

Cedar Valley Gems

Cedar Valley Rocks & Minerals Society

Cedar Rapids, Iowa

cedarvalleyrockclub.org

CEDAR VALLEY GEMS

JUNE 2023

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

Next CVRMS Meeting
Tues. June 20
we eat at 6:30 pm
Potluck Picnic!

at Thomas Park

343 Marion Blvd , Marion

Begley #2 Pavilion



Rock Polishing
Rock Identification
Rock Show & Tell

- **Bring Your Favorite Dish to Share**
- **Bring Your Own Table Service**

Rock That Crashed Through New Jersey Home May be 5 Billion-Year-Old Chunk of Halley's Comet

A rock likely to be a meteorite crashed into a New Jersey home on May 8, damaging a bedroom but causing no injuries. No one was at Suzy Kop's home in Hopewell Township, New Jersey. The meteorite landed around 1 p.m. EDT, crashing through the roof and landing in the bedroom belonging to Kop's father. Judging by the damage, the meteorite hit the floor, bounced to the ceiling, and came to rest in the corner



of the room. The metallic rock measures about 4 inches by 6 inches. Authorities are still investigating the origin of the apparent space rock, but Derrick Pitts, the chief astronomer at

The Franklin Institute in Philadelphia, said that it could be 4 to 5 billion years old. It's possible that the meteorite was part of the ongoing Eta Aquarid meteor shower, which roughly occurs between April 19 and May 29 each year, and which reached its peak around May 5 and 6. During peak days, the shower can produce hundreds of "shooting stars" per hour, most of which are meteors that burn up in the atmosphere. These meteors are the rocky debris left by Halley's Comet, which becomes visible from Earth every 75 to 79 years, according to NASA. Meteors enter Earth's atmosphere all the time, but most burn up before hitting the ground. On rare occasions, those that do land cause damage to buildings. For instance, in 2015, a 1.6 pound meteorite crashed into a home in San Carlos, Uruguay, destroying a bed and television. In 2021, a British Columbia woman woke to a loud noise and discovered a fist-sized rock between her pillows; it turned out to be a fragment of a meteor that exploded in midair, causing a fireball. <https://www.livescience.com/space/asteroids/rock-that-crashed-through-new-jersey-home-may-be-5-billion-year-old-chunk-of-halleys-comet>

CVRMS Meeting May 16 — Minutes —

MEETING CALLED TO ORDER by Marv Houg, 7:15 p.m.
Guests or new members introduced: Linda McDonald and Jamie Roberts Butler. Welcome!

MINUTES OF LAST MEETING: Minutes from previous meeting as published. Motion to approve by Julie and second by Sheri. Minutes approved as published.

TREASURER'S REPORT: by Dale. Checking account balance \$10,712.94. Motion to approve treasurer's report by A.J., second by Ray. Treasurer's report approved.

SCHOLARSHIPS FROM SHOW REVENUE: Scholarships will be awarded; University of Iowa **\$6,935**, Cornell **\$4,458**, and VAST, **\$2,958—record awards!**. Motion to approve the scholarships by Bill and second by Deanne. Motion approved.

PROGRAM; YouTube videos as selected by attendees (with a curious advertisement which brought a few chuckles from the membership).

DOOR PRIZE: drawing and prize won by A.J.

BUSINESS: Sharon showed a few samples of table covers. Ray made motion to allow Sharon to purchase table covers of her choice using club money. Second by Bill. Motion passed.

TAKO: (Take a kid outside) is this weekend. Meet at Klein Quarry at 9 a.m. Kim, Dave Malm, Glenn, Ray (will be late). Marv will call Deb about display tables. Matt will lead collecting trip into Klein Quarry after the TAKO event is over.

AUCTION: All consignee slots filled. Conflict with Denver Show? We won't have the problem next year since our dates will be later.

SAC & FOX ROCK SHOW AT MT. PLEASANT: Dale will send email reminder about Labor Day show, and will include reminder of Matt's June 10 trip to Linn County Sand Pit for Agates.

