Cedar Valley Gems

Cedar Valley Rocks & Minerals Society

Cedar Rapids, Iowa

cedarvalleyrockclub.org

CEDAR VALLEY GEMS DECEMBER 2021 VOL. 48, ISSUE 12

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

Next CVRMS Meeting

Tuesday Dec. 14

Hiawatha Community Center

101 Emmons St., Hiawatha - 7:15 pm

featured video

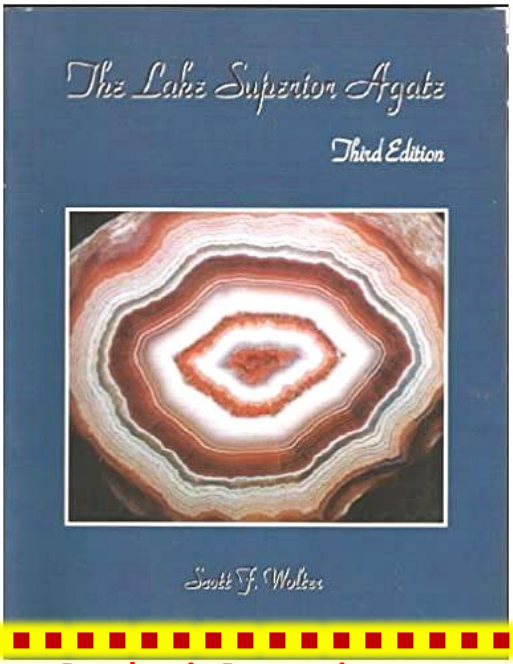
presentation by Scott Wolter

"The Lake Superior Agate"

from the 2008 Symposium

The Wonderful World of Agates

held in Wisconsin.



—-Pandemic Precautions —-

to attend we recommend that you *BE VACCINATED*

in the building you *MUST BE MASKED*

and *PRACTICE SOCIAL DISTANCING*

If you have a cough or cold STAY HOME

Information for CVRMS Members

Please Pay Your Dues $15 per Family

Please pay at our monthly meeting or mail check to:

Dale Stout, Treasurer
2237 Meadowbrook Dr. S.E.
Cedar Rapids, IA 52403

CVRMS Holiday Donations

At our December 14 meeting we will continue our tradition of collecting donations for the

Linn County Food Bank

and **HACAP**

If you can't make the meeting and wish to donate, please write a check to your **charity of choice** or to the **CVRMS** and mail it to **Dale Stout** (address above) or donate by credit card via ***Square*** at

https://square.link/u/8a1vu3bo

or by scanning the **QR code** at the left.

Please make your contribution by December 14

CVRMS Annual Meeting Nov. 16 — Minutes —

Hiawatha Community Center
Called by President Marv Houg at 7:20
at Hiawatha Community Center

GUESTS INTRODUCED: included new members. Judy Hartman, Jay Hartman, Carolyn Hussein, Mary Ebert, Dennis ?, Cody Long (secretaries apologies if names missed or misspelled). Welcome to all.

MINUTES FROM THE PREVIOUS MEETING: reviewed as published in the newsletter. Motion to approve by Dolores; 2nd by Kim. Approved as published.

TREASURER'S REPORT: A handout with rock show proceeds and expenses reviewed and explained. A total of 2,511 admissions with 710 children. Overall agreement that it was a good attendance given the new dates and time of year. An overall profit of approximately $8,337.29. Some expenses may still be outstanding. These proceeds go to our scholarship programs. **Checking account balance** $18,299.89. Motion to approve treasurer's report by Tom; 2nd by AJ. Motion approved.

PROGRAM: Bill Desmarais gave a slide presentation of his summer trip to Mt. Belford in Colorado. Interesting info. There are 58 peaks in Colorado over 14,000 ft. My. Belford is one of them at 14,197. Lots of info on beautiful wild flowers and thanks to the photographers. Enjoyable presentation.

BUSINESS MEETING: Motion made by Julie, 2nd by Ray, to have our annual show on March 26-27, 2022, unanimously approved. Motion made by AJ, second by Bill, that the theme of the upcoming show be "***Iowa's Industrial Minerals"***. Motion approved.

ELECTION OF OFFICERS: The nominations committee suggested retention of current board (*Pres*. Marv Houg, *Vice Pres.* Ray Anderson, *Treasurer* Dale Stout, *Secretary* Dell James, *Editor* Ray Anderson, *Liaison* Kim Kleckner, and *Webmaster* Sharon Sonnleitner) and re-election of out-going *board member* Bill Desmarais thru 2024. Toby Jordan resigned as *board member* and Matt Burns agreed to complete his term (thru 2022). Bill moved to close nominations, second by Tom. Approved. AJ made a motion to approve the slate as presented by the nominating committee. Second by Ray. Motion approved.

SEASONAL PARTY: There will be no party this year. COVID is still a threat. Instead, a regular meeting will be held.

COMMENTS ABOUT ROCK SHOW: Vendors seemed to be happy. A few incidents of shoplifting, which happens every show.

OLD BUSINESS: Agate Calendars are available for ordering. Let Dale know how many. He hopes to have them by the next meeting. **Staff shirts**, the bright green ones, are free to staff who help at the next show. Sharon has the info about these.

NEW BUSINESS: The Federation dues and insurance are coming due soon. **Correspondence**, A thank you note from the Kalona Prairie Heights 4th grade to Bill Desmarais for his presentation to 65 kids and parents. **Door prize** Won by Cody, who selected a geode.

MOTION TO ADJOURN: by AJ; 2nd by Tom. Motion approved. 9:28 meeting adjourned. Respectfully submitted.

Respectfully submitted,
Dell James, secretary

CVRMS Board Minutes Nov. 23

BOARD MEMBERS PRESENT: Marv Houg, Dale Stout, Ray Anderson, Bill Desmarais, Jay Vavra, Kim Kleckner, Sharon Sonnleitner, Dell James, Matt Burns

7:05 MEETING CALLED TO ORDER by Marv Houg at his house.

