Cedar Valley Gems

Cedar Valley Rocks & Minerals Society

Cedar Rapids, Iowa

cedarvalleyrockclub.org

CEDAR VALLEY GEMS **JANUARY 2019** **VOL. 45, ISSUE 1**

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

Next CVRMS Meeting Tues. Jan. 15

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

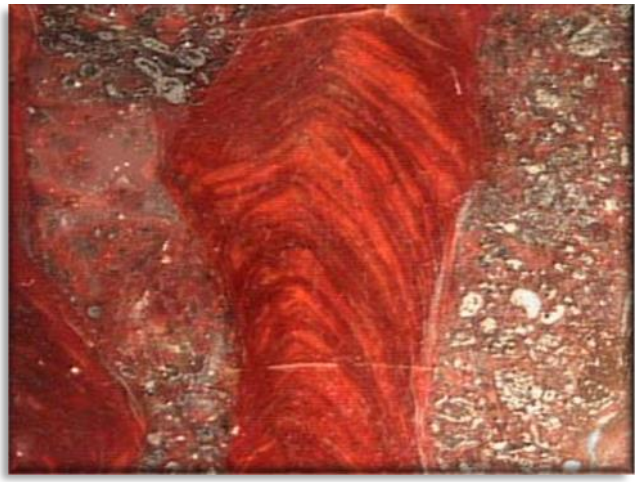
featured speaker:

Ray Anderson

Iowa Geological Survey

Geology of the Mary Ellen Jasper

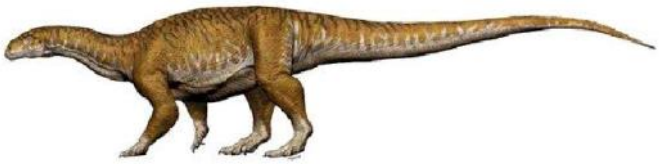
Almost 2 billion years ago the Earth was enjoying its recently oxygenated atmosphere by cleaning most of the dissolved iron that had built up in the oceans in the previous 2.6 billion years. Much of this iron was deposited as banded iron formation along the shorelines of the ancient continents. One of these areas of banded iron formation, the Mesabi Range of Minnesota, preserves some of the oldest organic structures on Earth, stromatolites, in jasper and iron oxide. These spectacular jasperized stromatolites, are found in abundance in the Mary Ellen iron mine near the town of Biwabik. Cut and polished these rocks make spectacular specimens and jewelry, known as ***Mary Ellen Jasper***. The story of how these fossils were created is poorly understood, but very interesting.



A slab of the Mary Ellen Jasper displaying a jasperized Precambrian stromatolite, the world's oldest organic structures

New Clues to How the Biggest Dinosaurs Got So Big

No creatures ever stomped across our planet quite like the sauropodomorphs. These long-necked plant eaters were the largest dinosaurs, and they included the mighty 70-ton titanosaurs, as well as the *Brachiosaurus* and *Diplodocus*. Paleontologists have long wondered how these lumbering 100-foot-long behemoths got so big. Now a group of researchers has uncovered a new, early sauropodomorph. It differed from later species in its group, with seasonal growth spurts leading to its giant proportions, rather than continuous, gradual growth. The finding, published in the journal *Nature*



Ingentia prima, which was about 33 feet long and weighed as much as 10 tons, lived about 47 million years before its colossal cousins, the Brachiosaurus and the Diplodocus

Ecology & Evolution provides insight into how certain dinosaurs became the biggest of the big. They discovered the new species while looking for Triassic Period fossils in northwest Argentina. A member of the genus *Lessemsaurus,* they called it *Ingentia prima*, meaning "**the first giant**." The animal they found weighed an estimated seven to 10 tons and measured about 33 feet long. It lived from 201 million to 237 million years ago, which was about 47 million years before its colossal cousins, the *Brachiosaurus* and *Diplodocus*, and 30 million years before the titanosaurs. It was believed that the first giants originated during the Jurassic period, a sauropod called *Vulcanodon that* lived 180 million years ago. The *lessemsaurids* grew through quick seasonal bursts while their later counterparts grew at a consistent rate until they became adults. The giant Jurassic and Cretaceous sauropods acquired big bodies through a slow and more complex manner that included developing extremely elongated necks and forelimbs, smaller skulls and thick, trunk-like limbs. In contrast, *Ingentia prima* did not have a greatly elongated neck and its legs were more flexible and bent rather than straight and pillar-like. These early giants showed that there was more than one way to climb to the top of the dinosaur world.
https://www.nytimes.com/2018/07/11/science/giant-dinosaurs-evolution.html?

Why be a CVRMS Member?

