

Cedar Valley Gems



Cedar Valley Rocks & Minerals Society

Cedar Rapids, Iowa

cedarvalleyrockclub.org

CEDAR VALLEY GEMS

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

Next CVRMS Meeting Tues. Feb. 18

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

featured video:

Paleo Sleuths



The one-hour Nebraska Educational Television 2016 documentary ***Paleo Sleuths***, follows Nebraska paleontologist Mike Voorhies as he unearths fossils; exploring how his discovery of a skull in a ravine in Royal, Neb., was a clue that helped reveal what we now know as **Ashfall Fossil Beds**. As Voorhies and his team excavate the site, he compares the record of evolution to pages in a book that scientists have the privilege of reading. He explores a series of paleontology excavations that showcase the changing landscape and animal life on America's Great Plains – beginning 34 million years ago with the Ice Age. Through interviews with paleontology experts, modern-day footage of excavations, historic re-enactments, archival photographs, and stunning animations with 3-D models that bring prehistoric figures to life, the educational and informative ***Paleo Sleuths***, features fossil discoveries in the Great Plains that challenge popular understanding of the origins of mammals.



As President of the Cedar Valley Rocks and Minerals Society, I would like to give a big **Thank-You** to **Rick Austin** for serving as one of our directors for the last 3 plus years. His many

talents and input were very much appreciated. I would also like to extend a big Welcome to **Toby Jordan** who is our new director replacing Rick. We look forward to having Toby's input on our board.



I would also like to thank those who helped with our Christmas Party in December, starting with Dell James who cooked the turkey, mashed potatoes and gravy, and to Jeff Groff who cooked the ham. Dell also made the center pieces for the tables. Also, thanks to Sharon Sonnleitner for helping coordinate the food set-up, cooking the dressing, and for the games we played, to Ray Anderson for putting together the slide program of our trip to the Henry Doorly Zoo, and to Bill Desmarais for bringing his microscope to share. Thanks also to everyone who brought food, to those who brought prizes, and to those who brought rock specimens for show and tell. The Christmas party is always well attended, and this is due to the input of many people, and for that we thank everyone who attended and helped.

As of this writing we are less than 2 months away from our March show. This is our biggest event of the year and the one event that requires the help of many people. Sharon has passed around sign-up sheets for the show at our monthly meetings. If you haven't been able to make it to a meeting but want to help, please contact Sharon and let her know that you want to help.

One additional request of club members. We want to keep our member directory up to date, so if you have changed your phone or email in the last few years please pass that information on to Sharon. You can find her address on the last page of this newsletter.

Marv Houg, President

CVRMS Jan. 21 Meeting

7:15p.m. Meeting called to order by Marv Hoag.

Guests and new/old members welcomed.

Minutes of last meeting reviewed. Motion to accept as published by Bill, second by Tom. Minutes accepted as published.

Treasurer's report-checking balance of \$14,163.12. Motion to approve by Julie, second by Dave. Report will be filed.

Program by Ray Anderson on volcanoes and volcanic rocks. This is a program prepared and presented to Johnson STEAM Academy *Discovery Days* in 2019.

Door prize was won by new member Jack Gilmore.

Old business

2020 Rock Show - March 28-29. Volunteers needed to fill egg carton rock samples at Sharon's house on Feb. 16; 8 people volunteered.

Displays for show discussed.

Yooperlite [fluorescent sodalite - $\text{Na}_8(\text{A}_6\text{Si}_6\text{O}_{24})\text{Cl}_2$] dealer Erik Rintamaki contracted for show.

Reminder that we need contributions for Friday (March 27) pot luck for workers and dealers. Saturday (March 28) dinner will be catered by Hy-Vee.

We need rock samples for Door Prizes, Pebble Pit, and Silent Auction.

Bill's Big Bus Boogie 2020— Saturday Oct. 3 field trip to the University of Wisconsin Geologic Museum and to the Burpee Museum in Rockford. We will depart Cedar Rapids at about 6:00 am and return about 7:00 pm.

CVRMS rock auction September 19-20 has all of the consignments that we can handle . . . we are FULL.

Motion to adjourn by A.J. second by Tom.

8:53 p.m. meeting adjourned.

