Cedar Valley Gems

Cedar Valley Rocks & Minerals Society

Cedar Rapids, Iowa

cedarvalleyrockclub.org

CEDAR VALLEY GEMS | OCTOBER 2020 | VOL. 46, ISSUE 10

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

Next CVRMS Meeting
Tues. October 20
7:15 pm

<<VIRTUAL MEETING>>

Join the Zoom Meeting
https://us02web.zoom.us/j/85221008141

featured video:

Walking with Dinosaurs The Ballad of Big Al

Big Al is a Jurassic allosaurus discovered in 1991 near Shell, Wyoming, the best preserved skeleton of *Allosaurus jimmadseni*. This 2-part BBC production begins with a graphic recreation the life of Big Al, who suffered several injuries throughout his short, tragic life in the late Jurassic Period. Part 2 is a scientific detective story tracing the evidence for Big Al the allosaur's existence, using clues from climate change studies, forensics, and fossil records to bring him back to "life

also Featuring:

Short Business Meeting

"Show Us Your Favorite Rocks"

"What Have You Have Been Up To?"

5 Exquisite New Blue Diamonds Found

Five blue diamonds, of exquisite transparency and brilliance, were recently found in South Africa, their proud owner announced on Wednesday. Petra Diamonds Limited said they were discovered the same week in its main mine in Cullinan, located about 25 miles east of the capital Pretoria. Each stone is individual, meaning they are not from a larger fractured diamond, and their weight ranges from 9.61 to 25.75 carats. "*Blue diamonds are so rare that there are no official statistics on them*," said Petra in a statement, stressing that it was very "unusual" to find *"five high quality stones at the same time".* The Cullinan mine is the main source of blue diamonds in the world. The last significant discovery was a 20.08 carat blue gem found at the site in September 2019, which sold for $14.9 million to an anonymous buyer. Petra said it was *"maintaining a flexible approach to sales*" for its latest find and "*still evaluating the optimal route to market for the stones.*" The group, which has three mines in South Africa and one in Tanzania, was battling with debt and falling diamond prices even before coronavirus shuttered the global gem trade. It warned that the five blue gems, whilst a "*positive development,*" would "*not have a material impact on... the required long-term solution to improve the group's capital structure."*
http://www.geologyin.com/2020/09/five-rare-blue-diamonds-discovered-at.html?

CVRMS Sept 15 Virtual Meeting

7:20 p.m. The meeting was called to order by Marv Hoag, President. There were 18 participants.

Treasurers report: by Dale Stout. Checking balance $3,287.45. Motion to approve by Glen, second by JJ. Report approved.

Ray presented a program: on Cold Water Cave located here in Iowa. Lots of questions and comments followed.

Old Business: none

New business: none

Field trips: Marv had extensive damage from the Derecho and has not had the time to call regarding making arrangements for field trips.

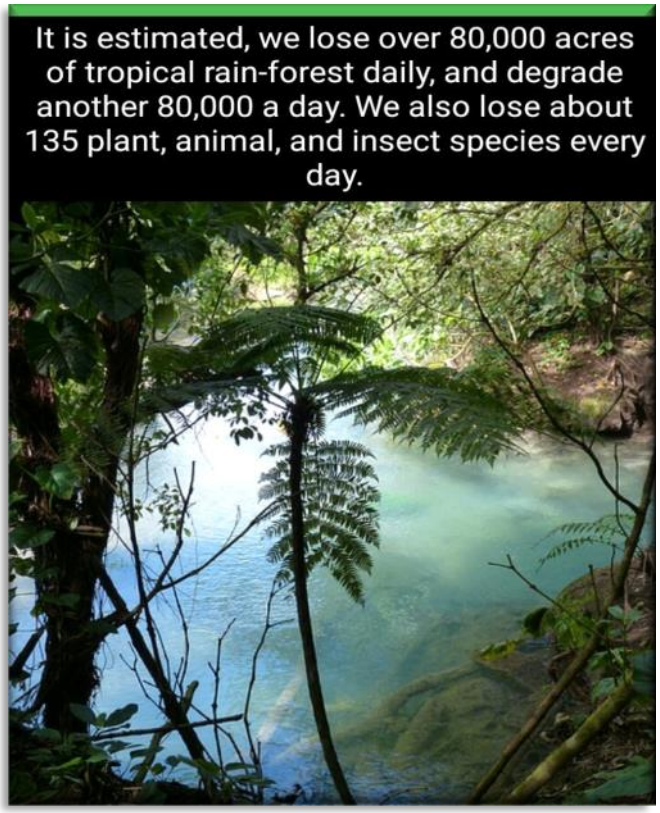
Reminders: that the auction was cancelled as was the bus trip which is postponed.

The combination of derecho and Covid 19 has created many difficulties. The storm with massive rain and wind may have created some opportunities for rock hounding. We shall see.

lost internet connection

Respectfully submitted,
Dell James, Secretary

Meeting formally adjourned and remaining participants engaged in rock show and tell and discussions.



CVRMS Board Minutes Sept 22 Virtual Meeting

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

The meeting was called to order by Marv via ZOOM 7:03 p.m.

Minutes of last meeting Last month's Board meeting cancelled due to derecho.

Treasurer's Report: Nothing changed from Meeting report.

Program for Oct. Meeting: Ray said that someone at the last meeting asked for a fossil program, so he proposed a BBC video about the Allosaurus Big Al. Bill mentioned that the bus trip originally planed for next month would include dinosaur fossils, so this was an appropriate program. Future program suggestions; Fossils of Eastern Iowa, Geology of Kline/Conklin, Jim Preslicka fossil presentation, Geology of Eastern Iowa State Parks, or a Phil Burgess talk.

Scholarship Checks: Dale has not yet sent out.

