Cedar Valley Gems

Cedar Valley Rocks & Minerals Society
Cedar Rapids, Iowa

HTTP://WWW.CEDARVALLEYROCKCLUB.ORG/

CEDAR VALLEY GEMS | NOVEMBER 2016 | VOL. 42, ISSUE 09

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

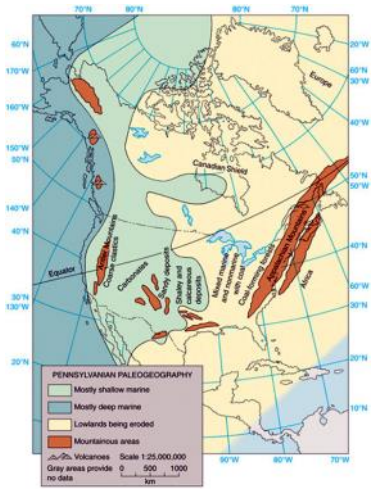
Next CVRMS Meeting Tues. Nov. 15

ANNUAL MEETING – ELECTION (see page 3)

At the NEW Indian Creek Nature Center
5300 Otis Road SE ,Cedar Rapids

Featured Speaker : Dr. Emily Fenzel
The University of Iowa
Dept. of Earth and Environmental Studies
"Using sand grains to identify ancient river systems: an example from the Pennsylvanian strata of Iowa"

During the Pennsylvanian (about 300 million years ago) Iowa lay at tropical latitudes near the equator. A giant river system carried sediments eroded from the mountains to the east, across Iowa, and to a western seaway, whose shoreline was constantly fluctuating in response to glacial ice building and melting on south polar land masses. One part of her research is to better understand movements of sediment in these river systems by studying the paleogeography of eastern North America and its continental-scale drainage patterns. She utilizes zircon grains recovered from these sediments, sampling, processing, and dating the zircons (using U-Pb and Hf isotopes) to identify their source regions. A better understanding of the functioning of the hot house worlds of the past can help us better understand and cope with the hot house world in our near future.



.

Sri Lanka "Island of Gems"

Sri Lanka, formerly known as Ceylon, is an island of about 25,000 square miles in the Indian Ocean just south of India. Sri Lanka and Brazil share the distinction of being the world's richest repositories of gemstones both in quality and variety. Ninety percent of the rocks of the island are of Precambrian age (2,400 million to 560 million years old). Around 25% of the total land area is reported to be gem bearing, with the gems recovered from sedimentary residual and alluvial deposits, metamorphic deposits (skarn and calcium -rich rocks), and rocks of magmatic origin. Sri Lanka boasts over 70 gem varieties. Among these sapphire (blue, yellow and white) and ruby, beryl, chrysoberyl (including alexandrite and cat's eye), garnet (hessonite and pyrope), quartz, spinel, topaz, tourmaline, moonstone and zircon are considered to be its most important gems. Other minerals on the island include gem quality andalusite, axinite, danburite, diopside, ekanite, enstatite, epidote, fibrolite, fluorspar, iolite, kornerupine, monazite, peridote, phenatite, scaprolite, zircon, scheelite, spinel, sinhalite, sphene, and tasffeite. The rich trove of gems in Sri Lanka have a long history. Early recordings in the *Mahavamsa* (127BC) say that Sri Lankan king Devanampiyatissa took many gifts of gemstones to the Emperor Asoka of India. Other notable travelers who commented on the abundancy of precious stones including Roman naturalist Pliny the Elder, Fa-Hien (a 5th century Buddhist monk), Marco Polo in the 13th Century ,Ibn Batuta ,the 14th century Arab traveler, and Robert Knox, the English author who was captured by king of Kandy in 1660. All commented on the vast array of stones, particularly rubies, topaz, and sapphires that decorated necklaces, bracelets and anklets on both humans and animals. About $600 million worth of gemstones are produced in Sri Lanka every year.

CVRMS October Meeting

OCTOBER 18, 2016

Indian Creek Nature Center's Amazing Space Building

•The meeting was called to order at 7:10 pm by Marv Houg. Bill Desmarais then welcomed members to the new "Amazing Space" Indian Creek Nature Center building and thanked John Myers and ICNC staff for allowing us it. Bill suggested we donate rocks, minerals, and fossils for their display drawers. Club members agreed.

•Introduction of new club members and University of Iowa professor and her students.

•Marv questioned last month's minutes stating that "Shock Quartz program" and "Ask Ray Garten" are two separate programs for the 2017 show.

•Motion to accept by A.J./ seconded; motion carried.

•Dale Stout read treasures report; the auction in September, profited the club: $8,655.08.

•Marv mentioned that Clarence Burn's collection was very helpful towards the auction. A quick explanation of the show, in March, and auction, in September, for new members. Jeff Groff also mentioned, that the show and auction, raises $ for UI, and Cornell students, VAST Sci. Center, etc.

•A motion to accept treasure's report by A.J. / seconded; motion carried.