Respectfully submitted,
Ray Anderson, Acting Secretary

CVRMS Board Minutes Jan. 28

MEETING CALLED TO ORDER: by Marv Hoag at his home, 7:07 pm

MEMBERS PRESENT: Marv Hoag, Dale Stout, Ray Anderson, Sharon Sonnleitner, Kim Kleckner, Jay Vavra, and Toby Jordan.

MINUTES OF LAST MEETING (Nov. 26, 2019): move to approve Jay; second-Sharon; approved unanimously

2020 SHOW:

Programs: A sixth speaker was scheduled, Bob McKay who will discuss the Decorah Impact Structure. Speaker line-up is complete. Ray will announce topic of Sat Dinner talk at next board meeting. We need better signage to direct people to speaking area.

Raffle Prizes: and Posters: Nothing New

New Dealers: Yooper dealer from Michigan contracted. Sharon said only 2 contracts still outstanding, but both said they are coming. Ray will check with State Archeologist about artifact ID booth.

Staff T-Shirts: Ray will ask for additional orders at Feb meeting then order new shirts.

Displays: Ray will use 2 cases for Iowa Meteorites

MSHA TRAINING: CR Main Library March 26. Times TBD.

2020 AUCTION: Marv added new lots; total now 1380.

2020 BILL'S BUS TRIP: Charter cost \$2135, lower than last year. Trip will leave CR at 6:00, University of Wisconsin Geo Museum then Burpee Museum, Rockford, return to CR ~7:00.

CRINOID AS STATE FOSSIL: Ray will contact Sen. Joe Bolkcom and Rep. Mary Mascher (bill sponsors) to express our interest in having them pursue the crinoid as State Fossil.

OTHER ITEMS: River Products display case on hold for now. Dale has new vendor for CVRMS name badges, \$7 for pin, \$8 for magnet. Dale taking orders.

ADJOURNMENT: Ray moved to adjourn, Jay seconded, Meeting Adjourned 9:05 pm

Respectfully Submitted:
Ray Anderson, acting Secretary

Staff T-Shirts for Workers

Working at the Rock Show or Auction in 2020??

Get Your Official Staff T-Shirts

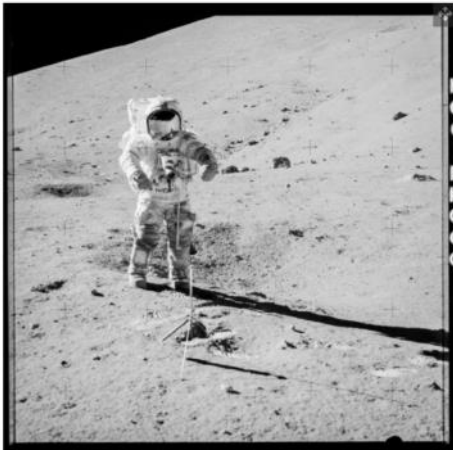
If you are a CVRMS member and are planning to work at the **2020 Rock Show on March 28-29** or at the **Rock Auction on Sept 19-20** you should have a **CVRMS Staff T-Shirt** so you will **Stand Out From The Crowd**. Ray will be ordering new shirts soon so let him know if you need one and your size.

Ray's email: rockdoc.anderson@gmail.com



NASA Opens Untouched Apollo Moon Rock Sample for First Time in 40 Years

Last November scientists at NASA's Johnson Space Center's Lunar Curation Laboratory in Houston opened one of its last untouched Apollo 17 samples, a 1.5-inch-wide tube holding the small stash of moon rocks and dust originally sealed by astronauts Gene Cernan and Harrison Schmitt during the second of their three moonwalks on Dec. 12, 1972. The 15 ounces of moon material, collected as part of a core sample taken near the rim of Lara Crater, had remained unopened since being brought to Earth 47 years ago. The samples will be analyzed enabling a new generation of scientists and curators to refine their techniques and help prepare future



Apollo 17 moonwalker Gene Cernan preparing to collect samples 73001 and 73002 at Station 3 on Dec. 12, 1972.