2020 Holiday Party: Bill suggested that Indian Creek Nature was available now, with appropriate masks and social distancing. Most uneasy about that. Holiday gathering this year will not happen

2021 CVRMS Rock Show: Probably will not happen. Final decision in future.

Terry Baty Memorial Bench and Rock Garden: to be erected in Troy Mills. Dale moved we donate $100 to fund, Kim seconded, approved by unanimous vote.

November CVRMS Election: Jay Vavra nominated to fill his expiring Board position. Election Nov. 16 Meeting. We will take other nominations at the meeting.

Field Trips: Marv will talk to Deb at River Products.

Non-Profit Organization Status: Should we seek 501C-3 status discussed. Allows tax deduction for donations. Process cost MAPS $500-600 and lots of work. Marv will find MAPS paperwork and we will continue discussions.

Adjournment: Dale moved for adjournment, Sharon second, meeting adjourned 8:23pm.

Respectfully submitted,
Ray Anderson, Acting like a Secretary

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Erbenochile erben

Towering Dinosaur With Radioactive Skull Found in Utah

The 155-million-year-old specimen was headless until a radiation detector located the skeleton's skull. A remarkable new species of meat-eating dinosaur has been unveiled at the Natural History Museum of Utah. Paleontologists unearthed the first specimen in the early 1990s in Dinosaur National Monument in northeastern Utah. The huge carnivore inhabited the flood plains of western North America during the Late Jurassic Period, between 157-152 million years ago, making it the geologically oldest species of Allosaurus, predating the more well-known state fossil of Utah, *Allosaurus fragilis*. The newly named dinosaur *Allosaurus jimmadseni,* was announced recently in the open-access scientific journal *PeerJ.* The species belongs to the allosauroids, a group of small- to large-bodied, two-legged carnivorous dinosaurs that lived during the Jurassic and Cretaceous periods. *Allosaurus jimmadseni*, possesses several unique features, among them a short narrow skull with low facial crests extending from the horns in front of the eyes forward to the nose and a relatively narrow back of the skull with a flat surface to the bottom of the skull under the eyes. The skull was weaker with less of an overlapping field of vision than its younger cousin *Allosaurus fragilis. Allosaurus jimmadseni* evolved at least 5 million years earlier than *fragilis* and was the most common and the top predator in its ecosystem. It had relatively long legs and tail, and long arms with three sharp claws. The headless skeleton was initially discovered in Dinosaur National Monument in 1990, then in 1996 the radioactive skull belonging to the skeleton was found using a radiation detector. Both skeleton and skull were excavated by teams from Dinosaur National Monument. "Big Al," another specimen belonging to the new species, was discovered in Wyoming on United States Bureau of Land Management (BLM) land in 1991 and is housed in the collections of the Museum of The Rockies in Bozeman, Montana. Previously thought to belong to *Allosaurus fragilis*, **"Big Al" was featured in the BBC's 2001 "*Walking with Dinosaurs: Ballad of Big Al*" video which will be shown at the October 15 CVRMS meeting (see p. 1).** Over the last 30 years, crews from various museums have collected and prepared materials of this new species. Other specimens include "Big Al Two" at the Saurier Museum Aathal in Switzerland and Allosaurus material from the Dry Mesa Quarry of Colorado at Brigham Young University. http://www.geologyin.com/2020/01/towering-dinosaur-with-radioactive.html

Spotlight Gemstones: Tourmaline / Opal

November's Birth Stones

If you were born in November you may choose from 2 birthstones, tourmaline or opal.

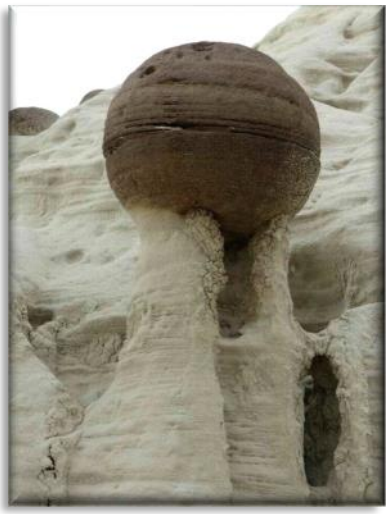
TOURMALINE is a crystalline boron silicate mineral compounded with elements such as aluminium, iron, magnesium, sodium, lithium, or potassium. It is a six-member ring cyclosilicate having a trigonal crystal system, occurring as long, slender to thick prismatic and columnar crystals that are usually triangular in cross-section, often with curved striated faces. The style of termination at the ends of crystals is sometimes asymmetrical, called *hemimorphism*. Tourmaline is distinguished by its three-sided prisms; no other common mineral has three sides. Prism faces often have heavy vertical striations that produce a rounded triangular effect. Tourmaline is classified as a semi-precious stone, and the gemstone comes in a wide variety of colors. Varieties include **schorl** (brownish-black to black), **dravite** (dark yellow to brownish-black), **rubellite** (red or pinkish-red), **indicolite** (light blue to bluish-green), **verdelite** or Brazilian emerald (green), and **achroite** (colorless). In all, 32 tourmaline group endmembers are recognized. **Bicolor** or **tricolor** tourmaline crystals are also found.

OPAL is a hydrated amorphous form of silica ($SiO_2 \cdot nH_2O$). Its water content may range from 3 to 21% by weight, but is usually between 6 and 10%. Because of its amorphous character, it is classed as a mineraloid, unlike crystalline forms of silica, which are classed as minerals. It is deposited at a relatively low temperature and may occur in the fissures of almost any kind of rock, being most commonly found with limonite, sandstone, rhyolite, marl, and basalt. The internal structure of precious opal makes it diffract light. Depending on the conditions in which it formed, it can take on many colors. Precious opal ranges from clear through white, gray, red, orange, yellow, green, blue, magenta, rose, pink, slate, olive, brown, and black. Of these hues, the black opals are the most rare, whereas white and greens are the most common. It varies in optical density from opaque to semitransparent. Fossils are sometimes replaced or coated by opal.

