Cedar Valley Gems

Cedar Valley Rocks & Minerals Society

Cedar Rapids, Iowa

CEDAR VALLEY GEMS **FEBRUARY 2017** **VOL. 43, ISSUE 2**

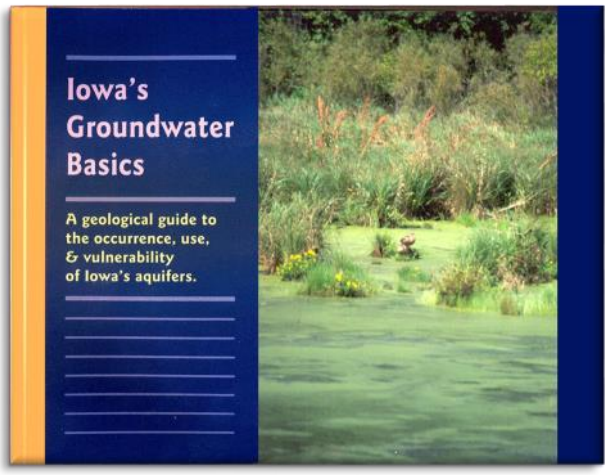
Ray Anderson, Editor: rockdoc.anderson@gmail.com

Next CVRMS Meeting Tues. February 21

meeting at the Fairfax Library
313 Vanderbilt St. – Fairfax

Featured Speaker : **Dr. Ray Anderson**
Cedar Valley Rocks and Minerals Society
"Iowa's Groundwater Basics"

As the world's population continues to grow above 6 billion people, a shortage of potable water in many areas is posing an increasing threat to social and political order. In most areas of Iowa we are blessed with sufficient quantities of good-quality water, but this resource is under threat. In this presentation Ray will concentrate on groundwater, reviewing ***Iowa's Groundwater***



Resources, their quality and distribution, and the threats to their continuing usefulness. He will describe the various subsurface aquifers, how they function, and how we obtain water from them. He will also describe some of the programs that are helping to protect this critical resource. Those attending the lecture will receive a printed copy of "***Iowa's Groundwater Basics***."

For all you Harry Potter fans, you may now have a favorite dinosaur, named in honor of **Draco Malfoy** and the **Hogwarts School of Witchcraft and Wizardry.** The *Dracorex hogwartsia* is known from one nearly complete skull and other fragments. It was discovered in the Hell Creek Formation in South Dakota by three inexperienced paleontologists and donated to the Children's Museum of Indianapolis in 2004 for study. It wasn't until 2006 that the dinosaur was officially named the *Dracorex* by Bob Bakker and Robert Sullivan. However Jack Horner, a renowned paleontologist studied the dinosaur and concluded that it was a juvenile pachycephalosaurus. This, however, is difficult to determine due to the fact that many pachycephalosaurs do not develop full head features, like the bone dome, until they are older. It resembled the modern vision of a dragon with its flat head, long snout, and spikes sticking out the back of its head. Its name was inspired by the young visitors to the Children's Museum of Indianapolis and by the Harry Potter book series by J. K. Rowling.

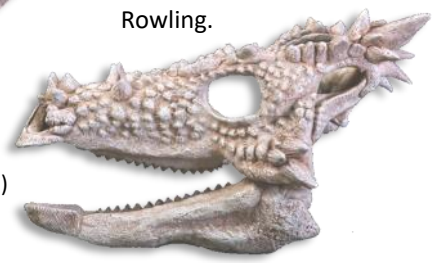


Photo of the fossil skull of *Dracorex hogwartsia* (above) and artist's reconstruction (right)

"I am absolutely thrilled to think that Hogwarts has made a small claw mark upon the fascinating world of dinosaurs. I happen to known more on the subject of paleontology than many might credit, because my eldest daughter was Utahraptor obsessed and I am now living with a passionate Tyrannosaurus rex lover, aged three. My credibility has soared within my science-loving family, and I am very much looking forward to reading Dr. Bakker's paper describing 'my' dinosaur, which I can't help visualizing as a slightly less pyromaniac Hungarian Horntail." —J.K. Rowling

http://scienceviews.com/dinosaurs/dracorex.html

CVRMS Board Meeting

December 20 Board Meeting

Present: Rick Austin, President Marv Houg, Dale Stout, Ray Anderson, Jay Vavra, Bill Desmarais, Sharon Sonnleitner.

Order: called by Marv at 7:20 pm at the home of Marv & Sue Houg.

SHOW March 25-26: All the dealer contracts are in except Roger Wolfe and the South Dakota agate dealer. Marv will check with Roger, and the SD dealer will send his contract when he gets back from Tucson. Marv has security arranged and noted the price went from $43 to $49/hr., due to insurance. Bill moved that we increase the security an hour each day: from 9:00 to 5:30 on Saturday and from 10:00 to 4:30 on Sunday. Rick seconded; carried unanimously. Decided to put signs on the back doors of the hall saying "***No Admittance from these Doors.***"

Marv has the catered dinner arranged with Hy Vee: ½ chicken & ½ roast beef, party potatoes, 6-layer salad, baked beans, roll & butter, table service. Price was not yet available.