BILLS BIG BUS TRIP: Sept 30 to Madison, *U of Wisc. Geology Museum*, and then to Rockford's *Burpee Museum of Natural History*. Leave at **6 am SHARP** and return about **6 p.m. Bring your own lunch**. Sign up sheet going around. If you sign up, show up. Or let Bill know. A tour guide for the U. of Wisc. Museum is available at <https://museum.geoscience.wisc.edu/>

SUMMER PICNICS: Venue rental prices have gone up. Marv will investigate other possible Summer Picnic Venues and Dale will inform members of picnic venues via email.

WIRE WRAP CLASS. Kim Long will contact woman at *NewBo* and let Marv know what he finds out. Club will pay her fees and we can hold it at Hiawatha Community Center.

MOTION TO ADJOURN: by AJ; second by Deanne. At 9:15 pm meeting was adjourned.

Respectfully submitted
Dell James, Secretary

CVRMS Board Meeting May 23 — Minutes —

MEETING CALLED TO ORDER by Marv Houg at his house, 7:10 pm. Board members present-Marv Houg, Ray Anderson, Matt Burns, Sharon Sonleitner, Jay Vavra, Kim Kleckner, Dell James, Bill Desmarais

MINUTES OF PREVIOUS MEETING reviewed. Bill made motion to approve and Ray seconded. Minutes approved as published.

ROCK AUCTION SEPT 9-10; Jay reported that 16 contracts in and 7 more out. Dell will contact Rock and Gem to advertise auction and include March show also.

FIELD TRIPS; Trip to Linn County Sand & Gravel scheduled for June 10 from 10 am to 2 pm. As usual Dale will send out notification.

Facebook no report. Seems that people are misusing it but Kim takes care of that.

BILLS BIG BUS BOOGIE FIELD TRIP; Sept. 30, 21 people have signed up so far. 56-passenger bus.

MISCELLANEOUS; Name Tags—Ray will check availability at Harry's Trophies in Coralville, Jay will check at Hiawatha store. **Member Manners**—Glen from Waterloo club gives a little speech about expectations before Waterloo Club field trips. Kim will get with him and with his input get something for our club. Kim will also work on a set of rules for audience members at club presentations. These are presentations not discussions and ours have lately turned into discussions. Please no phones and save questions until the end

JUNE PICNIC; C.R. Parks will close pavilions at 8:00 pm, too early for our meetings, so Marv will call for Thomas Park in Marion and check on Pavilion rental. Remember it is potluck and bring your own utensils including your drink. Anyone who has lapidary equipment to use and demonstrate is welcome to share your talents.

WIRE WRAP CLASS; Kim Long and Jay have not had any luck getting in touch with the wire wrap lady from New Bo.

MOTION TO ADJOURN: motion to adjourn by Bill and Second by Ray. Meeting adjourned 8:00 pm.

Respectfully submitted
Dell James, Secretary

T.A.K.O. at Klein



On Saturday, May 20, CVRMS members assisted TAKO of Johnson County with their tenth annual “Rockin’ Rocks and Fossils” program at River Product’s Klein Quarry in Coralville. Founded in 2006, TAKO (Take A Kid Outdoors) is an organization based in Iowa and dedicated to providing immersive outdoor experiences to children and people of all ages. At this year’s program TAKO hosted over 100 parents and kids.



Kim Kleckner talks to TAKO kids about rock collecting and passed out specimens that she has found.

A variety of activities was available for the kids, including photo display of quarry operation, rock product produced, discussion and display of area rocks and fossils. They collected a variety of souvenirs, including “hard hats”, reading materials, plaster casts of fossils, sample bags, and rock samples. About 90 attendees took guided tours of the quarry on custom viewing trailers, and ended their tour exploring quarry rocks piled in a parking area. CVRMS members were there to answer questions from the would-be geologists, who were especially excited to find specimens of pyrite and calcite (from the Ernst Quarry salted into the piles).



TAKO kids discover their own rock treasures among the quarried rocks piles in the parking area.

Spotlight Gemstone: Alexandrite

June's Birth Stone



natural light incandescent light

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

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

What in the World?



What in the World is this beautiful geologic specimen??

May's Photo



Last month's *What in the World* photo was the **Dragon's Eye**, part of Vermilion Cliffs National Monument on the border of Arizona and Utah. Cliffs of crumbled rock and canyons of exposed strata show the slow but steady progress of years and years of erosion. Dragon's Eye shows one of several pools of groundwater that slowly collects in these small pools, leaving the surrounding sandstone shredded and cracked to bits.

