

# Cedar Valley Gems



Cedar Valley Rocks & Minerals Society

Cedar Rapids, Iowa

[cedarvalleyrockclub.org](http://cedarvalleyrockclub.org)

CEDAR VALLEY GEMS

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Ray Anderson, Editor: [rockdoc.anderson@gmail.com](mailto:rockdoc.anderson@gmail.com)

## Next CVRMS Meeting TUESDAY, February 20

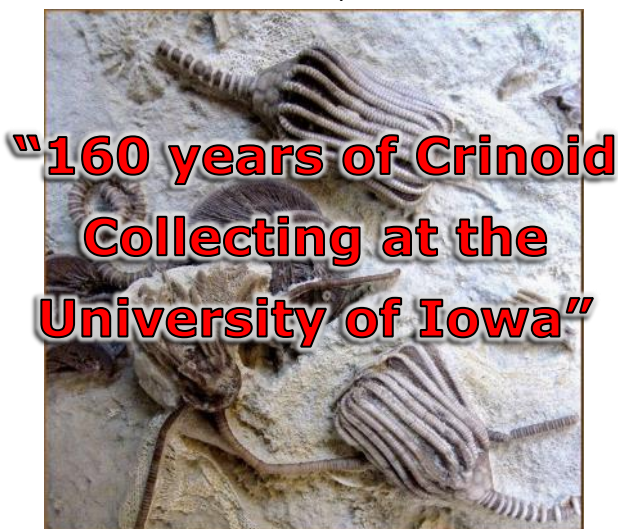
Hiawatha Community Center  
101 Emmons St., Hiawatha - 7:00 pm

featured speaker:

**Tiffany Adrain**

*Special Collections Manager*

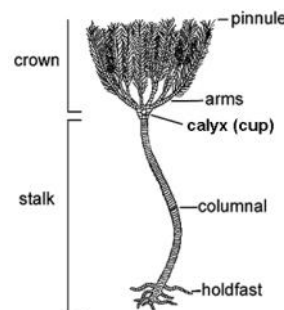
Department of Earth and Atmospheric Sciences  
The University of Iowa



The University of Iowa Paleontology Repository is home to over 1 million fossils from all geological ages and with worldwide coverage. A large part of this collection is what I like to refer to as the Midwest Crinoid Collection. It contains more than 50,000 specimens collected over the last 160 years by well known fossil collectors and paleontology researchers including Samuel Calvin, Frank Springer, Charles Belanski, Lowell Laudon, Harrell Strimple, Christina Strimple, Calvin Levorson, Arthur Gerck, Amel Priest, and Glenn Crossman. This presentation is an update of the presentation that was published in the April 2009 *Maps Digest*, and is a preview of a talk that Tiffany will present at this year's CVRMS Rocks, Fossils, and Minerals show in March.



Vice-President Ray Anderson has been spearheading a CVRMS project to convince the Iowa Legislature to designate the crinoid as Iowa's State Fossil, and we now have a bill. **Senate Joint Resolution 2001** "a joint resolution recognizing the fossil crinoid as the state fossil" was prepared by Iowa City Senator Joe Bolkcom and is co-sponsored by Senator Bill Dotzler (Waterloo), Nate Boulton (Des Moines), Robert Dvorsky (Coralville), Rich Taylor (Mount Pleasant), Kevin Kinney (Oxford), and Chaz Allen (Newton). It has not yet been determined when the bill will be voted, but it is time for **all you**



structure of a crinoid

**"friends of the crinoid" to contact your legislators and encourage them to vote for the bill.** Fossil crinoids from Iowa, especially from Le Grand, Burlington, and Gilmore City are among the finest ever collected, and are displayed in museums all over the world. Crinoid fossils can be found in rocks that underlie much of Iowa, even by novice collectors. A new page has been added to the CVRMS web site that provides information about crinoids (living and as fossils from Iowa) as well as information on the bill and how to identify and contact your legislator.

### FLOYD THE 'NOID



Project mascot **"Floyd the 'Noid"** wants **"all of you to contact your legislators, and also talk to others about contacting their legislators the crinoid bill."**

<http://cedarvalleyrockclub.org/crinoids.html>

## CVRMS Jan. 16 Meeting

### Hiawatha Community Center

Called by President Marv Houg at 7:18  
at Hiawatha Community Center

**Guests:** Ellen King, Jesse XXX, Eleanor XXX.

**Secretary's Report:** Motion was made by Tom Whitlatch to approve the secretary's report as published. 2nd by Bill Desmarais. Carried.

**Treasurer Dale Stout** reported a balance of \$28,158.26 in checking. Motion was made by AJ Johnson and seconded by Tom Whitlatch to accept the Treasurer's report. Carried.

**Program:** Ray Anderson presented the Nova video "Gems of the Earth." Terry Baty won the monthly door prize.

**MSHA Training:** Marv reported MSHA training is scheduled for March 22 at 2:00 and 6:00 at a place yet to be determined – possibly Hiawatha Community Center, Marion Library or Cedar Rapids Ladd Library.

#### **Show:**

Ray announced Tiffany Adrain from UI Paleo Repository will bring a display that includes a nice Cretaceous slab from Trowbridge, some other nice crinoids, and a modern one, as well as the 6' Eurypterid model. Beloit College will bring Le Grand crinoids collected by Beane. Augustana will provide 2 large slabs. Ray is also working on getting specimens of Burlington and Gilmore City crinoids from the State Historical Museum.

**Misc.:** Sharon Sonnleitner will post a sign-up form for workers and displays on our website. Marv announced we need items for the pebble pit, silent auction, and door prizes. Lisa Blunt suggested we have carpet around the pebble pit. Marv will ask John McArdle & Kelly Lund to give their program on their Australian field trip after dinner Saturday night of the Show. Friday night will have a potluck at 6:30. Saturday night will have a catered dinner at 6:15. A request for Dell to order more t-shirts was made. We will have a community display case for those who don't have enough items to fill a whole case.