What in the World?

What in the World? Is this beautiful purple mineral?

September's Photo



Last month's **What In The World** photo showed an iconic "cannonball" concretion from the Cannonball Member of the Late Cretaceous (69-66 Ma) Lance Formation near Theodore Roosevelt National Park in North Dakota. A peculiar feature of the Cannonball Member is the abundance of round concretions commonly known as "cannonballs". They are formed. by cementation of the sandy shale by the deposition of calcium carbonate transported by groundwater. Many of these are true septarian nodules with radiating and concentric veins of calcite.

Rock Calendar
CVRMS EVENTS OF INTEREST

2020

Oct. 3 - Bill's Big Bus Boogy
CVRMS Annual Bus Field Trip
U. of Wisconsin Geology Museum
& Burpee Museum
******POSTPONED ******
to be rescheduled in 2021

Oct. 20—CVRMS Monthly Meeting
Hiawatha Community Center 7:15 pm
******CANCELLED ******
INSTEAD
<< VIRTUAL MEETING >>
Video Presentation—see page 1 for details

Nov. 17—CVRMS Monthly Meeting
Hiawatha Community Center 7:15 pm
******CANCELLED ******
INSTEAD
<< VIRTUAL MEETING >>
Presentation to be Announced

December—CVRMS Holiday Party
Location not yet announced
It Won't be a Traditional Party but We Will Try to Do Something
details in Next Month's Newsletter

Ask a Geologist

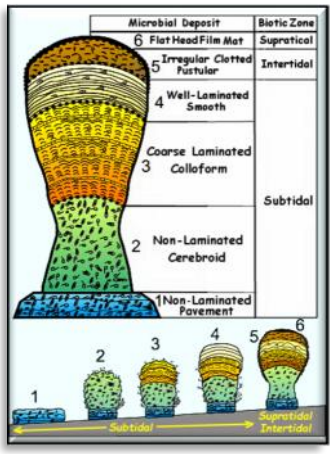
by Ray Anderson aka "Rock Doc", CVRMS Vice President

Ask a Geologist is a monthly column that gives CVRMS members an opportunity to learn more about a geologic topic. If you have a question that you would like addressed, please send it to rockdoc.anderson@gmail.com, and every month I will answer one in this column. Please let me know if you would like me to identify you with the question. I will also try to respond to all email requests with answers to your questions.

I recently received an email from a colleague, Susan, who worked at the University of Iowa Natural History Museum. She was on a canoe trip on the Upper Iowa River and sent me a photo of a round, layered fossil she encountered, looking for an identification. Was it a **stromatolite** or a **stromatoporoid**??

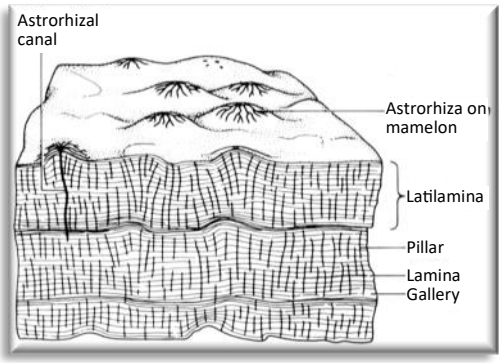
Rock Doc replied: There are two common fossil types that begin with "***strom***" and look roughly alike to the untrained eye. **Stromatolites** are sedimentary structures that are created when layers of sticky, photosynthetic cyanobacteria trap sediments layer by layer, sometimes creating huge mounds or sheets. Stromatolites are one of the earliest organically formed structures, dating back to the Precambrian (as old as 3.7 billion years ago), and they still existing today!. **Stromatoporoids** are an extinct group considered to have been calcareous sponges. "***Stroma"*** is Greek for a bed or layer. Both *stromatolites* and *stromatoporoids* have horizontally laminated structures.

The **"lite"** in **stromatolite** means rock, so a stromatolite is literally a "***layered rock.***" They are accretionary structures made by mostly cyanobacteria that collect and bind fine sediment into thin layers, usually in very shallow waters. Often the bacteria make their own calcareous cement for these laminae as a by-product of photosynthesis. They've been doing this for a long time: some of the stromatolites that live today in Shark's Bay, Australia, are *about 2,000 – 3,000 years old!*



Left-Modern stromatolites living in Shark Bay, Australia.
Right-Stromatolite morphologies vary with benthic zones.

Stromatoporoids are very different. The "**poroid**" refers to their semi-porous skeletal layers, which are separated from each other by minuscule pillars. Stromatoporoids first appeared in the Middle Cambrian, and they were particularly abundant during the Silurian and Devonian periods, flourishing until the end of the Devonian, when they became extinct -- except that they were also a major reef component in the Late Jurassic, and may possibly exist today! Stromatoporoids were unique poriferans that secreted an open calcareous skeleton, or *coenosteum,* consisting of a network of structural elements perpendicular and parallel to the growth surface. Single, sheet-like layers parallel to the growth surface are called *laminae*. Spaces between laminae are called *galleries*. During life, the galleries may have been filled with sea water or with soft tissue of the organism. *Pillars* are rod-like elements oriented perpendicular to laminae. Low mounds on the growth surface are termed *mamelons*. Associated with mamelons are canals called *astrorhizae*. Very similar structures on some genera of living sponges represent canal systems to expel water. Individual organisms grew in domal, tabular, encrusting, dendroid or digitate shapes. Although stromatoporoids can exhibit a wide range of gross morphologies, all can be identified by their distinctive internal structure. Sponges are characterized by the possession of a feeding system unique among animals. Poriferans don't have mouths; instead, they have tiny pores in their outer walls through which water is drawn. Cells in the sponge walls filter goodies from the water as the water is pumped through the body and out other larger openings. The flow of water through the sponge is unidirectional, driven by the beating of flagella which line the surface of chambers connected by a series of canals. Sponge cells perform a variety of bodily functions and appear to be more independent of each other than are the cells of other animals. When you look closely at a stromatolite, you will see laminae, but they are not well defined or regular as in stromatoporoids, and they do not have any kind of vertical structure such as pillars or galleries. Sponges have been conspicuous members of many fossil communities; with the number of described fossil genera exceeding 900, and approximately 5,000 living sponge species are classified in the phylum Porifera. Susan's fossils were **stromatoporoids**.



