

Cedar Valley Gems



Cedar Valley Rocks & Minerals Society

Cedar Rapids, Iowa

cedarvalleyrockclub.org

CEDAR VALLEY GEMS

FEBRUARY 2021

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

**Next CVRMS Meeting
Tues. February 16
7:15 pm**

<<VIRTUAL MEETING>>

Join the Zoom Meeting

<https://us02web.zoom.us/j/81679676835>

featured speaker

Dr. John Hill

Central Iowa Rock and Mineral Society

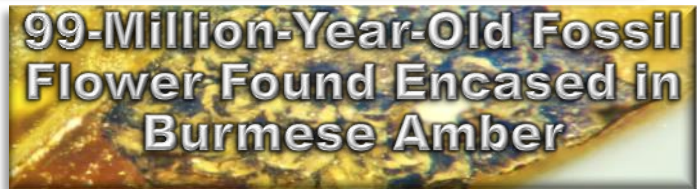
“The Tucson Show and Stone Art (Pietre Dure)”



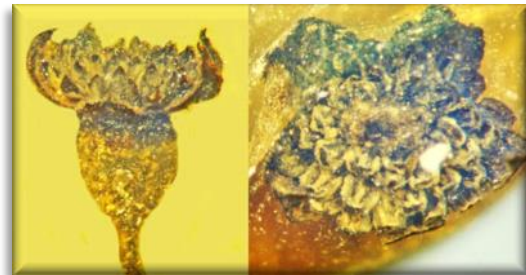
Pietre Dure Table Top

stone, boxes, and floor mosaics. John will show several objects that illustrate the above categories of stone art that he has either found, made, or purchased.

In his presentation John will first share some of his experiences at 2011 Tucson Gem Show and the annual Munich world gem shows. Then, he will review the history of *Pietre Dure* starting with ancient man through Rome and the Renaissance up to modern work done today in Florence, Italy, and in Fairfield, Iowa. Finally, he will discuss art in stone in the form of “*found objects*”, pictures in



A rare flower is finally getting its moment in the sun, almost 100 million years after it blossomed. Researchers at Oregon State University have identified a new species of angiosperm, or flowering plant, from the Cretaceous Period that was preserved in a shard of amber found in what is now



Myanmar. Sometimes you don't know what you've got till it's gone. *Valvilocus*

pleristaminis makes for a perfect example. Scientists only recently identified this mysterious, extinct flower. It once bloomed in the Cretaceous period - a floral relic of a by-gone age, preserved in time-stopping amber since some nameless day when dinosaurs still roamed the Earth. "a beauty, especially considering it was part of a forest that existed 100 million years ago," says emeritus professor George Poinar Jr. from Oregon State University. *V. pleristaminis*, which represents both a new genus and species of flower, is among the latest in this ever-expanding bouquet. "The male flower is tiny, about 2 millimetres across, but it has some 50 stamens arranged like a spiral, with anthers pointing toward the sky," Poinar explains. "Despite being so small, the detail still remaining is amazing. Our specimen was probably part of a cluster on the plant that contained many similar flowers, some possibly female." The specimen in question was obtained from amber mines in Myanmar, having been preserved in marine sedimentary deposits dating back to the mid-Cretaceous, approximately 99 million years ago. According to the researchers, *V. pleristaminis*, an example of an angiosperm (flowering plant), likely belongs to the order Laurales, particularly bearing some resemblance to the families Monimiaceae and Athurospermataceae. <http://www.geologyin.com/2020/12/99-million-year-old-fossil-flower-found.html?>

CVRMS Jan. 19 **Virtual Meeting** CVRMS Board Minutes Jan. 26

7:23 p.m. The meeting was called to order by Marv Hoag, President. There were 21 participants.

Minutes reviewed. Motion to approve by Ray, second by Bill . Approved as published.

Treasurers report by Dale . He received more donations for Christmas basket. Total went from \$460 to \$610. Marv expressed the club's thank you to everyone for their generosity. Checking account balance \$1966.16.

PROGRAM

John Hill was unable to connect with internet and will present program at another time.

OLD BUSINESS

Nothing new to report on show. As far as Sharon knows, all vendors except one will return.

Auction will be held on Sept. 18th and 19th. (The 19th is tentative) at the Morton Building at Amana Campground.

Jay and Sharon are working on the potential contributors. We could go for two days if we had enough lots.

ANNUAL SHOW November 6-7, 2021, at Hawkeye Downs.

MISCELLANEOUS

Joint club meeting program only will be on Monday 7:15p.m. Dale sent out notification.

Motion to adjourn by Glen, second by Dale. Meeting adjourned 8:46p.m.

Respectfully submitted,
Dell James, Secretary

7:16 P.M. THE MEETING CALLED TO ORDER by Marv via Zoom.

MEMBERS PRESENT: Marv Houg , Sharon Sonnleitner, Jay Vavra, Kim Kleckner, Dale Stout, Bill Desmarais, Toby Jordan, Ray Anderson

TREASURERS REPORT by Dale. Dues money coming in. Final total Christmas basket donations = \$610. Report Approved.

