.27. Motion to approve as reported by Lisa, 2nd by Karen. Treasurer's report approved.

PROGRAM: Video talk by Doug Moore, 2016 Agate Expo, "Agates Under a Microscope."

2023 ROCK SHOW: The show is upon us. Be sure to sign up for various chores. **Staff T-Shirts** are available from Sharon for members working at the show. **Kim needs** plastic bags for silent auction. **Marv reviewed** Friday's set-up activities, set-up starts at 9:00A.M. Bring your own tableware for Friday pot luck. (Club will provide them for vendors.) **Saturday catered dinner;** be sure to let Marv know if you are interested. Charge is \$16.00. **Lot of help needed** on Sunday post-show clean up the hall.

FIELD TRIPS: Matt will conduct a trip to collect gpepdes in the Sheffield area. It will be muddy so be sure to wear boots and gloves. Hopefully it won't be raining. No cost, just show up. Geodes can be picked up from farm fields. See the Email from Matt or check our webpage for more information.

2023 Rock AUCTION: All lot slots are filled.

BUS TRIP: Trip to Madison and Rockford on September 30. More information will be available after the Rock Show.

NEW BUSINESS; Ray reported that Dolores Slade had set up a display of local rocks and fossils in the Coralville Library as a part of the city's 150th anniversary celebration. Thank you, Dolores.

DOOR PRIZE; won by Ann Kohl

MOTION TO ADJOURN by AJ, second by Dale. 9:15 meeting adjourned.

Respectfully submitted
Dell James, Secretary

CVRMS Board Meeting March 28 — Minutes —

MEETING CALLED TO ORDER: 7:15 p.m. meeting called to order by Marv at his house. Present were Marv Houg, Sharon Sonnleitner, Ray Anderson, Jay Vavra, Matt Burns, Dell James, Kim Kleckner, (Bill and Dale both not feeling well.)

REPORT ON 2023 ROCK SHOW: Total attendance **5016; a record breaker!!** Vendors were happy with sales, and we received many positive comments from attendees. **A great big thank you!! to all of those club members who stepped up to the plate to help out.** Not all of the \$ numbers are in yet, but we know the Silent auction--\$2,657.00, Raffle--\$1,065.00. The remaining numbers will be calculated by Dale soon.

AT THE APRIL CLUB MEETING: we will vote on whether we have a Rock Show in 2024. We also need to start thinking of theme for next show.

2023 ROCK AUCTION: to be held on Sept 9 and 10th, 2023. We reviewed list of consignees and gave Jay the go ahead to send out contracts.

FIELD TRIP: to Sheffield area next Sunday. Check email for more info.

OLD BUSINESS: 501c3 Non-profit designation. Dale is not present so we have no new information

NEW BUSINESS: It was suggested by reader that we post contact links to various vendors on our Facebook page. Sharon noted that we have such a link on our website that could be linked from our Facebook page.

LOCAL SCIENCE FAIR: None of the Science Fair entries were "rock or fossil related," so no CVRMS prizes were awarded.

ROCK SHOW TABLE COVERS: Sharon has been investigating black polyester table covers that could be used instead of paper like we have been using. Matt made a motion to get 2 six foot covers as samples. Seconded by Ray. Discussion about the fire rating etc. Motion passed. Sharon will order.

KIM LONG suggested a contact for presenting a wire wrapping class. Jay will talk to her at Mystic Blooms in the New Bo City Market and see if she can provide lessons for club members.

FUTURE CVRMS OUTREACH: Kim Kleckner has presentations scheduled for 3 different school classes. **Ray and Bill** are scheduled to make a presentation at the Johnson STEM School in Cedar Rapids on March 30 and in May. But Bill may not be able to make the March date due to illness.

MOTION TO ADJOURN by Jay, second by Ray. 9:12 meeting adjourned.

Respectfully submitted
Dell James, Secretary

Meet "Horridus," One of the Most Complete Triceratops Fossils Ever Found

A massive *Triceratops* that died 67 million years ago left behind a near-complete skeleton that is among the most intact ever found. Nicknamed "**Horridus**" after the species name (*Triceratops horridus*), the fossil, which is about 85% complete, made its public debut on March 12 at Melbourne Museum in Australia in the new exhibit "*Triceratops: Fate of the Dinosaurs.*" Horridus was a herbivore, or plant-eating dinosaur, that lived during the **Cretaceous period (about 145 million to 66 million years ago)**, and it grew to an impressive size. The fossil contains more than 260 bones and weighs more than 2,200 pounds. It measures nearly 23 feet long and stands over 6.6 feet tall. The skull, which is 98% complete, is tipped with two slender horns at the brow and a stubby horn atop the nose. The neck frill spans 4.9 feet, and the skull weighs about 575 pounds. The fossil was discovered on private land in Montana in 2014, and Museums Victoria (the Australian organization that operates three state-owned