Left-Devonian stromatoporoids showing mamelons in top image and layering in cross-section photo below.
Right-Illustration of stromotoporoid structure and morphology..

October 23 is Bishop Ussher Day

Irish Archbishop James Ussher (1581-1656)
Calculated the Age of the Earth.

October 23 is (in)famous as supposed **Earth's birthday** - mentioned in many textbooks retelling the life of Irish Archbishop *James Ussher* (1581-1656). In 1650 Ussher published a book with the title "*Annales veteris testamenti, a prima mundi origine deducti*" (Annals of the Old Testament, deduced from the earliest beginning of the World), where he reconstructed the history of the world based on the Bible, Egyptian and Jewish chronologies, but also research by other scholars, like *John Lightfoot* (1602-1675), who published his calculations in the year 1644. The exact time given by the *Ussher-Lightfoot-Chronology* - **October 23*, 4004 B.C., at nine o'clock in the morning**** - is often ridiculed by textbooks as a futile attempt, but at his time Ussher's calculation were based on the most reliable information available and were not intended for practical use, but as a theological guideline. For Ussher and other scholars it was important to know the age of the earth to possibly infer the time of the rapture.

[* or 6 p.m. October 22, 4004 B.C. according to the Jewish calendar, **however Ussher didn´t mention a certain time, he only states that light was created first]

https://blogs.scientificamerican.com/history-of-geology/october-23-4004-bc-happy-birthday-earth/

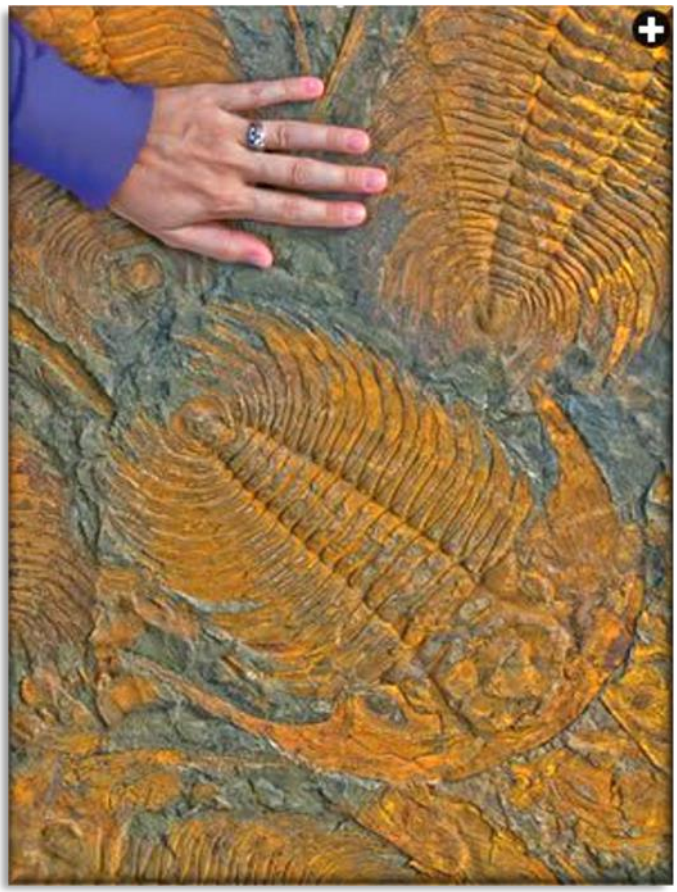
Unakite is the name applied to a coarse-grained granitic rock that, after metamorphism, contains abundant pink orthoclase and pistachio-green epidote. These colors have helped it become a popular lapidary material. It is easily cut and polished to produce beads, cabochons, small sculptures, and other ornamental items. It is also a

popular material for producing polished stones in a rock tumbler. Unakite is attractive, abundant, inexpensive, and frequently seen in the craft jewelry marketplace. It was first found in the United States in the Unakas mountains of North Carolina, from which it gets its name. Unakite is sometimes used as an architectural and decorative stone. Slabs of unakite are used as flooring tiles, facing stone, stair treads, and windowsills. Its most prominent use is as a trimming to the front steps of the Smithsonian National Museum of Natural History in Washington, D.C. It is also used as floor tiles on a landing at the south entrance. Unakite is formed when granite (an igneous rock) is altered by hydrothermal activity. During metamorphism, plagioclase in the granite is replaced by epidote to produce a rock composed primarily of green epidote, pink orthoclase, and clear to bluish-gray quartz. Unakite can also contain minor amounts of magnetite, chromite, ilmenite, apatite, zircon, and other minerals. Unakite is found in the deformed rocks of convergent plate boundaries where deeply-formed granites have been metamorphosed and exposed by weathering and erosion. It occurs where nearby fractures have delivered the hydrothermal fluids that altered the granite. Unakite can be found as pebbles and cobbles from glacial drift in the beach rock on the shores of Lake Superior. It also occurs in Virginia where it is found in the river valleys after having been washed down from the Blue Ridge Mountains. Unakite is not limited to the United States, and has also been reported in South Africa, Sierra Leone, Brazil, China, and Australia.