ROCK CALENDAR CVRMS EVENTS OF INTEREST

2023

June 20 — CVRMS Potluck Picnic
Thomas Park (Marion) Begley #2 Pavilion 6:30 pm
Rock Polishing

July 21 — CVRMS Potluck Picnic
Wanatee Park Meadowlark Shelter 6:30 pm
Geode Cracking

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

Sept. 9 -10 — CVRMS Rock Auction
Amana RV Park and Event Center
Amana, Iowa
(see page 10 for additional information)

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

Sept. 30 — CVRMS Bus Field Trip
U of Wisc. Geology Museum and Burpee Museum
(see page 11 for additional information)

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

Nov. 21 — CVRMS Monthly Meeting
Hiawatha Community Center 7:15 pm
Program to be announced

Dec. 5 — CVRMS Christmas Party
Hiawatha Community Center 7:15 pm
Details to be announced

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.

I read an interesting paper the other day addressing old questions that meteor impact scientists have debated for many years: what was the nature of the Tunguska impactor, the meteorite that exploded over the Siberian forests in 1908. This was the largest impact blast in recorded history, that flattening many trees but left no apparent crater.

The Tunguska event was the biggest asteroid impact in recorded history. How did it vanish without a trace?

by Hannah Osborne

On June 30, 1908, an asteroid flattened an estimated 80 million trees in Siberia over 830 square miles. Dubbed the Tunguska event, it is considered the biggest asteroid impact **in recorded history**. Yet no one has ever found the asteroid fragments or an impact site. The asteroid lit up the skies in a remote, sparsely inhabited region near the Podkamennaya Tunguska River. It unleashed a 10- to 15-megaton explosion, similar in size to the 1954 Castle Bravo nuclear bomb test, the fifth-largest nuclear detonation in history. *"The sky was split in two, and high above the forest the whole northern part of the sky appeared covered with fire,"* an eyewitness reported. One popular theory is that the asteroid formed Lake Cheko, a freshwater lake about 5 miles from the explosion epicenter. The lake is about 1,640 feet wide and 177 feet deep. Luca Gasperini, research director at the National



Research Council of Italy, and colleagues said the lake's cone-like shape and depth resembled an impact crater. In a study published in 2012 in the journal *Geochemistry, Geophysics, Geosystems*, they estimated that the sediments at the bottom of the lake had been building for 100 years, while evidence of trees at the bottom of the lake indicate the waterhole covers an old forest. But some experts were not convinced. In 2017, researchers led by Denis Rogozin, from the Russian Academy of Sciences, carried out their own analysis and concluded that lake sediments were at least 280 to 390 years old, **"significantly older than the 1908 Tunguska Event."** And in a new study published May 2 in the journal *Doklady Earth Sciences*, Rogozin and colleagues

presented more evidence to refute the idea Lake Cheko is the Tunguska asteroid's impact site. Previously, many researchers believed Lake Cheko's unusual cone shape was unique in the region, giving weight to the idea that an asteroid formed it. But Rogozin and colleagues analyzed two nearby lakes, Zapovednoye and Peyungda, that sit 31 miles and 37 miles from the suspected impact site. Both are also cone shaped, they found. *"The difference in the age of the lake sediments puts into question the impact origin of these lakes, this would require the arrival of three almost identical space bodies at different times, which is highly improbable given that the lakes are located in almost the same place on Earth,"* the researchers wrote. However, the conical shape of the lakes isn't the only evidence that Cheko was formed by the Tunguska event, Gasperini said. In a paper posted to the preprint server *arxiv* in 2018 (which still has not been peer reviewed), Gasperini and his team hypothesized that Tunguska was caused by a **"rubble-pile" asteroid'** a structurally weak mashup of fragments from a monolithic asteroid. As a result, the asteroid split into two pieces, one around 197 feet wide, the other around 20 to 33 feet wide. The smaller of these two smashed into Earth, forming Lake Cheko, they wrote. The team detected a 33-foot-wide anomaly at the bottom of the lake that may be a leftover fragment of the asteroid. By drilling to the lake center, someone could test the composition of the anomaly to confirm that hypothesis. However, Gasperini's team can no longer access the site due to the war in Ukraine. *"The Russian scientists could easily do this test, instead of continuing to publish articles showing data similar to ours with very questionable interpretations,"* Gasperini said. If Cheko wasn't formed by the Tunguska impact crater, then what happened to the asteroid that set fire to the skies more than a century ago? A paper published in 2020 in the journal *Monthly Notices of the Royal Astronomical Society* suggested a large iron asteroid passed through Earth's atmosphere, then curved away from Earth without breaking up. This, the team said, would explain why no trace of the asteroid has ever been found. Another paper posted to *arxiv* last month put forward yet another hypothesis, that the asteroid broke apart and scattered across the landscape. While many fragments would have burnt up in the atmosphere, the team said smaller chunks could have survived and hit Earth over a *"strewn field."* This paper suggests rocks from the asteroid could be about 10 to 12 miles northwest of the epicenter, *"even if the mud and vegetation could have made any trace disappear."* <https://www.livescience.com/space/asteroids/the-tunguska-event-was-the-biggest-asteroid-impact-in-recorded-history-how-did-it-vanish-without-a-trace>