museums in Melbourne) acquired the specimen in 2020, the museum announced in December that year. When Horridus arrived in Melbourne,

it was in pieces in eight crates — some of which were car-size, museum representatives said. Fossil preparers measured, labeled and 3D-scanned each bone before the skeleton was assembled for display. While many articulated *Triceratops* skeletons are exhibited around the world, only Horridus and a handful of others are made of bones that came from one individual animal. This fossil comprises hundreds of bones including a complete skull and the entire vertebral column, which will help us unlock mysteries about how this species lived 67 million years ago. In the exhibit, Horridus stands in a chamber with projections illuminating its bones. Scientists can't say for sure if Horridus was male or female, but there is much that researchers can learn from its near-complete skeleton about *Triceratops* evolution, biology and behavior. Being permanently housed at Melbourne Museum means this remarkable fossil will be accessible to science for generations to come. You can see Horridus in person at Melbourne Museum, but if that's too far away you can still examine the massive dinosaur's bones using an interactive 3D digital model on the museum's website.

<https://www.livescience.com/horridus-triceratops-display-melbourne-museum>

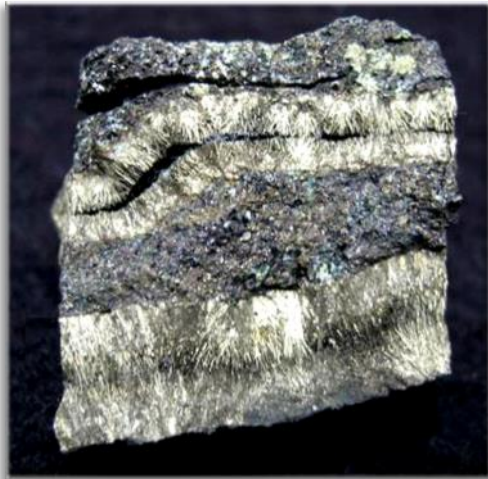


April's Birth Stone



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 the gold-colored, needle-like mineral in this rock??

March's Photo



Last month's **What in the World** photo is a strange concretion, called a sand spike from a locality near the Mexican-American border close to Mt. Signal, Imperial County, California. Spikes of different sizes were discovered in beds of sand, and they all were found pointing to the west! Read more about sand spikes on page 6 of this newsletter.

ROCK CALENDAR CVRMS EVENTS OF INTEREST

2023

Apr. 16 — Black Hawk Gem & Mineral Soc.
Gem, Mineral, and Fossil Show
Waterloo Center for the Arts
225 Commercial Street
Waterloo, Iowa

Apr. 18 — CVRMS Monthly Meeting
Hiawatha Community Center 7:15 pm
"Adventures in Geophysics: How the Iowa Geological Survey Uses Geophysics to Image Beneath the Ground"

Apr. 22 — Blairstown Rock & Mineral Show
MJ Post 170 American Legion Hall
102 Benton St NE
Blairstown, Iowa

May. 16 — CVRMS Monthly Meeting
Hiawatha Community Center 7:15 pm
Program to be announced

June 20 — CVRMS Pot-Luck Picnic
Ellis Park Overlook Shelter 6:30 pm
Rock Polishing

July 21 — CVRMS Pot-Luck Picnic
Wanatee Park Meadowlark Shelter 6:30 pm
Geode Cracking

Aug. 15 — CVRMS Pot-Luck Picnic
Morgan Creek Park Shelter 6:30 pm
Rock Bingo

Sept. 9 -10 — CVRMS Rock Auction
Amana RV Park and Event Center
Amana, Iowa

Sept. 19 — CVRMS Monthly Meeting
Hiawatha Community Center 7:15 pm
Program to be announced

Sept. 22—24 — Geode Fest
First Christian Church Parking Lot
3476 Main Street
Keokuk, IA

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

Before Human-Made Climate Change, Was Earth Actually in a Cooling Phase?

Over the past century, the Earth's average temperature has swiftly increased by about 1.8 degrees Fahrenheit. The evidence is hard to dispute. It comes from thermometers and other sensors around the world. But what about the thousands of years before the Industrial Revolution, before thermometers, and before humans warmed the climate by releasing



heat-trapping carbon dioxide from fossil fuels? Back then, was Earth's temperature warming or cooling? Even though scientists know more about the most recent 6,000 years than any other multi-millennial interval, studies on this long-term global temperature trend have come to contrasting conclusions. To try to resolve the difference, we conducted a comprehensive, global-scale assessment of the existing evidence, including both natural archives, like tree rings and seafloor sediments, and climate models. Our results, published 15 February 2023, suggest ways to improve climate forecasting to avoid missing some important slow-moving, naturally occurring climate feedbacks.