Joining the Cedar Valley Rocks and Minerals Society (**CVRMS**) is a great way to meet other people with similar interests in the Cedar Rapids area; including lots of people who you can show your prize finds to, and some who can actually tell you what you've found. You get monthly programs to help you understand the natural world around you, this great newsletter, and those wonderful summer and Christmas pot lucks. Another benefit of being a club member is the great field trips to otherwise hard to access rock and mineral collection sites. The **CVRMS** had its beginning in 1951, and currently has about 110 members with regular monthly meetings on the third Tuesday of the month in Hiawatha (see page 1). The CVRMS is a member of the Midwest Federation Of Mineralogical and Geological Societies (**MWF**) which includes about 110 rock and mineral clubs in an 11-states region. The **MWF** was organized in 1940 with the goal of promoting interest and education in geology, mineralogy, paleontology, archaeology and lapidary, and to sponsor and provide means of coordinating the work and efforts of groups interested in these fields. The **MWF** was one of the original four founding organizations of the American Federation of Mineralogical Societies **(AFMS**) in 1947. The AFMS was established to promote popular interest and education in the various Earth Sciences, and in particular the subjects of Geology, Mineralogy, Paleontology, Lapidary and other related subjects, and to sponsor and provide means of coordinating the work and efforts of all persons and groups interested therein. They sponsor and encourage the formation and international development of Societies and Regional Federations and by and through such means strive toward greater international good will and fellowship. The **AFMS** is composed of the **MWF** and six similar regional organizations of gem, mineral, and lapidary societies that represent a total of more than 650 member clubs and societies with about 50,000 total members.

Photo of the **CVRMS** annual Rocks, Fossils, and Minerals show.

This year the **CVRMS** will be hosting both the **AFMS National Show and Meeting** and the **MWF Annual Meeting** at the Ramada Inn in Cedar Rapids in association with our annual **Rocks, Fossils, and Minerals Show** at **Hawkeye Downs** on **April 23-24.** The **AFMS** show activities will be integrated with the **CVRMS** show at Hawkeye Downs, with meetings and awards banquet to be held at the Ramada (see page 11 for more information on all of these meetings and shows).

CVRMS Board Minutes Dec 18

Called at 7:10 at the home of Marv Houg
Present: President Marv Houg, Dale Stout, Ray Anderson, Bill Desmarais, Dell James, Jay Vavra, Sharon Sonnleitner, Rick Austin, Kim Kleckner

Christmas Party successful with not the outstanding turnout that was expected. Thanks to Ray for an outstanding slide show from the Milwaukee trip.

March Show-Ray and Sharon reported that things are lined up. Registrations coming in slowly. 11 vendor contracts still not returned.

Rock and Gem Magazine requested that they be allowed to participate. Overall opinion was that they be allowed.

Discussion regarding the *Midwest Federation newsletter* would like an article stating why people should come to the show.

Suggestions such as *local attractions* like the Amana Colonies, Devonian Fossil Gorge, Iowa Hall at U of I, programs, displays, vendors, etc. Jay will find out details from Midwest Federation and will write the article.

Sharon is putting together the information about Tiffany so she can be nominated for the *honoree award*. If she is chosen, she will be allowed to designate 2 students to receive $4000 each in scholarship money.

Displays needed. Marv will fill a lot of spaces.

Posters-we need to let Ray know and he can work on them.

Rick will repair the *fluorescent display* which has a few hiccups.

Some change in *vendors* including Rock and Gem, a sphere and fossil guy, and an opal dealer.

Programs: Ray working on it.

AJ will not be able to do *security*. Bill and Jay will handle.

Banquet table decorations-Marv will donate geodes to be incorporated into the design. Dell and Sharon working on them.

Raffle: Kim will help with raffle. Suggestions for prizes include amethyst cathedral, Keokuk geode, Bill will ask about dinosaur, petrified wood?, fish or sphere?

Auction: nothing to report except that it is full.
Jay will get contracts out.

501C-3 status. Marv is working on it.

Next Meeting Program: Ray will give talk about Mary Ellen Jasper. Members can bring in their samples.

Field trips: Bill looking at an Omaha Zoo trip in October sometime.

Crinoid bill is in the works again. Ray working on it. Floyd the Noid will be at the show.

Kim will write up about the kids activities planned during meetings.

Motion to adjourn by Rick, second by Ray.

Adjourned 9:20 p.m.

Respectfully submitted,
Dell James, secretary

You Are Brighter than the Sun

by Joseph Wang, Ph.D. Astrophysics

I did the math, and it worked out that **we human beings are actually burning brighter than the sun**. Yup. It's true. I remember this calculation because it was one of the first homework problems in graduate school I had, and it generates a weird result. ***The amount of energy that human beings produce turns out to be larger per mass than the sun.*** The nuclear processes in the sun aren't particularly efficient. It's just that there is a lot of sun. Also the important thing is that the energy lasts. If you take a human being and lock them in a sealed container, they will stop producing energy very quickly. Once the oxygen runs out, the energy production stops. The sun burns slowly but can last for billions of years, and ultimately human beings just reprocess energy generated by the sun (i.e. the oxygen that allows you to generate enormous amounts of energy comes from plants processing solar radiation).

How Fast is the Earth Moving thru Space?