•Bill D. reminded us we have 5 seats left for bus trip to The Field Museum. 5:00 am pick-up in Cedar Rapids and 5:30 am pick-up, at the Clarion Hotel in Iowa City.

Correspondence:

•for auction – Sunday start at same time as Saturday.

Business:

•meetings at NEW Indian Creek Nature Center Nov. 15 & Dec. 13 (Christmas party)

Other Business:

•Klein Quarry field trip – 35 to 40 people attended. Trilobites and crinoids were found. Overall, a very good day.

•Craig Kohl working on flint napping seminar.

•Marv passed around a sign-up sheet for members to bring treats for monthly meetings.

Old business:

•Theme for next year's show "Quartz and Calcite" ? Motion to accept theme by A.J./seconded; motioned carried. Tom Whitlatch reminded us about the 2019 Midwest Federation Show. A final decision needs to made .

New business:

•Rick Austin researched credit card readers for use at the auction. $49.00 (base) + $29.00 (dock) with % of transaction. cards used: VISA, MASTERCARD, DISCOVERY, and one more. Rick to bring this information to board.

Adjournment:

•A motion to adjourn by A. J. / seconded; motion carried.

•Meeting adjourned by 9:35 pm.

respectively submitted
Karen Desmarais, acting secretary

CVRMS Board Meeting

October 25 Board Meeting

7:15 at the Home of Marv & Sue Houg

Present: *President Marv Houg, Dale Stout, Rick Austin, Jay Vavra, Sharon Sonnleitner, Joy Cummings, Bill Desmarais, Ray Anderson, Tom Whitlatch*

AUCTION: Larry Krohn is the only person who has done a contract for the 2017 auction. Other regulars will be contacted. Others who expressed interest are Jeff Vogel and Roy Lester.

MUSEUM FIELD TRIP OCT. 23: Forty-five people attended. Thanks was extended to Bill Desmarais for making the arrangements for the trip, which was deemed a great success. Ray asked people to send him pictures so he can develop a program on the event. The following were suggested as possible future trips: Lazzadro Museum and Wheaton College Geology Exhibit, Milwaukee Public Museum and UW-Milwaukee Greene Museum, Augustana Geology Museum, Des Moines Natural History Museum, and possibly a dig.

JOINT MWF AND AFMS SHOW 2019: Tom recommended we host the 2019 MWF/AFMS show, which includes AFMS meetings on Thursday and MWF meetings on Friday. Possible field trips could include Iowa Hall and Devonian Fossil Gorge. It was agreed we would not rent a bigger space for the show. A motion to host the meeting was made by Ray, seconded by Rick and carried unanimously. It will be voted on at the November meeting. Tom will follow up with J.C. Moore, the MWF show coordinator to confirm that we will host, contingent on membership approval. Ray volunteered to head up a committee to organize the event.

REQUEST FOR SPEAKERS: Several members received an email from a teacher at Metro High School requesting speakers for a Nov 3 field trip to Palisades Park. Ray will follow up.

SHOW: Suggested title for 2017 show is "Calcite & Quartz, Two of Earth's Most Versatile Minerals, Abundant in Iowa." We are ready to update the floor plan and send out contracts soon.

CLARENCE BURNS SCHOLARSHIP: The Board recommended the auction proceeds of nearly $3,000 from the material donated by Clarence Burns be donated as a separate scholarship as Clarence suggested. A motion to donate $2,000 to the University of Iowa and $1,000 to Cornell College as the Clarence Burns Scholarship, in addition to our usual scholarship donations, was made by Dale, seconded by Sharon and approved unanimously.

FLINTKNAPPING: Jay has not been able to get a response from Toby, the flintknapper, so we will go to the next person to try to set up a flintknapping workshop.

IOWA STATE FOSSIL – CRINOID: Ray has talked to a couple people in the legislature, and they told him it is best to get the request to make the crinoid Iowa's state fossil early in the session. *— continued on page 3*

ELECTION OF CVRMS OFFICERS AT NOVEMBER MEETING

The November CVRMS meeting is the ***Annual Meeting*** which means that it is time for members to elect club officers at the November 17 monthly meeting. The nominating committee has suggested retention of the current slate of officers. They includes:

President	Marv Houg
Vice President	Ray Anderson
Treasurer	Dale Stout
Secretary	Dell James
Editor	Ray Anderson
Liaison	Joy Cummings
Director '19	Rick Austin
Webmaster	Sharon Sonnleitner

Anyone interested in serving in one of these offices may enter their name at the November 15 meeting and club members present will vote to elect club officers for 2017.

October 25 Board Meeting — *continued from page 2*

DISPLAY MATERIAL FOR THE NATURE CENTER: Jay suggested we might want to acquire some display material for the Nature Center. The question was raised whether it would be from individuals or groups. Bill will talk to John for more information on what they want. Jay will follow up with Bill.

NOMINATING COMMITTEE: Marv appointed Dale, Jay and Sharon to come up with a slate of officers for election at the November meeting, which is the Annual Meeting.