WELCOME TO MATT BURNS who is a new board member.

MINUTES OF THE PREVIOUS MEETING reviewed as published. Motion to approve by Bill; 2nd by Jay. Minutes approved.

TREASURER'S REPORT A completed report with show proceeds not yet completed. **A couple of c.d.s** became due. Dale combined them in one with a higher interest rate. **Paid Hawkeye Downs** for this year's show. **Scholarships** need to be paid with shows proceeds. We need to figure out the amounts to be awarded. **Domain name** $500 for 3 years is due. Jay will look into GoDaddy for a cheaper rate. Motion made by Ray, 2nd by Bill, for Jay to report findings. Motion passed.

ROCK AND GEM MAGAZINE has changed for club memberships and is no longer a good deal.

2021 SHOW COMMENTS: Kim and Kim will do **silent auction** next show. AJ expressed his decision not to do it anymore. Suggestions from Kim to watch for a magnifier with light and mirror. Sharon said we need a new black light. Rick Austen will take a look and see if we can make it automatic. **Suggestion by Dell** for a make-and-take-it for kids type program. Maybe bead stringing or something similar. Kim suggested rock painting. Matt said is **grandkids loving digging** in sand for rocks, fossils, whatever. **Raffle** still having some issues figuring amount earned. Some **dealer contracts** have already been signed for next show. **Student participation** from colleges U of IA and Cornell needs clarification of their roles. Ray will talk to Cornell and Iowa. A few **vendors not coming back** because of retirement. Suggestion that **AJ might enjoy** demonstrating lapidary skills. Also identifying rocks for people. **Iowa's Industrial Minerals** is the theme of next show. Ray will talk to Limestone Producers.

AUCTION OCTOBER 8 AND 9, 2022: General discussions involving our primary reason for having the auctions and need to get away from the commercial aspects. More to follow.

OLD BUSINESS: By-Laws as reviewed by Jay and Sharon with corrections noted. Dale made a motion to accept as rewritten. 2nd by Bill. Motion passed. By-laws will be published in newsletter and taken to general membership for approval.

STATUS OF 501C3. Need financial records for 5 years

NEW BUSINESS: Marv raised questions about the **need for officers insurance**, He will look into it. **Scholarship**s will need to be tabled until next month's board meeting. **Newsletter** will remind us that our Christmas donations will be collected. Bring your check books or cash. A hat will be passed. **Some suggestions** about making the Christmas meeting more fun.

MOTION TO ADJOURN by Bill, 2nd by Ray.
Meeting adjourned 9 p.m.

Respectfully submitted,
Dell James, Secretary

Thank You to the CVRMS Volunteers Who Helped to Make Our 2021 Rock Show a Success

AJ Johnson
Amber (Whitlatch) Baty
Andie Carter
Becky Johnson
Bill Desmarais
Bill Sonnleitner
Carey Dixon
Cody (Kincaid) Long
Colton Desmarais
Dale Stout
Dave Malm
Dell James
Dennis Kossow
Dennis Schlicht
Dolores Slade
Ginger (Schlicht)
Glen Rocca
Jack Gilmore
Jackie Patterson
Jan Johnson
Jeff Groff
JJ Buchholz
Joel Smith
John Franklin
Judy Franklin
Julie Whitlatch
Karen Desmarais
Katie (Long) Hurst
Kim Hanna
Kim Kleckner
Kim Long
Laura Eilers
Laurie Kell
Lisa Blunt
Matt Burns
Marv Houg
Mary Rocca
Michelle Johnson
Naomi Fletcher
Peter Loughner
Ray Anderson
Rick Austin
Sean Kincaid
Sharon Sonnleitner
Tammy Kincaid
Tom Whitlatch

Spotlight Gemstones: Zircon, Tanzanite, Turquoise

December's Birth Stones

If you were born in December you may choose from 3 birthstones, zircon, tanzanite, turquoise

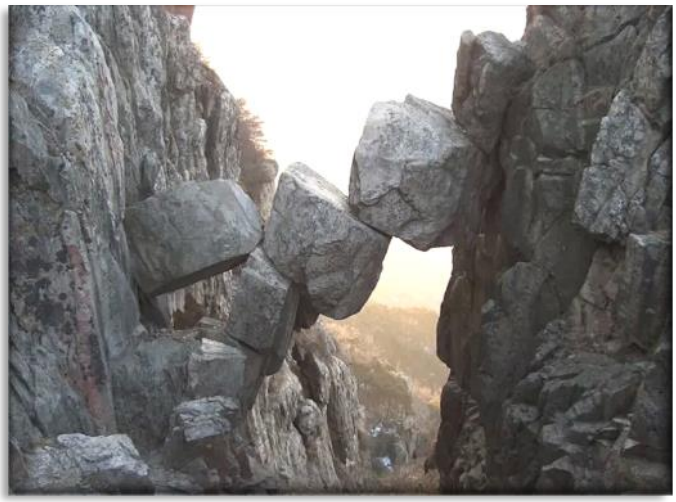
Zircon is a mineral belonging to the group of nesosilicates. Its chemical name is zirconium silicate and its corresponding chemical formula is $ZrSiO_4$. A common empirical formula showing some of the range of substitution in zircon is $(Zr_{1-y}, REE_y)(SiO_4)_{1-x}(OH)_{4x-y}$. Zircon forms in silicate melts with large proportions of high field strength incompatible elements. The crystal structure of zircon is tetragonal crystal system. The natural color of zircon varies between colorless, yellow-golden, red, brown, blue, and green. Colorless specimens that show gem quality are a popular substitute for diamond and are also known as "*Matura diamond*".