Earth's rotation is constant, but the speed depends on what latitude you are located at. The circumference of the Earth is about 24,898 miles, so at the equator it is spinning at 1,037 mph. Earth's spin, of course, is not the only motion we have in space. In one year Earth travels about 584 million miles around our sun at an orbital speed of about 67,000 mph. The sun has an orbit of its own in the Milky Way. The sun is about 25,000 light-years from the center of the galaxy, and the Milky Way is at least 100,000 light-years across. We are thought to be about halfway out from the center, so the sun and the solar system appear to be moving an average speed of 448,000 mph through the Milky Way. Even at this rapid speed, the solar system would take about 230 million years to travel all the way around the Milky Way. The Milky Way, too, moves in space relative to other galaxies. In about 4 billion years, the Milky Way will collide with its nearest neighbor, the Andromeda Galaxy. The two are rushing toward each other at about 70 miles per second (250,000 mph). So by combining these motions and speeds, at any given instant we may be moving in excess of 750,000 mph!

Spotlight Gemstones: Garnet

Garnet, is the name used for a large group of rock-forming minerals. These complex minerals share a common crystal structure and a generalized chemical composition of $X_3Y_2(SiO_4)_3$. In that composition, "X" can be Ca, Mg, Fe^{2+} or Mn^{2+}, and "Y" can be Al, Fe^{3+}, Mn^{3+}, V^{3+} or Cr^{3+}. Despite their variable appearance, garnets are usually easy to identify by their hardness, crystal habit and occurrence in metamorphic rock. Garnets usually form at high temperature and pressure, so they typically occur in their crystal form as rounded dodecahedrons (twelve-sided) or twenty-four sided trapezohedrons with a Mohs hardness of 6.5 -7.5. The birthstone of **January**, garnets are mined in a rainbow of colors (except blue). From the fiery orange of *Mandarin Garnets* to the rich green of *Tsavorite Garnets* and to the most widely recognized color the deep red of *Pyrope Garnets,* the garnet is considered a great gift to symbolize friendship and trust. Garnets have been used as gemstones and abrasives since the Bronze Age. All species of garnets possess similar physical properties and crystal forms, but differ in chemical composition. The different species are pyrope, almandine, spessartine, grossular (varieties of which are hessonite or cinnamon-stone and tsavorite), uvarovite and andradite. The garnets make up two solid solution series: pyrope-almandine-spessartine and uvarovite-grossular-andradite. These minerals are found throughout the world in metamorphic, igneous, and sedimentary rocks. Most garnets found near Earth's surface formed when a sedimentary rock with a high aluminum content, such as shale, is subjected to heat and pressure intense enough to produce schist or gneiss. Garnet is also found in the rocks of contact metamorphism, subsurface magma chambers, lava flows, deep-source volcanic eruptions, and the soils and sediments formed when garnet-bearing rocks are weathered and eroded. In the United States, the major industrial uses of garnet in 2012 were waterjet cutting (35%), abrasive blasting media (30%), water filtration granules (20%), and abrasive powders (10%).

What in the World?

What in the World is this bare-footed U of IA Geology student walking on?? And, where is it??

December's Photo

This is a view of "Crystal Mountain" in the White Desert of Egypt. It was created when a series of caves, complete with stalactites and stalagmites developed in Cretaceous chalk, was collapsed by earthquakes then had remaining voids filled with large barite and calcite crystals that grew from hydrothermal fluids, and were exposed at the land surface by tectonics and weathering.

Rock Calendar
CVRMS EVENTS OF INTEREST

2019

Jan. 15 - CVRMS Monthly Meeting
Feature Program
"Geology of the Mary Ellen Jasper"
by Ray Anderson
Hiawatha Community Center 7:15 pm

Feb. 19 - CVRMS Monthly Meeting
Feature Program
"to be announced"
Hiawatha Community Center 7:15 pm

Mar. 19 - CVRMS Monthly Meeting
Feature Program
"CVRMS & Field Work at Cornell College"
by Cornell Geology Students
Hiawatha Community Center 7:15 pm

Mar. 21-24—AFMS/MWF Annual Meeting
Ramada Inn
Cedar Rapids
see p. 10 for details

Mar. 23-24—CVRMS Rock, Fossil, and Mineral Show
Hawkeye Downs
Cedar Rapids
see p. 10 for details

Apr. 16 - CVRMS Monthly Meeting
Feature Program
"to be announced"
Hiawatha Community Center 7:15 pm

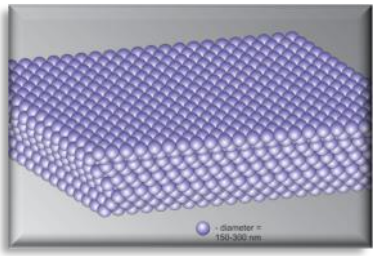
Ask a Geologist

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.