MISC: It was noted the October program by University of Iowa students was the best student program we have had in a long time.

- We will meet at the Nature Center through December (2nd Tuesday, Dec. 13, for the Holiday party). Dale will check on when the Collins cafeteria will be ready.
- Rick handed out a report on Square for taking credit cards. He will also check on Paypal's device.

A motion to adjourn was made by Ray, seconded by Dale, and carried. Adjourned at 9:45.

Respectfully submitted, **Sharon Sonnleitner**, Acting Secretary

November's Birth Stones

If you were born in November you may choose from 2 birthstones, citrine or topaz

Citrine is a member of the large quartz family (SiO_4), which, with its multitude of colors and structures, offers gemstone lovers almost everything their hearts desire in terms of adornment and decoration, from absolutely clear rock crystal to black onyx. The name *citrine* is derived from its color, the yellow of the lemon (although the most sought-after stones are a clear, radiant yellowish to brownish red). Like all crystal quartzes, the citrine has a hardness of 7 on the Mohs scale and is relatively resistant to scratches. With no cleavage it is also resistant to fracturing. Although citrine's refractive index is relatively low, the yellow stones have a mellow, warm tone that seems to have captured the last glow of autumn. Natural citrines are rare, and most good quality stones are found in Minas Gerais Brazil, Madagascar, and Hasawarka in the Ural mountains of Russia. Most commercial citrines are heat-treated amethyst or smoky quartz.

Topaz ($Al_2SiO_4(F,OH)_2$) is one of the few gem minerals that contains fluorine. The gem can be found in many varieties; colorless, pink, and shades of yellow to sherry-brown are most common, but blue and green-blue stones can resemble aquamarine, and natural red and pink colors are extremely rare. Sherry colored crystals can be heat-treated before cutting, producing pink topaz, a process called "pinking." Its hardness of 8 makes it very resistant to scratching. **Orange topaz**, also known as ***precious topaz***, is the traditional November birthstone (and the state gemstone of Utah), while blue topaz is the birthstone for December. Topaz is commonly associated with silicic igneous rocks (granite and rhyolite.) It typically crystallizes in granitic pegmatites or in vapor cavities in rhyolite lava flows including those at Topaz Mountain in western Utah. The American Golden Topaz is the largest piece of cut yellow topaz in the world. It is sized at 22,892 carats (4.5785 kg) and has 172 -facets (flat-faced cuts applied to gems, in order to help them reflect light.) The gem was cut from a piece of yellow topaz that was 11.8 kg (26 lb) in size, discovered in the Minas Gerais, Brazil. It was donated to the Smithsonian Institute, and put on display in the National Museum of Natural History in Washington, D.C.

Fossils Indicate Early Animals Caused World's First Mass Extinction

The first known mass extinction event, the **end-Ediacaran extinction**, took place 540 million years ago. The earliest life on Earth consisted of microbes, various types of single-celled organisms. These held sway for more than 3 billion years, when the first multicellular organisms evolved. The most successful of these were the Ediacarans, which spread around the globe about 600 million years ago. They were a largely immobile form of marine life shaped like discs and tubes, fronds and quilted mattresses.

Early multi-cell Ediocaran about 600 million years ago.

After 60 million years, evolution gave birth to another major innovation: metazoans, the first animals. Metazoans could move spontaneously and independently at least during some point in their life cycle and sustain themselves by eating other organisms or what other organisms produce. Animals burst onto the scene in a frenzy of diversification that paleontologists have labeled the **Cambrian explosion**, a 25 million-year period when most of the modern animal families, vertebrates, mollusks, arthropods, annelids, sponges and jellyfish, came into being.

"These new species were 'ecological engineers' who changed the environment in ways that made it more and more difficult for the Ediacarans to survive," said Simon Darroch, assistant professor of earth and environmental sciences at Vanderbilt University, who directed the new study described in the paper titled "A mixed Ediacaran-metazoan assemblage from the Zaris Sub-basin, Namibia," published in the journal *Palaeogeography, Palaeoclimatology, Palaeoecology*.

Early Metazoans (animals) from the Burgess Shale about 515 million years ago.

Darroch and his colleagues report that they have found one of the best-preserved examples of a mixed community of Ediacarans and animals, which provides the best evidence of a close ecological association between the two groups.

"Until this, the evidence for an overlapping ecological association between metazoans and soft-bodied Ediacaran organisms was limited," Darroch said. "Here, we describe new fossil localities from southern Namibia that preserve soft-bodied Ediacara biota, enigmatic tubular organisms thought to represent metazoans and vertically oriented metazoan trace fossils. Although the precise identity of the tracemakers remains elusive, the structures bear several striking similarities with a cone-shaped organism called *Conichnus* that has been found in the Cambrian period. With this paper we're narrowing in on causation; we've discovered some new fossil sites that preserve both Ediacara biota and animal fossils (both animal burrows – 'trace fossils' – and the remains of animals themselves) sharing the same communities, which lets us speculate about how these two very different groups of organisms interacted," he said.