1.7 Billion Tyrannosaurus Rexes Walked the Earth Before Going Extinct, New Study Estimates

The total number of *Tyrannosaurus rex* to ever roam Earth has been recalculated by scientists, with new research revealing 1.7 billion of these dinosaur kings existed throughout our planet's history. In April 2021, a study published in the journal *Science* estimated that up to 2.5 billion *T. rex* individuals lived between 68 and 65.5 million years ago. But a new study, published April 18 this year in the journal *Palaeontology*, has challenged that number, suggesting the actual figure is probably closer to 1.7 billion. Study author Eva Griebeler, stated that her



new model factored in information about *T. rex* that the original study's authors overlooked, which resulted in the reduced number. In the original study, a complex model factored in a number of

different variables, such as average body mass, population density, approximate geographic range, age of sexual maturity, number of eggs laid, average lifespan, survival rates and generation time, to estimate how many *T. rex* could have survived alongside one another. The model revealed that each *T. rex* generation likely consisted of around 20,000 individuals and that there were around 125,000 generations in the 2.5 million years they existed, meaning 2.5 billion *T. rex* in total. But Griebeler disagreed with some of the data imputed into this model. She believed Marshall's team overestimated the survival rates and egg-laying capabilities of *T. rex*, as well as the number of generations that existed during this time, which skewed the results. Research by Griebeler published shortly after the original study found these values were likely more similar to those seen in modern birds and reptiles. When these values were imputed into an updated model, it revealed that there were 19,000 individuals in each *T. rex* generation and that there were only around 90,000 generations, meaning the maximum number of *T. rex* to exist was 1.7 billion. Regardless of the exact number, both studies raise an interesting question, **where are all the *T. rex* bones?** If Griebeler's predictions are correct, it means that we have only found the remains of 0.0000002% of these giant dinosaurs. This is an important question that requires further research, Griebeler and Marshall agreed. Our understanding of *T. rex* is constantly changing. In recent years, numerous discoveries about the species have altered what we know about the long-dead dino kings. In November 2022, one research group predicted that the largest *T. rex* to ever walk Earth would have been 70% larger than the largest known *T. rex* fossil "Scotty." And in April 2021, another group revealed that the species' maximum speed would have likely been around 3 mph, which is around the same speed as a walking human. And other discoveries have suggested that the giant dinosaurs were also warm-blooded like modern birds and hid their teeth behind a thin pair of lips. <https://www.livescience.com/animals/dinosaurs/17-billion-tyrannosaurus-rexes-walked-the-earth-before-going-extinct-new-study-estimates>