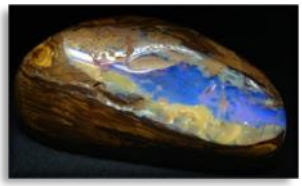
***Karen and Bill Desmarais** were telling me about the black opal that Karen received for her birthday. I wondered; "What makes a black opal different from any other opal??"*

***Rock Doc replied:** "Let's start out with what an opal is. Opal is made up of tightly packed minute silica spheres only 0.00001 inches' wide. If these spheres are aligned correctly and just the right, uniform size they will produce flashes of opal color. A non-crystalline form of mineral silica, opal is related to its more common cousins crystalline quartz and microcrystalline agate. Opal differs as it is formed in amorphous lumps of silica rather than from naturally faceted crystals. Simply stated, it is a solid gem mineraloid (has mineral characteristics, but is not one) that is solidified from the chemical silicon dioxide, in voids and fractures in rocks and in cavities in decaying vegetation, fossils, and bones. In science, opal is known as $SiO_2 \cdot nH_2O$, mixing silicon dioxide with water. Opal's Moh's hardness rating is measured at 6.0 to 6.5 on the scale similar in hardness to quartz. Opal comes in many varieties – white, blue, red, black, and even colorless. Its most unique character is that it displays all the colors of the spectrum resulting from the interference and diffraction of light passing through it. In other words, the bright rainbow look of opal, as they appear to the eye when seen, will move and change dramatically depending on the angle at which the stone is viewed. There are two main varieties of opal - precious and common. Precious opals exhibit the characteristic called "play-of-color," and are comparatively rare. Common opal is dull and valueless and occurs in abundance throughout the world. Common opal does not exhibit a play of color. When common opal is found in association with precious opal, it is known as potch. About 95% of all opal mined from the opal fields is common or potch, basically one color. The remaining 5% has some color, but about 95% of it is of mediocre grade. Therefore, only approximately 0.25% has any real value at all. There are 7 varieties of opals. **White opals** (or milky opals) feature light white body tones and are more common. **Boulder opals** form on ironstone boulders and are often cut with the ironstone left as matrix around a thin opal seam. **Crystal opals** are any of the above kind of opals that you can see through. **Fire opal**s are transparent to translucent with warm body colors of yellow, orange, or red. They don't usually show a play of color but may exhibit bright green flashes. **Girasol opals** are also a type of transparent to semitransparent milky quartz with opal that exhibits a bluish glow or sheen that follows the light source. **Peruvian opals** (also called blue opals) are semi opaque to opaque blue-green stones found in Peru. **Black opals,** the most prized opals, are characterized by a dark body tone (produced by a dark underlying potch) causing brightness of color which is unmatched by lighter opals. Black Opals are mined exclusively near Lightning Ridge, New South Wales, Australia. More than 90% of the world's quality gem opals come from Southern Australia, although they can be found in other parts of the world such as Ethiopia, Brazil, Mexico, Czechoslovakia and Nevada. All black opal comes exclusively from Australia, most from the many mines in the Cretaceous Winton Formation between the towns of Winton and Lightning Ridge in northeastern Australia. It is believed that these precious opals grew from silica dissolved from volcanic ash and carried down into the rocks by rainwater. It is estimated that it takes about **5 to 6 million years to create a 1/2 inch thick seam of opal**.*


opal structure


white opal


crystal opal


boulder opal


black opal


fire opal

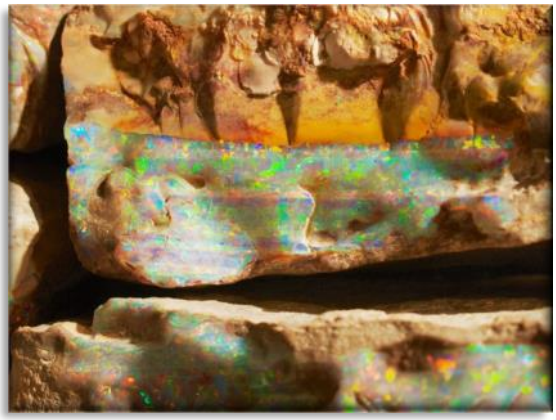

Girasol opal

black potch on the back side of a cut black opal stone


Peruvian opal

Australian Precious Opals also Fossilized Unknown Dinosaur

Opalized fossils of *Weewarrasaurus pobeni*, a previously unknown dinosaur, were recovered in an Australian opal field. Precious stones recovered from the opal fields of Australia have turned out not just to be opalized fossils - but the opalized fossils of a dinosaur previously unknown to paleontology. It's called *Weewarrasaurus pobeni* - named for the Wee Warra opal field near the small country town of Lightning Ridge, where it was found, and opal buyer Mike Poben, who donated the specimens to science. This creature lived nearly 100 million years ago in the Cretaceous, when what is currently the Lightning Ridge desert was still a lush, green space. It's also the first new dinosaur species to be named in the Australian state of New South Wales in nearly a century. The only fragment of *Weewarrasaurus* that was



Opal boulders in Coober Pedy, Australia.