Advertising: Marv looked into TV ads. Prices varied greatly for 30-second ads: from $15 between 4:00-5:00 am to $500 during the 6:00 and 10:00 news; $400 between 6:00 & 7:00 am. Also available are 15 seconds on both sides of a 30-second ad at 65% of the rate and 10-second ads at ½ the rate. Following discussion about how many new people each ad would have to bring in to pay for itself, among other things, it was decided to wait at least a year when we could compare the results from consecutive Shows held in the same months. Marv checked on stickers on the front of the Gazette. The cost is $45/1000 in Linn County, (circulation is 25,000). For various reasons, we decided not to pursue stickers. We will concentrate advertising on Free Radio, TV and web spots; Ray will write an article with background information to give to the Gazette; and we will put a larger ad than usual in the Gazette.

Programs: Bill's program for kids will be titled, "Calcite & Quartz, Hands-On Demonstration Lecture; Especially for Upper Elementary to Middle School Students." He is planning a short slide show, followed by kids rotating through 5 stations. Ray is working on other programs. The program schedule will be Saturday at 10:30 (Bill), 12:00, 2:00, and 3:30 and Sunday at 11:30, 12:30 (Bill) and 2:30.

Raffle: Marv reported prizes: ZRS – Amethyst Cathedral or Trilobite, Gary Peavy –possibly Amethyst Cathedral, Dave Malm –possible Canadian Amethyst, Marv –set of Geodes, Jack Neuzil –Wooden Dinosaur, Club – Box of Mineral Spec. Dale will get the gambling license.

Most dealers have their tax IDs, as required by new Iowa law.

Displays: Rick suggested displays of opals and industrial uses of quartz and calcite. Other suggestions are in the December Board minutes.

MSHA: The following meeting rooms will be check out for the MSHA training: Fairfax Legion – Sharon, Cherry Building – Jay, PCI & Building near Carlos O'Kelly's – Dale.

MISC.: Ray asked about continuing the ads from members that ran in the newsletter before Christmas. It was decided to put ads just on the website except around Christmas and put a disclaimer that we do not endorse any of the sellers. This month, auction contracts were received from Sandy Brandl and Wes Greenfield. Bill will poll the group next meeting to see if people could go on the club-sponsored fall bus trip on a Saturday instead of a Sunday.

Adjourned: at 9:30 pm.

Respectfully submitted, Sharon Sonnleitner, Acting Secretary

CVRMS Jan. 17 Meeting

Meeting held at new Fairfax Library
Call to order at 7:10 p.m. by Marv Houg, President

Introduction of new members, guests: Scott Cleppe

Minutes of previous meeting reviewed: Motion to accept by Sherri and 2nd by AJ. Minutes accepted as written.

Treasurer's Report: Dale gave treasurer's report, Checking balance at $23,142.32 Motion to accept by Bill, second by Sherri . Report accepted.

Correspondence: A thank you note from Cornell regarding the additional funds from the Clarence Burns award was available for reading. Marv will send copy to Ray to publish in newsletter.

Monthly Program: Dr.Emily Walsh "*Pressure-temperature histories of lower-crystal rock exposed in Arizona*" A question and answer period followed.

Door Prize: Dell James won and asked that another name be drawn. Kim Kleckner won.

New Business

Show Report: Marv will have signup sheets at next meeting for volunteers and displays. Contact Sharon if you need a display case with sizes etc. Catered dinner on Saturday at 6:15 p.m. More info on price and signup available at next meeting. Club will supply drinks and desserts. Pot luck dinner for dealers on Friday. Egg cartons need to be filled. Sharon will host a" fill the carton day" on February 25 at her home. Let her know if you are interested and if you have some material that would be appropriate for the egg cartons.

Old Business

MSHA training will be held on Thursday before the show. There will be a program at 2 p.m and a repeat at 6 p.m. Location is yet to be announced. Fee will be $10 and Marv will have signup sheet.

Field trips: Bill Desmarais reported on his research regarding another field trip similar to the Chicago Field museum. Some possibilities included various places like the Milwaukee Public Museum, Lizzadro Museum. Anyone with suggestions should contact Bill and he will work on it with a date sometime in the fall.

Other Business

No other business.

Adjournment

Motion to adjourn by AJ, second by Bill. Motion passed. Meeting adjourned at 9:15 p.m.

Respectively submitted,
Dell James, Secretary

what is "Ruby in Fuchsite"?

What is Fuchsite?

Fuchsite (pronounced fuke'-site) is a green variety of muscovite mica. It differs from most other muscovite by having a variable amount of trivalent chromium substituting for aluminum within the mineral. Chromium is the source of fuchsite's green color. Fuchsite is found in phyllites and schists in metamorphic rocks of the greenschist facies. In most instances it occurs as tiny grains scattered through the rock mass, but occasionally rocks composed almost entirely of fuchsite are found. These green fuchsite-rich rocks are known as "verdite."