What Prehistoric Poop Reveals About Extinct Giant Animals

Looking at poop can tell us a lot. Poop offers a window into all sorts of hidden worlds: bird microbiomes, clam habitats, recovering coral forests, and more. Excrement can also tell us about how and when animals went extinct thousands of years ago. A study published April 26 in the journal *Quaternary Research* looked at the fungal spores in the dung of the large animals, such as 20-foot-tall ground sloths and 1,000 pound armadillo-looking animals called armored glyptodonts, that roamed the Colombian Andes in South America during the Pleistocene. They found that the animals became extinct in not one, but two waves. The megafauna in this study first became locally extinct at Pantano de Monquentiva, a valley in Colombia surrounded by hills and near a bog, about 23,000 years ago and then again in the same area about 11,000 years ago. Spores of coprophilous fungi pass through the guts of these megafauna during their life cycle. The presence of these spores in sediment samples provides evidence that these long-extinct animals lived in a certain place and time. The team used samples found in a peat bog in Pantano de Monquentiva, about 37 miles from Bogota, Colombia. The findings offer a window back in time to better understand how the disappearance of large animals could transform ecosystems like they did all those millennia ago. "We know that large animals such as elephants play a vital role in regulating ecosystems, for example by eating and trampling vegetation," said Dunia H. Urrego, co-author and University of Exeter biologist and geographer. "By analyzing samples of fungal spores, as well as pollen and charcoal, we were able to track the extinction of large animals, and the consequences of this extinction for plant abundance and fire activity". The team found that the Monquentiva ecosystem changed dramatically when the megafauna disappeared, with different plant species thriving and increased wildfires. The analysis of the fungal spores didn't tell exactly which large animals were present, but it's possible that the animals were either the giant sloth and armadillo, or even macrauchenids and toxodonts, two peculiar extinct animals reminiscent of today's camels and rhinoceroses. The study also found that when all of this plentiful megafauna disappeared, it had major effects on the ecosystem. Roughly 5,000 years after their disappearance, the megafauna began to live again. This reprieve was short lived, and they all went extinct in a second wave of extinction 11,000 years ago. While the team does not know the direct causes of this, a number of factors like plant extinctions, climate changes, increased hunting by humans, and even a meteorite spike are potential causes. After the megafauna vanished, plant species at Monquentiva transitioned, with more woody and palatable plants (those favored by grazing animals), and the loss of plants that depend on seed dispersal by animals. Wildfires became more common after the megafauna extinctions, presumably because flammable plants were no longer being eaten or trampled upon. With the planet's current biodiversity crisis in mind, the study points to the importance of conserving local plants and watching fire activity before the value humans gain from nature completely disappears. <https://www.popsoci.com/environment/prehistoric-poop-fungi-megafauna-biodiversity/>

Climate Change Could Trigger Gigantic Deadly Tsunamis from Antarctica, New Study Warns

Climate change could unleash gigantic tsunamis in the Southern Ocean by triggering underwater landslides in Antarctica, a new study warns. By drilling into sediment cores hundreds of feet beneath the seafloor in Antarctica, scientists discovered that during previous periods of global warming, 3 million and 15 million years ago, loose sediment layers formed and slipped to send massive tsunami waves racing to the shores of South America, New Zealand and Southeast Asia. And as climate change heats the oceans, the researchers think there's a possibility these tsunamis could be unleashed once more. Their findings were published May 18 in the journal *Nature Communications*. "Submarine landslides are a major geohazard with the potential to trigger tsunamis that can



An artist's illustration of a tsunami wave poised to crash down upon a beach.