https://news.vanderbilt.edu/2016/07/29/newly-discovered-fossils-strengthen-proposition-that-worlds-first-mass-extinction-engineered-by-early-animals/

CVRMS FIELD TRIP TO CHICAGO'S FIELD MUSEUM

On Sunday October 23, 46 CVRMS members and guests got up early to board a bus at 5:00 am for a field trip to Chicago's Field Museum of Natural History. After a 4½-hour ride, including experiencing the excitement of Chicago traffic, they arrived at the museum, on the shore of Lake Michigan. The museum's collections number over 24 million specimens and objects, including the full range of existing biodiversity, gems, meteorites, fossils, as well as rich anthropological collections and cultural artifacts. Every year about 2 million people visit this great museum, on that day it was our opportunity.

A few field trip participants on the bus trip to the Chicago Field Museum

hadrosaur skeleton, these were the only dinosaurs identified from fossils found in Iowa

Craig Kohl shows off the smilodon skull cast from musuem

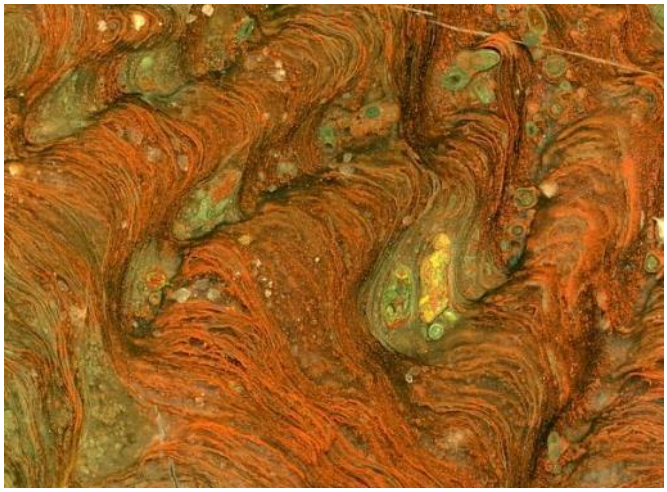
replica of a chariot from the display of "the Terra Cotta Army of China's first Emperor"

skeleton of Sue the *Tyrannosaurus rex*, one of the most famous objects in the museum

Terra cotta statues of Chinese soldiers, without their weapons which had deteriorated

statues of horses drawing a chariot from "the Terra Cotta Army of China's first Emperor"

What in the World?



What in the World is this spectacular treat??
(hint: not tasty pasta dish)

September Photo

Congratulations to those of you who identified last month's photo as an opal, but you only get partial credit unless you recognized it as a Mexican opal, and bonus points if you saw the rutile crystals growing into its base. It is a mystery how exactly this rutilated opal formed. Mexican Opal is volcanic in origin, formed many millions of years ago in volcanic rocks when silica, carried by water along fractures, was deposited in voids left by gas bubbles that formed when the rocks cooled from magma. The silica did not crystallize, but solidified from a gel to form microscopic spheres filled with water that separate light into the spectrum of colors seen in this precious gem. The rutile needles must have grown into the cavity prior to its filling with silica gel.

Rock Calendar

2016

Nov. 15 - CVRMS November meeting
Annual Meeting and Election of Officers
New Nature Center building

Dec. 13 - CVRMS CHRISTMAS PARTY
New Nature Center building

2017

March 25-26 - CVRMS Gem, Mineral, and Fossil Show
"The Wonders of Quartz"
Hawkeye Downs, Cedar Rapids

March 31-April 2—MAPS National Fossil Expo 39
"The Silurian"
Sharpless Auctions Facility, Iowa City

Sept. 16-17—CVRMS Rock Auction
Amana RV Park and Event Center
Amana, Iowa

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, regardless of if it is chosen.

Someone on the Field Museum bus commented: *"a lot of the Russian meteorites were found at the bottom of holes in the snow; they were hot and melted through the snow."* ***I commented,*** *"but meteorites are cold when they land on Earth, maybe since they were black the sun heated them and they melted into the snow"* ***and he replied,*** *"no they were hot when they landed and melted into the snow"*

Rock Doc replied: *When the Chelyabinsk meteorite exploded over Russia in February 2013, it showered rock fragments over the winter landscape below. In the following days, geologists from the nearby Vernadsky institute tracked down 450 fragments, most only 3 to 6 centimeters. At a total mass of 4 kilograms, the fragments account for just 0.02% of the original mass of the meteorite (apparently most of the meteorite was lost through ablation as the atmosphere chipped, scoured, and evaporated material.) Well, I did a little research about the fragments and why they were at the bottom of holes in the snow, and I discovered that we were both partially wrong and partially right. It turns out that scientists at Berlin's Museum für Naturkunde's Institute for Dynamics of Geospheres, and the Planetary Science studied the fragments' interaction with the snow and developed models to investigate their fall. They presented their results in March 2015 at the 46th Lunar and Planetary Science Conference in Texas. They observed that the largest fragments punched through the snow, hitting the frozen ground. The holes' walls contained strangely coarse snow, but otherwise it wasn't particularly noteworthy. But, the little fragments did something strange as they got stuck within the snow. Instead of blasting out a hole or a crater, they burrowed into the snow creating what they called "funneling holes" with the meteorite at the bottom. The walls of these holes had the same strangely coarse snow, creating a "snow carrot" 15 to 25 centimeters deep with the meteorite firmly encased in a shell of dense snow at the base. According to their models, as the fragments hit snow, the fluffy, porous substance was compressed into a funnel-shaped crater with increasing density along the hole's walls, creating the snow carrots. The density increase in the snow of these "carrots" was substantial, up to an 18% increase stretching outward up to 3.4 centimeters from the crater walls. As theoretical models go, theirs appears to be a tidy fit for the field observations of the geologists who collected the many tiny fragments of Chelyabinsk.*