Occasionally, corundum crystals are found in fuchsite. When these corundum crystals are of a bright red color, the material is known as ruby in fuchsite. This material attracts a lot of attention at rock, mineral, gem, and lapidary shows because of the contrasting colors of the fuchsite and ruby, and because the corundum crystals often exhibit spectacular hexagonal shapes when cut in slabs, cabochons, spheres, and other objects. As seen below it can also be carved into intricate designs.

Ruby in Fuchsite: Photo of a ruby-in-fuchsite cabochon with a rim of blue kyanite and white muscovite around the red ruby crystal. This blue kyanite rim is diagnostic of ruby in fuchsite and can be used to avoid misidentification as ruby in zoisite. This cabochon is about 1 inch in height.

Carved Ruby in Fuchsite: A pendant carved from ruby in fuchsite in which the artist took advantage of the red rubies to produce flowers. Blue kyanite alteration and white muscovite rims can be seen.

http://geology.com/minerals/fuchsite.shtml

Spotlight Gemstones: Amethyst

February's Birth Stone

February's birthstone, Amethyst, is the purple variety of the mineral Quartz, and is its most famous and valuable gem variety. Quartz in other colors includes gemstones such as Citrine, Rose Quartz, and Smoky Quartz. The purple of Amethyst is most often caused by iron impurities, though it can also be colored by natural radiation exposure. Amethyst is sometimes heat treated to deepen the color, or to transform it into Citrine. Some forms of Amethyst may also change to a light green color upon heat treatment (called Prasiolite or "Green Amethyst"). Amethyst is mined in many locations, some of which produce distinct color styles. For example, Amethyst from Uruguay has a deep purplish-blue color, as does Amethyst from Arizona. Amethyst from deposits that have since been exhausted in Russia, is known as "Siberian Amethyst", a very deeply reddish and bluish colored stone which commands a high price. African Amethyst is generally more deeply colored than the South American variety. Some Amethyst from a few locations may slightly fade in color upon prolonged exposure to light. The color distribution of Amethyst is sometimes uneven, and this is often taken into account when cutting a stone. Due to the abundance of Amethyst, it is usually clean and free of flaws or inclusions. Because of this, Amethyst with any visible flaws or inclusions should be avoided. Amethyst can occur in huge flawless crystals, and gems of all sizes have been faceted. Amethyst is sometimes heat treated to deepen the purple color and transform lighter colored stones into deeper hues. More often though, Amethyst is heat treated to produce Citrine and the green Quartz known as Prasiolite. Although Amethyst sources are abundant, synthetic Amethyst gems are also produced using the hydrothermal method. A natural mixture of purple Amethyst and golden Citrine has been coined with the trade name "Ametrine". Amethyst is faceted into many cuts, and is used in all forms of jewelry including rings, necklaces, earrings, bracelets, and pendants. Many large gems weighing several hundred carats have been cut from Amethyst. Ornamental objects are occasionally also carved from large pieces. Lower quality Amethyst is an important bead gem and can also be cut into cabochons. Tumbled beads of purple Amethyst mixed with white Quartz are also used as necklaces and bracelets.

http://www.minerals.net/gemstone/amethyst_gemstone.aspx

Fossils of giant pterosaurs found in Transylvania

A pair of researchers in the U.K. has identified fossils found in the Transylvania area in Romania as those of a pterosaur they have named *Hatzegopteryx*, a giant, muscle-bound flying reptile that could eat prey as large as a small horse. In their paper published in the journal *Peer*, Mark Witton with Portsmouth University and Darren Naish, with the University of Southampton describe the fossils and what they believe the creature looked like when it was alive. Fossil remains of pterosaur types have been found at many sites around the world—they usually had long necks and legs and were capable of eating prey as big as a modern rat. They have also been known to vary quite dramatically in size, from that of a jet fighter to a simple modern sparrow. *Hatzegopteryx* is quite different, though, the researchers point out, having a short, thick neck with extremely wide bones and a spongy filling which added even more strength. It also had a much wider mouth than others in the pterosaur family, allowing it to take down and swallow much larger prey. The fossils found thus far suggest that the creature was likely stocky in general with strong wing, and back and leg muscles possibly weighing as much as a quarter-ton. The fossils were dated to the late Cretaceous (approximately 70 million years ago) and were found in a part of Romania that scientists believe was once part of Hateg Island in the Tethys Sea. Prior digging in the area has turned up fossils of dwarf dinosaurs and a type of ancient, long-necked horse—but no big teeth suggesting anything larger. That suggests that *Hatzegopteryx* was likely the dominant predator on the island, able to swoop down and grab young dinosaurs or a horse at will without fear of being attacked by something bigger or stronger. Because large predatory theropods are unknown on Late Cretaceous Haţeg Island, scientists have not yet agreed on the evolutionary history of the pterosaur—many believe that they are related to modern crocodiles and ancient dinosaurs, and should therefore belong to the group archosaurs, but that cannot happen until more evidence is found, leading to a consensus.