**Crinoid as State Fossil:** Ray announced Senator Joe Bolkcom and some others have submitted a bill to have the crinoid named the State fossil.

**Bus Trip:** Bill announced a bus has been reserved for a trip to the Milwaukee Public Museum on November 4. The club will pay for the bus, so members as of May 1, 2018, only need to pay admission. If the bus is not full by September 15, the trip will be opened to the public for \$25/seat.

**Auction:** Marv announced we have 400 lots committed so far.

**Announcements:** Tom announced Bill Rathbun, past MWF State Director for Iowa, passed away on January 12. Lisa Blunt will be hostess for the February meeting.

**Adjournment:** AJ made a motion to adjourn. 2nd by Tom. Adjourned at 9:15.

Respectfully submitted,  
Sharon Sonnleitner, Acting Secretary

## CVRMS Board Minutes Jan. 30

Board Minutes – January 30, 2018  
Called at 7:15 at the home of Marv Houg

**Present:** President Marv Houg, Dale Stout, Ray Anderson, Bill Desmarais, Jay Vavra, Sharon Sonnleitner, Bob Roper, Rick Austin

**MISC:** Jay volunteered to put together an Index of the articles in the website's archived newsletters. Marv will ask JJ Buchholz and Kim Hanna to be Hospitality chairs and will check to see if Dell James has the box and the hostess sign-up list, which we would like to post on the Board-only part of the website so we have access to it.

**SHOW:** In an email Dell suggested creating a crinoid calling card for Bill (who will be wearing a crinoid costume at the show) to hand out to kids and also that he hand them crinoid columnals. Ray will work on it with Sharon. Dale will check on columnals.

**Electrical:** Bob will send an email to the dealers to request the total wattage they use and the number of items they plug in. The current contract with Hawkeye Downs allow 2 plug-ins with 2 items on each plug-in for \$40. Additional items and/or plug-ins are subject to additional charge.

**Catered Saturday Dinner:** Marv will check with the Oakland Road HyVee for Saturday's dinner and will also express our concerns about last year's dinner.

**Egg Carton Day:** The time for assembling egg carton collections to sell at the Show was set for Sunday, February 25, at 1:30 at Sharon's house. About 10 people are needed. Volunteers so far include Dale, Marv, Rick, Sharon & Bill Sonnleitner, and possibly Bill Desmarais and Jay.

**Raffle Prizes:** We currently have 2 zeolites and a box of fossils. In addition, we are looking for an amethyst cathedral, large geode and mineral box. Dale will get the license.

**Posters:** Ray has one done and is working on two or three more for our featured displays of crinoids.

**Dealers:** Most dealer contracts are paid. Marv will check with dealers on our list to replace Ray Garton, who has cut back on shows.

**PROJECTOR:** Rick presented his suggestions for a new club projector: Optima, Epson or BenQ. All have 5,000 lumens, HDMI, built-in speakers, and range between \$1,200 and \$1,500. The Board will check out his recommendations and make a recommendation to the membership after the next Board meeting.

**AUCTION:** About 500 lots are now committed. Sharon will check with Sandy Brandl, Bruce Birkemeyer, Phil Oliver, Mike Blin, and Clarence Burns about possible lots.

**CRINOID AS STATE FOSSIL:** Ray has designed and Sharon has implemented web pages on our site to help promote the crinoid as the state fossil. The bill has been submitted to the Senate, and Ray is sending out info to other organizations, schools, etc., to get support for the bill. Bill reported Rich & Manny Patterson will help promote the project.

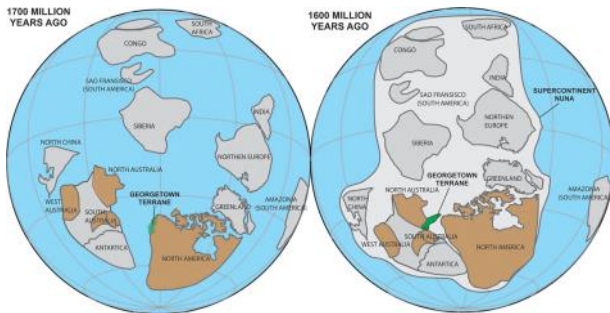
**LIBRARIES ROCK:** Libraries Rock is the theme of this summer's reading program. The Cedar Rapids Library contacted Ray about programs on general collecting, Keokuk geodes, and the Devonian Fossil Gorge, which he said he could put together.

Adjourned at 9:45.

Respectfully submitted,  
Sharon Sonnleitner, Acting Secretary



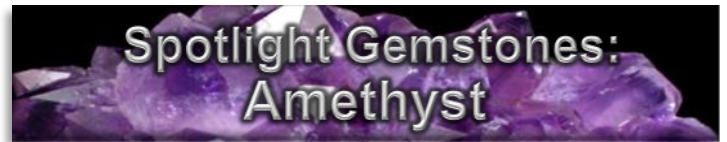
Geologists matching rocks from opposite sides of the globe have found that part of Australia was once attached to North America, 1.7 billion years ago. The rocks, sandstone sedimentary rocks that formed in a shallow sea, were unlike any others known in Australia but strongly resembled rocks that can be seen in present-day Canada. The researchers, who recently published their findings in *Geology*, concluded that the Australian area called Georgetown broke away from North America 1.7 billion years ago. Then, 100 million years later, this landmass collided with what is now northern Australia during the formation of the supercontinent "Nuna." Nuna subsequently broke apart 300 million years later, leaving the Georgetown area stuck to Australia as the North American landmass drifted away. The continents as we know



*This diagram shows the Georgetown terrane, in green, joining Australia around 1.6 billion years ago during the formation of the supercontinent Nuna.*

them today have **shifted places** throughout Earth's 4-billion-year history. Most recently, these landmasses came together to form the supercontinent known as **Pangaea** about 300 million years ago. Geologists are still trying to reconstruct how even earlier supercontinents before Pangaea assembled and broke apart. Scientists first proposed the existence of Nuna (sometimes called Columbia and possibly the Earth's first supercontinent) in 2002. Previous research suggested that northeast Australia was near North America, Siberia or North China when the continents came together to form Nuna. The researchers studied detrital (sedimentary) zircons, zircon crystals that had eroded from surrounding igneous rocks and deposited in the Georgetown terrane sandstones. The zircons retained information about the age of the rocks that they were eroded from, thus can be traced back to their source rocks. The zircon ages were consistent with rocks in northwest Canada but much different than the surrounding Australian rocks.