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Global warming in context Scientists like us who study past climate, or paleoclimate, look for temperature data from far back in time, long before thermometers and satellites. We have two options: We can find information about past climate stored in natural archives, or we can simulate the past using climate models. There are several natural archives that record changes in the climate over time. The growth rings that form each year in trees, stalagmites, and corals can be used to reconstruct past temperature. Similar data can be found in glacier ice and in tiny shells found in the sediment that builds up over time at the bottom of the ocean or lakes. These serve as substitutes, or proxies, for thermometer-based measurements. For example, changes in the width of tree rings can record temperature fluctuations. If the temperature during the growing season is too cold, the tree ring forming that year is thinner than one from a year with warmer temperatures. Another temperature proxy is found in seafloor sediment, in the remains of tiny ocean-dwelling creatures called foraminifera. When a foraminifera is alive, the chemical composition of its shell changes depending on the temperature of the ocean. When it dies, the shell sinks and gets buried by other debris over time, forming layers of sediment at the ocean floor. Paleoclimatologists can then extract sediment cores and chemically analyze the shells in those layers to determine their composition and age, sometimes going back millennia. Climate models, our other tool for exploring past environments, are mathematical representations of Earth's climate system. They model relationships among the atmosphere, biosphere, and hydrosphere to create our best replica of reality. Climate models are used to study current conditions, forecast changes in the future, and reconstruct the past. For example, scientists can input the past concentrations of greenhouse gasses, which we know from information stored in tiny bubbles in ancient ice, and the model can use that information to simulate past temperature. Modern climate data and details from natural archives are used to test their accuracy. Proxy data and climate models have different strengths. Proxies are tangible and measurable, and they often have a well-understood response to temperature. However, they are not evenly distributed around the world or through time. This makes it difficult to reconstruct global, continuous temperatures. In contrast, climate models are continuous in space and time, but while they are often very skillful, they will never capture every detail of the climate system.

A paleo-temperature conundrum In our new review paper, we assessed climate theory, proxy data, and model simulations, focusing on indicators of global temperature. We carefully considered naturally occurring processes that affect the climate, including long-term variations in Earth's orbit around the Sun, greenhouse gas concentrations, volcanic eruptions, and the strength of the Sun's heat energy. We also examined important climate feedbacks, such as vegetation and sea ice changes, that can influence global temperature. For example, there is strong evidence that less Arctic sea ice and more vegetation cover existed during a period around 6,000 years ago than in the 19th century. That would have darkened the Earth's surface, causing it to absorb more heat. Our two types of evidence offer different answers regarding the Earth's temperature trend over the 6,000 years before modern global warming. Natural archives generally show that Earth's average temperature roughly 6,000 years ago was warmer by about 1.3 °F compared with the 19th century median, and then cooled gradually until the Industrial Revolution. We found that most evidence points to this result. Meanwhile, climate models generally show a slight warming trend, corresponding to a gradual increase in carbon dioxide as agriculture-based societies developed during the millennia after ice sheets retreated in the Northern Hemisphere.

How to improve climate forecasts Our assessment highlights some ways to improve climate forecasts. For example, we found that models would be more powerful if they more fully represented certain climate feedbacks. One climate model experiment that included increased vegetation cover in some regions 6,000 years ago was able to simulate the global temperature peak we see in proxy records, unlike most other model simulations, which don't include this expanded vegetation. Understanding and better incorporating these and other feedbacks will be important as scientists continue to improve our ability to predict future changes. <https://www.sciencealert.com/before-human-made-climate-change-was-earth-actually-in-a-cooling-phase>

Sand Spikes: Century-Old Mystery Solved

Sand spikes, which are pin-shaped, carbonate-cemented sandstone bodies sometimes more than a foot long, were discovered at Mount Signal in southern California around a century ago. However, until recently, the formation of sand spikes has been enigmatic. Scientists have been puzzled by the eye-catching bulbous heads and protruding tails of these spikes and have commonly interpreted them as concretions that grew slowly below the groundwater table. Alternatively, it has been



Miocene-age sand spikes from Ochsenhausen (southern Germany) with several intergrown individuals, almost identical in appearance to those found at Mount Signal, California.