So, although the meteor was very cold in space (a few degrees above absolute zero [–459.67°F]) it was traveling about 45,000 miles per hour. As it encountered the Earth's atmosphere, its outside surface heated up from friction with the air molecules. But that outer layer quickly melted and was swept away by the air streaming past the meteor. So when the shock wave it created built to pressures that caused the meteor to explode, the pieces on the inside were still extremely cold, and remained very cold when they land on Earth. They did create a hole in the snow and were found at the bottom of the hole. But the hole was not melted, it was created because the fragments were moving so fast, faster than just gravity would accelerate them, that when they hit the snow they rapidly compressed and recrystallized it by releasing kinetic energy as they slowed.

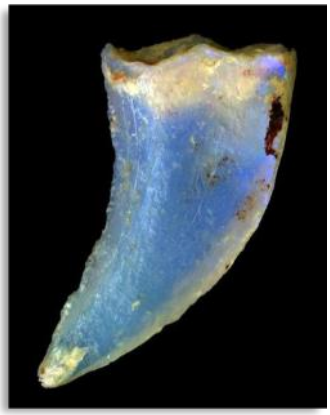
for more information see http://gizmodo.com/when-a-meteorite-hits-snow-it-forms-a-snow-carrot-ins-1692259034

Photo of an excavated compressed "snow carrot" with a hole in the center and a meteorite frozen to its bottom.

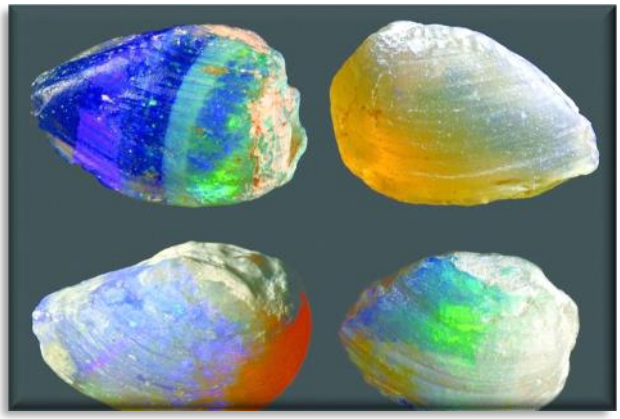
Opalized Dinosaur Bones and Pine Cones from *Lightning Ridge*

Only one place on Earth produces black opal fossils, Lightning Ridge in northern New South Wales, Australia. Lightning Ridge is the only opal field in Australia with fossils of diverse land-living Cretaceous organisms - pinecones and platypuses, microscopic protozoans and gigantic dinosaurs. The fossils are usually exact replicas of plant, shell or bone material, and at times they are comprised of gem quality black opal, which is as valuable as diamonds and more beautiful. Black opal fossils which may be found at Lightning Ridge include remnants of ancient plants, mussels, snails, crustaceans, fish, turtles, plesiosaurs, crocodiles, pterosaurs, dinosaurs, birds, and mammals. 110 million years ago the supercontinent Gondwana was a wilderness of forests of pines, ferns and palms separated by tracts of shallow sea. Dinosaurs and their relatives dominated this landscape, as well as our rare and tiny mammal ancestors. Near the edge of this ancient continent, fragments of the remains of these animals accumulated in the sands of the inland sea. Lightning Ridge fossils are three-dimensional replicas of ancient organic objects, transposed into non-precious potch (colorless opal) or precious opal. In those that are pseudomorphs, the silica has filled a simple cavity or void, like jelly in a mold, so that only the basic shape and perhaps the surface texture is preserved. However, many specimens are replacement fossils, in which intricate internal structures have been preserved by chemical alteration before the cavity was filled by the silica solution. Most specimens at the Ridge are a combination of pseudomorph and replacement fossils. Although the transformation to silica has destroyed biomolecular evidence, marrow tissue, blood vessels, capillaries and nerve channels may be perfectly preserved. If the potch is transparent, these features are clearly visible below the surface in opalized bones. A surprising aspect is the opalization of delicate materials like leaves and even dinosaur skin. Many pieces resemble coprolites, reptilian armor scutes or heavy scales; very occasionally, bone specimens seem to show remnants of tendons or cartilage. This outstanding quality of preservation is partly because the opal-dirt is extremely fine-grained and an ideal casting medium. Kaolinite, smectite, and illite clays produce the putty-like properties of the opal clay, the smectite making it plastic and malleable. Most opal fossils found at the Ridge consist of potch, therefore any fossils with color are rare and valuable. Many fossils are damaged by machinery during excavation, as pick and shovel based operations are giving way to machine-driven excavations. Removing fossil specimens can be a delicate operation, and colorless fossil specimens are largely ignored by miners searching for color.