<https://www.livescience.com/61490-chunk-of-north-america-in-australia.html#undefined.gbp>



## *February's Birth Stone*



February's birthstone, **amethyst**, is the purple variety of the mineral quartz, its most famous and valuable gem variety. Quartz in other colors include gemstones such as **citrine** (yellow), **rose quartz** (pink), and **smoky quartz** (gray). The purple of amethyst is most often caused by iron impurities, though it can also be colored by natural radiation exposure. Amethyst is sometimes heat treated to deepen the color, or to transform it into citrine. Some forms of amethyst may also change to a light green color upon heat treatment (called **prasiolite** or "**green amethyst**"). Amethyst is mined in many locations, some of which produce distinct color styles. For example, amethyst from Uruguay has a deep purplish-blue color, as does amethyst from Arizona. Amethyst from deposits that have since been exhausted in Russia, is known as "**Siberian amethyst**", a very deeply reddish and bluish colored stone which commands a high price. African amethyst is generally more deeply colored than the South American variety. Some amethyst from a few locations may slightly fade in color upon prolonged exposure to light. The color distribution of amethyst is sometimes uneven, and this is often taken into account when cutting a stone. Due to the abundance of amethyst, it is usually clean and free of flaws or inclusions. Because of this, amethyst with any visible flaws or inclusions should be avoided. Amethyst can occur in huge flawless crystals, and gems of all sizes have been faceted. Amethyst is sometimes heat treated to deepen the purple color and transform lighter colored stones into deeper hues. More often though, amethyst is heat treated to produce citrine and the green quartz (prasiolite). Although there are numerous natural sources of amethyst, synthetic amethyst gems are also produced, using the hydrothermal method. A natural mixture of purple amethyst and golden citrine has been coined with the trade name "**Ametrine**". Amethyst is faceted into many cuts, and is used in all forms of jewelry including rings, necklaces, earrings, bracelets, and pendants. Many large gems weighing several hundred carats have been cut from amethyst. Ornamental objects are also occasionally carved from large pieces. Lower quality amethyst is an important bead gem and can also be cut into cabochons. Tumbled beads of purple amethyst mixed with white quartz are also used as necklaces and bracelets.

## What in the World?



**What in the World is special about this famous New Mexico geological attraction ??**

## January's Photo



Last month's *What in the World* image was an aerial photo of the mouth of the Colorado River as it flows into the Gulf of Mexico. Because of withdrawal of the Colorado's water for municipal and agricultural uses and warmer weather conditions this river bed is usually dry, with water actually making it to the Gulf on only rare occasions. The river's flow at the US/Mexico border is now only 10% of its natural volume. This 2014 image shows water entering the Gulf during one of a series of High Flow Experiment releases of water from dams, designed to restore native Colorado River vegetation and remove sand bars. The white areas are salt flats.

## Rock Calendar 2018 CVRMS EVENTS OF INTEREST

### Feb 20 - CVRMS Monthly Meeting

Feature Program  
*"160 Years of Crinoid Collecting at the University of Iowa"* — Tiffany Adrain  
 Hiawatha Community Center 7:15 pm

### March 20- CVRMS Monthly Meeting

Feature Program  
*Cornell College Field Students*  
 Hiawatha Community Center 7:15 pm

### March 24-25 - CVRMS Gem, Mineral, and Fossil Show

*"Crinoids; Iowa's State Fossil?"*  
 Hawkeye Downs, Cedar Rapids

### April 6-April 8—MAPS National Fossil Expo 39

*"Permian AND Triassic Periods"*  
 Sharpless Auctions Facility, Iowa City

### April 17 - CVRMS Monthly Meeting

Feature Program  
*"To Be Announced"*  
 Hiawatha Community Center 7:15 pm

### May 15 - CVRMS Monthly Meeting

Feature Program  
*"To Be Announced"*  
 Hiawatha Community Center 7:15 pm

### Sept. 15-16—CVRMS Rock Auction

Amana RV Park and Event Center  
 Amana, Iowa

### Nov. 4—CVRMS Fall Field Trip

*Milwaukee Public Museum*  
 Milwaukee, Wisconsin

# Ask a Geologist

by Ray Anderson aka "Rock Doc", CVRMS Vice President

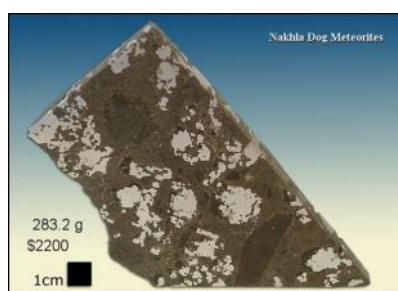
**Ask a Geologist** is a monthly column that gives CVRMS members an opportunity to learn more about a geologic topic. If you have a question that you would like addressed, please send it to [rockdoc.anderson@gmail.com](mailto:rockdoc.anderson@gmail.com), and every month I will answer one in this column. 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, regardless of if it is chosen. for