suggested that they are petrified mushrooms or animal burrows. In a recent paper, Elmar Buchner (HNU Neu-Ulm University of Applied Sciences) and colleagues present a novel, dynamic formation model for sand spikes. The authors investigated several sand spike occurrences and, based on structural and stratigraphic features of these occurrences, suggested that sand spikes are a previously unrecognized type of seismite (a rock modified by the passage of high-energy seismic waves). They pointed out that sand spike tails at Mount Signal consistently point away from the nearby San Andreas Fault, and sand spikes in Miocene-age sands in the North Alpine Foreland Basin of southern Germany systematically point away from the 15-mile-wide Nördlinger Ries impact crater located some tens of miles to the north. The latter is confined to the Ries seismite, up to a 50-foot-thick layer of intensely deformed, sand-dominated sediments that were located near the paleo-land surface at the time of the Ries impact, which caused a magnitude 8.5 earthquake 14.81 million years ago. Although sand spikes are rare geologic phenomena, there may be additional places on Earth where they may occur. According to Buchner and colleagues, sand spikes are preferably produced in partially water-saturated sands during strong earthquakes of magnitude 7 and greater. Sand spikes are, therefore, a promising new tool for identifying strong tectonic or impact-induced palaeo-earthquakes when assessing the natural hazard potential of seismically active regions https://www.lpi.usra.edu/planetary_news/2021/12/21/sand-spikes-century-old-mystery-solved-and-a-new-tool-to-identify-regions-prone-to-major-earthquakes/

Scientists Solve Mystery Behind Honeycomb Pattern in Salt Deserts

The mesmerizing honeycomb patterns found in salt deserts such as Badwater Basin in California's Death Valley and Salar de Uyuni in Bolivia have perplexed tourists and inspired sci-fi movie-makers for decades. Scientists, too, have struggled to explain the mechanism behind the shapes. Now, physicists



think they've finally solved this natural puzzle. Lucas Goehring, a professor of physics at Nottingham Trent University in England, said that the answer lies in the groundwater beneath the salt crust. In a recently published paper, researchers describe how layers of salty and less salty water circulate up and down in donut-shaped currents, which are squeezed together horizontally to form the regular pattern. Previously, scientists suggested that the cracks and ridges form as the salt crust expands and dries out, bending and fragmenting under the strain. Now, the researchers note that previous attempts to understand the iconic landscape didn't account for the uniform size of the hexagons, which are always 3 to 6 feet across, wherever in the world they are found. The new study confirms the widely accepted idea that the geometric patterns are formed by a mechanism rooted in basic thermodynamics. *"The surface patterns reflect the slow overturning of salty water within the soil, a phenomenon somewhat like the convection cells that form in a thin layer of simmering water,"* Goehring said. Salt deserts aren't as bone-dry as they seem. Beneath the salt crust sits a layer of extremely salty water, which can be reached by digging with your hands. The water evaporates in the hot summer months, leaving only a blanket of salt, some of which dissolves into the next layer of water. This layer is then more dense than the one below it, and the salty water sinks in a ring that surrounds fresher, less dense water rising to replace it. The water evaporates and leaves a salt residue, which dissolves into the top water layer again. The cycle repeats itself to form what scientists call a convection roll. Research on salt deserts has focused either on these subsurface currents or on the crust. The new study argues that the two features interact and mirror each other to form the tessellations. Where the dense, salty surface water sinks, salt accumulates on the crust to form ridges. The salt crust grows more rapidly around the edges of each hexagon because it is in contact with saltier water than the middle. Normally, a convection roll would adopt a circular donut shape. Because there are so many of them packed closely together on a salt flat, however, the rolls are squeezed against each other to form hexagons, the researchers said. <https://www.livescience.com/scientists-solve-mystery-behind-strange-honeycomb-pattern-in-salt-deserts>

One of Earth's Biggest Mass Extinctions Caused by Rising Sea Levels in Eerie Echo of Today

Depleting oxygen and rising hydrogen sulfide levels in the oceans may have been responsible for one of Earth's most significant mass extinctions more than 350 million years ago, a new study finds. The changes were likely driven by rising sea levels and have some spooky parallels to conditions seen today. Researchers studied samples of black shale from the Bakken Formation, a



Hydrogen sulfide forms when algae decomposes on the ocean floor. The decomposition process also depletes the area of oxygen.

200,000-square-mile region partly laid down during the late Devonian that encompasses parts of North Dakota and Canada and is one of the largest contiguous deposits of natural gas and oil (opens in new tab) in the United States. The team found evidence that Earth experienced periods of oxygen depletion and hydrogen sulfide expansion, which likely contributed to the sweeping extinction events that ravaged Earth during the Devonian period (419.2 and 358.9 million years ago), or the "Age of Fishes." "There have been other mass extinctions presumably caused by expansions of hydrogen sulfide before, but no one has ever studied the effects of this kill mechanism so thoroughly during such a critical period of Earth's history," said study co-author Alan Jay Kaufman, a geologist at the University of Maryland. During the Devonian period, sea life proliferated. Jawless fishes, known