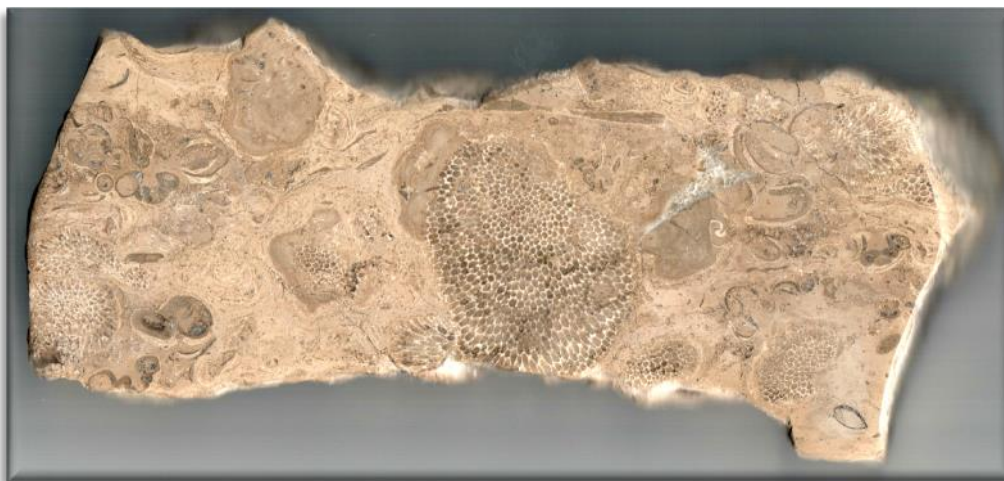
AUCTION: Marv asked Jay to send letter to all perspective dealers to obtain lot numbers for the **September 18 and maybe 19, 2021** auction. We have all of the supplies we need for auction, except we always need more flats.

SHOW: Sharon prepared a spread sheet of dealers who signed up for last year's canceled show on. Most dealers will return for the November 2021 show. Discussion of potential replacements for dealers dropped out. Kim moved to offer dealer slot to Beth Fratzke and Gary Grufman of GLG Jewelry/Agates. Dale second and motion passed. The show's theme will be "**Meteorites**". Program and displays to be determined.

MISCELLANEOUS: May **T.A.K.O. Quarry** visit not yet finalized. Marv and Ray will spearhead rounding up rocks for **River Products display case**. Decided that we should wait until about May before we make any plans. Jay suggested we should have a **generic club email address**. Sharon thought our web page would support it and will check. The club email address will facilitate Jay acquiring a **new Square account**. Nothing new on club's **Bill's Bus Tour**. **Tom Slade** passed away; Marv will announce at February meeting.

MOTION TO ADJOURN made by Ray, second by Dale. 8:35 meeting adjourned

Respectfully submitted
Ray Anderson, Acting Secretary

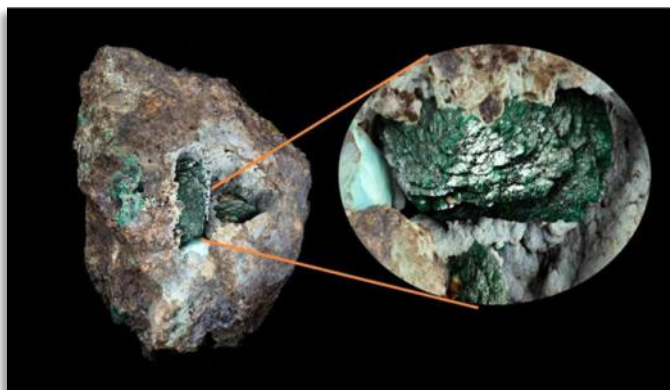


Polished Slab of limestone of the Cou Falls Member (a.k.a. the *Idiostroma* beds) of the Little Cedar Formation from Johnson County. The rock is a "packstone" with fossils including *favosities* coral, brachiopods, and stromatoporoids (including the branching *Idiostroma* and encrusting varieties). In the early 1900's the stone was polished for cane handles and other uses and was called "**Iowa City Marble**."

— from *Rockdoc Ray*

Kernowite: New Green Mineral Discovered in 220-year-old Rock

Known from just a single location, a *new species of mineral* has been described from the UK (a mineral is naturally occurring chemical substance formed by geological processes; a rock is an object formed of one or many minerals in combination). A sample of rock collected from a mine in Cornwall 220 years ago has turned out to include an entirely new mineral. A scientist was investigating a mineral called **liroconite** {a com-



Kernowite (green color)

Image credit: Natural History Museum, London

plex hydrated copper aluminium arsenate hydroxide - $\text{Cu}_2\text{Al}[(\text{OH})_4\text{AsO}_4] \cdot 4(\text{H}_2\text{O})$, a gorgeous bright blue mineral from Cornwall and was trying to understand why its color varies from bright teal-blue to a dark emerald green. It turned out that the darkest green samples are sufficiently chemically different to the blues that it should be defined as a new species, **kernowite** [a similar complex arsenate mineral with the composition $\text{Cu}_2\text{Fe}(\text{AsO}_4(\text{OH}))_4 \cdot 4\text{H}_2\text{O}$]. The crystal structure of the two minerals include positions that can contain atoms of either aluminium or iron. In **liroconite**, the position is dominantly filled with aluminium and the physical crystal ends up being blue. In the new mineral, **kernowite**, the position is instead dominantly filled with iron, resulting in a green crystal. The researchers believe that the more iron the darker the green, but that is still not confirmed. Both minerals have exactly the same crystal structure, meaning that all the atoms are in the same positions, it is just the chemical composition that varies. **Kernowite**, is the Cornish word for Cornwall. The mine from which **kernowite** has been found is also the location from which the majority of the world's **liroconite** (highly prized among collectors) was produced. The mine that yielded most of the **liroconite**, the *Wheal Gorland*, was a copper and tin mine, active between around 1790 and 1909. Recently the mine was demolished and is now beneath a housing estate. This means that more samples of the mineral may never be found again. But, hopefully other samples will be found in public and private collections, but until that happens, the one sample held at the London Museum of Natural History and another in a private collection are the only known examples of **Kernowite** in the entire world.

<http://www.geologyin.com/2020/12/kernowite-new-green-mineral-discovered.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 rock hounds 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? Are we looking at here??

January's Photo



Last month's "What in the World" photo was taken in northwest Namibia, right on the border with Angola. The rich royal blue landscape is dominated by exposures of the tectosilicate mineral sodalite [Na₈(Al₆Si₆O₂₄)Cl₂], widely used as an ornamental gemstone. Slabs and blocks

of sodalite are quarried and exported from that area.

Namibia's Empirion Sapphire Shores are one of the only places in the world with brilliant blue-colored sand, that is made up in part by blue sodalite grains that give the sand its color.