**Rona asked:** "With all of these sedimentary rocks, has anyone ever found a new mineral in Iowa?"

**Rock Doc replied:** Well, I haven't really researched that question, but I can think of 2 minerals that were first found in Iowa. One is **Tetrataenite**, which is a nickel-iron mineral that I used to brag was first discovered in the Estherville (Iowa) meteorite. Then I discovered that that wasn't completely correct. I read the article in which **Tetrataenite** was first named (a 1980 *American Mineralogist*) that said that the iron-nickel mineral in the Estherville meteorite was originally misidentified as **taenite** (a mineral with a cubic crystal structure). The 1980 paper examined samples of Estherville meteorite and 17 other meteorites and concluded that



Estherville meteorite



Slab of the Estherville meteorite showing the silver colored crystals of tetrataenite

the metal was **tetrataenite**, a phase of **taenite** (a common nickel-iron element in meteorites.) The **taenite** had transformed to **tetrataenite** as its original asteroid cooled slowly below 750° F (and iron was concentrated in a new mineral **kamasite**, creating the diagnostic Widmanstätten line pattern. The remaining, more nickel-rich **taenite** recrystallized to form the tetragonal mineral **tetrataenite**). Anyway, the 1980 paper identified the tetragonal mineral in all 18 meteorite samples and named it **tetraenite**. But, in the 1980 paper, the authors stated that the Estherville meteorite supplied the "type" material for identification of the **tetrataenite**, so Estherville is where the "type" mineral was found.

The other Iowa mineral I know is **lowaite**, a talc-like mineral with the chemical formula  $Mg_4Fe^{+++}(OH)_8OCl_2 \cdot 4(H_2O)$  that was identified in Precambrian rocks in a drill core from northeast Sioux County, Iowa, in 1967. **lowaite** is a bluish-green mineral that looks very similar to the green mineral **serpentinite**, with which is associated in the Iowa core. A



lowaite specimen



serpentinite specimen



chrome-rich lowaite specimen from the Kaznakhtinskii massif in Siberia, Russia

number of years ago Dr. Carl Seifert, longtime geology professor at Iowa State, was telling me about spending a summer on a deep sea core drilling project in the Pacific. Most of the rocks that they were drilling and studying were ocean floor basalts that were hydrothermally altered to serpentinite. "One day," he said. "I noticed that all that stuff we were calling serpentinite was pretty bluish. So we x-rayed some of the rock and it was **lowaite**." An Iowa State geology professor bobbing around in the Pacific Ocean, sees **lowaite** for the first time in a core from the bottom of the ocean. Subsequently Carl looked for the **lowaite** in the northwest Iowa core, and said he couldn't find any because the **lowaite** altered to a greenish white color that blended into the surrounding serpentinites when it dried out. Interestingly, brilliant purple masses of a chromium-rich variety of **lowaite** were recently discovered in the Kaznakhtinskii massif in the Altai Mountains of Siberia, Russia, and are being marketed as **lowaite**. Pretty rock, but it has a hardness of only 1.5 and is not stable in an oxygenated environment.

## Feathered dinosaurs were extra fluffy

New analysis of the remains of a bird-like dinosaur called *Anchiornis* suggests feathered dinosaurs were fluffier than researchers thought. Modern birds are the evolutionary offspring of a group of feathered theropod dinosaurs. Together they comprise the group known as paravians, a group that included the famed *Velociraptor*. The fossilized remains of an *Anchiornis* specimen offered scientists at the University of Bristol in England the opportunity to study the dinosaur's feathers in great detail. Because some of the specimen's features had become separated from its body prior to burial and fossilization, researchers were able to closely study their structure. The new analysis revealed long, flexible barbs protruding from short quills, forming two vanes. The feathers



appeared like a fluffy fork-tuner, or a large v-shape.

The feathers in question are known as contour feathers, as they covered the dinosaur's body. Paravian dinosaurs also boasted more decorative bird-like

feathers. Contour feathers offered warmth and protection and, as the latest research showed, they also offered their wearers a fluffy appearance. The findings, detailed this week in the journal *Paleontology*, allowed paleoartists to update their imagery of feathered dinosaurs to reflect the fluffier appearance of *Anchiornis* and other paravians.

"Paleoart is a weird blend of strict anatomical drawing, wildlife art, and speculative biology. The goal is to depict extinct animals and plants as accurately as possible given the available data and knowledge of the subject's closest living relatives," paleoartist Rebecca Gelernter said in a news release.

"As a result of this study and other recent work, this is now possible to an unprecedented degree for *Anchiornis*. It's easy to see it as a living animal with complex behaviors, not just a flattened fossil." In addition to inspiring new illustrations, the research also revealed the challenges faced by early paravians as they attempted flight. The contour feathers of *Anchiornis* were so fluffy they likely caused too much drag to allow the dinosaur to achieve liftoff. However, *Anchiornis'* longer bird-like feathers on its four wings (one for each limb, two arms and two legs) likely allowed the dinosaur to glide when jumping from trees and cliffs.

<http://www.spacedaily.com/reports/>

[Feathered dinosaurs were extra fluffy new research shows 999.html](http://www.spacedaily.com/reports/Feathered_dinosaurs_were_extra_fluffy_new_research_shows_999.html)

## Stone Found In Egypt Has Minerals We Have Never Seen

A newly published study sounds like the beginning of a great sci-fi story: A stone recovered in 1996 in Southern Egypt is puzzling scientists because, although definitely from outer space, it doesn't look like any regular meteorite or asteroid, and the latest analysis shows that the micro-minerals within are unlike anything we have ever encountered here or in the cosmos. The rock, known as a hypatia stone, has a huge amount of carbon compounds and almost all of them have transformed into micro-diamonds. Some of the carbon compounds are of particular interest because they are known as polyaromatic hydrocarbons, a major component of interstellar dust. And there is even more unusual stuff, like aluminum, occurring in pure metallic form, not in a chemical compound, which is never found on Earth. The stone also features a mineral called moissanite (a silicon carbide compound) in an unexpected form as well as nickel-phosphorus



Egyptian hypatia stones

grains with very little iron, another combination never observed on Earth before. Finally, the stone was found in an area of the Sahara desert that has also yielded Libyan Glass, a nearly clear tektite glass created by a meteoric

explosion 28.5 million years ago that produced 3500° F temperatures melting the quartz sand. The study concluded that the black stone was the core of a carbon-rich comet that formed prior to the origin of the Solar System. The comet exploded due to atmospheric stresses before impact, transforming the carbon into micro-diamond and melting the desert sand.