explorers for lunar missions anticipated in the 2020s and beyond. The Apollo program brought a total of 842 pounds of moon rock and regolith (or soil) back to Earth. The majority of the samples are held today at Johnson Space Center, with a smaller collection stored off-site for safekeeping. The sample, assigned the ID number 73002, was the upper segment of a 2-foot-long "drive tube." The bottom segment, sample 73001, was slated to be opened in January. Together they are the first untouched Apollo moon rock samples to be opened since the 1970s. The drive tube was used to collect core samples that preserved the vertical layering within the soil, including information about landslides on the moon, and a record of the volatiles trapped within the lunar regolith, perhaps even those escaping from along the Lee-Lincoln Scarp, a fault at the Apollo 17 landing site. Two other drive-tube samples, one each from Apollo 15 and Apollo 16, will become the only lunar material caches to be kept untouched. Unlike 73002, the lower drive tube sample 73001 was sealed on the moon in a special vacuum container and then placed in another vacuum container and sealed again once on Earth. The sample was opened after scientists fine-tuned their plan for capturing the moon's gases that were caught in the container along with the sample itself.

<https://www.space.com/nasa-apollo-untouched-moon-rock-sample-opened.html?>

Spotlight Gemstones: Amethyst

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. Many rockhounds in this area have collected amethyst at the mines located just east of Thunder Bay, Canada. Amethyst from this locality is frequently found in fractures in granitic rocks. 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.

http://www.minerals.net/gemstone/amethyst_gemstone.aspx

What in the World?

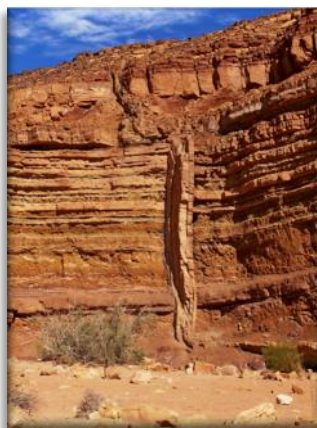


What in the World is this geologic feature and where can you see it??

Limestone



January 2020's Photo



January's **What in the World?** photo was taken in Nahal Ardon Valley, Ramon National Geological Park, Israel. The park showcases an area of uplift associated with Lower Cretaceous intrusions of basaltic magmas and the eruption of a volcano. The intrusions and associated heating uplifted a 25-mile-diameter circular region resulting in erosional removal of up to 1500' of Triassic and Jurassic sediments. Basaltic magma was intruded into fractures that developed in these sediments. A river cut through the soft sedimentary rocks, producing a deep valley, that is now a wadi (dry valley) in the Negev desert. The photo shows one of the basalt dikes, now mostly altered to clay minerals. In some places these dikes are associated with celestine-quartz-calcite geodes" (concretions) where the dikes pass through Jurassic evaporite sediments.

Rock Calendar CVRMS EVENTS OF INTEREST

2020

Feb. 18 —CVRMS Monthly Meeting
Hiawatha Community Center 7:15 pm
Featured Video
"Paleo Sleuths"
see page 1 for details

Mar. 17 —CVRMS Monthly Meeting
Hiawatha Community Center 7:15 pm
Feature Presentation
Cornell College Field Activities
by Cornell College Geology Students

Mar. 26 —MSHA Training
Training by John McArdle
Cedar Rapids Public Library—\$10
times to be announced

**March 28-29 - CVRMS Gem, Mineral,
and Fossil Show**
"Meteorites: Earth's Oldest Rocks"
Hawkeye Downs
Cedar Rapids
see page 10 for details

Sept. 19-20—CVRMS Rock Auction
Amana RV Park and Event Center
Amana, Iowa
<https://www.cedarvalleyrockclub.org/auction.html>

Sept. 27-29 - Geode Fest and Rock Show
Chaney Creek Boat Access
Illinois Highway 96 N
Hamilton, Illinois
<http://www.keokukiotourism.org/>

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.

Jay Vavra sent me a message saying, "I'm reading a book (Reading the Rocks by Brenda Maddox) about early geologists and geology as a science. I just finished a chapter about Hutton and the unconformity he found at Siccar Point in Scotland that helped realize that the earth was much much older than believed. The book describes Siccar Point as "the most important place in geology." "If you were to make a list of places for someone to visit that have been important for geology or geologic knowledge, what would you include?"