https://geology.com/gemstones/unakite/

Morocco's Trilobite Economy

Growing slowly at first, fossil and mineral exports expanded so rapidly beginning in the late 1980s and early 1990s that today more than 50,000 Moroccans earn their livelihoods in the fossil and mineral specimen mining and export business. Collecting, especially among youngsters, has gone worldwide, and the US market is the largest. Fossil exporter Brahim Tahiri of Alnif has built an enterprise that supports scores of families in the rural Tafilalt region of southeastern Morocco—where, he notes, "*there are no other jobs.*" Tahiri got his start in the fossil business when he was still a student, working for his older brother Ali. After Ali died in a car crash in 1999, Brahim stepped up to fill his shoes. Today, the business he runs with his brothers Mohammed and Yousif provides work for about 65 fossil-diggers throughout the Tafilalt region, with an additional two dozen workers employed in the family's fossil-preparation "*factory*" near Erfoud, about 70 miles northeast of Alnif. Fossils "*prepped*" by Tahiri's employees are sold throughout Europe, the United States, Australia and Japan. Fossil- and mineral-diggers have made Morocco famous for its trilobites and its *Orthoceras*-rich limestones. Polished slabs of black limestone streaked with cone-like *Orthoceras* fossils are sold as curios or fashioned into coffee tables, ornamental sinks and even bathtubs. Finely prepared Moroccan trilobites can be found in the collections of museums great and small, as well as in the homes of innumerable amateur paleontologists. And the country's colorful minerals, such as bright-red vanadinite and silvery skutterudite, are also the pride of many a great collection worldwide. Moroccan specimen-mining is a delicate, labor-intensive enterprise: The goal is to find and produce attractive samples that can be sold as scientific curiosities, or perhaps even as works of art—so the miner strives to harvest his treasures from the ground undamaged. Dynamite is seldom used. For the teams of men who work in the small pits and trenches that mark the fossil fields, shovels, picks and chisels, and perhaps a backhoe, are the tools of choice. It's hard, dusty work. Many miners are Berber tribesmen whose families have deep roots in the region. Once specimens are cut from the earth, local men clean and prepare them for sale. In Erfoud, middlemen gather every Thursday and Sunday to buy the output of the numerous diggers and "*preppers.*" Around a hundred different export outfits batch the bulk of Moroccan fossil and mineral specimens; these are purchased by dealers at the world's major fossil and mineral shows, such as those in Tucson, Arizona and Munich, Germany. Then they are sold in lots of dozens or hundreds to gift shops in museums and malls. Mining is big business in Morocco. In 2000, *The New York Times Magazine* reported that the fossil trade alone was worth $40 million annually in Morocco, although—as in most similar industries—middlemen and retailers see much more profit than diggers and preppers. American geologist Douglas Shakel has aptly described Morocco's booming specimen-mining industry as the "*trilobite economy.*" A few scientists worry that specimen-mining "*exploits*" Morocco's paleontological heritage. Others note that paleontologists have identified hundreds of species of trilobites—many new to science—from finds by miners working the country's Paleozoic limestones, which were laid down 245 to 570 million years ago. Without markets to support Moroccan diggers, a large number of these species would never have been discovered. Few trilobites are found in perfect condition and prepping usually involves some degree of restoration. Trilobite replicas can be made from plaster, plastic or auto-body putty, and it can be hard for amateurs to tell real fossils from replicas. The price that a trilobite fossil will fetch in the marketplace depends upon its rarity and condition, the hours spent preparing it and the quality of the workmanship. In the US, trilobites may retail for anything from one or two dollars to several thousand, and some unusual high-quality pieces have sold for more than $20,000.



https://archive.aramcoworld.com/issue/200902/morocco.s.trilobite.economy.htm

Scientists Finally Discover How 'Stone Forests' Develop Their Otherworldly Forms

According to ancient legend, a beautiful maiden named Ashima drowned in a river, and turned into stone; this is how China's stunning **Stone Forest of Shilin** first took shape. According to new research, however, there's another explanation for the

Stone Forest of Shilin. (Westend61/Getty Images)

phenomenon that gives stone forests their surreal and otherworldly forms. In a new study, scientists investigated the formation processes behind these jagged pillars. Through a series of simulations and experiments, they demonstrated how flowing water carves ultra-sharp spikes in landforms. While it might take decades or centuries for a real stone forest to blossom, the same trick can be observed in just hours with a suitable analogue, in this case candy. Stone forests are an example of karst topography, but the hydrological conditions that sharpen the tips of their rocky '*trees*' can be mimicked in the lab (or even just the kitchen) using a recipe of table sugar, corn syrup, and water. In the right ratios, this makes something called hard-crack candy, which is composed of about 99 percent sugar content. When a block of this candy was repeatedly immersed in water and then removed, researchers observed it progressively dissolve into an array of sharp spikes in the space of about 2 hours. As to how the same process creates stone forests in the real world, the team thinks that fluid-filled pores or fissures in porous rock could act as conduits for water flows, with minor cavities expanding as their surfaces dissolve, and ultimately spawning sharp rocky columns. In a lab setting, with a contrived, pre-shaped block of candy, the results produce a neat and symmetrical array of spikes, but in the actual stone forests the same order is not apparent and the process creates a myriad of shapes so striking and unexpected, they can even give rise to legends. https://www.sciencealert.com/scientists-finally-discover-how-stone-forests-develop-their-otherworldly-forms