<http://www.sci-news.com/space/science-libyan-desert-glass-diamond-bearing-pebble-evidence-comet-01446.html>

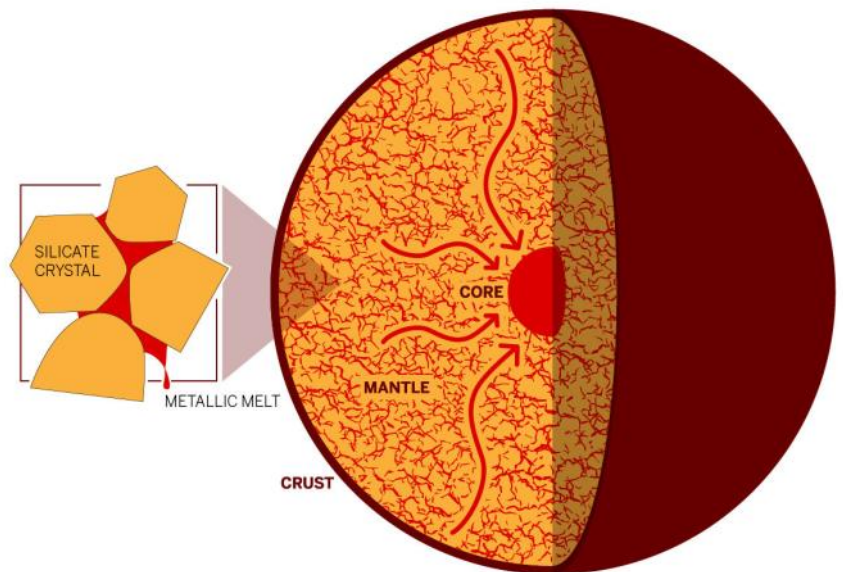


Sketch of a comet exploding above desert

# Trickle-down is the solution to the planetary core formation problem

Scientists have long pondered how rocky bodies in the solar system, including our own Earth, got their metal cores. According to research conducted by The University of Texas, evidence points to the downwards percolation of molten metal toward the center of the planet through tiny channels between grains of rock. The finding calls into question the interpretation of prior experiments and simulations that sought to understand how metals behave under intense heat and pressure when planets are forming. Past results suggested that large portions of molten metals stayed trapped in isolated pores between the grains. In contrast, the new research suggests that once those isolated pores grow large enough to connect, the molten metal starts to flow, and most of it is able to percolate along grain boundaries. This process would let metal trickle down through the mantle, accumulate in the center, and form a metal core like the iron core at the heart of our home planet. *"What we're saying is that once the melt network becomes connected, it stays connected until almost all of the metal is in the core,"* said co-author Marc Hesse. The research was published on Dec. 4 in the *Proceedings of the National Academy of Sciences*. Planets and planetesimals (small planets and large asteroids) are formed primarily from silicate rocks and metal. Part of the planet formation process involves the initial mass of material separating into a metallic core and a silicate shell made up of the mantle and the crust. For the percolation theory of core formation to work, the vast majority of metal in the planetary body must make its way to the center. In this study, researchers developed a computer model to simulate the distribution of molten iron between rock grains as porosity, or melt fraction, increased or decreased. Researchers found that once the metal starts to flow, it can continue flowing even as the melt fraction decreases significantly.

This is in contrast to previous simulations that found that once the metal starts flowing, it only takes a small dip in the volume of melt for percolation to stop. *"People have assumed that you disconnect at the same melt fraction at which you initially connected...and it would leave significant amounts of the metal behind,"* Hesse said. *"What we found is that when the metallic melt connects and when it disconnects is not necessarily the same."* According to the computer model, only 1 to 2 percent of the initial metal would be trapped in the silicate mantle when percolation stops, which is consistent with the amount of metal in the Earth's mantle. The researchers point to the arrangement of the rock grains to explain the differences in how well-connected the spaces between the grains are. Previous work used a geometric pattern of regular, identical grains, while this work relied on simulations using an irregular grain geometry, which is thought to more closely mirror real-life conditions. The geometry was generated using data from a polycrystalline titanium sample that was scanned using X-ray microtomography. The numerical model that was developed allowed for finding three-dimensional melt networks of any geometrical complexity for the first time. Scientists conjectured that having a three-dimensional model was key in understanding and quantifying how melt trapping works. The effort paid off because researchers found that the geometry has a strong effect on melt connectivity. In the irregular grains, the melt channels vary in width, and the largest ones remain connected even as most of the metal drains away. The researchers also compared their results to a metallic melt network preserved in an achondrite meteorite, a type of meteorite that came from a planetary body that differentiated into discernable layers. X-ray images of the meteorite taken in the Jackson School's High-Resolution X-Ray CT Facility revealed a metal distribution that is comparable to the computed melt networks. The researchers concluded that this comparison shows that their simulation capture the features observed in the meteorite.