Rock Doc replied: *"That's a tough question, Jay, the science of geology includes so many disciplines, and my career has dipped into a lot of them (such as geophysics, stratigraphy, petrology, sedimentology, paleontology, etc.) Each has its own "magic" localities, those places that produce "aha moments." Historically, Siccar Point in Scotland would be high on almost anyone's list. Siccar Point is famous in geology as the rocky promontory on the east coast of Scotland where in 1788 James Hutton developed his theory of uniformitarian, (the assumption that the same natural laws and processes that operate in our present-day scientific observations have always operated in the past and apply everywhere in the universe.) Many geologists simply say "the present is the key to the past," so existing processes can be used as the framework for understanding the geologic history of the Earth.*

There are a number of localities that I consider crucial to my understanding of the concepts that I have applied to my work as a geologist. Perhaps the most important of these is the Lake Superior Region. I spent much of my career trying to understand the Precambrian geology of Iowa. But, those rocks are buried under thousands of feet of sedimentary strata, and we have precious few drill penetrations and fewer-yet samples of those rocks. That sedimentary cover thins rapidly to the north, until by the time one gets to the northern half of Minnesota and Wisconsin, he is surrounded by Precambrian rocks. Unfortunately for us rock geologists, debris left behind by the glaciers cover most of the area, but rivers running into Lake Superior have eroded the glacial drift and the underlying bedrock is increasingly exposed. And what a suite of rocks! Igneous, metamorphic, and sedimentary rocks deposited over a 2.5 billion year period can be seen in the area. By modeling maps of the gravity and magnetic anomalies in the upper Midwest one can observe trends that lead from the Iowa subsurface to exposures around Lake Superior. The billion year old Mid-continent Rift System, the Iowa section of which was the topic of my PhD dissertation at Iowa, is a perfect example of that. Volcanic rocks observed along the north shore of Lake Superior in Minnesota and the Keweenaw Peninsula of Northern Michigan are virtually identical to the those encountered in deep drilling in Iowa. By studying rocks around the lake I can understand what they are composed of and how they formed in Iowa.



Lake and river sediments deposited between MRS basalt flows along Lake Superior in northwest Minnesota.

There are a number of wonderful geologic localities in Iowa that produced "aha moments" for me as I struggled to understand our State's geology. Such places as the Orba and Johnson Transshipment Company barge terminal access in Lee County (excellent exposures of Upper Mississippian strata and geode beds), the Clayton Barge Terminal road in Clayton County (excellent exposures of Lower and Middle Ordovician strata), and the Saylorville Dam emergency spillway in Polk County (superb exposures of Pennsylvanian Cherokee Group strata of Central Iowa). They and others have been featured in geologic guidebooks, but that is a discussion for another time.

How Cold Water Agates Form

This article was modified from a "Rock Rustler News" article by Dr. Bill Cordua (see reference below)

We have two different types of agate in our area: the **Lake Superior agate** and the "cold water" agate. "**Lakers**" are from filled gas cavities in volcanic rocks (amygdales). they formed from fluids with temperatures of perhaps 200 to 300 degrees C. The **cold water agates** and their non-banded relative **chert** formed at about room temperature. They commonly occur in the Ordovician dolostones forming the prominent bluffs along much of the Mississippi Valley and its tributaries. Cold water agates are often associated with crusts of tiny sparkly quartz crystals, called **drusy quartz**. These silicified rocks form masses and intricate networks



Coldwater agate with drusy quartz crystals

within the dolostone. How do these silica deposits form from such relatively cool water? An important clue is the distribution of these silica materials within the dolostones, which make up the Prairie du Chien Group. This group is divided into two formations: the slightly older Oneota Formation and the overlying Shakopee Formation. Both were deposited in a warm shallow sea, so shallow that sediments were often exposed to air as the sea went out. The formations are rich in evidence of this. Ripple marks and cross-beds that show current flow, stromatolites that grow in shallow water, mud cracks and salt crystal casts that formed at low stands of the seas. The two formations are separated by an unconformity – an erosion surface formed when the Oneota Formation was exposed to air for many years before the Shakopee Formation was deposited. Much of the silicification occurs in the Oneota below this boundary. Another zone of silicification occurs near the top of the Shakopee, below another unconformity covered by the St. Peter Sandstone. It is clear that these unconformities are related to the silica deposition. Many workers believe these rocks are **silcretes**. **Silcretes** are a variety of what geologists call "**duricrusts**," which are sediments cemented by minerals precipitated during