as placoderms, diversified widely throughout oceans that encircled the supercontinents Gondwana and Euramerica. Oceans were also full of trilobites and early ammonites, and extensive reefs fringed the continents. On land, Earth saw its first forests of ferns and early trees. By the mid-Devonian, Earth's earliest known tetrapod *Tiktaalik roseae* had crawled out of the sea. However, the Devonian period also saw some of the most significant extinctions in Earth's history, including one of the five infamous 'mass extinction' events that led to the evolution of the flora and fauna we know today. Placoderms, trilobites and early ammonites disappeared, while cartilaginous fish-like sharks and rays proliferated. To better understand the Devonian extinctions, the research team analyzed more than 100 core samples drilled from black shale deposits in the Bakken Formation. This organic-rich sediment accumulated near the end of the Devonian period, recording the environment within its chemical makeup. The team found evidence of "anoxic events," where waters were completely depleted of oxygen, they reported in the study, published March 8 in the journal [Nature](#). These sharp drops "are likely linked to a series of rapid rises in sea level" due to the melting of South Pole ice sheets during the preceding Silurian period (443.8 million to 419 million years ago)," Kaufman said. Simultaneously, plants transformed rocky land into soil, which would have released nutrients to flow into those rising oceans. The influx of nutrients into the oceans would have triggered massive algal blooms, which died, decomposed and soaked up oxygen. As they decomposed, the dead algae released hydrogen sulfide, increasing levels of the toxic chemical. The oxygen-depleted seas were too much for Devonian marine life. Researchers estimate that 75% of all life went extinct by the end of the Devonian. The Devonian mass extinction is a warning for today, the study authors wrote. Oxygen-depleted dead zones emerge in oceans every year, in places like the Gulf of Mexico and the Baltic Sea. Intensive fertilizer use, plus sewage runoff, boost the ocean's nutrient levels and encourage massive algal blooms. And as the globe warms and sea levels rise, the oceans won't circulate oxygen as well, Kaufman said in the statement. Past mass extinctions can help scientists understand the consequences of our actions today. Although the reasons for sea-level rise and nutrient influx in the Devonian are different from today, they could lead to the same result — a massive loss of life in our planet's oceans, the researchers argue.

<https://www.livescience.com/one-of-earths-biggest-mass-extinctions-caused-by-rising-sea-levels-in-eerie-echo-of-today>

Fragment of 1,000-Pound Meteor that Exploded Over Texas Could Reveal New Insights About Our Solar System

A hefty meteor weighing around the same as a grand piano recently exploded in the skies above Texas, potentially showering the surrounding area with smaller fragments. One of these meteorite chunks has already been recovered and could help reveal more about our cosmic neighborhood, experts say. The meteor, which was likely a small asteroid, entered Earth's atmosphere on Feb. 15 at around 5 p.m. CST and broke apart in a burst of flames about 21 miles above the city of McAllen. This type of space rock is known as a fireball meteor because of the bright flash given off as it breaks apart, due to friction between the fast-moving object and the air in the atmosphere. *"Based on analysis of preliminary information from several sources, NASA experts believe the object was a meteoroid about two feet in diameter weighing about 1,000 pounds"* according to NASA's Meteor Watch. The meteor was traveling at around 27,000 mph when it exploded and released the equivalent energy of around 8 tons of TNT, they added. The meteor's size and speed suggested that fragments had likely reached the ground without burning up completely. On Feb. 18, Robert Ward, a meteorite hunter based in Arizona, recovered a fragment of the meteorite near El Sauz, Texas, after tracing the debris' trajectory using data from a National Oceanic and Atmospheric Administration weather radar. *"When samples such as the remnants of this event are collected and studied, they enhance our understanding of the origin and evolution of our solar system,"* said NASA representatives. There are likely more fragments scattered in the same



A close-up of the recovered Texas fireball fragment recovered by Robert Ward.

If someone finds one on land they own then that person owns the fragment, but if you find it on public land you should contact the Smithsonian Institute, which manages the National Meteorite Collection, NASA representatives wrote. In a weird coincidence, the recent fireball arrived exactly 10 years after the Chelyabinsk meteor, which was around nine times larger than the Texas fireball and exploded over Russia Feb. 15, 2013, with the equivalent force of around 30 Hiroshima bombs. The recent fireball was also the third fireball meteor detected worldwide in as many days: On Feb. 13 a meteor exploded in the skies above France, and on Feb. 14 a space rock broke apart above Italy, according to AMS. What's more, all three produced meteorites that have been recovered by experts, which is very rare. <https://www.livescience.com/fragment-of-1000-pound-meteor-that-exploded-over-texas-could-reveal-new-insights-about-our-solar-system?>

March CVRMS Busy Work

CVRMS members got together a week before the Rock Show to prepare rock kits for the Pebble Pit. From the left, Dell James, Kim Long, Deanne Feller, Kim Kleckner, and Dale Stout glue a variety of rock specimens into egg cartons for sale at the show for \$1. Not show are Bill and Sharon Sonnleitner, Marv Houg, and Ray Anderson.