Rock Calendar CVRMS EVENTS OF INTEREST

2021

Feb. 5 — Central Iowa Mineral Society
MONTHLY VIRTUAL MEETING - 7:30 pm
speaker Dr. John Hill
"The Tucson Show and Stone Art (Pietre Dure)"

Feb. 9 — Blackhawk Gem & Min. Soc.
MONTHLY VIRTUAL MEETING - 7:15pm
<https://us02web.zoom.us/j/84321675928>
speaker Ray Anderson
"The History and Legacy of Coal Mining in Iowa"

Feb. 10 — M.A.P.S. Monthly Meeting
MONTHLY VIRTUAL MEETING - 7:00pm
Stephanie Drumheller, U. of Tenn. Paleontologist
"How to Make a Dinosaur Mummy: Applying Forensic Principles to a Paleontological Quandary"

Feb. 16 — CVRMS Monthly Meeting
MONTHLY VIRTUAL MEETING - 7:15 pm
<https://us02web.zoo.us/j/81679676835>
speaker Dr. John Hill
"The Tucson Show and Stone Art (Pietre Dure)"
more details on Page 1

Feb. 22 — 3 Rock Clubs Monthly Program
MONTHLY VIRTUAL PROGRAM - 7:30 pm
<https://us02web.zoom.us/j/89198680585>
program to be announced

Sept 18-19— CVRMS Auction
Amana RV Park and Event Center
Amana, Iowa
more details to follow

Sept. 24-26 — Geode Fest
Chaney Creek Boat Access
Illinois Highway 96 N
Hamilton, Illinois

Oct. 22-24 — MAPS 2021 Fossil Expo
Illinois State Fair Grounds
Springfield, Illinois
more details to follow

Nov. 6-7 — CVRMS Rks, Fos, & Min Show
Hawkeye Downs
Cedar Rapids, Iowa
more details to follow

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.

A rock name that many avid rockhounds in the Upper Midwest might recognize is the "Omar." These holey, gray rocks have (like nearly every rock) an interesting story, so I have decided to briefly review their history and uses.

OMARS

Omars, a shortened form of the name "Omarolluks," are a distinctive type of glacial erratic that exhibits prominent rounded, often deep, hemispherical voids and pits. They are composed of *greywacke* (gray'-wackee), a grey, earthy variety of metamorphosed sandstone generally characterized by its hardness, dark color, and poorly sorted angular grains of quartz, feldspar, and small rock fragments or lithic fragments set in a compact, clay-fine matrix. The greywacke is identifiable by its low metamorphic grade and the 10–40% rock fragments, distinctive volcanic clasts, and spherical carbonate concretions that it contains. Their name refers to

their source, which is the Proterozoic **Omarolluk Formation** (1.76 billion years old) in the Belcher Islands, an archipelago in southeast Hudson Bay. The Laurentide Glacial Ice Sheet eroded omars from the Belcher Islands and carried them into central Canada and the U.S. where they were deposited on moraines. Because scientists know precisely where they came from they are very valuable in documenting the movement of glaciers. Omars are typically rounded and range in size from pebbles to boulders. Their rounded shape, whether found in glacial tills or glacial-fluvial (outwash) gravels, indicate that they were eroded from pre-existing river deposits. Omars are typically found associated with granules and pebbles of oolitic jasper that were transported from the Belcher Islands in Hudson Bay, Canada. There is uncertainty on how to translate the proper name Omarolluk (and omar rocks). According to the records of the Canada Centre for Mapping and Earth Observation Natural Resources, the features Omarolluk Sound and Omarolluk Formation were named after Omarolluk, an Inuit man who accompanied and guided R. J. Flaherty on numerous geological surveys of the Belcher Islands and elsewhere in the Canadian north. He was probably an Inuktitut-dialect speaker from the eastern coast of Hudson Bay. The spelling likely varied from the originally pronounced but unrecorded aural form of the name. Despite the pronunciation problems, Omarolluk was surely a real person.



Group of Omars with a quarter for scale.

Far less common but equally distinctive are erratics of red oolitic jasper that were derived from the Kipalu Formation of the Belcher Group. In parallel with the now widely accepted field term "Omar," the term "**Kipalu**" was introduced in 2000 for such erratics of oolitic jasper. A map showing the distribution of these distinctive erratics, in relation to indicators of Wisconsinan glacier movement, provides the basis for inferring at least two discrete glaciations that produced several major ice lobes.

While no Omars have been verified in Iowa, they have been identified in SE Minnesota (just north of Howard County) and NW Minnesota (just north of Lyon County). Bob McKay of the Iowa Survey identified a rock found by a Mason City man as an omar in 2012, and I know that I have seen and collected what I would call Omars in several locations in Iowa. So keep your eyes open and you might find a Omar or a Kipalu yourself.

A sample of a Kipalu, which like Omars, can be used to trace the path of glaciers



The Massive Genome of The Lungfish May Explain How We Made The Leap to Land

If you are a lucky species, you will stumble into random gene mutations that just happen to help you survive better - allowing you and your descendants to keep and build on the helpful traits they encode. As with anything involving luck, the more chances you take, the more chances you have of hitting the jackpot. That's what seems to have happened with our long-ago ancestors - the ones we share with still living lungfish. They struck enough genetic jackpots to allow them to climb out of