weathering, particularly from the leaching of silica from volcanic ash. These form most often in arid or semi-arid climates. Many who collect rocks out west are familiar with "**caliche**"- a white limey duricrust formed on weathered rocks. Silcretes are similar, but involve cementation by silica. To see how this might happen, we need to go back in time about 480 million years and look at the landscape when the unconformity between the Shakopee and Oneota Formations was forming. We'd see a bare low-lying plain of limey muds exposed to air and rain in a warm climate. To the east, volcanoes associated with the formation of the Appalachian Mountains spewed volcanic ash in our direction. The Iowa region was close to the equator then. Only lichen and microbial life existed on the land. Rain water would dissolve lime, silica and other salts making a corrosive, probably alkaline, brine. The silica could come from the siliceous remains of organisms such as sponges, volcanic ash or perhaps released from weathered rocks. As this water percolated down cracks, it leached more chemicals from the surrounding rocks, picking up organic material and salts from minerals such as halite or anhydrite. The dissolution formed hollows and in places extensive cave systems. The fluids would precipitate minerals at or below the water table, filling the openings, and replacing the host rock. The products were cold water agates (originally likely a form of opal) and drusy quartz, as well as some pyrite, marcasite, calcite and hematite. We can see this process happening more recently in Australia and Africa. Chert and coldwater agates are found in many area rocks and they were important to ancient peoples who used them to make arrowheads, knives, and other tools. How lucky we are to be able to find coldwater agates literally in our backyards.



tumbled Keswick coldwater agate

Vol.

Revised from "How Cold Water Agates Form" by Dr. Bill Cordua in "On the Rocks," Minnesota Mineral Club, *Rock Rustler News*, No. 1, 75, Jan. 2020, p. 5.



Scientists Say We Need These 6 Things For Us to Meet Our Climate Goals

Our planet is in a tight spot. We're not hitting the targets we know we need to hit, and we're breaking all the wrong kinds of records. What's it going to take for us to get out of this mess? Researchers have long known the answers, at least on a purely scientific front: we need to phase out our reliance on fossil fuels to eliminate the excessive production of heat-trapping chemicals building up in our atmosphere. But how do we do that? What would it look like? This part of the puzzle is not so well explored: the social dynamics and shifts that would need to take place for society to shake off its dangerous inertia and actually realize our goals of a safe, stable climate. We now have some new leads on this. In a new study, an international team of scientists and climate change experts investigated what these 'tipping mechanisms' could be, identifying six elements they say could spark societal change towards climate stabilization and planetary sustainability. *"From the energy sector to financial markets to our cities – we were able to pin down social tipping elements and identify concrete interventions that might activate contagious processes of rapidly spreading technologies, behavioral patterns, and social norms,"* says sociologist and economist Ilona M. Otto from the Potsdam Institute for Climate Impact Research (PIK) in Germany. In a multi-faceted study that drew upon workshopping, surveying, and an assessment of scientific and academic literature, the researchers examined the elements most likely to help society limit global warming by transitioning to a carbon-neutral state by 2050. While the researchers acknowledge the tipping mechanisms they've identified are not any kind of complete list, they nonetheless could serve as a roadmap to achieve *"rapid socio-economic transformation pathways and explore narratives for a decarbonized future in 2050,"* Otto says. According to the research, the social tipping interventions that could help us do this would be:

1. removing fossil-fuel subsidies and incentivizing decentralized energy generation;
2. building carbon-neutral cities;
3. divesting from assets linked to fossil fuels;
4. revealing the moral implications of fossil fuels;
5. strengthening climate education and engagement; and
6. disclosing information on greenhouse gas emissions.