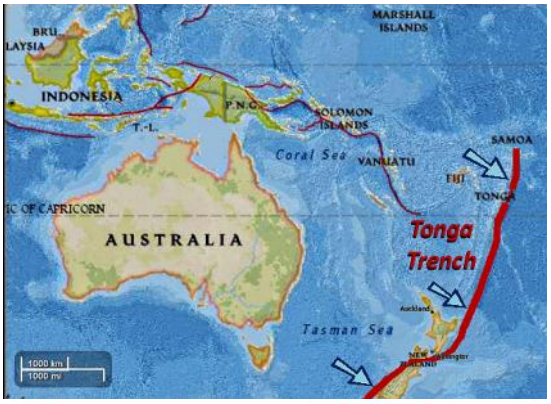
Two giant, long-necked azhdarchids, the Maastrichtian species *Arambourgiania philadelphiae*, argue over a small theropod.

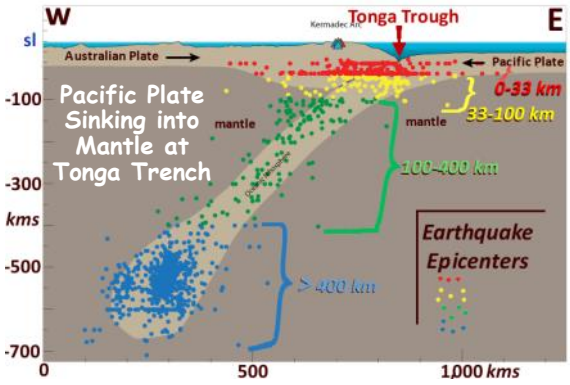
The similarly sized but more powerful Maastrichtian, Transylvanian giant azhdarchid pterosaur *Hatzegopteryx* sp. preys on the rhabdodontid iguanodontian *Zalmoxes*. Because large predatory theropods are unknown on Late Cretaceous Haţeg Island, giant azhdarchids may have played a key role as terrestrial predators in this community

https://phys.org/news/2017-01-fossils-giant-pterosaurs-transylvania.html

Release of water shakes Pacific plate

Tonga is a seismologists' paradise. The subduction zone off the east coast of the archipelago racks up more intermediate-depth and deep earthquakes than any other subduction zone (where one plate of Earth's lithosphere dives under another) on the planet. That swarm of earthquakes is catnip for seismologists because they still don't understand what causes earthquakes at such great depths. Below about 40 miles, the enormous heat and pressure in Earth's interior should keep rock soft and pliable, more inclined to ooze than to snap. So triggering an earthquake at depth should be like getting molasses to shatter. Seismologists from Washington University, Scripps Institution of Oceanography, and Carnegie Institution for Science analyzed the data from 671 earthquakes that occurred between 30 and 280 miles beneath Earth's surface where the Pacific Plate dives below the Australian plate along the Tonga Trench. Analyzing data from several seismic surveys with both ocean bottom seismometers and island-based seismic stations, they were surprised to find a zone of intense earthquake activity deep in the down-going slab. The pattern of the activity along the slab provided strong evidence that the earthquakes are sparked by the sudden release of water when the slab heats up enough to force hydrated minerals to decompose and give off their water. The pressure produced by these fluids causes earthquakes in the same way that wastewater injected into deep wells causes quakes in Oklahoma. The Tonga Trench has been well studied by seismologists since early American scientists, invited to investigate the *"grumbling earth"* by the King of Tonga, got their first clear glimpse of a subduction zone in action. The classic paper that Isacks, Oliver and Sykes published in 1968 led to the acceptance of the then speculative theory of plate tectonics. In 1985 a Japanese seismologist discovered that the slab descending in the Tonga Trench has a double seismic zone. One is in the top part of the slab where it fractures as it bends down, the other is deep in the mantle. The Tonga subduction zone is a great natural laboratory because its characteristics are so extreme. The ocean floor taking the dive there is older and colder than most other subducting slabs. It is also moving very fast., up to 9" a year," (the San Andreas Fault moves 2" a year). Also, the subducting slab isn't descending into the trench at uniform speed, but going down much faster at the northern end of the trench than at the southern end. This means that the slab heats up at different rates along its length. This is a perfect setup for studying temperature-dependent phenomenon. *Why the sudden burst of earthquakes as the slab descended?* The telling clue was that the burst angled upward from north to south along the slab. The faster the slab was moving, the deeper the earthquakes, and the slower the slab, the shallower the earthquakes. The angled seismic belt told the scientists that the mechanism triggering earthquakes was temperature sensitive. The earthquakes occur in the mantle when the down-going slab gets hot enough to release its water. The seismicity changed with depth in a way that correlated with the subduction rate and the slab temperature. *But where does the water come from, and why is it released suddenly?* The interior of the Pacific plate is exposed to seawater as the plate is pulled under the Tonga Plate and faults open on its upper surface. The seawater reacts with the rock to form hydrous minerals (minerals that include water in their crystal structure) in the serpentine family. The most abundant of these serpentine minerals is a green stone called antigorite. But as the slab descends and the temperature and pressure increases, these hydrous minerals become unstable and break down through dehydration reactions. Their sudden release of large amounts of water is what triggers the earthquakes. The temperatures calculated in the earthquake locations strongly suggest that minerals dehydrate very deep in the Tonga subduction zone. The "phase diagrams" for antigorite dehydration reactions compares neatly with the pressure and temperature of the slab at the seismic belt. The most exciting part of the research is the evidence of water 180 miles beneath the surface. We currently don't know how much water gets to the deep Earth or how deep the water reaches. In other words, we don't know how much water is stored in the mantle, which is a key factor for Earth's water budget. The water down there may be as important to us as the water up here. It is beginning to look like water is the lubricant that oils the machine that recycles Earth's crust. The Tonga dataset is a great treasure chest that we'll be exploiting for many years to come; Tonga has many more stories to tell us about Earth's interior. https://www.sciencedaily.com/releases/2017/01/170111151428.htm