Rainbow Obsidian

Obsidian is mineral-like, but not a true mineral, because as a glass it is not crystalline; in addition, its composition is too variable to be classified as a mineral. It is sometimes classified as a mineraloid. Though obsidian is usually dark in color, similar to mafic rocks such as basalt, obsidian's composition is extremely felsic. Obsidian consists mainly of SiO_2 (silicon dioxide), usually 70% by weight or more. Crystalline rocks with a similar composition include granite and rhyolite. Because obsidian is metastable at the Earth's surface (over time the glass becomes fine-grained mineral crystals), no obsidian has been found that is older than the Cretaceous period. This transformation of obsidian is accelerated by the presence of water. Although newly-formed obsidian has a low water content, typically less than 1% water by weight, it becomes progressively hydrated when exposed to groundwater, forming perlite. Pure obsidian is usually dark in appearance, though the color varies depending on the impurities present. Iron and other transition elements may give the obsidian a dark brown to black color. Most black obsidians contain nanoinclusions of magnetite. An iridescent, "*rainbow*"-like sheen (***rainbow obsidian***) can be produced by the magnetite nanoparticles when they create *thin-film interference*. Thin-film interference is a natural phenomenon in which light waves reflected by the upper and lower boundaries of a thin film interfere with one another, either enhancing or reducing the reflected light. When the thickness of the film is an odd multiple of one quarter-wavelength of the light on it, the reflected waves from both surfaces interfere to cancel each other. Since the wave cannot be reflected, it is completely transmitted instead. When the thickness is a multiple of a half-wavelength of the light, the two reflected waves reinforce each other, increasing the reflection and reducing the transmission. Thus when white light, which consists of a range of wavelengths, is incident on the film, certain wavelengths (colors) are intensified while others are attenuated. Thin-film interference explains the multiple colors seen in light reflected from soap bubbles and oil films on water. It is also the mechanism behind the action of antireflection coatings used on glasses and camera lenses. Rainbow obsidian can be found in California, Oregon, and Jalisco Mexico.

Polished Rainbow Obsidian. Photo: La Roche Mère

http://www.geologyin.com/2020/09/rainbow-obsidian.html?

Tiny, 48-million-year-old Primitive Horse Looked Like a Badger

A reconstruction of a primitive horse the size of a small dog has revealed that the 48-million-year-old creature may have looked like a modern-day badger. The former coalfield of Geiseltal in Saxony-Anhalt has yielded large numbers of exceptionally preserved fossil animals, giving palaeontologists a unique window into the evolution of mammals 47 million years ago. A team led by the University of Tübingen and the Martin Luther University Halle-Wittenberg (MLU) has shown that the body size of two species of mammals developed in opposite directions. The study was published in "*Scientific Reports*." 47 million years ago (the middle Eocene) the Earth was much warmer and the area of Geiseltal was a swampy subtropical forest whose inhabitants included ancestors of the horse, ancient tapirs, large terrestrial crocodiles, as well as giant tortoises, lizards and ground-dwelling birds. So rich are the Geiseltal finds that they give researchers an unprecedented high-resolution picture of evolutionary dynamics at the population level. A team led by Dr Márton Rabi from the University of Tübingen and the Martin Luther University Halle-Wittenberg (MLU) has shown that the body size of two species of mammals developed in opposite directions. The study was carried out with Simon Ring and Professor Hervé Bocherens at the Senckenberg Centre for Human Evolution and Palaeoenvironment and the University of Tübingen in cooperation with Dr Oliver Wings from the MLU. "*We were initially interested in the evolution of the ancient horses, which were about the size of a Labrador dog. These animals are particularly abundant in the Geiseltal fossil record*," Rabi says. Researchers initially believed they had several species of early horse. "*However, we found that here, there was only one species, whose body size shrank significantly with time,*" Rabi explains. Tapirs in the region grew larger instead of shrinking during that time period. Over about a million years, while the ancestors of the horse shrank from an average body weight of 86 pounds to around 57 pounds; the tapirs increased from 273 pounds to an average body weight of 491 pounds. "*All the data indicate that the body size of the horses and tapirs developed differently not because of the climate, but because of different life cycles,*" explains Bocherens. Small animals reproduce faster and die younger: relative to their size, they don't have to eat as much to maintain their body mass and can devote more resources to having young. Larger animals live longer and have lower reproduction rates. They have to eat more and therefore have fewer resources for reproduction -- but, being large, face fewer predators and can range further to get better food. That extends their lives and gives them more time to breed. The Geiseltal tapirs and the horses therefore likely maximized the different advantages of their respective life cycle strategies, which caused divergent body size evolution. The Geiseltal fossil site is located in the eastern state of Saxony-Anhalt. In the course of open-cast brown coal mining between 1933 and 1993, tens of thousands of fossil specimens of more than one hundred species were discovered there. Many were the ancestors of modern vertebrates. "*The Geiseltal is as important a fossil site as the Messel Pit near Darmstadt, which is a UNESCO World Heritage Site,*" says Dr. Rabi. *"But because the Geiseltal collection was hardly accessible during East German times, it kind of went off the radar."*

A reconstruction of a primitive horse the size of a small dog has revealed that the 48-million-year old creature may have looked like a modern-day badger. Pictured, the *P. voigti* fossil

http://www.geologyin.com/2020/08/tiny-48-million-year-old-primitive.html

Gigantic Dinosaur Footprints Are Found on the Roof of a Cave

Recently reported in the *Journal of Vertebrate Paleontology*, researchers from the University of Burgundy–Franche-Comté discovered the three dinosaur trackways during an expedition in 2015 around the labyrinth-like Castelbouc Cave beneath the Causse Méjean plateau in southern France. "*What's so incredible is that thousands of people have passed through this cave without ever*