opalized pine cone



opalized dinosaur tooth



opalized fresh water mussel shells

opalized ammonite

opalized plesiosaur vertebra

http://www.opalsdownunder.com.au/learn-about-opals/advanced/opal-fossils

Mo$t Valuable Gem$tone

Currently, the largest specimen of emerald ever discovered is the Bahia Emerald, a huge mass of emerald crystals embedded in a host rock that weigh the equivalent of 1.9 million carats. Recently, the Bahia Emerald has received an appraisal as high as $900 million, which would make it the most valuable gemstone in the world.

Bahia Emerald as found and trimmed.

However, most people place the value around $400 million. The giant stone was originally discovered in the beryl mines of western Bahia State, Brazil, on July 9, 2001. After being smuggled to the United States, the stone was eventually moved to New Orleans. Hurricane Katrina left the Bahia Emerald submersed under 16 feet of water for two months, before it could be retrieved. The enormous block of emeralds was then stolen by a gem dealer in Las Vegas. It was eventually recovered by the Los Angeles Sheriff's Department after a large search operation. According to some reports, the Bahia Emerald was involved in a $197 million banking transaction with Bernard Madoff before he was arrested. Eventually eight people stepped forward to claim ownership of the emerald. One man says he paid $60,000 to a collection of Brazilian miners for the gemstone, another says he gave up $1.3 million in diamonds for the emerald. The ensuing court battle for the Bahia Emerald became one of the largest custody lawsuits in California history. After a series of legal actions to determine the emerald ownership, Judge John Kronstadt announced that he would hear the case, but no official ruling has been made yet. If nobody is proven to be the owner, it remains unclear what will happen to the huge gem.

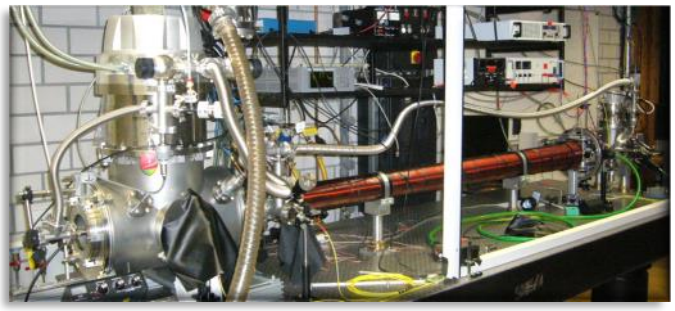
Greenland ice is melting 7% faster than previously thought

The same hotspot in Earth's mantle that feeds Iceland's active volcanoes has been playing a trick on the scientists who are trying to measure how much ice is melting on nearby Greenland. A new study in the journal *Science Advances*, determined that the hotspot softened the mantle rock beneath Greenland in a way that ultimately distorted their calculations for ice loss in the Greenland ice sheet. This caused them to underestimate the melting by about 20 gigatons (20 billion metric tons) per year. That means Greenland did not lose about 2,500 gigatons of ice from 2003-2013 as scientists previously thought, but nearly 2,700 gigatons instead, a 7.6 percent difference. It doesn't change estimates of the total mass loss all over Greenland by that much, but it increases our understanding of where within the ice sheet that loss has happened, and where it is happening now. Plate tectonic movement caused parts of Greenland to pass over the Iceland hot spot about 40 million years ago. The hotspot softened the rock in its wake, lowering the viscosity of the mantle rocks along its path deep below the surface of Greenland's east coast. During the last ice age, Greenland's ice sheet was much larger than now, and its enormous weight caused Greenland's crust to slowly sink into the softened mantle rock below. When large parts of the ice sheet melted at the end of the ice age, the weight of the ice sheet decreased, and the crust began to rebound. It is still rising, as mantle rock continues to flow inwards and upwards beneath Greenland. The existence of mantle flow beneath Greenland is not a surprise in itself. When the Gravity Recovery and Climate Experiment (GRACE) satellites began measuring gravity signals around the world in 2002, scientists knew they would have to separate mass flow beneath the earth's crust from changes in the mass of the overlying ice sheet. GRACE measures mass, period. It cannot tell the difference between ice mass and rock mass. So, inferring the ice mass change from the total mass change requires a model of all the mass flows within the earth. If that model is wrong, so is the ice mass change inferred from GRACE. Models of this rock flow depend on what researchers can glean about the viscosity of the mantle. The original models assumed a fairly typical mantle viscosity, but Greenland's close encounter with the Iceland hot spot greatly changed the picture. This understanding of the crustal systems will lead to better-informed projections of ice melt and sea level rise, and it will have big implications for measuring ice loss elsewhere in the world.