What in the World?

What in the World is this beautiful sphere made from?

January Photo

artisit's reconstruction of *Anomalocaris*

Last month's photo was a slab bearing an impression of *Anomalocaris,* a fossil from the "Cambrian explosion" fauna discovered in the Burgess Shale of British Columbia, Canada, (seen in the background). *Anomalocaris* is an extinct genus of anomalocaridid, a family of animals thought to be closely related to ancestral arthropods. The animal lived in the early to middle Cambrian (~550-530 million years ago) and was quite cosmopolitan, having been found in rocks from Canada, China, Utah, and Australia.

Help ! **We need additional displays for the March 25-26 CVRMS Gem, Mineral, and Fossil Show. The show topic is *"Calcite and Quartz,"* but we can use any display of rocks or fossils that visitors would enjoy viewing. We have a variety of display cases available if needed. If you have materials to display please contact Marv Houg at 364-2868 or m_houg@yahoo.com.**

Rock Calendar 2017

CVRMS Events of Interest

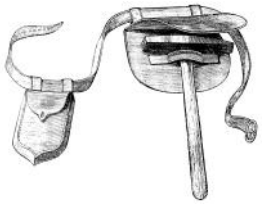
February 21 - CVRMS Monthly Meeting
Fairfax Library
313 Vanderbilt St. - Fairfax

March 21 - CVRMS Monthly Meeting
Fairfax Library
313 Vanderbilt St. - Fairfax

March 25-26 - CVRMS Gem, Mineral, and Fossil Show
"Calcite and Quartz, Two of Earth's Most Versatile Minerals Abundant in Iowa"
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.

***Rona asked**: "The theme of your Rock Show includes Quartz, and you told me Opal was Quartz. Why is Opal with its brilliant play of colors so different from other types of Quartz??*

***Rock Doc replied**:* Great question, Rona. Quartz is one of the most common minerals in the Earth's crust. The mineral name, quartz, refers to a specific chemical compound (silicon dioxide, or silica, SiO_2), having a specific crystalline form (hexagonal). It is found in all major classes of rocks; igneous, metamorphic and sedimentary. Opal is hydrated quartz ($SiO_2 \cdot nH_2O$) but is usually not considered a mineral because it is amorphous (no crystal structure). However, because it has some degree of homogeneity, it is called a *mineraloid*. There are many forms of opals, but all are composed of layers of very small quartz spheres displaying various degrees of order. Most people associate the term opal with *precious opal*, valued for its strong opalescence (a vivid play of rainbow colors) in a translucent body. Precious opal is amorphous, made of corner bonded tetrahedral SiO_4 molecules with water filling the voids between (see **Figure 1**). They form in silica gels from the dissolved shells of silicious microorganisms that accumulate on the sea floor. These tetrahedrons group together creating tiny spheres which align in ordered layers in precious opal (see **Figure 2**). These spheres are all the same size, about the same as the wavelength of light (approximately 100 – 500 nm) and are stacked regularly. Because water and silica have different refractory indices, they act like a diffraction grating, refracting incident light, in an opalescent play of colors (see **Figures 3 and 4**). If the opal is fractured or dried and the water in the voids is lost, the opalescence and the colors may also vanish.

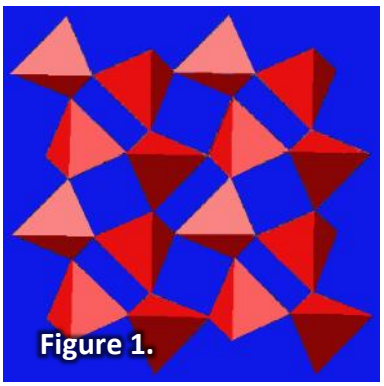


Figure 1.

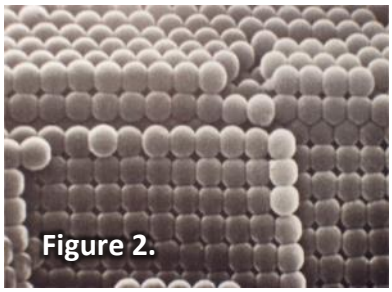
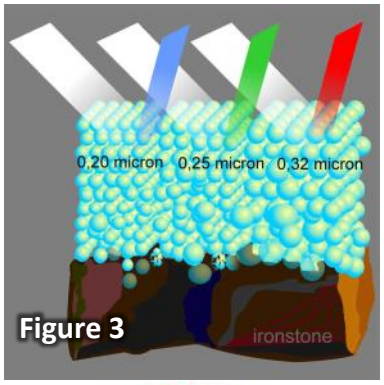


Figure 2.