A scientist on a caving trip happened to spot dinosaur tracks in the ceiling of Castelbouc Cave in France

seeing a thing," says a still dumbfounded Jean-David Moreau, a palaeontologist at the Biogeosciences Laboratory in Dijon. "*All it took was for one person to take a closer look than usual at the ceiling, and there they were, clearly visible: the tracks of footprints apparently made by giant dinosaurs.*" Identifying them with the light from their headlamps alone was no easy task, and Moreau and his team had to return several times to confirm their amazing find: three 75 foot-long trails left by sauropods, four-legged herbivorous dinosaurs from the Middle Jurassic, 170 million years ago. "*In two of the trackways, you can see alternate foot- and handprints, the hands being identified by their half-moon shape. Some of the footprints show five toes as well as claws*," the scientist explains. "*The largest are 4 feet in length, making them among the biggest ever identified worldwide, and were made by animals that must have measured around 100 feet.*" This is also the first time that sauropod footprints have been found in the Causses basin, even though palaeontologist have already uncovered a wealth of trace fossils there. The region boasts dozens of trace fossil sites; however, no vestige of the giant herbivores had ever been spotted until now. "*The Causses basin, also called the Causses gulf, recorded the entire geological history of the Jurassic, which lasted for 55 million years,*" says Moreau. "During this period, the sea retreated three times from the region, enabling dinosaurs to settle there: 200 million years ago, 168 million years ago – when the Castelbouc tracks are dated – and 145 million years ago. The excitement generated by the discovery has nurtured the researcher's passion for the geologically rich region of the Grands Causses, where he hopes to find more traces of the sauropods' presence. "*As well as continuing to explore the surfaces and outcrops where footprints are traditionally found, we'll now be taking a very close look at the roofs of the abundant natural cavities in the area*," says Moreau.

http://www.geologyin.com/2020/08/gigantic-dinosaur-footprints-are-found.html

Astronomers Spy Phosphine on Venus, a Potential Sign of Life

An international team of astronomers demonstrated that the cloud tops of Venus contain traces of phosphine, a toxic, rancid gas that is produced by microbial life on Earth. What's more, they say, the chemical's presence is a mystery. No known non-biological processes can create phosphine in the conditions found on Venus. If the find is confirmed, it raises the tantalizing possibility that the hellish world may harbor alien life in its weird and mysterious clouds. The researchers announced their find during a Zoom press conference on September 14. "*There is a chance we have detected some kind of living organism in the clouds of Venus*," said Jane Greaves, an astronomer at Cardiff University. "*We are not claiming we have found life on Venus*," MIT planetary scientist and study co-author Sara Seager emphasized a few minutes later. "*We are claiming a confident detection of phosphine (PH_3) gas whose existence is a mystery*." The research wasn't published until Monday in *Nature Astronomy*, but word of the news quickly spread through the field during the previous week after the embargoed paper was distributed to journalists. The discovery puts a spotlight on the prospect of life in the Venusian clouds, which was once considered a fringe idea. In addition to igniting much debate, the detection of unexplained phosphine in the clouds of Venus has already spurred more research and unofficial proposals about how future Venus missions could hunt for more signs of alien life. Although the surface of Venus is hot enough to melt lead (nearly 900° F), it has been proposed that life could thrive in its clouds. After all, some 10 miles above the surface, temperatures and pressures are much more Earth-like. However, the planet's clouds are made of at least 80 percent sulfuric acid, a corrosive, deadly compound that's thousands of times more acidic than battery acid. These clouds interact with sunlight, linking the surface, the atmosphere, and the sun through chemistry and creating a rich cycle of activity that has no other analog in the solar system except Earth. The energy and minerals stirred up in these clouds could provide a temperate niche that's rich in the nutrients necessary for life. In a paper published last month, Seager and her colleagues proposed a hypothetical life cycle that would allow Venusian microbes to survive at altitudes between 30 to 37 miles above the surface. The idea depends on the microbes hibernating as "*spores*" cocooned inside sulfuric acid cloud droplets, episodically falling to lower cloud layers as acid rain, before later surfing back skyward on updrafts of air. In June 2017, Greaves obtained time on the James Clerk Maxwell Telescope (JCMT), a radio telescope on Mauna Kea in Hawaii, training it on Venus, which naturally emits radio waves.

https://www.discovermagazine.com/the-sciences/astronomers-spy-phosphine-on-venus-a-potential-sign-of-life?