CVRMS member **Dolores Slade** did her share to help **Coralville** celebrate its **Sesquicentennial** (150 Years since the town was founded). She organized a display of fossils and limestone specimens at the Coralville Public Library, and a discussion of how Coralville received its name. In 1866, shortly after famed Harvard scientist Louis Agassiz lectured at the University of Iowa about the *"Coral Reefs of Iowa City."* The scheduled lecture was to be about continental glaciers, but he was so impressed by the fossilized coral that he found in the area that he changed his lecture topic to a discussion of the corals. This "corals" lecture was so well received by the public that the residents decided to name their village Coralville. The display that Dolores and Ray Anderson prepared includes examples of Coralville's corals.



520-Million-Year-Old Sea Monster Had 18 Mouth Tentacles

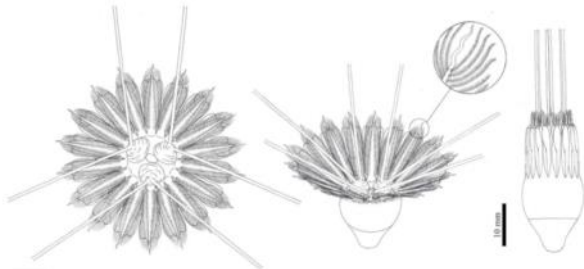
The discovery of a fossil showing an ancient sea creature with 18 tentacles surrounding its mouth has helped to solve a modern-day mystery about the origins of a gelatinous carnivore called a comb jelly, a new study finds. The previously unknown "sea monster," which scientists dubbed *Daihua sanqiang*, lived a whopping 518 million years ago in what is now China. And the extinct animal shares a number of anatomical characteristics with the modern comb jelly, a little sea creature that uses so-called comb rows full of loads of hair-like cilia to swim through the oceans. The discovery suggests that this newfound species may be the comb jelly's distant relative, said study lead researcher Jakob Vinther, a paleobiologist at Bristol University in the United Kingdom. "With fossils, we have been able to find out what the bizarre comb jellies originated from," Vinther told Live Science. "Even though we



A detailed fossil of the newly identified *Daihua sanqiang*

now can show they came from a very sensible place, it doesn't make them any less weird." This finding, however, has sparked a debate. While the discovery of *D. sanqiang* is impressive, it's hard to say whether this ancient creature is part of the lineage that produced comb jellies, said Casey Dunn, a professor of ecology and evolutionary biology at Yale University. "I am highly skeptical of the conclusions they draw," Dunn said. Vinther came across the *D. sanqiang* fossil while visiting colleagues at Yunnan University in China. The scientists there showed him a number of fossils in their collection, including the mysterious creature they later named *Daihua sanqiang*, which was discovered by study co-researcher Xianguang Hou, a paleobiologist at Yunnan University. The genus name honors the Dai tribe in Yunnan;

"hua" means flower in Mandarin, and refers to the critter's flower-like shape. On each of *D. sanqiang*'s tentacles are fine, feather-like branches with rows of large ciliary hairs, which likely helped it catch prey. These hairs, according to Vinther, grabbed his attention "because we only find big cilia on comb jellies." To swim, comb jellies move their cilia, which then flicker in beautiful iridescent colors. Moreover, the *D. sanqiang* fossil bears an intriguing resemblance to other known ancient animals, including *Xianguangia*, another ancient creature with 18 tentacles, and the tulip-like sea creatures *Dinomischus* and *Siphusauctum*. "To make a long story short, we were able to reconstruct the whole [early] lineage of comb jellies, by doing anatomical comparisons," Vinther said. This is a big deal, because some scientists argue that these swimming carnivores were among the first animals to evolve on Earth, based on family trees analyses and genetic modeling of modern comb jellies. But now, this international team has possibly shown that comb jellies have a long lineage that precedes them, Vinther said. This newly described lineage suggests that some of the ancestors of comb jellies had skeletons and that their ancient tentacles evolved into the combs with the densely packed cilia seen on comb jellies today. The discovery also sheds light on where these ancient animals likely sat on the tree of life. For instance, researchers previously thought that *Xianguangia* was a sea anemone, but it "is actually part of the comb jelly branch," study co-researcher Peiyun Cong, a professor of paleobiology at Yunnan University, said in a statement. These findings also make a strong case that comb jellies are related to corals, sea anemones and jellyfish, the researchers said. "Those [ancient] tentacles are the same tentacles that you see on corals and sea anemones," Vinther said. "We can trace comb jellies to these flower-like animals that lived more than half a billion years ago." But not everyone agrees with this analysis. While Dunn commended the researchers for their detailed description of *D. sanqiang* and its proposed relatives, some of these creatures have such different body shapes that it's challenging to see how they could be related, he said. It's possible that the tulip-looking *Dinomischus* and *Siphusauctum* creatures are related to each other. But *Siphusauctum* has ciliary rows on the inside of its body, and the animal purported to come after it, *Galeactena*, has these rows on the outside of its body. It's hard to see how this animal would, in effect, turn inside out as it evolved, Dunn said. Given that some of these claims are tenuous, the burden of proof is higher, and the researchers don't quite get there, Dunn said. "These are exciting animals no matter how they're related to each other," Dunn said. "Even though I'm skeptical that tentacles and comb rows are homologous [evolutionarily related], I think that as we describe more diversity from these deposits, certainly we're going to learn a lot more about animal evolution." The study was published online in the journal *Current Biology*. <https://www.livescience.com/65049-ancient-creature-18-tentacles.html>