Of course, many of these mechanisms are already in process and evident in society to some degree, but whether any have yet reached a tipping point leading to a rapid societal transformation is debatable. Nonetheless, the researchers see positive signs, highlighting the phenomenon of school students conducting climate strikes. *"The movement is causing 'irritations' in personal world views and thus might be changing peoples' norms and values and the ways of thinking and acting, possibly leading to changes in policies and regulations, infrastructure development, as well as individual consumption and lifestyle decisions,"* the authors write in their paper. The value of such realizations and changes, however, needs to be tied to broader shifts in society, business, and governance, to reduce friction hindering adoption of carbon-neutral lifestyles. *"Awareness of global warming is high but social norms to fundamentally shift behavior are not,"* says PIK's director, Johan Rockström. *"This is a mismatch that science alone cannot fix. For individuals to live a carbon-free lifestyle must be made easy... but on the longer term a new social equilibrium is needed in which climate protection is recognized as a social norm, otherwise shocks on the financial markets or economic crises could destroy progress in decarbonization."* For us to succeed, the researchers say we need *"contagious dynamics"* that spread exponentially and simultaneously within society, politics, and the economy. It's a lot to hope for, the world the way it is, but it's something that needs to happen, the researchers say. After all, there are other kinds of tipping points already being triggered around the planet, and they are not the kind we want to see.



We often think of dinosaurs as the coolest creatures to have walked the Earth before mankind began its bizarre march towards the present, but you don't have to look back millions of years to find some stunning animals that have since gone extinct. The remains of a woolly rhino were discovered in Siberia's Sakha Republic back in 2015, and researchers have been working hard at rebuilding the ancient beast to get a better idea of what it looked like when alive some 30,000 to 50,000 years ago. The specimen's name is Sasha, and while scientists



couldn't determine whether the rhino was male or female from its remains, they have still managed to reconstruct much of its body. Amazingly, Sasha's hair even managed to survive thousands of years of being stuck in the frosty ground where it was discovered, and after a thorough cleaning we're able to see what the animal would have looked like when it roamed during the ice age. Sasha is thought to only have been around seven months old at the time of death, but still measures nearly five feet long. By contrast, rhinos that we see today hit that size after about a year and a half of age, indicating that either the woolly rhinos grew much more rapidly or topped out at much larger sizes when fully grown. *"We can only guess how mammoths and the woolly rhinoceros lived by the plants that were around then, by minerals which can be determined in the composition of animal bones, and in the isotopes of oxygen and carbon which also can be extracted from the bones,"* senior researcher Yevgeny Maschenko explains. *"At that time, 35-50,000 years ago, the climate was colder and drier, and there were no climatic zones that now exist. There was no tundra vegetation, and there were very good conditions for such herbivores, with a lot of grass, cereals, and this is how all these giant animals could live there because there was enough food."* At present, scientists don't have many clues as to why the species went extinct. There are plenty of theories, but not much hard evidence to back any of it up. For now we'll just have to enjoy what still remains of them, like adorable Sasha. <https://bgr.com/2018/01/25/woolly-rhino-reconstructed-russia-sasha/>



Opalized wood is a type of petrified wood that is composed of opal rather than chalcedony or another mineral material. It almost always consists of common opal, without play-of-color, but rare instances of petrified wood composed of precious opal are known. How is such a transformation possible? Well, it can only take place under the right set of circumstances.

Opal forms in cavities within rocks. If a cavity has formed because a bone, shell or pinecone was buried in the sand or clay that later became the rock, and conditions are right for opal formation, then the opal forms a fossil replica of the original object that was buried. One of the most common and best geologic environments for the formation of petrified wood is a forest buried by a volcanic ash fall.



Opalized wood from Nevada

In this situation the ash buries the plants and protects them from decay and insect attack. The ash also serves as an abundant source of easily dissolved silica, which will be carried into the wood by moving groundwater where it precipitates in cavities and replaces the solid woody materials.

opalized fossils of two kinds:

1. Internal details not preserved:

Opal starts as a solution of silica in water. If the silica solution fills an empty space left by a wood, shell, bone etc. that has rotted away – like jelly poured into a mold – it may harden to form an opalized cast of the original object. Most opalized shell fossils are *"jelly mold fossils"* – the outside shape is beautifully preserved, but the opal inside doesn't record any of the creature's internal structure.

2. Internal details preserved:

If the buried organic material hasn't rotted away and a silica solution soaks into it, when the silica hardens it may form an opal replica of the internal structure of the object. This happens sometimes with wood or bone.

Opalized wood can be just as beautiful as petrified wood composed of chalcedony. However, opalized wood has durability differences and is less suitable for some jewelry and lapidary projects. Opalized wood has a lower hardness and is more easily damaged by abrasion. It also has a lower tenacity and is more likely to break upon impact or exposure to stress .