the water and access the whole new world of land, around 420 million years ago. In doing so, they became the ancestors of all land animals with backbones (tetrapods). Having a massive genome, like that found in modern lungfish, may have helped with this. Researchers just sequenced the entire genome of the endangered Australian lungfish (*Neoceratodus forsteri*), which has the largest known animal genome. It is 14 times the size of ours. "When you look at it from a genomic perspective, [lungfish are] genomically halfway between a fish and a land-based vertebrate," said biologist Siegfried Schloissnig. Of six still living species of lungfish, four are African, one South American, and one Australian. The Australian species has retained the most ancestral features, and was mistakenly classed as an amphibian when first discovered, due to its bizarre mix of fish and newt features, including its weird, leg-like lobed fins. These strange in-between 'living fossils' can live up to 100 years. Australian lungfish still appear to closely resemble the fossils of their 100-million-year-old (and now extinct) ancestral species that hauled themselves out of the water, eventually spawning mammals, birds, reptiles, and amphibians. Its genome confirms that this air-gulping swimmer is our closest living fish relative, beating the other contender, coelacanths - another group of lobed finned fish. So within the Australian lungfish's giant haystack of genes are clues to how animals made the transition from aquatic to terrestrial, including such evolutionary innovations as air breathing, limbs, posture, prevention of desiccation, nitrogen excretion, reproduction, and olfaction. The Australian lungfish is an incredible living record of our evolution. The animal hunts for frogs, worms and snails, as well as munching on plants in the water. It usually relies on gills to breathe, but its single lung allows the lungfish to surface for fresh air when dry conditions reduce their watery environment, making it murky and stagnant. There is no doubt that the newly sequenced genome will unveil more of the secrets of this bizarre vertebrate and how it adapted to life on land.

<https://www.sciencealert.com/lungfish-s-massive-genome-could-explain-how-we-made-our-leap-from-sea-to-land>



You never know what you're going to get when you crack open a geode-like rock called an agate, but a new specimen is even more surprising than usual: It looks just like Cookie Monster. The agate, found in **Soledade**, a precious stone hotspot in southern Brazil, is a dead ringer for the blue, googly-eyed **Sesame Street Muppet**. After its owner, California mineral collector Mike Bowers, posted about the agate on Facebook, it went viral, with write-ups in newspapers

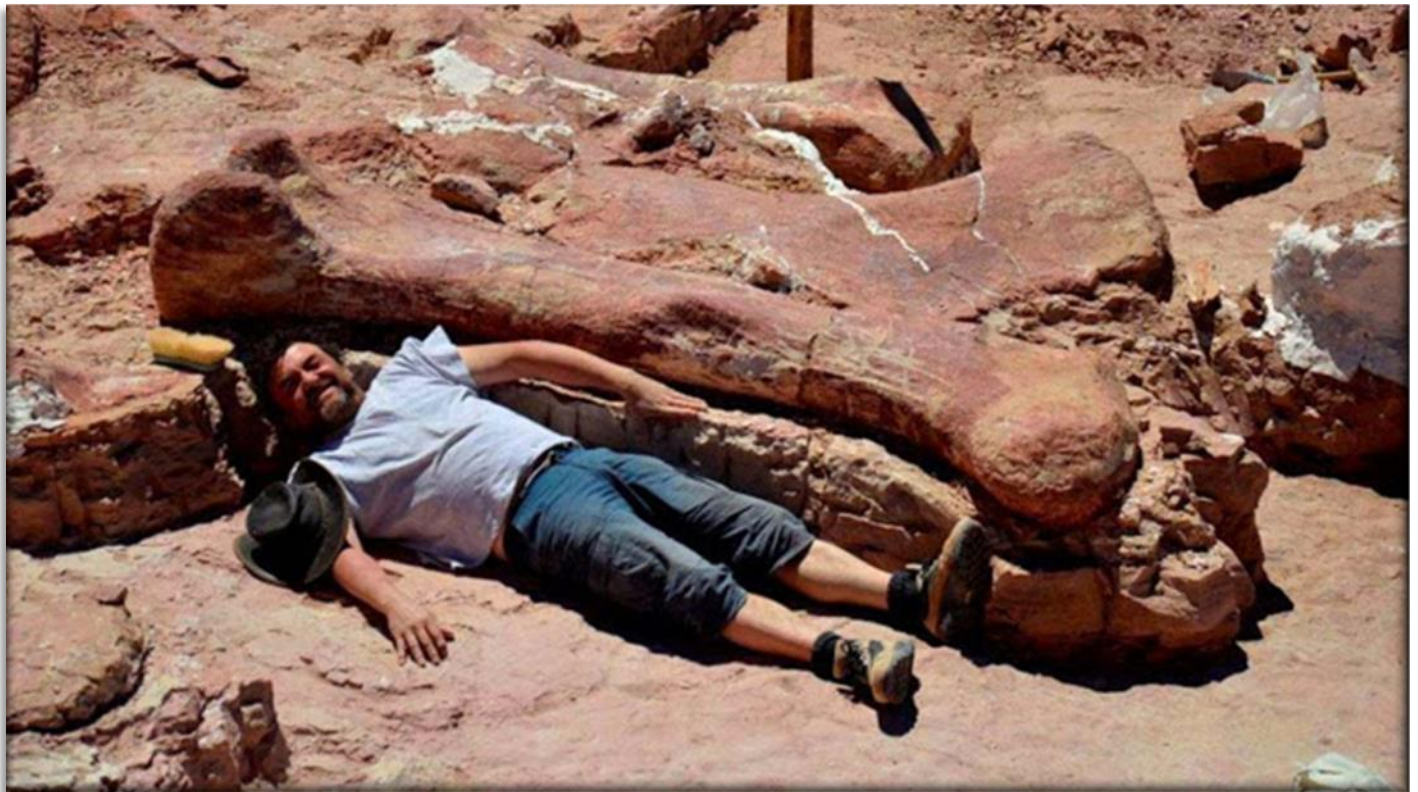


from Australia to Israel to the United States. "I didn't realize that Cookie Monster was so well known and part of the world cultural heritage!" Bowers told Live Science. The agate came to Bowers in November via Brazilian gemologist Lucas Fassari, who had acquired it in a batch of many agates from Soledade. Bowers immediately purchased the Cookie Monster agate, but didn't post it online until Jan. 16, as he was ill with [COVID-19](#).