Fragments of a *Weewarrasaurus pobeni's* jaw.

recovered was its lower jaw, but with teeth intact, but that revealed a lot. For a start, it wasn't a big dinosaur, only about the size of a medium-sized dog. Based on its teeth and the shape of its jaw, palaeontologist Phil Bell from the University of New England in Australia determined that it was a small species of ornithopod, a group of bipedal grazing herbivores that includes *Iguanodon* and *Parasaurolophus*. Lightning Ridge is one of Australia's fossil hotspots. It was once a rich floodplain on the edge of a giant inland sea called the Eromanga Sea that spread across the Australian continent. The once abundant prehistoric life that filled the area was frequently preserved in the mud, which over the years turned to stone. This process can be seen around the world, but in Australia, something else happened. When the inland sea started disappearing 100 million years ago, acidity increased in the rocks, releasing silica which collected in hollows and pockets - such as those left behind by decayed bones. As acidity levels then decreased, these silica pockets hardened into opal, resulting in perfect shimmering rainbow molds of ancient remains. Nowhere in the world did this opalization occur so frequently as Lightning Ridge. And this is what was found by Poben, who came across the two pieces of the opalized jawbone in a bag of rough opals he bought from miners. Poben brought his find to Bell, who was excited by its beauty and uniqueness. Australia was apparently home to only two large ornithopods, *Muttaburrasaurus* and one that is currently in the process of being studied. The continent seems to have been much richer in the smaller varieties. Fossils found at Lightning Ridge indicate that small ornithopod species thrived on the lush vegetation, very different from America, where smaller herbivores would have had to compete for food with giants such as *Triceratops* and *Alamosaurus*. So fossils like *Weewarrasaurus* are much more than just a pretty face - they can help us better understand how dinosaur biodiversity differed around the world, and how that diversity may have come about. Bell and his team are currently working hard to describe more opalized fossils, usually found broken as part of mining spoils.

Illustration of the rare *Weewarrasauru*.

https://www.businessinsider.com/precious-opals-also-dinosaur-fossils-australia-2018-12?

Organic Makeup of Ancient Meteorites Sheds Light on Early Solar System

The origin of organic matter found in meteorites that formed during the birth of the Solar System 4.5 billion years ago may provide key clues to understanding the birth of life here on Earth. It could also help astronomers investigate the potential habitability of other solar systems. That's according to a new study led by The University of Manchester. Published in *Proceedings of the National Academy of Sciences of the United States of America (PNAS)*, the new research confirms that organic materials accreted in chondritic asteroids probably formed via basic chemical reactions during the infant stage of our Solar System. Carbonaceous chondrites are meteorites that originated from chondritic asteroids that are as old as our Solar System. Researchers have been analyzing the isotopic makeup of oxygen in the organic materials found in these specific meteorites. Isotopes are atoms of the same element that share the same numbers of protons, but have a different numbers of neutrons. Isotopic analysis provides scientists with the isotopic signature of a compound, which acts as a fingerprint of processes involved in its formation. By doing this, the team has helped pinpoint the origins of the organic materials contained within the meteorites, which are made up of key elements necessary for life, such as carbon, hydrogen, oxygen, nitrogen, and sulfur. The findings suggest that if organic materials can form by basic chemical processes operating in our Solar System, there is a possibility that they are widespread in other planetary systems. Carbonaceous chondrites are made of the first solid materials (such as rocks, organics, water ice, and fine grain dust) formed in the Solar System. When found on Earth and analyzed in detail, they act as time capsules for understanding how planets formed and evolved over billions of years. Organic-rich carbonaceous chondrites are particularly rare, comprising only a few per cent of all known meteorites. Because the Earth is a dynamic planet, processes such as plate tectonics and erosion have erased most of the early Earth's records. This makes comprehensive studies of chondrites all the more important to understand how our planet formed and evolved. Using samples from the Muséum National d'Histoire Naturelle in Paris, the researchers spent two years precisely measuring and interpreting the oxygen isotope composition of organics in some of these early-formed meteorites. The study provided the first "*high-precision triple oxygen isotope analysis*" of carbonaceous chondrite organics. Past studies mostly focused on two other building blocks of life abundant in organics, hydrogen and nitrogen. Oxygen has a crucial advantage over those elements, because it is fairly abundant in these meteorites (comprising 10-20% of chondrite organics). But most importantly, oxygen has three different stable isotopes, while hydrogen and nitrogen only have two stable isotope varieties. Having three stable isotopes, oxygen offers an extra level of information compared to the others, providing critical clues to further constrain the origin of chondritic organics. The oxygen isotope pattern observed was similar to the relationship linking the composition of the Sun, asteroids and terrestrial planets. This likely implies that carbonaceous chondrite organics were formed through chemical reactions in the early Solar System, rather than having been inherited from the interstellar medium.