<http://www.geologyin.com/2019/11/opalized-petrified-wood.html?>

What Are Lost Continents, and Why Are We Discovering So Many?

For most people, continents are Earth's seven main large landmasses. But geoscientists have a different take on this. They look at the type of rock a feature is made of, rather than how much of its surface is above sea level. In the past few years, we've seen an increase in the discovery of lost continents. Most of these have been plateaus or mountains made of continental crust hidden from our view, below sea level. One example is **Zealandia**, the world's eighth continent that extends underwater from New Zealand (see map below). Several smaller lost continents, called microcontinents, have also recently been discovered submerged in the eastern and western Indian Ocean. But why, with so much geographical knowledge at our fingertips, are we still discovering lost continents in the 21st century? There are many mountains and plateaus below sea level scattered across the oceans, and these have been



mapped from space. However, not all submerged features qualify as lost continents. Most are made of materials quite distinct from what we traditionally think of as continental rock, and are instead formed by massive outpourings of magma. A good example is Iceland which, despite being roughly the size of New Zealand's North Island, is not considered continental in geological terms. It's made up mainly of volcanic rocks deposited over the past 18 million years, meaning it's relatively young in geological terms. The only foolproof way to tell the difference between massive submarine volcanoes and lost continents is to collect rock samples from the deep ocean. Finding the right samples is challenging, to say the least. Much of the seafloor is covered in soft, gloopy sediment that obscures the solid rock beneath. Researchers use a sophisticated mapping system to search for steep slopes on the seafloor, that are more likely to be free of sediment. Then they send a metal rock-collecting bucket to grab samples. The more depths of the oceans are explored and sampled the, the more likely that more lost continents will be discovered. Perhaps the best

known example of a lost continent is Zealandia. While the geology of New Zealand and New Caledonia have been known for some time, it's only recently their common heritage as part of a much larger continent (which is 95% underwater) has been accepted. This acceptance has been the culmination of years of painstaking research, and exploration of the geology of deep oceans through sample collection and geophysical surveys. New discoveries continue to be made. During a 2011 expedition, scientists discovered two lost continental fragments more than 650 miles west of Perth. The granite lying in the middle of the deep ocean there looked similar to what you would find around Cape Leeuwin, in Western Australia. Other possible lost continents are suspected to exist in the Indian Ocean. In August 2019, the research vessel **RV Investigator** began a 28-day voyage to explore a possible lost continent in a remote part of the Coral Sea. The area is home to a large underwater plateau off Queensland, called the Louisiade Plateau, which represents a major gap in our knowledge of Australia's geology. On one hand, it could be a lost continent that broke away from Queensland about 60 million years ago. Or it could have formed as a result of a massive volcanic eruption taking place around the same time. Nobody knew, because no rocks had been recovered from that area. The **RV Investigator** spent about two weeks collecting rocks from the feature and recovered a wide variety of rock types from parts of the seafloor as deep as 15,000 ft. Most were formed through volcanic eruptions, but some show hints that continental rocks are hiding beneath. Lab work over the next couple of years will give us more certain answers. However, not all lost continents are found hidden beneath the oceans. Some existed only in the geological past, millions to billions of years ago, and later collided with other continents as a result of plate tectonic motions. Their only modern-day remnants are small slivers of rock, usually squished up in mountain chains such as the Himalayas. One example is Greater Adria, an ancient continent now embedded in the mountain ranges across Europe. Due to the perpetual motion of tectonic plates, it's the fate of all continents to ultimately reconnect with another, and form a supercontinent. But the fascinating life and death cycle of continents is the topic of another story.