Agates are a form of quartz that develop within cavities created when gas bubbles are frozen in place by the cooling volcanic lava. Over time, water infused with silicon dioxide percolates through the cavities and crystallizes on the cavity walls, creating colorful layers of crystals. The colors are caused by chemical impurities in the silicon dioxide and by the spacing of the crystals. Some agates completely fill their volcanic voids, but many leave small spaces inside, lined with sparkly, inward-facing quartz crystals. In the case of the Cookie Monster agate, these voids just happen to look like a pair of Muppet eyes and an enthusiastically grinning mouth. For now, Bowers said, he plans to keep the stone. It may eventually end up in a museum or in the hands of a high-end collector, he said. "It is totally unique and awesome to see everyone loving this stone as much as we do," he said. <https://www.sciencealert.com/this-geode-like-rock-bears-an-uncanny-resemblance-to-sesame-street-s-cookie-monster>

Dinosaur Unearthed in Argentina Could Be the World's Largest Land Animal Ever

Experts have uncovered the remains of a gigantic dinosaur in Argentina, and believe it could be one of the largest creatures to have ever walked the Earth. A team of researchers with Naturales y Museo, Universidad de Zaragoza and Universidad Nacional del Comahue has found evidence that suggests the remains of a dinosaur discovered in Argentina in 2012 may represent a creature that was the largest ever to walk the Earth. In their paper published in the journal *Cretaceous Research*, the group describes the fossilized remains that have been found so far and what they have revealed. The largest creature ever to live is believed to be the blue whale—the largest of which grow to 110 feet long. The biggest land creatures are believed to have been the dinosaurs—of them, the titanosaur (as their name suggests) is believed to be the largest. And of those, *Argentinosaurus* represents the largest that left enough evidence for it to be classified the heaviest—at approximately 120 feet in length and weighing in at a hundred tons, it would have dwarfed today's land animals by a considerable amount. Researchers studying Patagotitan fossils (another titanosaur found in Patagonia) have suggested some of them might have broken the record for the largest, but there was insufficient fossil evidence to prove it. In either case, the researchers studying the new remains have begun to believe that they have

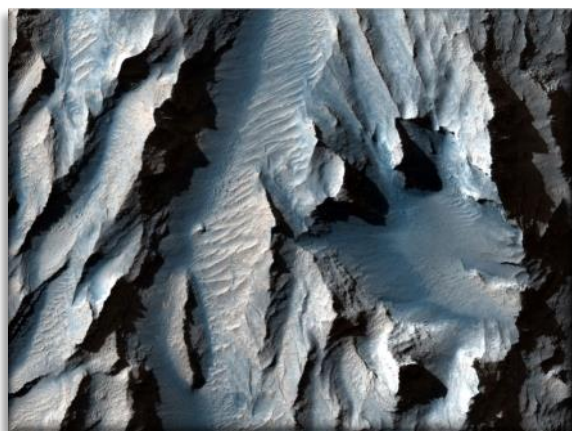


found an even bigger titanosaur. Thus far, the dinosaur has been dated back to 98 million years ago (putting it in the Late Jurassic to the early Cretaceous). The fossils found include 24 vertebrae, all belonging to a giant tail, parts of a pelvis and a pectoral girdle. The huge size of each suggests the dinosaur was a very large titanosaur—one that might be bigger than *Argentinosaurus*. That claim cannot be confirmed, however, until leg bones are found. Their size will allow the researchers to make estimates of the animals' body weight. Titanosaurs belong to the sauropod family, which means they were herbivores, had massive bodies and long necks and tails. Such dinosaurs would have had few worries from meat-eating enemies if they managed to grow to full size. Their fossils have been found on all continents except Antarctica. The researchers conclude by noting that more digging in the area will likely reveal more fossils from the same dinosaur and perhaps evidence of its true size. Patagotitans may have been the world's largest terrestrial animal of all time, and weighed up to 77 tons, while *Argentinosaurus* were similarly gargantuan, and measured up to 131 feet and weighed up to 110 tons -- weighing more than 12 times more than an African elephant (up to 9 tons). Experts believe that the specimen strongly suggests the co-existence of larger titanosaurs together with medium-sized titanosaurs and small-sized rebbachisaurids at the beginning of the Late Cretaceous period, which began 101 million years ago.

http://www.geologyin.com/2021/01/dinosaur-uneearthed-in-argentina-could.html?utm_source=feedburner&utm_medium=email&utm_campaign=Feed%3A+GeologyIn+%28Geology+IN%29

Peer Inside the Solar System's Largest Canyon

Stretching 18 miles wide and averaging 4,000 feet deep, the Grand Canyon is absolutely humbling to us wee humans. But it seems pitiful in comparison to the **Valles Marineris canyon** on Mars, which is roughly ten times longer and five times deeper than the Grand Canyon, stats that earn it the title of the largest canyon in the entire solar system. Numbers alone are one thing, but breathtaking close-up images of Valles Marineris recently released by the University of Arizona put the stats into perspective. And they're not just nice to look at—they'll help researchers better understand how this gigantic chasm formed, which is still largely a mystery. One leading theory, as noted by the European Space Agency (ESA), is that Mars' crust was ripped open billions of years ago by magma swells. A neighboring area called Tharsis bulge



A close-up view of Tithonium Chasma, which is feature of Valles Marineris, the solar system's largest canyon.
NASA/JPL/UArizona

(which is home to the solar system's largest volcano Olympus Mons) became engorged with magma, stretching and ripping the landscape, and eventually caused a massive rift. Images like those recently released also suggest that landslides and ancient rivers sculpted Valles Marineris after it ripped open. Getting better looks at small details, like fault lines and areas where rocky material clumps together, helps scientists fine-tune their ideas of how Valles Marineris came to be. Researchers used the HiRISE camera on the Mars Reconnaissance Orbiter to snap the most recent shots. The instrument is massive, clocking in at 143 pounds and measuring roughly five feet by two feet. All of the tech packed into this camera has massive capturing and processing power. It can resolve something the size of a kitchen table in a shot of Mars' surface 3.7 miles wide. To get more clues as to the structure's origins, researchers used this impressive power to zoom in on regions of the canyon like **Tithonium Chasma**, pictured above. They noted light and dark diagonal slashes on the surface of the feature's slope, which they think could point to ancient cycles of freezing and thawing on the Red Planet. It's tiny details like these that will help us understand how Valles Marineris came to be, as well as the planet's climate history as a whole. Doing so will hopefully clarify if there was ever a whisper of life on Mars—and where. <https://www.popsci.com/story/science/valles-marineris-mars-largest-canyon-solar-system/>

What is Irradiated Quartz, Is it Safe?