The Orgueil carbonaceous meteorite, a scientific treasure that fell in 1864 in southwest France. The main mass of the meteorite is on exhibit at the Muséum National d'Histoire Naturelle in Paris.

https://phys.org/news/2018-08-makeup-ancient-meteorites-early-solar.html#nRlv

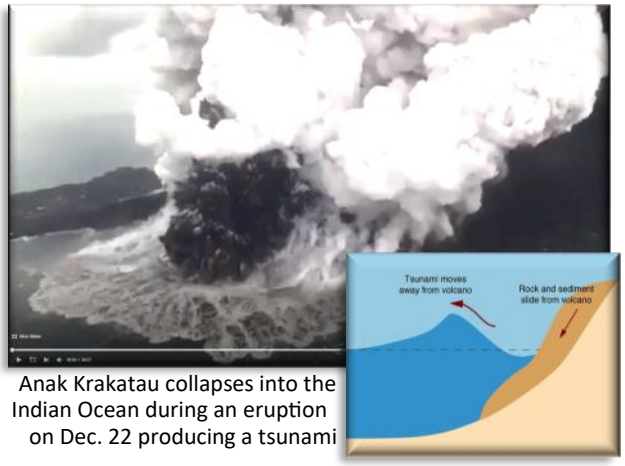
Indonesia Tsunami Kills Hundreds After Anak Krakatau Eruption

At least 373 people were killed and 1500 injured after a tsunami hit coastal towns on Indonesia's Sunda Strait, which connects the Java Sea to the Indian Ocean between the Indonesian islands of Java and Sumatra**.** The tsunami struck on Saturday, December 22, at about 9:30 pm local time (14:30 GMT), during a local holiday. There was no warning of the giant waves which destroyed hundreds of buildings, sweeping away cars and uprooting trees. It is thought that the tsunami was generated by undersea landslides during an eruption of the Anak Krakatau volcano. The Sunda Strait is a passage that connects the Java Sea to the Indian Ocean which was produced by an earlier volcanic eruption. In August 1883, the Krakatoa volcano underwent one of the most violent volcanic eruptions in recorded history. The eruptions were equivalent to 200 megatons of TNT - about 13,000 times the nuclear yield of the bomb dropped on Hiroshima in 1945. Massive tsunamis with waves of up to 41m killed more than 30,000 people. Thousands more were killed by hot ash. The eruptions were heard thousands of miles away. World temperatures dropped by more than 1°C the following year. The volcano virtually disappeared leaving a water-filled crater. In 1927 a new volcano, Anak Krakatau (Child of Krakatau), emerged as a new volcanic island in the center of the Krakatoa volcano crater, and it has continued to erupt and grow periodically ever since. The area of the Sunda Strait, at the southern tip of Sumatra and northern Java, only 62 miles from Jakarta, with its tropical climate and rich tropical forest has become a first class tourist attraction. The tsunami hit several popular tourist destinations including the Tanjung Lesung beach resort in the west of Java island. Anak Krakatau had been spewing ash and lava for months before a 158-acre section of its southwest side collapsed, causing an underwater landslide and the tsunami. Images captured by the European Space Agency's Sentinel-1 satellite showed a large portion of the southern flank of the volcano had slid off into the ocean, pushing water ahead of it. The fact that the tsunami was triggered by a volcano rather than an earthquake meant no tsunami warning was triggered, scientists said. Coastal residents reported not seeing or feeling any warning signs before waves of up to three meters high surged in. High seas as a result of the full moon might have contributed to the strength of the waves, the disaster management agency said. The proximity of the volcano to the coast gave authorities very little time to act, Professor David Rothery from The Open University told AFP news agency. Hundreds of military personnel and volunteers spent Monday scouring beaches strewn with debris in search of survivors. At least 1,459 people were injured and more than 600 homes, 60 shops and 420 vessels damaged when the tsunami struck. Rescue efforts are being hampered by blocked roads but heavy lifting equipment is being transported to badly hit areas to help search for victims.

Location of Anak Krakatoa volcano in the 1883 eruption crater of Krakatau in Indonesia.

Anak Krakatoa in September, 2012, one week after an eruption

Anak Krakatoa had erupted a number of times in recent months this image was taken in July, 2018



Anak Krakatau collapses into the Indian Ocean during an eruption on Dec. 22 producing a tsunami

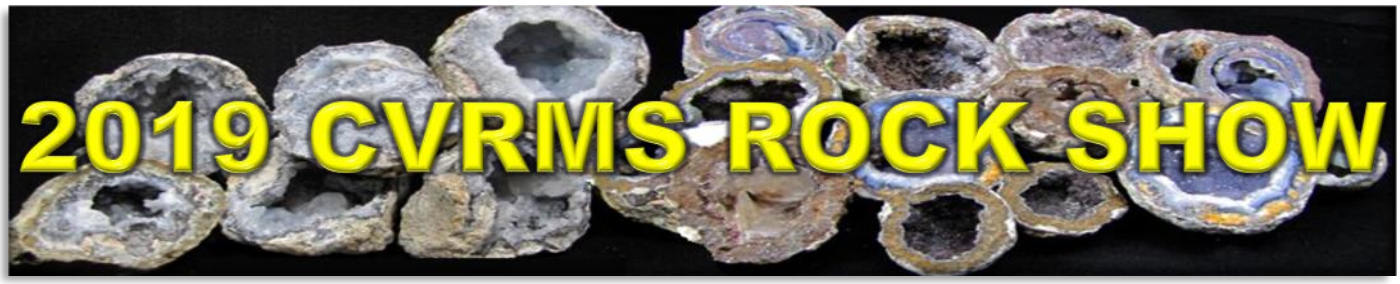
First Fossil Bird with Teeth Specialized for Tough Diet