lead to huge loss of life," Jenny Gales, a lecturer in hydrography and ocean exploration at the University of Plymouth in the U.K., said in a statement. "Our findings highlight how we urgently need to enhance our understanding of how global climate change might influence the stability of these regions and potential for future tsunamis." Researchers first found evidence of ancient landslides off Antarctica in 2017 in the eastern Ross Sea. Trapped underneath these landslides are layers of weak sediment crammed with fossilized sea creatures known as phytoplankton. Scientists returned to the area in 2018 and drilled deep into the seafloor to extract sediment cores, long, thin cylinders of the Earth's crust that show, layer by layer, the geological history of the region. By analyzing the sediment cores, the scientists learned that the layers of weak sediment formed during two periods, one around 3 million years ago in the mid-Pliocene warm period, and the other roughly 15 million years ago during the Miocene climate optimum. During these epochs, the waters around Antarctica were 5.4 degrees Fahrenheit warmer than today, leading to bursts of algal blooms that, after they had died, filled the seafloor below with a rich and slippery sediment, making the region prone to landslides. "During subsequent cold climates and ice ages these slippery layers were overlain by thick layers of coarse gravel delivered by glaciers and icebergs," said Robert McKay, director of the Antarctic Research Centre at Victoria University of Wellington and co-chief scientist of International Ocean Discovery Program Expedition 374 (which extracted the sediment cores in 2018). The exact trigger for the region's past underwater landslides isn't known for sure, but the researchers have found a most-likely culprit: the melting of glacier ice by a warming climate. The ending of Earth's periodic glacial periods caused ice sheets to shrink and recede, lightening the load on Earth's tectonic plates and making them rebound upwards in a process known as isostatic rebound. After the layers of weak sediment had built up in sufficient quantities, Antarctica's continental upspringing triggered earthquakes that caused the coarse gravel atop the slippery layers to slide off the continental shelf edge — causing landslides that unleashed tsunamis. The scale and size of the ancient ocean waves is not known, but the scientists note two relatively recent submarine landslides that generated huge tsunamis and caused significant loss of life: The 1929 Grand Banks tsunami that generated 42-foot-high waves and killed around 28 people off Canada's Newfoundland coast; and the 1998 Papua New Guinea tsunami that unleashed 49-foot-high waves that claimed 2,200 lives. With many layers of the sediment buried beneath the Antarctic seabed, and the glaciers on top of the landmass slowly melting away, the researchers warn that, if they're right that glacial melting caused them in the past, future landslides, and tsunamis, could happen again. "The same layers are still present on the outer continental shelf, so it is 'primed' for more of these slides to occur, but the big question is whether the trigger for the events is still in play." McKay said. "We proposed isostatic rebound as a logical potential trigger, but it could be random failure, or climate regulated shifts in ocean currents acting to erode sediment at key locations on the continental shelf that could trigger slope failure. This is something we could use computer models to assess for in future studies."

<https://www.livescience.com/planet-earth/antarctica/climate-change-could-trigger-gigantic-deadly-tsunamis-from-antarctica-new-study-warns>

All Butterflies Evolved from Ancient Moths 100 Million Years Ago in North America

Scientists have painstakingly constructed the **world's biggest butterfly tree of life** and discovered that the first butterflies evolved 100 million years ago in what is now Central and North America. At this time, the supercontinent Pangaea was in the process of breaking apart, and North America was split in two by a seaway separating the east and west. Butterflies originated in the western side of this continental chunk. There are now an estimated **20,000** species of butterflies, and they are found on every continent except Antarctica. Although scientists knew **when butterflies originated**, they were still unsure about the region they emerged from and their earliest diet. The team of scientists, led by Akito Kawahara, a curator of lepidoptera (butterflies and moths) at the Florida Museum of Natural History, constructed the new butterfly tree of life by sequencing 391 genes from nearly 2,300 butterfly species from 90 countries, representing 92% of recognized genera. The researchers compiled data from multiple sources into a single publicly available database. They used 11 rare butterfly fossils as a standard to make sure that the branching points of their tree of life matched the time period of branching displayed by fossils. The findings, published May 15 in the journal *Nature Ecology & Evolution*, showed that **butterflies emerged around 101.4 million years ago** from the ancestors of nocturnal herbivorous moths. This puts the first butterflies in the mid-Cretaceous, making them contemporaries of dinosaurs. After evolving, butterflies spread to what is now South America. Some migrated to Antarctica, which was much warmer at the time and still connected to Australia. They had reached the northern edge of Australia when the two landmasses split, a process that began around 85 million years ago. Next the butterflies crossed the Bering Land Bridge (a land bridge that once existed between Russia and North America) and reached what is now Russia 75-60 million years ago. They then spread out to Southeast Asia, the Middle East and the Horn of Africa. They even reached the then-isolated island of India around 60 million years ago. Surprisingly, due to unknown reasons, the spread of butterflies paused at the edge of the Middle East for 45 million years before finally spreading into Europe around 45-30 million years ago. An analysis of 31,456 records of butterfly host plants revealed that the first butterflies fed on plants from the legume family. Legumes are found in almost every ecosystem and most lack potent defensive chemicals against insect feeding. Scientists believe these traits might have caused the butterflies to stick with a legume diet for millions of years. Today, butterflies have diversified to eating other plant families but most stick to a single plant family, mostly wheat family and legume family. Interestingly, the most recent common ancestor of legumes is around 98 million years old, which largely coincides with the origin of butterflies. *"The evolution of butterflies and flowering plants has been inexorably intertwined since the origin of the former, and the close relationship between them has resulted in remarkable diversification events in both lineages,"* co-author Pamela Soltis, a curator at the Florida Museum, said in the statement.