https://news.osu.edu/news/2016/09/21/magmaice/

Krypton Age Dating

Unlike *kryptonite*, the imaginary glowing green mineral that holds Superman at bay, krypton (**Kr** - element 36) is a colorless, odorless, tasteless noble gas. Krypton occurs in trace amounts in the atmosphere (for every krypton atom 685 000 nitrogen molecules). Krypton has 37 isotopes (only 6 stable) including unstable Kr-81 that is produced when cosmic rays strike the atmosphere. Kr-81 decays very slowly, and a stable isotope, Kr-83, does not decay. Comparing the proportion of stable-to-radioactive isotopes provides an age, much like techniques used for C-14 or radiocarbon dating. However, Kr-81 has a half-life of around 230,000 years (compared to C-14 half-life about 5,730 years). So where C-14 dating is only accurate within the past 60,000 years, Kr-81 can provide accurate ages back to 1.5 million years. The Kr-81 dating technique is only possible since the development of ***atom trap trace analysis*** (ATTA), developed at the Argonne National



Atom Trap Trace Analysis equipment at the Kirchhoff Institute for Physics, University of Heidelberg

Laboratory near Chicago in 2011. The technique has recently been used by researchers who successfully identified the age of 120,000-year-old Antarctic ice. They should be able to locate and date ice that is more than a million years old, allowing them to reconstruct the climate much farther back into Earth's history, and potentially understand the mechanisms that have triggered the planet's multiple shifts into and out of ice ages. Other researchers are trying to understand the climate transition that occurred 1.2 million years to 900,000 years ago, the *Mid Pleistocene Transition,* an important and enigmatic time interval when the Earth's climate cycles (between times of warming and ice ages) changed from about 41 thousand years before the transition to about 100 thousand years after. The reason for this change is not known. Krypton age dating will help scientists fill in the gap in our knowledge of the history of the Earth's climate and its fluctuations.

Bacteria in Fracked Wells

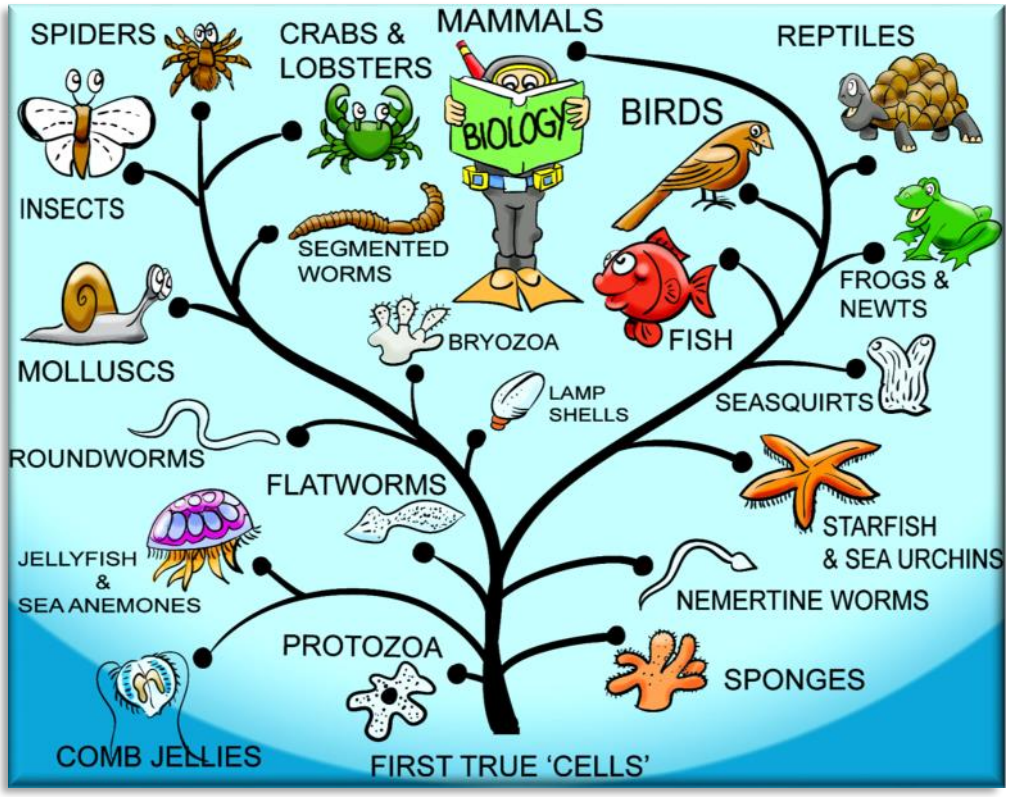
Scientists have discovered that microbes actually consume some of the chemical ingredients commonly used in the fracking process, creating new compounds which in turn support microbial communities below ground. The process allows the microbes to survive in very harsh environments that include very high temperatures, pressures, and salinity. By studying samples from hydraulically fractured wells in Pennsylvania and

microbes inside a fracking well.