While living birds have a beak to manipulate their food, their fossil bird ancestors had teeth. Now a new fossil discovery shows some fossil birds evolved teeth adapted for specialized diets. A study of the teeth of a new species of early bird, *Sulcavis geeorum*, published in the *Journal of Vertebrate Paleontology*, suggests these fossil birds were capable of eating prey with hard exoskeletons like insects or crabs. The researchers believe the teeth of the new specimen hints at previously unrecognized ecological diversity. *Sulcavis geeorum* is an enantiornithine bird from the Early Cretaceous (121-125 million years ago) of Liaoning Province, China. Enantiornithine birds are an early group of birds and the most numerous birds from the Mesozoic (the time of the dinosaurs). *Sulcavis* is the first discovery of a bird with ornamented tooth enamel. The dinosaurs – from which birds evolved – are mostly characterized by carnivorous teeth with special features for eating meat. The enantiornithines are unique among birds in showing minimal tooth reduction and a diversity of dental patterns. This new enantiornithine has robust teeth with grooves on the inside surface, which likely strengthened the teeth against harder food items. No previous bird species have preserved ridges, striations, serrated edges, or any other form of dental ornamentation. While other birds were losing their teeth, enantiornithines were evolving new morphologies and dental specializations. We still don't understand why enantiornithines were so successful in the Cretaceous but then died out – maybe differences in diet played a part. The new study highlights again how uneven the diversity of birds was during the Cretaceous. There are many more enantiornithines than any other group of early birds, each one with its own anatomical specialization. https://phys.org/news/2013-01-fossil-bird-teeth-specialized-tough.html#nRlv

Never-Before-Seen Minerals Could Mark The Dawn of Our New Geological Epoch

Scientists have identified a sudden explosion of mineral diversity on the surface of our planet that would not exist if it weren't for humans, adding weight to the argument that we're living in a new geological epoch - the **Anthropocene**. A 2017 study found that the incredible upsurge of new minerals around the time of the industrial revolution led to the unprecedented diversification of crystals on Earth, eclipsing even the Great Oxidation Event 2.3 billion years ago as the **"*greatest increase in the history of the globe*".** "*This spike of mineral novelty is so rapid - most of it in the last 200 years, compared to the 4.5-billion-year history of Earth, there is nothing like it in Earth's history,*" said Robert Hazen (Carnegie Institution for Science). "*This is a blink of an eye, it is just a surge, and ... we are only seeing the tip of the iceberg*." Hazen and his team analyzed the **5,208 minerals on Earth** that are officially recognized by the International Mineralogical Association, and found that **208** of them would not exist if it weren't for human activity. These human-triggered minerals include **chalconatronite**, a rare copper mineral that crystallizes as a bright blue crust on ancient Egyptian bronze artefacts, and **andersonite**, a uranium-laced mineral with a fluorescent green or yellow glow that forms on the walls of mine tunnels. The bronze-hued **abhurite** was discovered on the wreck of the *SS Cheerful*, which sank off the coast of England in 1885, and was formed by a chemical reaction between the salt water and the ship's sunken supply of tin ingots. Most of the 208 minerals triggered by humanity came about thanks to mining, while six were found on the walls of smelters, three in a geothermal piping system, and four on prehistoric sacrificial burning sites in the Austrian mountains. Many other new minerals could also be forming in our giant waste dumps, encrusting old batteries and electrical appliances. The list did not include new minerals that have been deliberately synthesized by humans, such as those produced in magnets, batteries, and synthetic gemstones, as the '*true*' definition of a mineral according to the International Mineralogical Association is that it must occur "*naturally.*" "*If you're a geologist who came back 100,000 years or a million or a billion years from now ... you would find amazing mineralogical evidence of a completely different time,*" Hazen said.
https://www.sciencealert.com/an-explosion-of-never-before-seen-minerals-could-mark-the-dawn-of-a-new-geological-epoch

andersonite



Cedar Valley Rocks & Minerals Society's 55th Annual Rocks, Fossils, and Minerals Show

"GEODES: IOWA'S MYSTERIOUS STATE ROCK"

The 2019 Show will be held March 23rd-24th, 2019
at Hawkeye Downs, Cedar Rapids.
Hours are 8:30am to 6:00pm on Saturday March 23, 2019
9:30am to 5:00pm on Sunday March 24, 2019

PROGRAMS
Programs on Theme-Related Topics
Call ahead or check our website for Speakers & Times

DEMONSTRATIONS
Tumbling
Glass Bead Making
Cabbing, Beading
Silversmithing
Flint Knapping
Geode Cracking

PEBBLE PIT FOR KIDS
1¢, 5¢, 10¢, 25¢, & 50¢ Items
$1 Rock & Mineral Kits

HOT FOOD
Hawkeye Downs Concessions

DISPLAYS
Geodes
Minerals
Crystals
Fossils
Amethyst
Crinoids, Artifacts
Petrified Wood
Polished Stones
Spheres, Agates

SILENT AUCTION
Geodes, Minerals, Crystals, etc.