There are two variants of precious opal. white opal and black opal, the first with a white body color, the latter being colored by black inclusions of carbon compounds, but still with strong opalescence. Black opal is considered as one of the most precious stones.

Although the gem varieties are rare, opal in other forms is fairly common in many low-temperature environments. Opal forms from silica rich watery solutions and, very similar to chalcedony, watery silica gels. It can be found in cracks of silica rich volcanic rocks, but also in sedimentary rocks. In volcanic rocks it may form on rock walls from silica transported with water steam. Most opal is of biogenic origin.

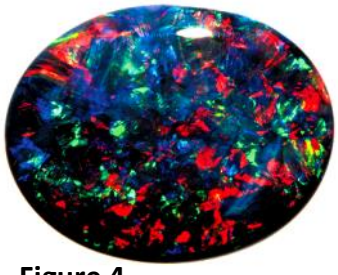


Figure 4

Figure 1. Silica tetrahedrons join at the corners in an aqeous silica gel.

Figure 2. The joined tetrahedrons form spheres of uniform size that stack in ordered layers in precious opal, as seen by a scanning electron microscope.

Figure 3. Incident white light is split into spectral colors and refracted by the contrasting indexes of refractions of the quartz and water.

Figure 4. A cabochon of precious black opal displaying the play of refracted colors.

Some unique marine life that was discovered around hydrothermal vents at a place called Longqi ('Dragon's Breath'), 1200 miles southeast of Madagascar, was recently described in the journal *Scientific Reports*. A research team, led by Dr. Jon Copley, explored an area the size of a football stadium on the ocean floor, pinpointing the locations of more than a dozen mineral spires known as 'vent chimneys'. These spires, many of which rise more than two stories above the seabed, are rich in copper and gold that is now attracting interest for future seafloor mining. However, the spires are also festooned with deep-sea animals, nourished by hot fluids gushing out of the vent chimneys. The team, which includes colleagues at the Natural History Museum in London and Newcastle University, carried out genetic comparisons with other species and populations elsewhere to show that several species at Longqi are not yet recorded from anywhere else in the world's oceans. The expedition, which took place in November 2011 in an area that was licensed for mineral exploration by the International Seabed Authority of the United Nations, was tasked with providing a record of life on the ocean floor in the area before any mining surveys were conducted. The Longqi vents are the first known in the region and the expedition was the first to explore them using a deep-diving remotely operated vehicle (ROV).

The deep-sea animals that are so far only known from Longqi include: a species of hairy-chested 'Hoff' crab, closely related to 'Hoff' crabs at Antarctic vents; two species of snail and a species of limpet; a species of scaleworm; and another species of deep-sea worm. Apart from one species of snail, which has been given the scientific name *Gigantopelta aegis*, most have not yet been formally described. "*We can be certain that the new species we've found also live elsewhere in the southwest Indian Ocean, as they will have migrated here from other sites, but at the moment no-one really knows where, or how well-connected their populations are with those at Longqi,*" said Dr. Copley. "*Our results highlight the need to explore other hydrothermal vents in the southwest Indian Ocean and investigate the connectivity of their populations, before any impacts from mineral exploration activities and future deep-sea mining can be assessed.*" The scientists also found other species at Longqi that are known at other vents far away in other oceans. Another new species of scaleworm lives at vents on the East Scotia Ridge in the Antarctic, 3,700 miles away, while a species of ragworm lives at vents in the eastern Pacific, more than 6,000 miles away. "*Finding these two species at Longqi shows that some vent animals may be more widely distributed across the oceans than we realized*," added Dr. Copley. https://www.sciencedaily.com/releases/2016/12/161215080853.htm

The Foxfire Diamond: Smithsonian's Newest Rock Star

The largest gem-quality diamond ever found in North America is on display at the Smithsonian for three months in its rough, uncut state. The 187.63 carat Foxfire diamond was almost discarded when it was unearthed in August 2015 at the Diavik diamond mine, above the Arctic Circle in Canada's Northwest Territories (see p.6 Feb. 2016 newsletter). The mine was not known for large diamonds like the Foxfire, but much smaller stones. The chances of a large diamond coming through the sorting system were believed to be so slim that all large stones were assumed to be kimberlite, thus filtered and crushed. The Foxfire diamond could have been crushed, but because of its slightly elongated shape, it slipped through the sifting screen.