<https://www.livescience.com/animals/butterflies/all-butterflies-evolved-from-ancient-moths-in-north-america-100-million-years-ago>

Bill & Ray Teach at the Johnson STEAM Academy

On May 5, CVRMS Board members Bill Desmarais and Ray Anderson presented programs at the **Johnson STEAM Academy "Discovery Days."** The Cedar Rapids Magnet School's curriculum features an innovative, problem-based learning design rooted in **STEAM: Science, Technology, Engineering, Art, and Math**. Each unit includes a real-world problem that students must solve by assuming a potential career and applying learning gained throughout the unit of study. Students work collaboratively using a design process that encourages critical thinking and problem solving. Ray presented a PowerPoint discussion of the Earth's rocks and minerals, with a variety of speci-



Students examine samples of various rock types



Bill explains the details of resin casts of real dinosaur bones

mens for hands-on examinations by the students. Bill followed with his outstanding program on dinosaurs, including PowerPoint photos of his *dinosaur hunting* expeditions, and hands on explanations of resin casts of a variety of bones, real fossil dinosaur bones, fossil eggs, and even a sample of dino poop. The students enjoyed the presentations and had many good questions.



Bill allows students to touch a real fossil dinosaur egg



Casts of the upper and lower jaw of a T-Rex skull were a hit

Giant Heat Plumes Deep in Earth Revealed: The Fires That Ignite Diamond Eruptions

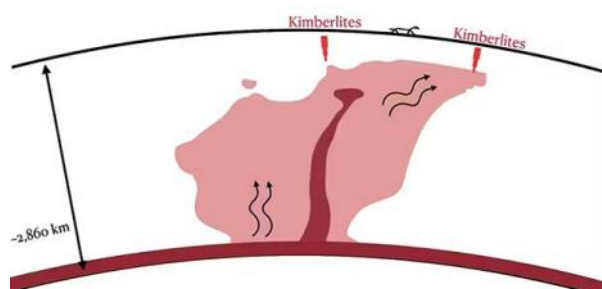
Most diamonds are formed deep inside Earth and brought close to the surface in small yet powerful volcanic eruptions of a kind of rock called "kimberlite." Supercomputer modeling, published in *Nature Geoscience*, shows these eruptions are fueled by giant "pillars of heat" rooted 1,802 miles below ground, just above our planet's core. Understanding Earth's internal history can be used to target mineral reserves, not only diamonds, but also crucial minerals such as nickel and rare earth elements. Kimberlite eruptions leave behind a characteristic deep, carrot-shaped "pipe" of kimberlite rock, which often contains diamonds. Hundreds of these eruptions that occurred over the past 200 million years have been discovered around the world. Most of them were found in Canada (178 eruptions), South Africa (158), Angola (71) and Brazil (70). Between Earth's solid crust and molten core is the mantle, a thick layer of slightly goopy hot rock. For decades, geophysicists have used computers to study how the mantle slowly flows over long periods of time. In the 1980s, one study showed that kimberlite eruptions might be linked to small thermal plumes in the mantle, feather-like upward jets of hot mantle rising due to their higher buoyancy, beneath slowly moving continents. It had already been argued, in the 1970s, that these plumes might originate from the boundary between the mantle and the core, at a depth of 1,800 miles. Then, in 2010, geologists proposed that kimberlite eruptions could be explained by thermal plumes arising from the edges of two deep, hot blobs anchored under Africa and the Pacific Ocean. And last year, it was reported that these anchored blobs are more mobile than previously thought. However, exactly how activity deep in the mantle was