Tanzanite is the blue/violet variety of the mineral zoisite (a calcium aluminium hydroxyl Sorosilicate—$Ca_2Al_3(SiO_4)_3(OH)$) belonging to the epidote group. It was discovered in Northern Tanzania in 1967, near the city of Arusha and Mount Kilimanjaro. Tanzanite is used as a relatively cheap gemstone, where it can substitute for the far more expensive sapphire after undergoing artificial heat treatment to form a deep blue coloration. Naturally formed tanzanite is extremely rare and is endemic only to the Mererani Hills. Tanzanite is noted for its remarkably strong trichroism, appearing alternately sapphire blue, violet and burgundy depending on crystal orientation. Tanzanite can also appear differently when viewed under alternate lighting conditions. The blues appear more evident when subjected to fluorescent light and the violet hues can be seen readily when viewed under incandescent illumination. Tanzanite is usually a reddish brown in its rough state, requiring heat treatment to bring out the blue violet of the stone.

Turquoise is an opaque, blue-to-green mineral that is a hydrated phosphate of copper and aluminium, with the chemical formula $CuAl_6(PO_4)_4(OH)_8{\cdot}4H_2O$. It is rare and valuable in finer grades and has been prized as a gem and ornamental stone for thousands of years owing to its unique hue. The substance has been known by many names, but the word *turquoise* dates to the 17th century and is derived from the French *turques* for "Turks" because the mineral was first brought to Europe from Turkey, from mines in the historical Khorasan Province of Persia. Pliny the Elder referred to the mineral as *callais* and the Aztecs knew it as *chalchihuitl*.

• • *information from Wikipedia*

What in the World?



What in the World? Is this amazing natural rock formation and where is it??

November's Photo

November's ***What in the World?*** photo showed a specimen of **Fordite**, also known as ***Detroit agate*** or ***Motor City agate***. It is old automotive paint which has hardened sufficiently to be cut and polished. It was formed from the buildup of layers of enamel paint slag on tracks and skids on which cars were hand spray-painted (a now automated process), which have been baked numerous times. In recent times the material has been recycled into jewelry.

ROCK CALENDAR
CVRMS EVENTS OF INTEREST

2021

Dec. 14 — CVRMS Monthly Meeting
Hiawatha Community Center 7:15 pm
2021 HOLIDAY PARTY is CANCELLED
But we will still be holding our meeting,
the featured video
"The Lake Superior Agate" by Scott Wolter
see page 1 for more information

Dell says to *"wear your ugliest seasonal sweater"*

CEDAR VALLEY ROCKS & MINERALS SOCIETY

bring some *cookies, candy, fudge, or other light treats*

2022

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

Feb. 15 — CVRMS Monthly Meeting
Hiawatha Community Center 7:15 pm
Program to be determined

Mar. 15 — CVRMS Monthly Meeting
Hiawatha Community Center 7:15 pm
Cornell College Students

Mar. 26-27 — CVRMS Rks, Fos, & Min Show
Hawkeye Downs
Cedar Rapids, Iowa
"Iowa's Industrial Minerals"

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.

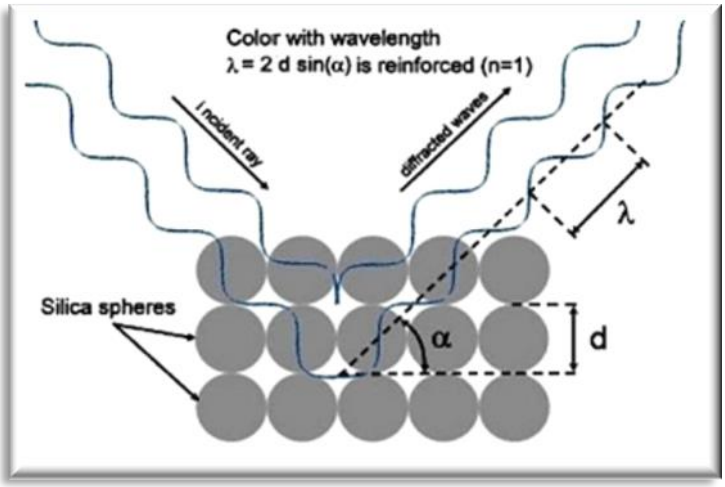
Among last month's Rock Show dealers was Ron Wooly with ***Dreaming Down Under***, selling an amazing selection of opals. It got me thinking about **How Opals Get their Color**.

Opal hues can range across the spectrum. An opal might display a single color, two or three colors, or all the colors of the rainbow. **Precious Opal** exhibits the phenomenon known as *play of color*, which is produced by the diffraction of white light through a micro-structure with an ordered arrayed silica spheres. The internal structure of precious opal makes light diffract; and depending on the conditions in which it formed, it can produce many colors.

The variety of natural opal is determined by the two characteristics, body tone and transparency.

- **Body Tone** - The base tones of light, dark, and black opals range from colorless, white, through shades of grey, to black.
- **Transparency** - Opal of any body color will be opaque, translucent, or transparent. When it is transparent or very translucent, and the color clarity is sharp, it is often referred to as crystal opal.

The Structure of Opals. Basically, opal is made up of water and silica (the main component in glass). A silica solution that forms when silica mixes with water, cam fills voids or become trapped in layers under ground. Over a long period of time, the water evaporates, allowing the gradual formation of layer upon layer of microscopic silica spheres. The spheres are formed because particles of silica spontaneously adhere to other particles which form around it. These spheres range in diameter from 1500 to 3500 angstroms (1 angstrom is 1 ten millionth of 1 millimeter). When white light waves enter the top of an opal, they refract and bounce around inside the opal, through all the microscopic spheres and the gaps between the spheres. As the light passes through the spheres and gaps, it diffracts (splits). Like a prism, the opal splits the white light into all the colors of the spectrum, and the light eventually bounces back out the top of the stone, at which point we get an eyeful of beautiful opal colors. The opal is the only known gemstone that is able to naturally diffract light in this way. You may have noticed that some opals don't have all the colors of the spectrum. Many opals can only display blue coloring, for example. This is because the diameter and spacing of the spheres controls the color range of an opal. Getting back to our color diffraction theory, the size and angle at which light is split determines the color produced. **Small spheres** (about 1500 angstroms in diameter) produce opal of **blue color only** (the most common), whereas **larger spheres** (about 3500 angstroms diameter) produce **orange to red** (the rarest color). Between these sizes the rest of the colors of the rainbow occur. Therefore the rarity of the colors (most common to least common) is as follows: blue, green, yellow, orange, and red.