The name Foxfire pays homage to the aboriginal name for the aurora borealis, which looks like "*foxtails swishing away in the sky.*" One of the interesting properties of this diamond is that if you go in a dark room and turn on a black (uv) light, it glows

The Foxfire diamond fluoresces bright blue under ultraviolet light then phosphoresces yellow when the light is turned

bright blue and "lights up the room". Many diamonds fluoresce, but Foxfire is exceptionally bright, caused by trace inclusions of nitrogen. It gets even weirder. What is unusual, is that when the uv light is turned off, the diamond continues to glow, first a deep orange color and then it fades to a creamy white glow. So that phosphorescence can tell us something about how that diamond was formed. It gives us this interesting insight into its history that we wouldn't get just by looking at it. The 187 carat Foxfire pales in size when compared to the largest diamond, South Africa's enormous Cullinan diamond, which weighed 3,107 carats before it was cut into numerous stones. The Hope diamond, also on display at the Smithsonian, weighs 45 carats. http://foxfirediamond.com/

When Will Life on Earth End?

Findings recently published in the journal *Astrobiology* reveal the habitable lifetime of planet Earth, based on our distance from the sun and temperatures at which it is possible for the planet to sustain liquid water. The study, led by UAE professor Andrew Rushby, investigated the potential of planets recently discovered outside our solar system (exoplanets) to host life. Rushby used the 'habitable zone' concept to make these estimates, that is "the distance from a planet's star at which temperatures are conducive to having liquid water on the surface." He used stellar evolution models to estimate the

end of a planet's habitable lifetime by determining when it will no longer be in the habitable zone. He estimate that Earth will cease to be habitable somewhere between 1.75 and 3.25 billion years from now. After that, Earth will be in the *'hot zone'* of the sun, with temperatures so high that the seas would evaporate leading to a catastrophic and terminal extinction event for all life. Of course conditions for humans and other complex life will become impossible much sooner, and this is being accelerated by human-induced climate change. Humans would be in trouble with even a small increase in temperature, and near the end of that time frame only microbes in niche environments would be able to endure the heat. Looking back a similar amount of time (3 billion years), we know that there was cellular life on earth. We had insects 400 million years ago, dinosaurs 300 million years ago and flowering plants 130 million years ago. Anatomically modern humans have only been around for the last 200,000 years, so you can see it takes a really long time for intelligent life to develop. Of course, much of evolution relies on luck, so this isn't concrete, but we know that complex, intelligent species like humans could not emerge after only a few million years. After all, it took us 75 per cent of the entire habitable lifetime of this planet to evolve. And a similar story would be expected elsewhere.

https://www.sciencedaily.com/releases/2013/09/130918211434.htm

Trapiche Emeralds

The name trapiche comes from **tra·pi·che** (de azúcar), meaning "of sugar." More specifically, trapiche emeralds are named for the grinding wheel used to process sugarcane in the region of Colombia, South America, where they are most often found. In the figures below you can see the spoked structure in these gemstones that approximates the look of the grinding wheel.

The unique design present in trapiche emeralds is not a case of asterism. Trapiche emeralds are formed during a beryl crystal's growth. Black carbon impurities fill in at the emerald crystal junction which forms a radial pattern with a six-pointed star effect. In some trapiche emeralds, inclusions consisting of albite, quartz, and a carbonaceous material outline a hexagonal beryl core, and they extend from it in "spokes" that divide the surrounding emerald material into six trapezoidal sectors. First, the central, tapered core grows under hydrothermal conditions. Second, growth may slow or even stop for some time. Next, growth conditions change again, and both emerald and albite are formed. However, the hexagonal prism faces of the core crystal are able to maintain their uniform growth, producing pure emerald, while areas growing from the edges between prism faces are not and are filled by albite. This results in six sectors of clear emerald and six of predominantly albite and minor emerald. Thus, the central core and the six surrounding sectors of a trapiche emerald comprise a single, untwinned crystal. Often, the hexagonal beryl center is transparent and colorless or it can be green. A 1970 analysis of Muzo, Colombia´s trapiche emerald by Nassau and Jackson found that the principal coloring agent was vanadium. It was long believed that trapiche emeralds only came from Colombia at the Muzo and Penas Blancas mines. However a reference describes a large grayish green trapiche beryl weighing 13.74 carats from Madagascar. Information is very scarce on trapiche emeralds from that area. Apparently some stones have been treated, most common oil or epoxy impregnation of cracks, but this type of treatment is typical for most of the emeralds on the market.