driving kimberlite eruptions remained unknown. Geologists assumed that mantle plumes could be responsible for igniting kimberlite eruptions. However, there was still a big question remaining: how was heat being transported from the deep Earth up to the kimberlites? To address this question, investigators used supercomputers in Canberra, Australia, to create three-dimensional geodynamic models of Earth's mantle. Their models account for the movement of continents on the surface and into the mantle over the past one billion years. The researchers calculated the movements of heat upward from the core and discovered that broad mantle upwellings, or "pillars of heat," connect the very deep Earth to the surface. Their modeling showed these pillars supply heat underneath kimberlites, and they explain most kimberlite eruptions over the past 200 million years. The model successfully captured kimberlite eruptions in Africa, Brazil, Russia, and partly in the United States and Canada. Their models also predicted previously undiscovered kimberlite eruptions occurred in East Antarctica and the Yilgarn Craton of Western Australia. Towards the center of the pillars, mantle plumes rise much faster and carry dense material across the mantle, which may explain chemical differences between kimberlites in different continents. The models do not explain some of the kimberlites in Canada, which might be related to a different geological process called "plate subduction." The researches have so far predicted kimberlites back to one billion years ago, which is the current limit of reconstructions of tectonic plate movements. <https://www.sciencealert.com/giant-heat-plumes-deep-in-earth-revealed-the-fires-that-ignite-diamond-eruptions>



Kimberlite eruptions in the past 200 million years.

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Schematic representation of Earth's heat pillars and how they bring heat to kimberlites, based on the geodynamic model.

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Cedar Valley Rocks & Minerals Society will hold its **2023 consignment Auction on September 9-10** in the Morton Building at the Amana RV Park, Amana, IA. The auction assists collectors or families of collectors to dispose of their collections. Knowledgeable club members act as auctioneers. Auctions typically attract about 100 bidders, and about 1300 lots will be auctioned.

Viewing is Friday night Sept. 8 from 5:00 - 7:30 pm , Saturday morning Sept. 9 from 7:30 - 9:00 am. and Sunday morning Sept. 10 from 8:00 - 9:00 am. The Saturday Auction runs from 9:00 a.m. to about 8:00 pm, with hot food available during the day and a dinner offered from 5:30 - 6:00 pm. The Sunday Auction runs from 9:00 am to about 3:30 pm, again with hot food available.

Cash, credit card (with small service fee) or good check is accepted for payment. Iowa sales tax of 7% is also added to all items. Bidders who provide Iowa tax permits are exempt from paying it.

If you can't stay for those special lots you want, you can leave a maximum bid, and a club member will bid for you up to your maximum.

Motel rooms are available in Amana, but they are sometimes sold out. Motels are also available in Little Amana (15 minutes away), Cedar Rapids & Iowa City (each about 25 minutes away).

Since each sale has several consigners, the sale rotates among the consigners. All lots are numbered, and an order of sale is available at viewing on Saturday morning. **Equipment sales begins at 2:00 pm on Saturday.**

If you have a collection to dispose of, please contact [Marv Houg](#) or [Sharon Sonnleitner](#) (*see contact information on page 12*). The club does all the advertising and sets up the Friday before the auction. A 25% commission is charged for non-members, and 20% is charged for members or families of members who have belonged to the club for at least 2 years.



"Bill's Big Bus Boogie" 2023

U. of Wisc. Geology Museum & Burpee Museum of Natural History

The 2023 edition of "Bill's Big Bus Boogie" adventure is on again after a 3-year COVID break. This year's trip will take CVMRS members on a bus field trip to the **University of Wisconsin Geology Museum** in Madison, Wisconsin, and the **Burpee Museum of Natural History** in Rockford, Illinois, on **Saturday, September 30, 2023**.



The sign-up sheet for members interested in participating in the trip will be available at club meetings. For additional information contact **Bill Desmarais** at desmarais_3@msn.com or phone 319-365-0612.

It will be another great and memorable "Bill's Big Bus Boogie" field trip!

2023 Bills Big Bus Boogie
 will leave from Cedar Valley World Travel
 6100 7th St SW, Cedar Rapids
 Sat. Sept. 30 - **6:00 a.m. SHARP** and return ~ 6:00 p.m.
monitored parking available

additional information will appear in future newsletters.

2022 & 2023 Officers, Directors, and Committee Chairs

President	Marv Houg (m_houg@yahoo.com).....	(319)364-2868
Vice President. ...	Ray Anderson (rockdoc.anderson@gmail.com)	530-2419
Treasurer	Dale Stout (dhstout55@aol.com)	365-7798
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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

**Next Meeting:
JUNE 20
Thomas Park—Marion
Pot-Luck Picnic
Begley #2 Pavilion**



Ray Anderson, Editor
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Iowa City, Iowa 52240-9620