An artist's illustration of *Daihua sanqiang*.

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Trilobites Had a Hidden Third Eye, New Fossils Reveal

Trilobites, a group of extinct marine arthropods, had a hidden third eye, and sometimes even a fourth or fifth, new research



Much like modern-day arthropods, trilobites had more than two eyes. suggests. Paleontologists knew that, like other arthropods such as insects and spiders, these hard-shelled prehistoric sea creatures had a pair of compound eyes, which they used to see during the Paleozoic Era (541 million to 252 million years ago). But scientists recently discovered a median eye located in the middle of the long-dead creatures' foreheads, a common characteristic in arthropods today, according to a study published March 8 in the journal *Scientific Reports*. Before this, scientists thought that the third eyes "were a characteristic of the larval stage of the animals" that was indicative of this time of life. These eyes were "located under a transparent layer of the carapace [shell], which became opaque during the fossilization process," meaning the third eye was essentially hidden within ancient fossils, researchers said. When the researchers examined a specimen of *Aulacopleura koninckii* that had part of its head missing, they found three "dark, inconspicuous and tiny oval spots of the same size at the front of the head," according to the statement. "This clear, regular appearance distinguishes this structure from random formations produced by decay or fossilization and corresponds to the expected relics of simple median eyes equipped with a pigment layer," said lead author Brigitte Schoenemann, a professor at the Institute of Zoology at the University of Cologne in Germany. "Even if it is a single find, it supports the assumption that trilobites originally had median eyes." At different points in evolution, trilobites likely had anywhere from one to multiple median eyes. For example, the researchers found that the trilobite *Cyclopyge sibilla* had three median eyes equipped with lenses similar to those in human eyes, and *Cindarella eucalla* had four. Nowadays, most modern insects and crustaceans have three median eyes, according to the researchers. "We now have an important tool to determine [trilobites'] position in the evolutionary tree," the study authors wrote in the statement. <https://www.livescience.com/trilobites-had-a-hidden-third-eye-new-fossils-reveal>

Chrysoberyl: One of the World's Most Expensive Gemstones

The mineral or gemstone chrysoberyl is a beryllium aluminate with the formula BeAl_2O_4 . Despite the similarity of their names, chrysoberyl and beryl are two entirely different gemstones, although they both contain beryllium. Chrysoberyl is the third hardest commonly encountered natural gemstone and lies at 8.5 on the Mohs scale of mineral hardness. The ordinary chrysoberyl is yellowish-green and transparent to translucent.

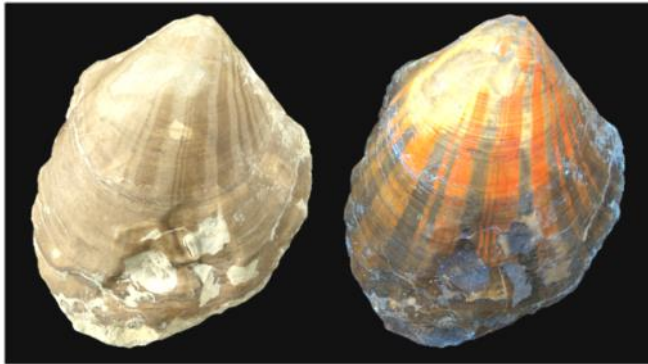


When the mineral has a good pale green to yellow color and is transparent, it is used as a gemstone. The three main varieties of chrysoberyl are: ordinary yellow-green chrysoberyl, cat's eye or cymophane, and alexandrite. Chrysoberyl forms as a result of peg-