Bragg angle (ά) adapted to the silica sphere structure of precious opal produces a play-of-color

Opals which display red can also display all the other colors of the spectrum. Therefore the possible combinations of colors in an opal can be seen as: blue only, blue-green, blue-green-yellow, blue-green-yellow-orange, and finally the full spectrum of blue-green-yellow-orange-red. For this reason, the presence of red in an opal can greatly add to its value, since it is somewhat of a rarity. Opals can also contain aqua and purple as well as the other 'non-primary' colors which are produced when two primary colors are combined. (For example, the green and orange between the primary colors of blue, yellow, and red). https://www.geologyin.com/2017/12/how-does-opal-get-its-color.html

Baby Bird Fossil Is 'Rarest of the Rare'

The chick lived **127 million years ago** and belonged to a group of primitive birds that shared the planet with the dinosaurs. Fossils of birds from this time period are rare, with baby fossils seen as "*the rarest of the rare.*" The tiny fossil of a prehistoric baby bird is helping scientists understand how early avians came into the world in the *Age of Dinosaurs*. The fossil, which dates back to the **Mesozoic Era (250-65 million years ago)**, is a chick from a group of prehistoric birds called Enantiornithes. Made up of a nearly complete skeleton, the specimen is amongst the smallest known Mesozoic avian fossils ever discovered. It measures less than five centimeters, smaller than the little finger on an average human hand, and would have weighed just three ounces when it was alive. What makes this fossil so important and unique is the fact it died not long after its birth. This is a critical stage in a bird's skeletal formation. That means this bird's extremely short life has given researchers a rare chance to analyze the species' bone structure and development. Studying and analyzing ossification (the process of bone development) can explain a lot about a young bird's life, the researchers say. It can help them understand everything from whether it could fly or if it needed to stay with its parents after hatching or could survive on its own. The researchers explained that the evolutionary diversification of birds has resulted in a wide range of hatchling developmental strategies and important differences in their growth rates. By analyzing bone development we can look at a whole host of evolutionary traits. With the fossil being so small the team used synchrotron radiation to picture the tiny specimen at a *'submicron'* level, observing the bones' microstructures in extreme detail. The new technologies are offering palaeontologists unprecedented capacities to investigate provocative fossils. Here they made the most of state-of-the-art facilities worldwide including three different synchrotrons in France, the UK and the United States. The researchers found the baby bird's sternum (breastplate bone) was still largely made of cartilage and had not yet developed into hard, solid bone when it died, meaning it wouldn't have been able to fly. The patterns of ossification observed in this and the other few very young enantiornithine birds known to date also suggest that the developmental strategies of this particular group of ancient avians may have been more diverse than previously thought. However, the lack of bone development doesn't necessarily mean the hatchling was over reliant on its parents for care and feeding, a trait known as being *"altricial."* Luis Chiappe, from the LA Museum of Natural History and study's co-author added: "This new discovery, together with others from around the world, allows us to peek into the world of ancient birds that lived during the age of dinosaurs. It is amazing to realise how many of the features we see among living birds had already been developed more than 100 million years ago." https://www.geologyin.com/2021/11/baby-bird-fossil-is-rarest-of-rare.html

Artist's painting of the baby bird (silhouette compared to cricket for scale).

Septarian Concretions

A **concretion** is a hard, compact mass of matter formed by the precipitation of mineral cement within the spaces between particles, and is found in sedimentary rock or soil. **Septarian concretions** are concretions containing angular cavities or cracks, called *"septaria."* The **septaria** are the calcite filled cracks at the center of the rock, indicating where the centers of the concretions have shrunk, possibly during dehydration during its long transformative journey. Cracks are highly variable in shape and volume, as well as the degree of shrinkage they indicate. Although it has commonly been assumed that concretions grew incrementally from the inside outwards, the fact that radially oriented cracks taper towards the margins of septarian concretions is taken as evidence that in these cases the periphery was stiffer while the inside was softer, presumably due to a gradient in the amount of cement precipitated. The process that created the *septaria* that characterize *septarian concretions* remains unclear. A number of mechanisms have been proposed, including the dehydration of clay-rich, gel-rich, or organic-rich cores; shrinkage of the concretion's center; expansion of gases produced by the decay of organic matter; or brittle fracturing or shrinkage of the concretion interior by either earthquakes or compaction. Septaria usually contain crystals, often calcite, that precipitated from circulating solutions. Siderite or pyrite coatings are also occasionally observed on the wall of the cavities present in the septaria, giving rise respectively to a panoply of bright reddish and golden colors. A spectacular example of septarian concretions, which are as much as 10 feet in diameter, are the **Moeraki Boulders.** These concretions are found eroding out of Paleocene mudstone of the *Moeraki Formation* exposed along the coast near Moeraki, South Island, New Zealand. They are composed of calcite-cemented mud with septarian veins of calcite and rare late-stage quartz and ferrous dolomite. https://www.geologyin.com/2017/12/what-is-septarian-concretion.html