Ohio, scientists have begun to understand the complex interactions among microbes -- important for understanding the planet's environment and subsurface. The findings also help scientists understand what is happening in fracking wells and could offer insight into processes such as corrosion. The team studied microbes in fracking fluid from more than a mile and a half below the ground surface, measuring the metabolic byproducts excreted by the microbes, which can tell scientists what compounds the microbes are producing, where they are drawing energy from, and what they need to stay alive. The team found that fractured shales contained similar microbial communities even though they came from wells hundreds of miles apart in different kinds of shale formations. The complex mix, with some microbes producing compounds that others use or feed upon, produces some interesting outcomes. One particularly interesting compound, glycine betaine, is what allows the microbes to thrive by protecting them against the high salinity found in the wells. Other microbes can subsequently degrade the compound to generate more food for the bacteria that produce methane. Yet another process may produce substances that contribute to the corrosion of the steel infrastructure in wells. The scientists even discovered a new strain of bacteria inside the wells, dubbed "Frackibacter." Understanding microbial action is central to how much carbon enters Earth's atmosphere and for understanding how chemicals in the ground change and move. The study highlights the resilience of microbial life to adapt to and colonize a habitat structured by physical and chemical features very different from their origin.

Evolution stuck in slime for billions of years

Researchers are providing a new explanation as to why life remained as little more than slime for billions of years, before rapidly diversifying in the *'Cambrian explosion of life'*. Using a new technology originally developed for mineral exploration, the team has shown how varying levels of oxygen and biologically-important elements in the ancient oceans might have triggered the major evolutionary events that led to us here today. Researchers have identified ancient conditions that almost ended life on Earth, using a new technique they developed to hunt for mineral deposits. The first life developed in the ancient oceans around 3.6 billion years ago, but then nothing much happened. Life remained as little more than a layer of slime for 3 billion years. Suddenly, 550 million years ago, evolution burst back into action -- and here we are today. S o what was the hold-up during those boring billions of years? According to geologists the key was a lack of oxygen and nutrient elements, which placed evolution in a precarious position. During those 3 billion years, oxygen levels declined and the oceans were losing the ingredients needed for life to develop into more complex organisms. By analyzing ancient seafloor rocks, scientists were able to show that the slowdown in evolution was tightly linked to low levels of oxygen and biologically-important elements in the oceans. They looked at thousands of samples of the mineral pyrite in rocks that formed in the ancient oceans. By measuring the levels of certain trace elements in the pyrite using newly developed techniques they were able to more accurately determine how much oxygen and nutrients were around billions of years ago. Their research was published in the March 2015 issue of the journal *Earth and Planetary Science Letters*. They were initially looking at oxygen levels in the ancient oceans and atmosphere to understand how mineral deposits formed and where to look for them today. But the technology that they developed to find minerals can also tell us much about the evolution of life. After an initial burst of oxygen, the study plots a long decline in oxygen levels during the 3 billion years before leaping up about 750-550 million years ago. They concluded that this recovery of oxygen levels led to a significant increase in trace metals in the ocean and triggered the *'Cambrian explosion of life'*. Researchers will be doing much more with this technology, but it's already becoming clear that there have been many fluctuations in trace metal levels over the millennia and these may help us understand a host of events including the emergence of life, fish, plants and dinosaurs, mass extinctions, and the development of seafloor gold and other ore deposits. https://www.sciencedaily.com/releases/2014/02/140218143318.htm



Officers, Directors, and Committee Chairs

CEDAR VALLEY ROCKS & MINERAL SOCIETY

President	Marv Houg (m_houg@yahoo.com)	364-2868
Vice President.	Ray Anderson (rockdoc.anderson@gmail.com)	337-2798
Treasurer	Dale Stout (dhstout55@aol.com)	365-7798
Secretary	Dell James (cycladelics@msn.com)	446-7591
Editor	Ray Anderson (rockdoc.anderson@gmail.com)	337-2798
Liaison	Joy Cummings (joybelle28@live.com)	981-2482
Imm. Past Pres.	Sharon Sonnleitner (sonnb@aol.com)	396-4016
Director '17	Jay Vavra (vavrajj@gmail.com)	447-9288
Director '18	Bill Desmarais (desmarais_3@msn.com)	365-0612
Director '19	Rick Austin (rcausting@gmail.com)	361-5410
Sunshine	Dolores Slade (doloresdslade@aol.com)	351-5559
Hospitality	Jeff Kahl	455-2201
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 7:00 p.m., temporarily at a location to be announced. The December meeting is a Christmas dinner held near the usual meeting night. June, July, and August meetings are potlucks held at 6:30 p.m. at area parks on the 3rd Tuesday of each month.

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

Ray Anderson, Editor
2155 Prairie du Chien Rd. NE
Iowa City, Iowa 52240-9620