New research from The University of Texas at Austin adds evidence to a theory that claims the metallic cores of rocky planets like Earth were formed when molten metal trapped between grains of silicate rock percolated to the center of the planet during its early formation

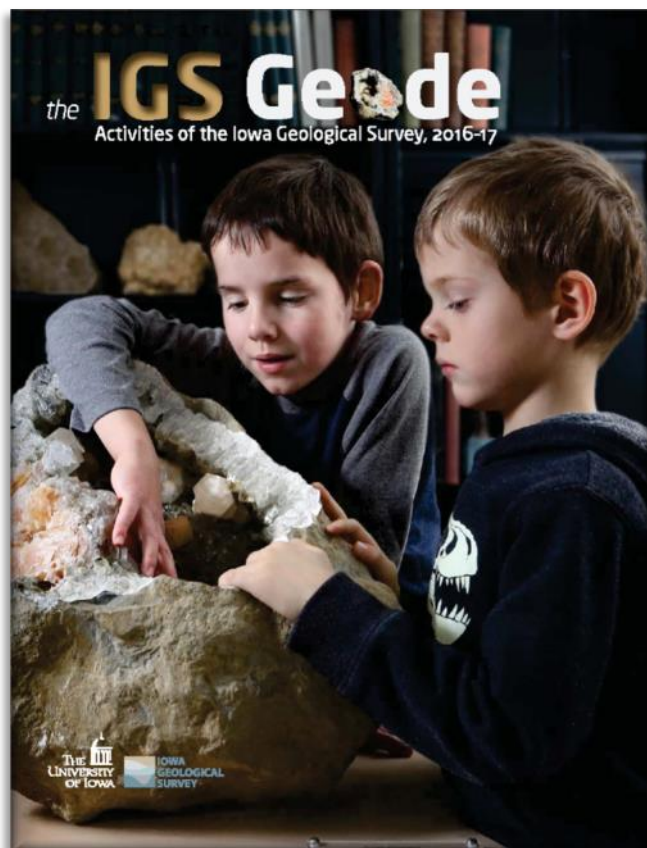
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[http://www.spacedaily.com/reports/Trickle\\_down\\_is\\_the\\_solution\\_to\\_the\\_planetary\\_core\\_formation\\_problem\\_999.html](http://www.spacedaily.com/reports/Trickle_down_is_the_solution_to_the_planetary_core_formation_problem_999.html)

# What's New In Iowa Geology ??

## the IGS Geode

New on-line Magazine from the Iowa Geological Survey



Associate State Geologist Keith Schilling recently announced the publication of a new magazine, *The IGS Geode*, showcasing some of the Iowa Geological Survey's recent activities. The publication represents a continuation of the transition of the Iowa Geological Survey (IGS) from their previous administrative home in the Iowa Department of Natural Resources to our current home within IIHR—Hydroscience & Engineering at the University of Iowa. Schilling noted that they chose the title *The IGS Geode*, "because it is, of course, the state rock. By loose definition, geodes are spherical rocks that contain hollow cavities often lined with crystals. However, the geode also serves as a symbol of our work here at the IGS. As you will see when reading this magazine, IGS staff are doing amazing things for Iowans, but our work is sometimes hidden from view — like the crystals inside a geode". . . our annual report is an effort to essentially "crack open" the geode of IGS activities and show the state what IGS geologists have been doing in the past year". *The IGS Geode* highlights the breadth and scope of some of survey research, education, and outreach activities. As you can read in its pages, IGS is doing exciting things for Iowans. It remains committed to serving Iowa and providing expertise on surface and subsurface natural resources. We can look forward to annual IGS updates in future editions of the magazine as survey geoscientists report on their projects and results.

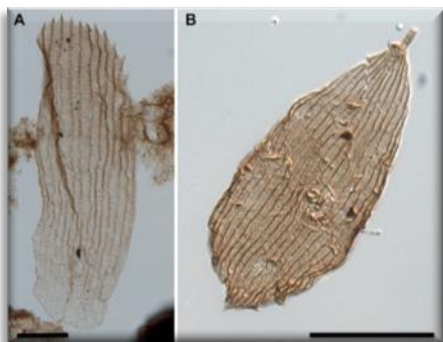
*The IGS Geode* can be viewed and downloaded as a pdf file at <http://www.pageturnpro.com/University-of-Iowa-College-of-Engineering/82821-The-IGS-Geode/default.html#page/1>.



## The Oldest Known Butterflies Existed Before Flowers

To help them slurp up tasty nectar from floral tubes, butterflies and moths have a long, tongue-like mouthpiece known as a proboscis. The prevailing (and very logical) theory about this handy appendage is that butterflies and moths evolved their proboscises in response to plants that developed flowers. But that theory might be wrong. A new study has uncovered evidence suggesting that butterflies and moths had proboscises millions of years before flowers came into existence. While studying fossils in rock cores dating to the late Triassic and early Jurassic periods, an international team of researchers discovered the fossilized remains of the tiny scales that coat the bodies of butterflies and moths. Using a needle tipped with a human nostril hair, researchers were able to push 70 scales beneath a microscope (the nose hair has just the right length and springiness for getting a pollen grain, or in this case the butterfly scale, to adhere to it). Scientists were surprised to discover that some scales were hollow, a feature only seen among moths and butterflies with proboscises. This discovery, described recently in the journal [Science Advances](#), threw researchers for a loop because the scales are about 200 million years old, making them the oldest known Lepidoptera remains by about 10 millions years. Previous molecular studies on the creatures suggest a similar early evolution of proboscis-bearing butterflies and moths. The fossils are also about 70 million years older than the first flowers, raising intriguing questions about the evolution and function of the proboscis. It is possible that there is simply a gap in the fossil record, and flowers existed earlier than scientists realized. But the study authors believe the more likely explanation is that butterflies and moths evolved their proboscises before flowers came into being, possibly to help them lap up the sugary pollination drops produced by gymnosperms, the most common group of plants that sprung from the ground during the Jurassic.