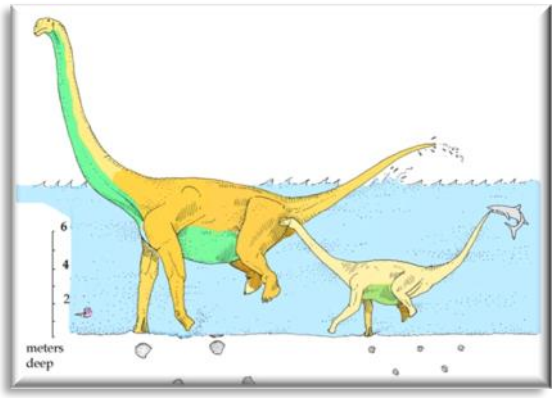
cut and polished septarian concretion

Weird Tracks in Texas Indicate Giant Sauropods Walking on Their Front Feet Only

They were the largest animals to ever walk the Earth: sauropods, a dinosaur clade of such immense size and stature, they're sometimes dubbed *"thunder lizards."* These towering hulks (including *Brontosaurus*, *Brachiosaurus*, and *Diplodocus* among others) needed four thick, powerful legs to support and transport their massive bodies. At least, most of the time. ***Perhaps***. Some mysterious, ancient tracks described in a 2019 study could offer fresh support for a disputed view in paleontology: that these lumbering giants sometimes got around on two legs, not four, belying what their quadruped status (and simple physics) would seem to demand. As strange as it might sound, this hypothesis dates back several decades, to when fossil researcher Roland T. Bird identified some unusual dinosaur tracks laid down on ranch grounds in the county of Bandera, Texas. What made the tracks unusual was that the marks were manus only, referring to footprint impressions made by front limbs, not the rear limbs (known as ***pes***). "*Without a doubt made by a sauropod, but as I interpret them, made by an individual while swimming*," Bird wrote in a letter in 1940. "*They were all typical forefeet impressions as if the animal had just been barely kicking bottom.*"

Sauropod footprints at the Coffee Hollow A-Male trackways.

With time, Bird's interpretation of these manus-only tracks fell out of favor, as modern paleontology came to realize that sauropods were primarily land animals, not aquatic as was once thought. The alternative view to explain manus-only tracks like this is that the forefeet of sauropods (supporting more of the animals' body weight) are all that leaves track marks on certain kinds of ground surfaces, as the rear limbs, supporting less weight, leave less impression on soil and sediment. While that might now be the generally preferred interpretation of manus-only sauropod tracks, the case for dinosaurs treading through shallow, shoulder-height bodies of water on their front limbs (with their rear limbs not reaching the ground) has never been definitively ruled out. A series of sauropod tracks in Texas gave paleontologists a chance to reconsider the merits of the arguments. The marks were first identified in 2007 in a limestone quarry called the Coffee Hollow, which makes up part of the Glen Rose Formation, a geological site that preserves numerous dinosaur footprints dating back approximately 110 million years ago (within the Cretaceous period). Three different trails of parallel, manus-only sauropod trackways were investigated at the site by teams from Purdue University Fort Wayne and the Houston Museum of Natural Sciences, with several dozen individual footprints being preserved for study (before the surface layers were removed for commercial purposes). While we don't know for sure what kind of sauropods left these manus-only marks, the researchers highlighted the possibility that it could be a different kind of dinosaur to those responsible for other manus-only footprints previously seen in the Glen Rose Formation. Given the size of the footprints (up to about 27.5 inches long and wide), it is likely the tracks belonged to larger kinds of sauropods, and the trackmarks look to be "true tracks" left on the upper surface, as opposed to undertracks (impressions made in lower layers of sediment). As for whether the marks support the idea of differential foot pressure or of "*unusual behavior*" (left by dinosaurs semi-swimming, or punting through shallow water), the researchers said it's impossible to be sure, but acknowledge what is perhaps more likely, given the weight of what other fossil evidence tends to suggest. *"Greater differential pressure exerted on the substrate by the forefeet than the hindfeet probably explains the Coffee Hollow trackways, like other manus-only sauropod trackways, but the possibility that they indicate unusual locomotion cannot at present be ruled out,"* the authors wrote in their paper. *"Although hypothesized unusual behavior would not necessarily involve 'swimming,' it is worth considering the possibility that R.T. Bird might have been correct in thinking that (at least some?) Glen Rose Formation manus-only sauropod trackways were made by dinosaurs that were wading in water deep enough for their makers to punt, pulling themselves along by their forefeet, while their hind legs floated above the bottom."* Ultimately, the team said future discoveries will be needed to settle the matter – which means the punting sauropod still has a chance to wade into reality. https://www.sciencealert.com/weird-tracks-in-texas-indicate-giant-sauropods-walking-on-their-front-feet-only



A whimsical exploration of the punting hypothesis

Meet "Cold Bone": The First Distinct Dinosaur Species Ever Found in Greenland

A pair of 214 million-year-old skulls are thought to belong to the first distinct dinosaur species identified in what is now Greenland, researchers say. Given the name *Issi saaneq* (or "**cold bone**" in Greenlandic Inuit), the dino is believed to have been a long-necked, plant-eating sauropodomorph. It's been reconstructed from two skulls discovered back in 1994, which were originally thought to belong to *Plateosaurus*. After a closer analysis of the skulls, one a juvenile, the other a late-stage juvenile or sub-adult, and a comparison with other more recent fossil findings, researchers have now decided that this is a species all of its own, an extra branch to add to the Late Triassic dinosaur family tree. *"The anatomy of the two skulls is unique in many respects, for example in the shape and proportions of the bones,"* says paleontologist Victor Beccari, from NOVA University Lisbon in Portugal. *"These specimens certainly belong to a new species."* Using a type of X-ray technique known as a Micro-Computed Tomography (micro-CT) scan, researchers were able to build 3D models of the skulls and pick out key differences from the *Plateosaurus* (including variations in the placement and shape of the jaw). While we don't know for sure how large *Issi saaneq* might have been, if the species was like other plateosaurids, it's possible it would have reached lengths up to almost 33 feet, a similar size to *Plateosaurus,* as well as the *Macrocollum* and the *Unaysaurus*: two related species found in modern-day Brazil, which are almost 15 million years older. When *Issi saaneq* was alive, the supercontinent Pangaea would have been starting to break apart, forming the Atlantic Ocean in the process. It's this shifting geography that means we now have dinosaur fossils spread out all across the world. "*At the time, the Earth was experiencing climate changes that enabled the first plant-eating dinosaurs to reach Europe and beyond,*" says sedimentologist Lars Clemmensen from the University of Copenhagen in Denmark. Something else that is of particular interest about this discovery is that the sauropodomorphs were the predecessors to the sauropods, the largest animals to ever walk on the face of the Earth, so this is quite a key piece of the evolutionary jigsaw. While there's plenty of evidence for the *Plateosaurus* living in what is now Germany, France, and Switzerland, only a few dinosaurs from this species have been dug up and documented in modern-day Greenland. Now there's evidence of a distinct Greenlandic dinosaur species all of its own. We can add it to the growing list of new dinosaur species that are being discovered and documented with each passing year. https://www.sciencealert.com/214-million-year-old-skull-discoveries-point-to-the-first-dinosaur-on-greenland