Quartz may be the **second most common mineral** on our planet's crust (after feldspar). People from the ancient Egyptians and Australian Aborigines to modern-day New Age practitioners believe that this crystal holds mystical or healing properties. **Black quartz** is a variety of quartz that ranges in clarity from almost complete transparency to an almost-opaque black crystal. Like other quartz gems, it is a **silicon dioxide** crystal. The color of smoky quartz is caused by irradiation and traces of aluminum built into its crystal lattice. Aluminum replaces silicon to form an $[AlO_4]^-$ group instead of $[SiO_4]$. To compensate for the imbalance of charge in the lattice, small monovalent cations (H^+ , Li^+ or Na^+) are built into the lattice, as well. High energy radiation transfers the extra electron from $[AlO_4]^-$ to the cation, and a color center is formed. Interestingly, H^+ seems to interfere with this process, and higher concentrations of built-in hydrogen inhibit the formation of color-centers. In normal geological environments this process can only take place at temperatures below $50^\circ C$, otherwise the rate of color center destruction surpasses that of color center formation. So the color of the crystals appeared long after the crystals have grown. It is estimated that it takes several million years for a crystal to assume a deep color in a granite of average composition. True



smoky quartz will lose its color when heated to about $200^\circ C$, and the color will occur again when the crystal is irradiated with x or gamma-rays. It's still common practice to artificially irradiate colorless quartz

and sell it as smoky quartz. **Is irradiated smoky quartz safe?** There is no radiation hazard associated with irradiated smoky quartz. Irradiating a crystal will cause some energy to be stored in the crystal structure, which can change the optical properties, typically observed as a change in color. Natural smoky quartz is usually found in intrusive igneous and certain high grade metamorphic rocks, like granite and orthogneiss, as these contain traces of radioactive elements whose radiation cause the coloration. Smoky quartz from volcanic rocks is less common, and amethyst and colorless quartz dominate. Smoky quartz from sedimentary rocks is very unusual. Their content of radioactive elements is usually very low. Much of the "smoky" quartz reported from sedimentary rocks is actually not true smoky quartz, but quartz containing black or brown inclusions. **Cairngorm** is another name for Smoky Quartz, used mostly in Scotland, specifically for the deposit in the Cairngorm Mountains. **Morion** is a very dark brown to black opaque variety. <http://www.geologyin.com/2020/02/is-black-quartz-natural.html>

Tunguska Explosion Caused by Asteroid Grazing the Earth, Say Scientists

In the early morning of Jun. 30, 1908, a massive explosion flattened entire forests in a remote region of Eastern Siberia along the Tunguska River. Curiously, the explosion left no crater, creating a mystery that has puzzled scientists ever since; what could have caused such a huge blast without leaving any remnants of itself? Now Daniil Khrennikov at the Siberian Federal University in Russia and colleagues have published a new model of the incident that may finally resolve the mystery. Khrennikov says the explosion was caused by an asteroid that grazed the Earth, entering the atmosphere at a shallow angle and then passing out again into space. *"We argue that the Tunguska event was caused by an iron asteroid body, which passed through the Earth's atmosphere and continued to the near-solar orbit,"* they say. If they are correct, the theory suggests Earth escaped an even larger disaster by a hair's breadth. First some background. Scientists have long speculated on the cause of the Tunguska impact. Perhaps the most widely discussed idea is that the explosion was the result of an icy body, such as a comet, entering the atmosphere. The ice then rapidly heated up and evaporated explosively in mid-air but without ever hitting the ground. Such an explosion could have been powerful enough to flatten trees without leaving a crater. And it would have left little evidence other than vapor in the atmosphere. But this theory does not fit some of the other evidence. There were just a handful of eyewitness reports of the event. These describe how *"the sky split in two,"* a huge explosion and widespread fire. But together, they provide evidence that the impactor traveled some 435 miles through the atmosphere before the explosion that morning. So Khrennikov and colleagues simulated the effect of meteorites made of rock, metal or ice, moving through the atmosphere at a speed of 12 miles per second. Friction with the atmosphere immediately heats these objects. But while iron vaporizes at around 5,432 degrees Fahrenheit, water vaporizes at only 212 degrees F. So icy meteorites do not last long. Indeed, Khrennikov and colleagues calculate that an icy body large enough to cause such a large explosion would have traveled no more than 186 miles through the atmosphere before vaporizing completely. That suggests the Tunguska meteorite could not have been made of ice. Instead, Khrennikov and colleagues say a different scenario fits the facts. They say the explosion must have been caused by an iron meteorite about the size of a football stadium. This must have passed through the upper atmosphere, heated rapidly, and then passed out into the Solar System again. The shock wave from this trajectory was what flattened trees. The shock wave would have caused an explosion of about the right magnitude, and any vaporized iron would have condensed into dust that would be indistinguishable on the ground. Crucially, this scenario would not have left any visible asteroid remnants. It could also explain reports of dust in the upper atmosphere over Europe after the impact. If Khrennikov and colleagues are correct, then Earth had a lucky near-miss that morning. A direct impact with a 656 foot-wide asteroid would have devastated Siberia, leaving a crater 2 miles wide. It would also have had catastrophic effects on the biosphere, perhaps ending modern civilization. In the event, the Tunguska impact is thought to have killed perhaps three people because the region is so remote. It could clearly have been much worse. https://www.discovermagazine.com/planet-earth/tunguska-explosion-caused-by-asteroid-grazing-the-earth-say-scientists?utm_source=dscfb&utm_medium=social&utm_campaign=dscfb