Lepidopteran scales in palynological preparations, as seen in transmitted light



<http://advances.sciencemag.org/content/4/1/e1701568.full>

## Giant Fireball in Michigan Did Not Trigger an Earthquake

On January 16 a brilliant burst of light streaking across the sky brightened the landscape of Michigan when it dramatically exploded. Then the National Weather Service's Detroit office tweeted out confirmation that the rock speeding through our atmosphere had caused an earthquake. Not quite. The object did transfer some energy to the ground (either by smacking into it, or by sending the equivalent of a sonic boom through the air). But while the effect was

enough to rattle some shelves and buildings, there was not nearly enough energy transfer to cause or trigger an earthquake, not even a small one.



Fireball seen over Wisconsin

What the USGS

had actually confirmed was that their instruments picked up tremors roughly equivalent to what they would register during a magnitude 2.0 earthquake. Seismometers are designed to detect vibrations in the ground, be they caused by earthquakes, quarry blasts, or even excited fans. But did the falling object hit the ground with the *force* of a small earthquake? Nope. You can't directly compare a meteor to the size of an earthquake. When we see the energy transfer on our instruments people think, oh, it hit the ground with this force, but that's not necessarily true. Most of it may not even have hit the ground. A meteorite that explodes in the air creates a shock wave that transfers a lot of that energy to the ground. We don't even know that more than a few small pieces hit the ground. The meteor that exploded over Chelyabinsk, Russia, registered on seismic networks as a magnitude 2.7 earthquake, but seismic accounts before that are pretty rare. If you missed this spontaneous light show, don't worry. There will be plenty of other meteor showers. According to NASA, about 45 tons of "meteoritic material" falls into our planet's atmosphere every day. They're not all big beautiful fireballs like the one Michigan saw that night, but take a chance and look up every once in a while. You just might see something that rocks your world.

<https://www.nytimes.com/2018/01/17/science/michigan-meteor.html>

## Rocks Needed for March Rock Show

We are in need of rocks and fossil specimens for the **March 24-25 CVRMS Rock Show**. Rocks are needed for the following programs:

- ★ **Silent Auction**—rock and fossil specimens to be auctioned
- ★ **Door Prizes**—rock and fossil specimens to be door prizes
- ★ **Pebble Pit**—rock and fossil specimens for children to discover

If you have specimens that you would be willing to donate for these programs please contact Marv Houg at **319-364-2868** or at [m\\_houg@yahoo.com](mailto:m_houg@yahoo.com). Your help will help us to present another excellent show.

## Half-billion-year-old microscopic animal fossils found in Greenland

Scientists have found a treasure trove of tiny fossils in the rocks of Greenland. The microscopic organisms date to more than half a billion years ago, offering new insights into the *Cambrian Explosion*, a dramatic increase in the planet's biodiversity that began 541 million years ago. During this period, Earth's shallow seas teemed with life, and the first modern ecosystems formed -- animal and plant life as we recognize it today was born. The details of this dramatic evolution have been revealed by world-famous excavation sites like the Burgess Shale, a bed of shale exposed in the Canadian Rockies. Similarly aged strata has also been found in Greenland, but most of the fossils at Sirius Passet belong to larger creatures and hard-bodied organisms. Heat generated by tectonic activity over the last 500 million years has metamorphosed Greenland's rocks several times, destroying much of the fossilized evidence of soft-bodied organisms from the Cambrian Period. But a team of Sweden scientists discovered an outcropping of rocks that escaped much of the heating and subsequent damage. There, just south



The remains of the oldest known pterobranch hemichordate; the hook-like teeth from a priapulid, a sediment dwelling predatory worm; and the shell of a tiny arthropod

of Sirius Passet, an acid extraction procedure used to dissolve layers of mudrock revealed a multitude of tiny fossils representing soft-bodied Cambrian life. The rocks are filled with the tiny fossils, most of them smaller than a millimeter in length and requiring a microscope for examination. Among other fossils, researchers discovered the preserved hook-like teeth of predatory priapulid worms, which they used to burrow into the mud in search of prey. Scientists found fragments of the oldest known pterobranch hemichordate, a rare group of tube-dwelling filter feeders. The rocks also revealed fossilized defensive spines belonging to a variety of arthropods. Researchers described their fossils in the journal *Geology* in late December. The sheer abundance of these miniature animal fossils makes it clear that this discovery will help to reshape our view of the non-shelly animals that crawled and swam among the early Cambrian seas more than half a billion years ago.

<https://www.upi.com/Half-billion-year-old-microscopic-animal-fossils-found-in-Greenland/2211513713303/>

## More than 74,000 people evacuated as volcano erupts in the Philippines

Mount Mayon in the Philippines began actively erupting in mid-January causing more than 74,000 people to be evacuated and officials to brace for a humanitarian emergency that could last for months. It ejected ash and lava fountains up to 1.8 miles from the crater in a picturesque but increasingly dangerous eruption. Pyroclastic flows, superheated gas and volcanic debris that could incinerate anything in their path, reached three miles from the crater in one area, according to the Philippine Institute of Volcanology and Seismology said. At least 66 emergency shelters in nine cities and towns in northeastern Albay province, have been filled. Ash clouds reached up to three miles high as it erupted. Based on its previous eruptions, Mayon's activity could last from two to four months, prompting Albay and national authorities to take steps to reduce the impact on schools, public health and safety, livelihood and law and order. Temporary learning cen-