Living reconstruction of Issi saaneq.

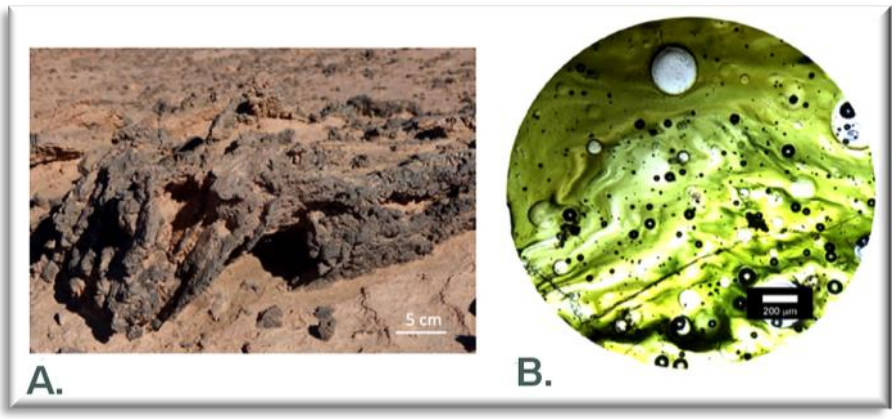
'Kryptonite' Discovered in Mine

Kryptonite is no longer just the stuff of fiction feared by caped superheroes. A new mineral matching its unique chemistry (as described in the film **Superman Returns**) has been identified in a mine in Serbia. According to movie and comic-book storylines, kryptonite is supposed to sap Superman's powers whenever he is exposed to its large green crystals. The real mineral is white and harmless, says Dr Chris Stanley, a mineralogist at London's Natural History Museum. "*I'm afraid it's not green and it doesn't glow either - although it will react to ultraviolet light by fluorescing a pinkish-orange,*" he said. Researchers from mining group Rio Tinto discovered the unusual mineral and enlisted the help of Dr Stanley when they could not match it with anything known to science. Once the London expert had unraveled the mineral's chemical make-up, he was shocked to discover this formula was already referenced in the literature - albeit literary fiction. *"Towards the end of my research I searched the web using the mineral's chemical formula,* ***sodium lithium boron silicate hydroxide,*** *and was amazed to discover that same scientific name, written on a case of rock containing kryptonite stolen by Lex Luthor from a museum in the film Superman Returns. The new mineral does not contain fluorine (which it does in the film) and is white rather than green but, in all other respects, the chemistry matches that for the rock containing kryptonite."* The mineral is relatively hard but is very small grained. Each individual crystal is less than five microns (millionths of a meter) across. Identifying its atomic structure required sophisticated analytical facilities at Canada's National Research Council. *"Being able to analyze all the properties of a mineral, both chemical and physical, brings us closer to confirming that it is indeed unique"* explained Dr Le Page. Finding out that the chemical composition of a material was an exact match to an invented formula for the fictitious kryptonite "*was the coincidence of a lifetime*," he added. The mineral cannot be called kryptonite under international nomenclature rules because it has nothing to do with krypton, a real element in the Periodic Table that takes the form of a gas. Instead, it was formally named **jadarite** when it was recently described in the *European Journal of Mineralogy*. Jadar is the name of the place where the Serbian mine is located. Dr Stanley said that if deposits occurred in sufficient quantity it could have some commercial value. It contains boron and lithium, two valuable elements with many applications, he explained. *"Borosilicate glasses are used to encapsulate processed radioactive waste, and lithium is used in batteries and in the pharmaceutical industry."* https://www.geologyin.com/2014/11/kryptonite-discovered-in-mine.html

The fictional mineral Kryptonite

Mysterious Glass in the Atacama Desert May Be From an Ancient Exploding Comet

Mysterious bits of twisted glass strewn across Chile's Atacama Desert may have originated from a large comet that exploded in Earth's atmosphere around 12,000 years ago, according to a new study. The ancient explosion, which may have been multiple back-to-back explosions, would have produced intense winds as strong as tornadoes and scorching heat that burned the desert sand, transforming it into silicate glass, or a solid that contains silicon and oxygen in a particular structure. Though researchers first discovered these glass deposits around a decade ago, their origins had remained a mystery. The silicon glasses, some dark green and some black, are found in concentrated patches across a 47-mile-long corridor in the Atacama Desert, according to a statement from Brown University. The individual glasses are "*twisted and folded* " and have been found to stretch up to 20 inches across (slightly larger than a pizza box). The researchers who first discovered the glasses hypothesized that they came from a bolide, or fireballs that explode in the atmosphere; but another group later concluded that the glasses were the result of intense grass fires, according to the new study. At the time, the area wasn't a desert, it had sandy soil, but also trees and grass, according to the statement. To figure out the culprit, researchers from the U.S. and Chile conducted a chemical analysis of dozens of glass samples found in that desert. Inside the glass, the researchers found minerals called zircons, some of which had decomposed into **baddeleyite**, a rare zirconium oxide mineral, according to the statement. That transition from zircon to baddeleyite typically occurs at temperatures higher than 3,040 degrees Fahrenheit, much hotter than the temperature that grass fires would have reached, according to the statement.