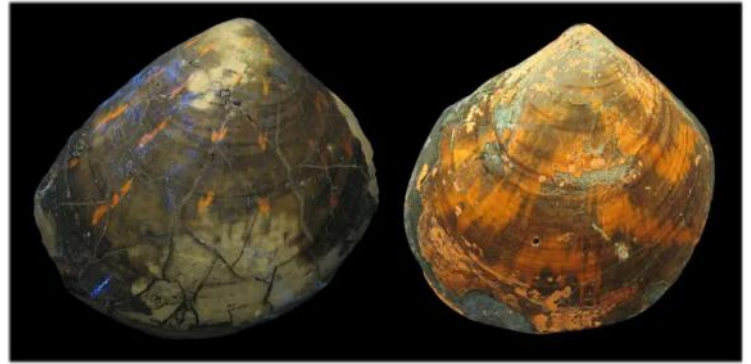
matic processes. Melting in Earth's crust produces relatively low-density molten magma, which can rise up to the surface. As the main magma body cools, the water initially present at low concentrations became more concentrated in the molten rock because it could not be incorporated into the crystallization of solid minerals. The remaining magma thus becomes richer in water, and also in rare elements that similarly do not fit into the crystal structures of the major rock-forming minerals. Water extends the temperature range downwards before the magma becomes completely solid, allowing the concentration of rare elements to proceed to the point where they produce their own distinctive minerals. The resulting rock is igneous in appearance but formed at a low temperature by a water-rich melt, with large crystals of common minerals such as quartz and feldspar, but also with elevated concentrations of rare elements such as beryllium, lithium or niobium, often forming their own minerals; this is called pegmatite. Chrysoberyl may also grow in country rocks near pegmatites, when pegmatite-rich be- and al-rich fluids react with surrounding minerals. It can therefore be found in mica shales and in contact with the metamorphic deposits of dolomitic marble. Because it is a hard, dense mineral that is resistant to chemical alteration, it can be weathered out of rocks and deposited in river sands and gravels in alluvial deposits with other gem minerals such as diamonds, corundum, topaz, spinel, granite and tourmaline. Beryllium is concentrated in felsic pegmatites where chromium is almost absent. Therefore, the only situation where alexandrite can grow is when Be-rich pegmatite fluids react with Cr-rich country rock. This unusual requirement explains the rareness of this chrysoberyl variety. Chrysoberyl is not present in large deposits to be used as a beryllium ore. It's only used as a gemstone due to its very high hardness and its unique properties. **Chrysoberyl has recently been marketed for tens of thousands of dollars, with alexandrite chrysoberyl often hitting over \$100,000.** <https://www.geologypage.com/2020/10/chrysoberyl-one-of-the-worlds-most-expensive-gemstone.html>

Glowing Fossils: Fluorescent Color Patterns Found in 240 Million-Year-Old Shells

UV light allows you to view intricate structures in fossils that would be impossible to observe in normal daylight. This method has often been used on fossilized seashells from the Earth's current geological era to reveal color patterns that had long since faded away. According to a new study from the **University of Göttingen**, fluorescent color patterns may even be detected in 240 mil-



Scallop *Pleuronectites* from the Triassic period with fluorescent colour pattern; left under normal light, right under UV light



Color pattern variations in the fossil scallop *Pleuronectites*

lion-year-old shells from the Earth's Mesozoic Era. This makes them the oldest fluorescent color patterns discovered so far. This study's findings were published in the journal *Palaeontology*. Traces of color patterns are extremely rare in Mesozoic Era fossils. However, UV light examination of scallops from the Triassic era, right at the start of the Mesozoic Era, reveals that color patterns



Different fluorescent colors in the fossil scallop *Pleuronectites*.

are preserved much more often than previously believed. UV light, which is undetectable to the human eye, excites organic compounds in the fossils, causing them to glow. This exposes a surprising variety of color patterns, including many kinds of stripes, zigzags, and flame patterns. The diversity of color patterns is comparable to that of modern seashells seen on a beach. However, the color patterns of today's scallops do not show any fluorescence. "In the case of the Triassic shells, fluorescent compounds were only formed in the course of fossilization through oxidation of the original pigments," explains Dr. Klaus Wolkenstein from the Geosciences Centre at the University of Göttingen, who is currently carrying out research at the **University of Bonn**. Surprisingly, the fossil shells show different fluorescent colors, depending on the region where they were found. "The color spectrum ranges from yellow to red with all the transitions in between, which suggests that there were clear regional differences in the fossilization of these scallops," adds Wolkenstein. Reference: "Fluorescent colour patterns in the basal pectinid *Pleuronectites* from the Middle Triassic of Central Europe: origin, fate and taxonomic implications of fluorescence" by Klaus Wolkenstein, 27 October 2022, *Palaeontology*. <https://scitechdaily.com/glowing-fossils-fluorescent-color-patterns-found-in-240-million-year-old-shells/>

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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. 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

Next Meeting:
APRIL 18
Hiawatha Community Center
"Adventures in Geophysics"
How the Iowa Geological Survey
Uses Geophysics to Image
Beneath the Ground
by Jason Vogelgesang
Iowa Geological Survey



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