The History of Navajo Turquoise Jewelry

Turquoise, or "*Doo tl' izh ii*" in Navajo, holds a very special significance in several Native American cultures, especially for the Navajo people. This semi-precious gemstone that is often called the "*stone of life*" is currently well-known because of the popularity of Navajo turquoise jewelry, but it has a long and fascinating history dating back many centuries to the ancient civilizations across the Southwest. Today, authentic turquoise is still highly prized for its scarcity and beauty, and in some cases its historical significance. Before we talk about the history of Navajo turquoise jewelry specifically, you should know some basic facts about the stone itself. Being familiar with the traits that define turquoise will inevitably help you to imagine and understand why the Navajo people of times gone by found it so alluring, and also why turquoise is still revered by virtually all cultures to this day. Perhaps one of the main reasons why ancient cultures have long been attracted to turquoise is because of its color-changing abilities. While turquoise is not really alive, it does change colors depending on the environment, light, dust, and one's skin acidity. Besides fascinating the Navajo people, this ability to shift in hue made turquoise ideal for use in divining, prophecy, and prediction. Changes in Navajo turquoise jewelry color were also used to gauge the health and well-being of the wearer, and also to restore vitality when needed. While the most widely known color of turquoise is the traditional opaque blue-green color, there are many other variations including white, powder blue, sky blue, and a yellowish-green. It was especially attractive to the Native Americans since it contains blue, green, black, white, and occasionally brown: colors that represent the natural world. The texture and look of turquoise can also vary depending on its copper and aluminum contents. That's one of the great things about Navajo turquoise jewelry – each piece is completely unique, silently telling a history of its origin, as well as its travels across the globe. Few other stones conjure such imagination and mystique. A talisman to kings, a boon to warriors, and a shaman's tool, turquoise has been featured prominently throughout countless royal halls and tombs, including those of the ancient Egyptians. The Navajo people once relied on turquoise as a currency and collateral. Today, the popularity of Navajo turquoise jewelry among jewelry and fashion enthusiasts is a clear testimony of its longevity in cultures of all eras. The iconic designs and stylings of Navajo jewelry will never go out of style, and it is only going to become more desirable (not to mention valuable) as resources become scarcer over time. During the early 1900s, a man called Atsidi Chon or "*Ugly Smith*" started incorporating turquoise into his silver creations. This unique Navajo turquoise jewelry style opened the gates for a whole new world of designs, with the Squash Blossom necklace being one of the most enduring. Atsidi Chon also taught the art of silversmithing to the Zuni tribe. This led to more unique silver and turquoise jewelry designs from the Southwestern U.S. It was around this time that the Southwestern tribes started trading jewelry and using it as currency. At its simplest, turquoise is simply considered a bringer of good fortune. The Navajo would store it in baskets or hang it from the ceilings to ward off evil in the home, and they would surround the exteriors of homes or graves with it for the same reason. Warriors would carry it to battle to ensure strength and protection. Hunters would bring it on excursions to promote luck and safety. Tribespeople would give it as gifts or symbols of kinship. Understanding how often turquoise was depended on in day-to-day life really makes you realize why jewelry was the logical next step – adorning the body in this sacred stone is a convenient and attractive way to harness its power. In short, Navajo turquoise jewelry is a means to get in touch with the stone's aura, rather than simply a fashion statement. Much more than just a good luck charm, turquoise was truly hallowed to the Navajo people. In some Native American legends, it is said that when the skies opened up and rained after a long drought, the tears of the people seeped into the Earth and formed turquoise. The stone was central to many spiritual observances. For example, one observance involved casting a piece of turquoise into a river and saying a prayer to the god of rain, Neinilii. The turquoise-rain connection doesn't stop there. Tribespeople would utilize sticks with turquoise attached to seek out water, a critical practice in the Southwestern desert climate. When praying to the wind spirits, they would throw pieces of turquoise into the air, assuming the howl of the wind was the spirits seeking the stone. Estsanatlehi, or *Changing Woman* as she is called in English, is a Navajo goddess who is widely known for her prominent use of turquoise in the legend. Initially, she herself was turquoise, and she also wore turquoise and shell jewelry, carried one turquoise cane and one shell cane, and lived in a turquoise home on the West horizon. Today, young Navajo women dress in a similar fashion at coming-of-age ceremonies, and the tribe sings songs that are said to have been sung for Changing Woman as she ran toward the dawn as far as the eye could see and then back. There are countless other examples of the Navajo people's use of turquoise in religious observances. Many ceremonies performed centuries ago are still relevant to Navajo culture today.

https://www.southwestsilvergallery.com/blog/the-history-of-navajo-turquoise-jewelry/

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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:

Dale Stout
2237 Meadowbrook Dr. SE
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CVRMS website:
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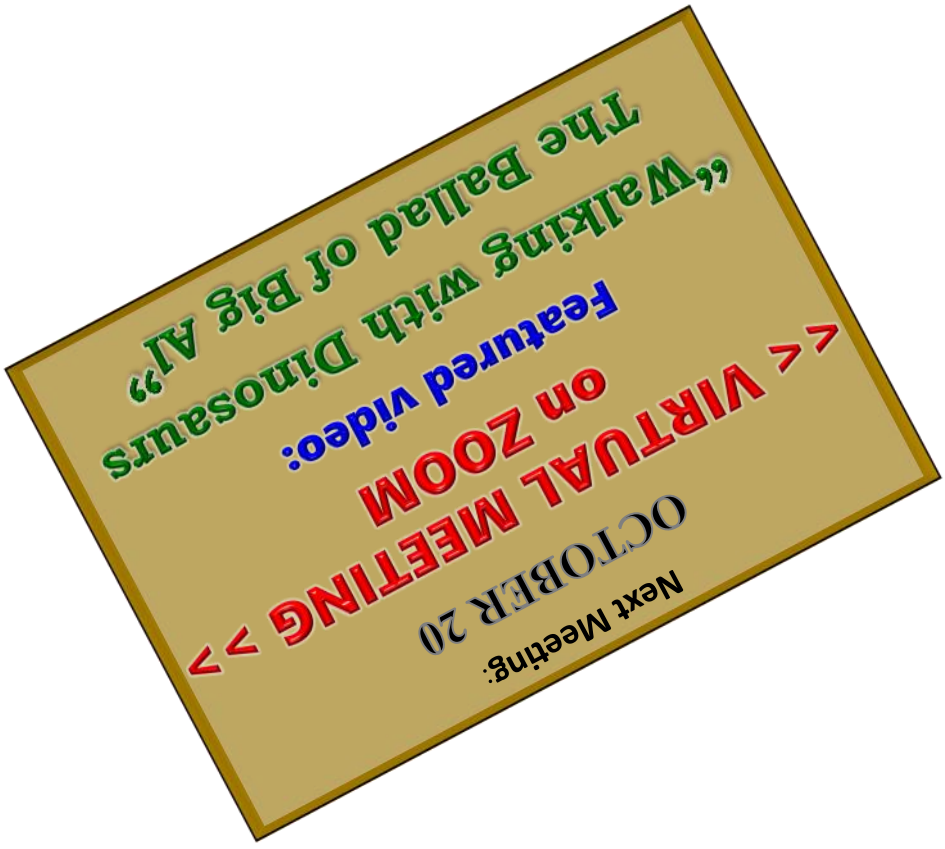

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