(A.) Example of la arge glass slab at Chipana (Chile) that folded over during emplacement.**(B.)** Thin-section view of folded glass from Puquio de Núñez showing typical green color, vesicles, and schlieren.

The researchers also discovered minerals in the glasses that have previously been found only in meteorites and other rocks originating in space; some of the minerals, such as **cubanite** and **troilite**, were similar to the minerals discovered in samples from a comet called Wild 2 collected by NASA's Stardust mission. What's more, the odd, twisted shapes of the glasses also point to the intense heat and winds that would be produced by such a comet explosion. The researchers concluded that these glasses are likely the result of a comet similar to Wild 2. *"This is the first time we have clear evidence of glasses on Earth that were created by the thermal radiation and winds from a fireball exploding just above the surface,"* lead author Pete Schultz, a professor emeritus at Brown University's Department of Earth, Environmental and Planetary Sciences, said in the statement. *"To have such a dramatic effect on such a large area, this was a truly massive explosion. Lots of us have seen bolide fireballs streaking across the sky, but those are tiny blips compared to this."* The researchers estimated that the explosion occurred around 12,000 years ago, but they hope that further studies will help to pinpoint the date and size of the comet with more precision. *"It's too soon to say if there was a causal connection or not, but what we can say is that this event did happen around the same time as when we think the megafauna disappeared, which is intriguing,"* Schultz said. *"There's also a chance that this was actually witnessed by early inhabitants, who had just arrived in the region. It would have been quite a show."*

https://www.livescience.com/glassy-rock-chile-atacama-desert-ancient-comet

A 100,000-Year-Old Mammoth Tusk Has Been Discovered Off The Coast of California

To the untrained eye, it may have looked like a giant wood log. In reality, scientists had spotted something unusual off the California coast two years ago: a 3-foot long mammoth tusk. A research team at the Monterey Bay Aquarium Research Institute discovered the tusk in 2019 while exploring an underwater mountain roughly 10,000 feet below the ocean's surface. Though other mammoth fossils had been plucked from the ocean before, it's rare for such objects to nestle along the deep seafloor. Scientists ultimately determined that the tusk belonged to a young female Columbian mammoth, possibly one that lived during the Lower Paleolithic era, which spanned 2.7 million to 200,000 years ago. Researchers are still working to determine the creature's precise age, along with more details about its life, including its diet and how often it reproduced. *"This is an 'Indiana Jones' mixed with 'Jurassic Park' moment,"* according to Katie Moon, a postdoctoral researcher at the University of California, Santa Cruz. The discovery could ultimately signal the presence of other ancient animal fossils hidden in the deep sea. Monterey Bay scientists hadn't intended to encounter a mammoth tusk in 2019. At the time, the research team was roving the ocean with remotely operated vehicles in search of deep-sea species. "*You start to 'expect the unexpected' when exploring the deep sea, but I'm still stunned that we came upon the ancient tusk of a mammoth,*" said Steven Haddock, senior scientist at the Monterey Bay Aquarium Research Institute. On a hunch, the scientists decided to retrieve the tusk from the ocean floor, and the team visited the site in July to grab the artifact. They attached soft materials like sponges to the remotely operated vehicle then gingerly lifted the tusk using the vehicle's robotic arms. The full tusk gave scientists a sample of mammoth DNA, which they used to determine its species. Scientists believe the Columbian mammoth was one of the largest creatures of its kind. It probably used its tusks to protect itself and forage for food when it roamed North America up to 10,000 years ago. Scientists are now analyzing the tusk to pinpoint how long ago the mammoth lived. So far, results suggests the mammoth tusk is much more than 100,000 years old. Scientists believe the ocean is responsible for keeping the artifact in such pristine condition. Deep-sea temperatures are just above freezing which slows down the rate of fossil decay. Fossils also have a better chance of surviving in the deep sea's high-pressure environment. https://www.sciencealert.com/ocean-has-pristinely-preserved-a-100-000-year-old-massive-mammoth-tusk

Scientists Figure Out What Happens to the Earth's Disappearing Crust

Like a giant broken-up cookie whose pieces float atop a sea of scalding milk, Earth's outer shell is made of (less-tasty) rocky rafts that constantly bump into and dive beneath each other in a process called plate tectonics. So what happens to those hunks of disappearing crust as they dive into Earth's milky interior? It turns out that they get weak and bendy, like a slinky snake toy, but they don't disintegrate completely, new modeling shows. The models also suggested that plate tectonics, at least in its modern form, likely only got going in the past billion years. Plate tectonics drives earthquakes and volcanoes, creates mountain ranges and islands, and is the reason Earth's continents, once supercontinents, are now oceans apart. But there's still much unknown about how plate tectonics works, such as what happens when a plate slides beneath another (in an area called a subduction zone) and disappears into the mantle, the middle layer of the planet, which is, sizzling solid rock. To figure this out, the researchers used 2D computer models of subduction zones and programmed them using known physics of how materials behave, such as how rocks deform under certain forces. Then, they observed the model to see what happened at the subduction zone and compared their findings to real-life observations. Their models suggested that as one plate dove beneath another, the descending piece, known as a slab, abruptly bent downward and cracked; the bending also caused the grains on the underside of the plate to become finer and weaker. The pressures left the plate mostly intact but with many weak points. That means that the plates don't break apart and thus keep pulling on the parts behind them, for a very long time. Indeed, the plate can keep sliding under the other plate for hundreds of millions of years, he said. Their simulations matched observations and deep seismic imaging that showed weakened areas of a subduction zone in Japan. Reviewers called their models "*robust and meaningful*." The team also modeled what would have happened if Earth's interior were 270 degrees Fahrenheit hotter, similar to temperatures it would have reached about a billion years ago. They found that in these simulations, the slab broke up only a few miles into the mantle, because it was unable to sustain its own weight in a mantle that was less viscous due to the hot conditions. So, unlike modern subduction that can continue for hundreds of millions of years, subduction back then would have ended very quickly, within a few million years. This finding suggests that modern plate tectonics may not have begun until sometime in the past billion years, he added. While a primitive form of plate tectonics may have existed between 3.5 billion and 2 billion years ago, during the Archean or Proterozoic eras, it was probably very different from what the planet experiences today, Gerya said. And around 1.8 billion to 1 billion years ago, they speculated, there was a quiet period in which the plates were much less active. But "plate tectonics in some form has been with us since at least 2 billion years ago. The researchers now hope to explore the phenomenon and its relation to earthquakes, using more advanced 3D models. https://www.livescience.com/what-happens-sinking-tectonic-plates