<http://www.geologyin.com/2019/11/what-are-lost-continents-and-why-are-we.html>

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Massive, 1,100-Pound Dinosaur Bone Unearthed in France

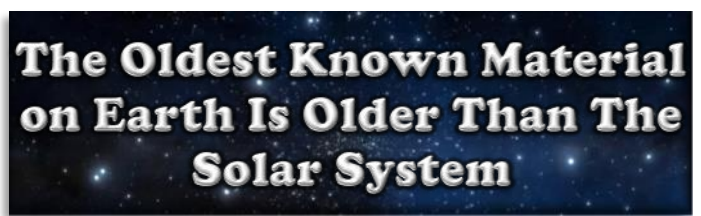
The femur (thigh bone) of a giant dinosaur was recently discovered by French paleontologists at an excavation site in southwestern France where remains of some of the largest animals that ever lived on land have been recovered since 2010. The 10-foot-long, 1,100-pound femur at the Angeac-Charente site is thought to have belonged to a sauropod, herbivorous dinosaurs with long necks and tails which were widespread in the late Jurassic era, over 140 million years ago. "This is a major discovery," Ronan Allain, a paleontologist at the National History Museum of Paris told Reuters. "I was especially amazed by the state of preservation of that femur. These are animals that probably weighed 40 to 50 tons." Allain said scientists at the site near the city of Cognac have found more than 7,500 fossils of more than 40 different spe-



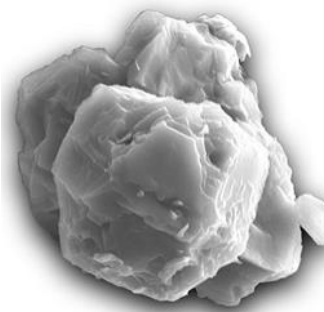
Maxime Lasseron inspects the femur of a Sauropod

cies since 2010, making it one of the largest such finds in Europe. The scientists believe that the bones are from a sauropod, which are the largest herbivorous dinosaurs and first appeared in the late Triassic Period. These reptiles were the largest of all dinosaurs and the largest land animals that have ever lived, they had a small head on a long neck and a very long tail. Scientists believe they would spend their time wallowing in shallow water that would help support their bodies. "We can see the insertions of muscles and tendons, scars," explained Allain. "This is a very rare find as large pieces tend to collapse on themselves, to fragment." The dinosaur bone was found covered in clay by volunteers from the National Museum of Natural History.

<https://www.geologyin.com/2019/07/massive-1100-pound-dinosaur-bone.html>



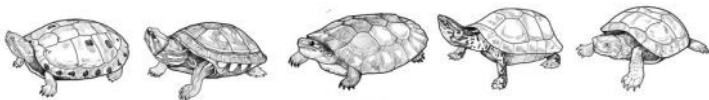
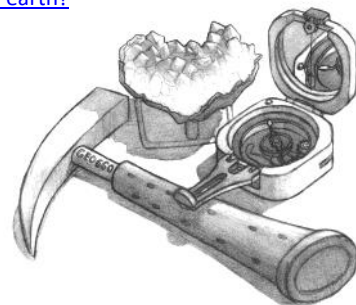
The oldest solid material on Earth has just been identified, and it predates the Solar System itself by at least a few hundred million years. The microscopic grains of dust were forged in a distant star somewhere between 5 and 7 billion years ago, according to new research. By comparison, our Sun is just 4.6



microscopic grains of silicon carbide

billion years old. Eventually, these grains were carried to Earth in a meteorite. They are the oldest solid materials ever found, and they tell us much about how stars formed in our galaxy. Called "presolar grains" - they are rare, and difficult to identify. One meteorite that is known to contain pre-solar grains is the Murchison meteorite, a 220 pound space rock that

exploded over Murchison, Australia, in 1969. The Field Museum acquired 100 pounds of the Murchison meteorite, for research. A large number of microscopic grains of silicon carbide (SiC) were recovered from the meteorite and identified as interstellar - and therefore pre-solar, but a precise age has been harder to pin down. Forty of the silicon carbide pre-solar grains were checked for traces of the elements helium-3 and neon-21. These revealed the ages of the grains. Some were quite old, more than 5.5 billion years old, but most of them were between 4.6 and 4.9 billion years old. This large number of younger grains was unexpected, revealing a previously unknown episode of enhanced Milky Way star formation about 7 billion years ago. As the stars reached advanced stages of their evolution, the grains would have condensed into outflows and blown out into space, later to be taken up and incorporated into what would become the Murchison meteorite. It's just mind-blowing to think of everything those tiny specks must have passed through before landing here on Earth. <https://www.sciencealert.com/a-meteorite-discovered-in-australia-contains-oldest-known-material-on-earth?>



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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., 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:

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