Philippine Mount Mayon is currently erupting

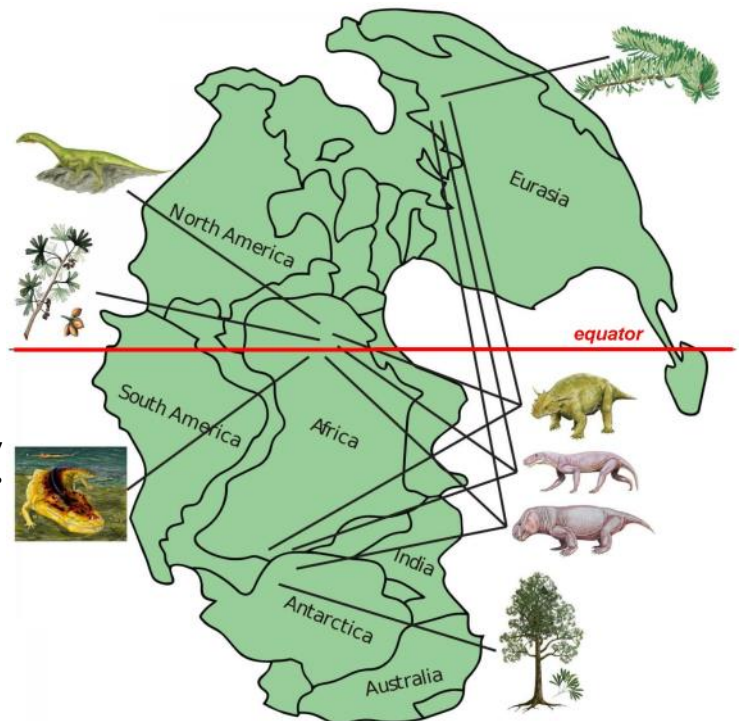
ters are being set up in dozens of schools to allow classes to continue even as the schools have been turned into evacuation centers. Farm animals are being brought to areas closer to their owners in evacuation camps to prevent more losses to villagers' livelihoods. Although Mayon has erupted about 50 times in the last 500 years, sometimes violently, it has remained popular among climbers and tourists. In 2013, an ash eruption killed five climbers who had ventured near the summit despite warnings. Its most destructive eruption, in 1814, killed more than 1,200 people and buried the town of Cagsawa in volcanic mud. The Philippines, which has about 22 active volcanoes, lies in the 'Ring of Fire,' a seismically active zone surrounding the Pacific Ocean where earthquakes and volcanic activity are common. In 1991, Mount Pinatubo in the northern Philippines exploded in one of the biggest volcanic eruptions of the 20th century, killing hundreds of people, covering entire towns and cities in ash and prompting the U.S. government to abandon its Luzon island air and naval bases. <http://metro.co.uk/2018/01/24/more-than-74000-people-evacuated-as-volcano-erupts-in-the-philippines-7257951/>

# How Much Can 252-million-Year-Old Ecosystems Tell Us About Modern Earth? A Lot!

252 million years ago, Earth was crawling with bizarre animals, including dinosaur cousins resembling Komodo dragons and bulky early mammal-relatives, a million years before dinosaurs even existed. New research shows us that the Permian equator was both a literal and figurative hotspot: it was, for the most part, a scorching hot desert, on top of having a concentration of unique animals. Here, you could find some of the first tetrapods to emerge from the water and live on land, living right next to newly evolved, dinosaur and crocodile-like reptiles. Many of these species were wiped out after an extinction which changed life on the planet forever. In a paper published in *Earth-Science Reviews*, paleontologists studied fossil sites all over the world from the late Permian to get an idea of what lived where. They found an unusual assortment of species near the equator, and one that is comparable to the modern tropics, except that the array of large, carnivorous reptiles would look very out of place anywhere on Earth today. *"The tropics act as a diversity center - stuff that has gone extinct elsewhere is still alive there, and there's new stuff evolving,"* explains Brandon Peacock, co-author of the paper. While it makes sense that the warm, wet rainforests we see now have incredible diversity, it seems counterintuitive that these fiery, hot deserts were home to an exceptional range of species, especially because diversity at the equator fluctuates so much historically. These findings about the late Permian beg the question, *"Why are we seeing so much biodiversity at the equator?"* This is something scientists have yet to answer, but it shows us that biodiversity at the tropics isn't intuitive, and isn't consistent. What scientists know for sure is that regardless of desert or rainforest, climate change negatively impacts living things.

This unequalled comparison of Permian climate and species distribution to modern events shows us that while many changes are natural and we see them throughout our planet's history, drastic changes like this can be triggered by something much larger (volcanic activity likely caused this in the Permian, and human activity is the suspected culprit today). After the Permian extinction, *"it was almost as though the slate had been wiped clean, and all the ecosystems had to rebuild,"* says Peacock. This event altered life permanently, and while new animals evolved and thrived, the process of recovery took millions of years, and the animals that were lost never returned. *"If we want to know how Earth's systems work, what's expected and what's normal, we need to look to the past,"* and the fossil record is the best measure of ecosystem stability. As we already begin to face extinctions and carbon levels similar to those before the Permian extinction, examining these patterns over time gives us the evidence we need to measure and minimize our impact on climate, preventing further permanent damage to our planet's ecosystems and animals.

[http://www.spacedaily.com/reports/How\\_much\\_can\\_252\\_million\\_year\\_old\\_ecosystems\\_tell\\_us\\_about\\_modern\\_Earth\\_A\\_lot\\_999.html](http://www.spacedaily.com/reports/How_much_can_252_million_year_old_ecosystems_tell_us_about_modern_Earth_A_lot_999.html)



This map of Pangea shows the distribution of life during the late Permian period. Many species exclusively thrived near the equator, including early amphibian tetrapods and early crocodiles and dinosaurs, while animals like dicynodonts (early mammal-relatives) were in greater abundance farther north and south

## 2017 Officers, Directors, and Committee Chairs

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Club meetings are held the 3rd Tuesday of each month from September through November and from January through May at 7:00 p.m., at the Hiawatha Community Center in the Hiawatha City Hall, 101 Emmons St., Hiawatha IA. The December meeting is a potluck dinner held the 2nd Tuesday. 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:**

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