How Do Trapiche Emeralds (the Superstars of Trapiche Gemstones) Form?

Trapiche minerals are characterized by crystallographically equivalent growth sectors that are separated by more or less sharp boundaries of inclusions. A rare type of emerald known as a **Trapiche Emerald** is occasionally found in the mines of Colombia. A trapiche emerald exhibits a **"star"** pattern; it has raylike spokes of dark carbon impurities that give the emerald a six-pointed radial pattern. It is one of several types of trapiche or trapiche-like minerals, which also include *trapiche ruby, sapphire, garnet, chiastolite and tourmaline*. The name comes from the Spanish term trapiche, **a sugar mill**, because of the resemblance of the pattern to the spokes of a grinding wheel. Trapiche emeralds were first described by Émile Bertrand in 1879. They are generally found only (and rarely) in the western part of the Eastern Cordillera basin, in the Muzo, Coscuez and Peñas Blancas mines of Colombia. Singular finds in Brazil and Madagascar have also been reported. Despite its starlike appearance, this unique "spoked" pattern isn't a case of asterism. However, trapiche emeralds may reveal **chatoyancy**, a *"cat's eye"* effect. Parallel growth tube inclusions can create a cat's eye in the "*pie-shaped*" sections as well as, rarely, along the length of whole cabbed trapiche emeralds. Expert lapidaries can orient and cut these stones to bring out this effect. Emerald is a gem variety of beryl, a cyclosilicate with the ideal formula $Be_3Al_2Si_6O_{18}$. Its structure is characterized by six-membered rings of silica tetrahedra lying in planes parallel to (0001). During the formation of an emerald crystal, black carbon impurities may enter the gemstone mix. Because of emerald's hexagonal crystal structure, these impurities may fill in at the crystal junctions, forming a six-point radial pattern. In some trapiche emeralds, inclusions of albite, quartz, carbonaceous materials, or lutite may outline the hexagonal emerald core. From there, they extend in spokes that divide the surrounding emerald material into six trapezoidal sectors. The emeralds showed dark, fibrous inclusions between the prismatic edges, starting from the middle of the crystal and enlarging toward the prism's corners. The inclusions, which seemed to be emphasized by corrosion, were composed of quartz, muscovite, carbonates, pyrite, and a dark carbonaceous matter (probably with an organic or bituminous origin), sometimes with biotite and kaolin. The core of the emeralds had the shape of two opposite hexagonal pyramids with their vertices located in the middle of the crystal. Sometimes these pyramids were so unevenly developed that the core resembled a column. The core was richer in inclusions, some of them more darkish to black, than the rest of the crystal. The evidence indicates that growth began with the clear, tapered, central beryl prism in a normal fashion. After a transition stage which produced the albite-containing outline of the central core, growth of the outer sectored region is interpreted as the basis of a eutectic type growth with both beryl and albite growing simultaneously. The beryl grew parallel to the faces of the original prism and a two phase beryl-albite structure grew at the corners. In the regions of clear beryl outside the central prism there are striations parallel to and perpendicular to the faces of the prisms. These markings indicate that the lateral faces of the trapiche emeralds grew with a plane interface. This plane interface moved out parallel to the original faces of the prism. The growth markings indicate clearly that the two-phase growth at the corners did not precede the single phase beryl growth of the flat faces but that the two occurred simultaneously. During two-phase growth the two phases usually, but not always, originate from a single pair of nuclei. In the case where a crystal of one of the phases was pre-existing, one would expect, as indeed happened in this case, that the growth of the beryl phase maintains the orientation of the original crystal. This kind of structure commonly occurs in metal eutectic systems where it has been studied extensively. One of the phases of the eutetic will grow from a single crystal of that material. The other phase forms either from a single nucleus which subdivides extensively or from many nuclei, and grows in an intimately mixed fashion with the starting phase. Thus the observation that all of the beryl present in a single trapiche emerald has the same orientation can be readily accounted for in terms of the eutectic growth. Multiple nucleation of the ablite probably occurred since it does not appear to be all one single crystal. One of the problems in the morphology of these emeralds is to understand why the two-phase growth occurred at the corners of the prism. During the growth of a polyhedron, the corners and edges are in a more favorable position for diffusion than the centers of the faces. The concentration of rejected species should therefore be highest near the center of the faces. This effect leads to the well-known hopper growth of crystals where the corners and edges of the crystal grow more rapidly, the centers of the faces becoming hollow and depressed. This diffusion effect also Leads to dendritic types of growth. In the present instance, however, the precipitation of the second phase occurred preferentially at the edges of the crystal. A similar phenomenon is observed, infrequently, in snow flakes. https://www.geologyin.com/ 2017/12/how-does-trapiche-emerald-form.html

Very rare crystal Trapiche Emeralds from Muso Mine, Colombia.

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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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