DONATIONS REQUESTED

Adults	$3.00
Students (12-18)	$1.00
Children (Under 12)	Free
Youth Groups (w/adult)	Free

SLUICE FOR MINERALS (Kids & Adults)
MANY ITEMS FOR SALE, INCLUDING:

Books	Fossils	Jewelry	Minerals	Book Ends
Opal	Agates	Carvings	Seashells	Petrified Wood
Slabs	Geodes	Crystals	Tumblers	Lapidary Equip.
Gems	Beads	Spheres	Meteorites	Jewelry Findings

PROFITS GO TO SCHOLARSHIPS
NOT RESPONSIBLE FOR ACCIDENTS

CHILDREN MUST BE ACCOMPANIED BY AN ADULT
ONLY SERVICE DOGS ALLOWED

associated with the Rock Show this Year, CVRMS is Hosting the:

AMERICAN ASSOCIATION OF MINERAL SOCIETIES' NATIONAL SHOW

and the

MIDWEST FEDERATION OF MINERALOGICAL AND GEOLOGICAL SOCIETIES ANNUAL MEETING

March 21-23, 2019 Ramada, Cedar Rapids
see https://www.cedarvalleyrockclub.org/AFMSHome.html for details and registration

Paraiba Tourmaline

In 1989, Brazilian miners discovered a unique and brightly colored variety of tourmaline in the state of Paraiba. The new type of tourmaline, which soon became known as Paraiba tourmaline, came in unusually vivid blues and greens. The gemstone world was captivated from the very beginning by the beauty and "neon glow" of the Paraiba tourmalines. In no time at all they achieved great popularity, and today they are among the most sought-after and most expensive gemstones in the world. It was determined that the element copper was important in the coloration of the stone, resulting in the description of this variety as Cuprian or copper-bearing. Within a very short time, the market absorbed the modest supply of Paraiba tourmaline from Brazil. A recent African discovery from Mozambique has produced beautiful tourmaline colored by copper. This new source produces material which is virtually indistinguishable from Paraiba Tourmaline from Brazil. Paraiba Tourmaline gemstones from Mozambique is often less included and found in larger sizes than the Brazilian variety. Paraiba tourmaline gemstones are excellently suited for wearing and are uncomplicated to care for, since all green tourmalines have a hardness of 7 to 7.5 on the Mohs' scale. Its luster is vitreous, it ranges from transparent to opaque, and is doubly refractive to a high degree. Its cleavage is perfect on the basal plane, breaking with uneven fractures. Tourmaline has a specific gravity of 3.06, a refractive index of 1.624 - 1.644, and birefringence of 0.020. Not only a wide range of colors characterizes this gemstone, Paraiba tourmaline also shows a remarkable dichroism. Depending on the angle of view of a Paraiba tourmaline gemstone, the color will be different or at least show different intensity. The deepest color always appears along the main axis, a fact that the cutter of Paraiba tourmaline has to keep in mind when cutting a Paraiba tourmaline stone. No Tourmaline exactly resembles another one. Paraiba tourmaline gemstones show many faces and are thus excellently suited to match all moods and tempers. It does not come as a surprise then, that ever since ancient days Paraiba tourmaline has been attributed with magical powers. Paraiba tourmaline is supposed to be an especially powerful influence on love and friendship, giving them permanence and stability. In the fascinating world of gemstones, Paraiba tourmaline is very special. Its availability and its glorious, incomparable color spectrum make fancy tourmaline one of our most popular gemstones. We have a large collection of Fine Paraiba Tourmaline Gems to help add beauty, stability and even a little love to your life. Prices for loose Paraiba tourmaline gems continue to climb, and have already reached a level which, earlier on, would not have seemed realistic for a tourmaline. Five-figure prices per carat are by no means exceptional for fine, large Paraiba Tourmaline gemstones.

samples of Paraiba Tourmaline rough

green Paraiba Tourmaline

various colors of Paraiba Tourmaline stones

https://www.ajsgem.com/gemstone-information/paraiba-tourmaline-48.html

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Webmaster	Sharon Sonnleitner (sonnb@aol.com)	396-4016

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 the 2nd 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
Cedar Rapids, IA 52403

CVRMS website:
cedarvalleyrockclub.org

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