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The Ordovician Extinction: Our Planet's First Brush With Mass Animal Death

Some mass extinctions unfold like a sloppy murder, leaving clear fingerprints for the keen investigator to uncover. (Asteroids are no masters of subtlety.) The **Late Ordovician mass extinction**, the oldest since animals evolved and the second most lethal, isn't one of them. Though there is a standard explanation for this granddaddy of death, involving an ancient ice age, the evidence is cryptic enough that experts are still submitting new theories for how **85 percent of all marine species** suddenly sank into oblivion. This catastrophe occurred about **444 million years ago**, near the end of the Ordovician Period. In the sequence of geologic time, the Ordovician follows the Cambrian Period, well-known for the evolutionary "explosion" of the same name that populated the world with nearly all the modern animal phyla — the major branches we now see in the tree of life. The ranks of vertebrates, mollusks, arthropods and other broad taxonomic groups still familiar to us today were growing and diversifying at an extraordinary rate, until this abrupt event. At the time, most of Earth's dry land was merged together in the supercontinent of *Gondwana*, which had drifted so far south that it hovered over the pole like present-day Antarctica. To the north, there were a few minor continents (notably *Laurentia*, which includes most of North America, and *Baltica*, which includes the Baltic region and part of Russia) that dotted the tropical and temperate regions around the equator. Plants and animals were perhaps beginning to venture above water, though nothing near the extent that they would in the coming eras. By and large, most of the action was still happening under the sea, where trilobites, corals and other primordial ocean-dwellers prospered like never before. Then came their demise. In conventional wisdom, it consisted of **two distinct "pulses"** separated by roughly a million years. First, glaciers engulfed *Gondwana* and the planet cooled dramatically, chilling the tropics and mid-latitudes. Sea levels plummeted hundreds of feet destroying vast stretches of the warm, shallow-water habitat that sustained much marine life. Then, the second pulse, when the glaciers melted, the planet warmed, and the ocean rose. The species that had just adapted to the cold struggled once again to evolve fast enough. But there are many problems with this glacial explanation for the extinction; not the least is what triggered that icy advance. While scientists are unsure why the majority of species died at this moment, they do understand how those deaths influenced the progression of life. Many extinctions jolt evolution off its course, allowing a host of new organisms to rise from the ashes and fill new niches in a new environment. But not so with the Ordovician extinction. Although 85 percent of all *species* perished, the larger groupings, *genera* and *families*, suffered much smaller percentages of loss. The *asaphida* family of trilobites (with snail-like eye stalks) disappeared as did many graptolites, corals, bryozoans, brachiopods, and conodonts. However, it did not produce major changes to ecosystem structures compared to other mass extinctions, nor did it lead to any particular morphological innovations. In fact, the fossil record is so similar before and after the event that a rookie paleontologist staring right at the layers might miss the cutoff. <https://www.discovermagazine.com/planet-earth/the-ordovician-extinction-our-planets-first-brush-with-death?>

Researchers Uncovered a 5,000-Year-Old Crystal Dagger Buried in Spain

Archeologists have discovered many tools left behind by prehistoric civilizations. Most of these are made of stone, but in Spain, researchers have found incredible weapons made of rock crystal. Dating back to at least 3000 BCE, these weapons include an incredible crystal dagger that would have taken enormous skill to carve. The incredible find was discovered in the megalithic tomb of **Montelirio tholos**, which is located in southwestern Spain. This enormous site is made from large slate slabs and stretches over 143 feet. It was excavated between 2007 and 2010; five years later, researchers from the University of Granada, the University of Seville, and the Spanish Higher Research Council published their study of the crystal tools. In



addition to the dagger, they found 25 arrowheads and cores for making the weapons. The remains of at least 25 individuals were also found within Montelirio tholos; and the tombs contained many grave goods, including "shrouds or clothes made of tens of thousands of perforated beads and decorated with amber beads," as well as ivory objects and fragments of gold blades. Crystal arrowheads were found together in a cluster, which leads the researchers to believe that they may have been a ritual offering. The dagger was found on its own in a separate chamber, "in association with an ivory hilt and sheath." Measuring nearly 8.5 inches long, it's similar in shape to other daggers of the period. (Of course, the difference is that those daggers were made of flint and this one is formed from crystal.) Since there were no crystal mines near-

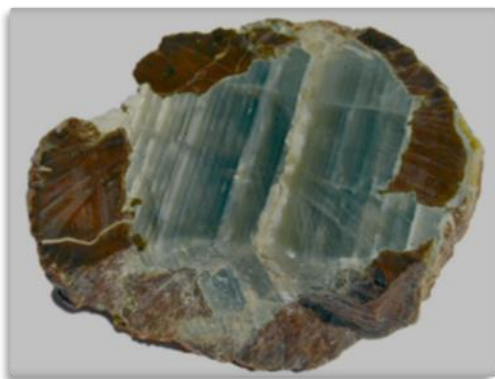
by, the materials for these items would have been sourced from far afield. This contributes to the idea that they were intended for an elite few who would have been able to afford to gather such materials and have them shaped into weapons. It's also interesting to note that none of the weapons were ascribed to a single individual, but appear to have been for collective use. Though we can't be certain of their exact purpose, the discovery and study of these weapons continue to give a fascinating insight into the prehistoric cultures that roamed the Earth over 5,000 years ago. <https://mymodernmet.com/prehistoric-crystal-dagger/?fbclid=IwAR1a1G1fwV->

Lemurian Aquatine Calcite

The stone called **Lemurian Aquatine Calcite** is a recent arrival from a remote region of Argentina. It is named after the ancient oceanic civilization of Lemuria. Here are the facts on this mineral *before* it was trademarked and associated with Lemuria. It has a few other names: *Blue Argentinian Calcite*, *Argentinian Blue Onyx*, and *Argentinian Aquamarine Onyx*. Is that confusing or what? Calcite, Onyx, Aquamarine -- what is this stone? Simply, it is a chalcedony variety of agate, which itself is a type of quartz. The closest trade name is *Argentinian Blue Onyx*. The name **Lemurian Aquatine Calcite** is a recent arrival from a remote region of Argentina. It is named after the mythic ancient oceanic civilization of Lemuria. Lemuria is most frequently pictured as a now-sunken continent that once linked Australia and India. Lemurian culture is fanaticized as a society of harmony, inner peace and spiritual attunement. Many of the Pacific islands, including Indonesia are considered to be the remnants of the lost Lemurian continent. Easter Island, with its mysterious huge stone monuments, is also purported to be a remnant of Lemuria. The inhabitants of Lemuria were believed by some to have been much more deeply and consciously entwined in the 'higher worlds' than humans are in modern times. They were supposedly a people of the "Water element," with all its connections to emotion and spirituality. In fact, some accounts, including those of Polynesian folklore, say that the inhabitants of Mu, or Lemuria, were adept at telepathy, teleportation, psychokinesis, and other paranormal abilities such as raising the vibration of the body to move through trees, walls or other 'solid' objects. The Lemurian civilization is viewed by most "chroniclers" as having existed between 80,000 and 25,000 B.C. Since Lemuria was said to have been a civilization of exceptional harmony, prosperity and spirituality, the soft blue color of the stone Lemuria, reminiscent of the color of *tropical seas*, is what connected the stone to the legend. Subsequently, advocates of *crystal healing* (a pseudoscientific alternative medicine technique that uses semiprecious stones and crystals) rapidly embraced **Lemurian Aquatine Calcite**. They identified it as *a stone which deeply nourishes the emotional body. It is a strong antidote to stress, fear, worry and anxiety about the future. It soothes and replenishes the etheric body. It enhances dream life and facilitates lucid dreaming. It is ideal for opening up one's capacities for recalling past lives, ancient knowledge and tuning into to the morphic fields of the Earth's past.* If you cross paths with a sample of **Lemurian Aquatine Calcite**, you may be able to benefit from some of the healing properties, but please keep in mind that it is actually onyx, not calcite and it was named after a non-existent continent.

The word **Onyx** primarily refers to the parallel banded variety of the silicate mineral *chalcedony*. Agate and onyx are both varieties of layered chalcedony that differ only in the form of the bands: **agate** has curved bands and **onyx** has parallel bands. The colors of its bands range from black to almost every color. Commonly, specimens of onyx contain bands of black and/or white. Onyx is used by some as a descriptive term, and has been applied to parallel banded varieties of alabaster, marble, obsidian and opal, and misleadingly to materials with contorted banding, such as "Cave Onyx" and "Mexican Onyx".

A half-polished slab of Chalcedony agate from Argentina



Tumbled stones of Lemurian Aquatine Calcite



This Lemurian Aquatine Calcite Sphere is 4.5 cm in diameter.



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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](http://101EmmonsSt.com). 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

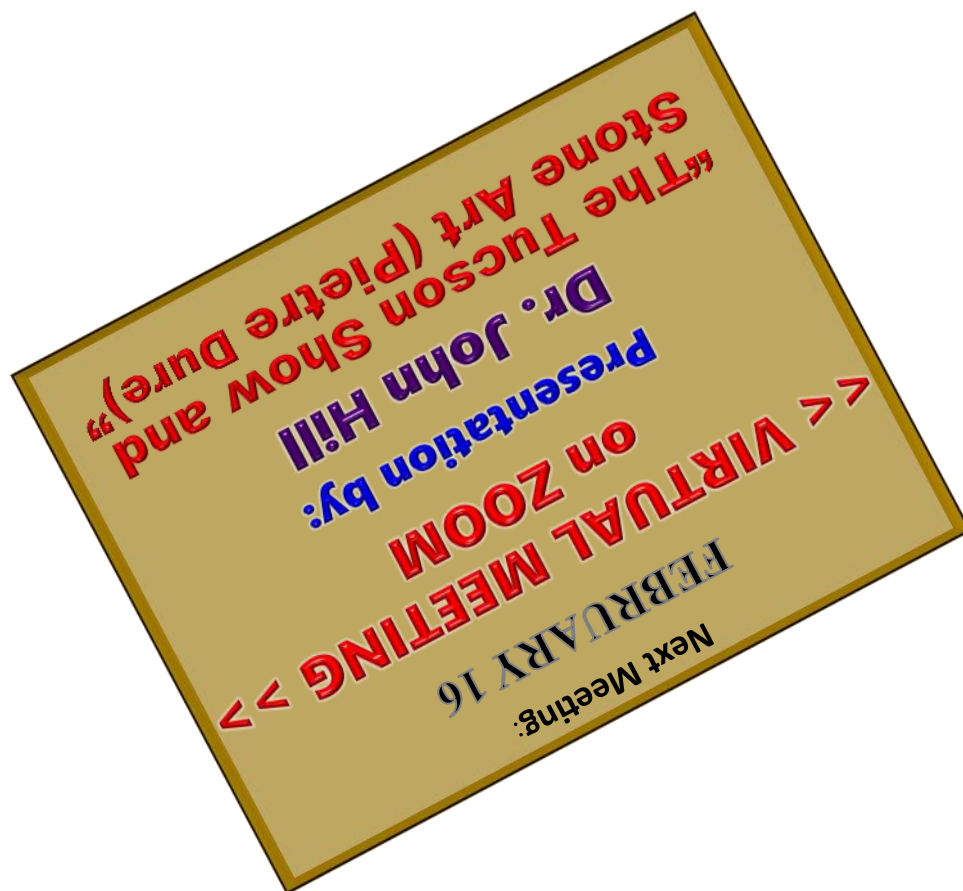
CEDAR VALLEY ROCKS & MINERAL SOCIETY

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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