https://www.gemsociety.org/article/trapiche-emerald/

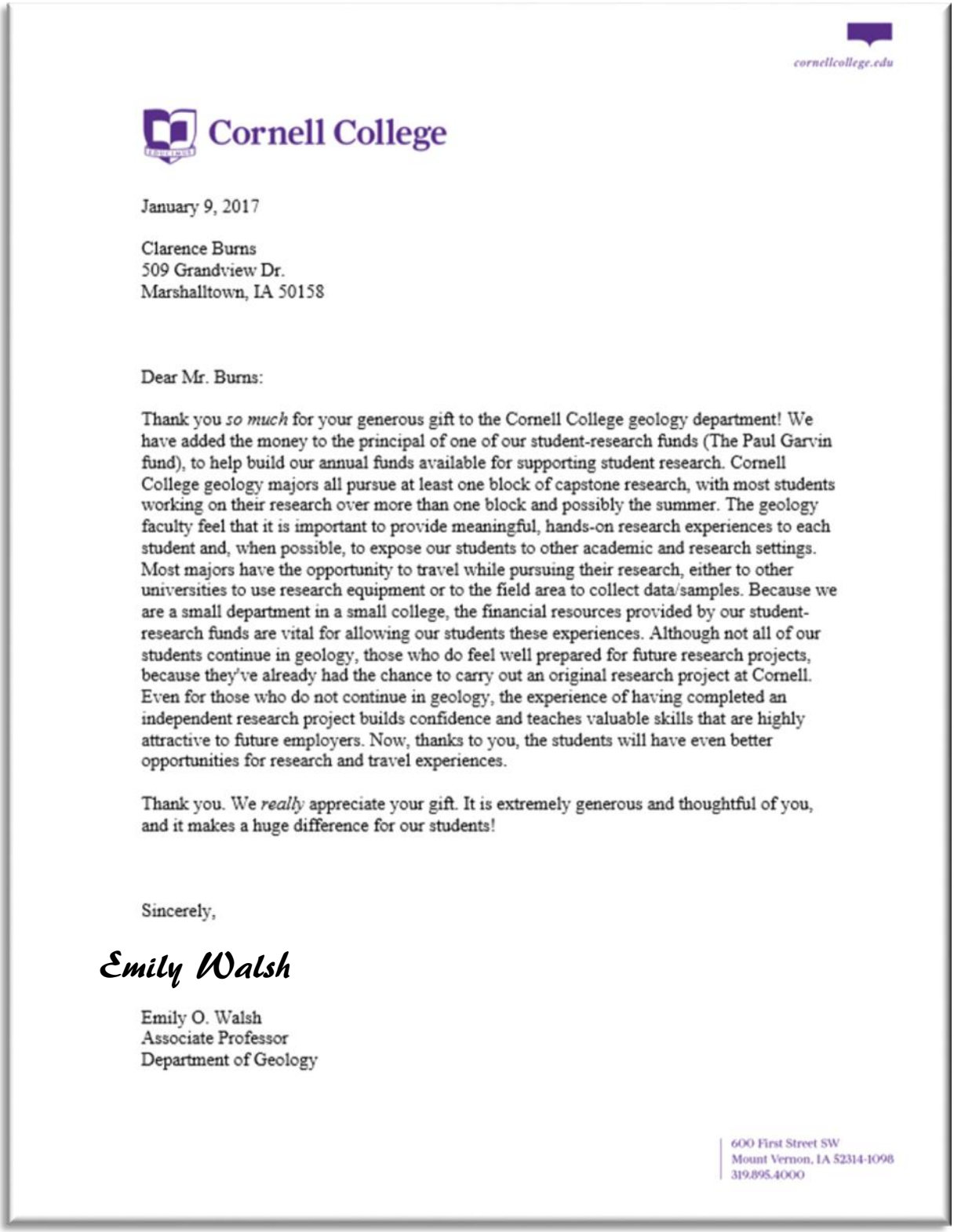
Tiny Cone-Shaped Creature Gets a Twig on the Tree of Life

When researchers first described hyoliths roughly 175 years ago, flummoxed paleontologists bestowed them with the Latin moniker *Incertae sedis*—the binomial equivalent of "We don't know. Where did this strange little creature fit in the tree of life? Now, almost two centuries later scientists may finally have an answer, positioning the hyolith on the proper twig in the tree of life. Less than half an inch long, the tiny extinct hyolith lived during the Cambrian period 540 million years ago. It resembles "a tentacled ice cream cone with a lid," writes Nicholas St. Fleur in*The New York Times*, and has characteristics similar to snails or clams but is also very different. It sports a pair of "helens," or curved stilts, that likely allowed the creature to prop itself up on the ocean floor to feed.

Fossil hyolith (left) and artist's reconstruction (right).

To crack the mystery, Joseph Moysiuk took a fresh look at 1,500 hyolith fossils from the Burgess Shale in the Canadian Rockies and the Spence Shale, a formation in Idaho and Utah. Of those, 254 fossils included impressions of the hyolith's soft tissue, giving the researchers new insights into the structure of the animals. A scanning electron microscope and other instruments revealed that the hyoliths had tentacled structures coming out of their mouths. A band of tissue protruded from the hyolith "lid," and between 12 and 16 tentacles, depending on the exact species, extended off that tissue. That type of feeding structure is called a lophophore, which is one of the primary organs of a group of creatures called Lophophorata, which includes modern day bryozoa (aquatic "moss animals") and brachiopods (a group of marine bivalves). Based on these analyses the hyolith, appears to combine characteristics from several modern lophophorata groups. The creature has a shell like a brachiopod and has a tubular body similar to a group called phoronids or horseshoe worms. The hyolith, says Moysiuk, was likely a stationary filter feeder, and is more closely related to brachiopods than molluscs, like clams. "We suggest that hyoliths may be distant cousins of brachiopods who have retained a tubular-shaped body from an ancestor they share with phoronids. It's adding this new branch to the tree of life." *http://www.smithsonianmag.com/smart-news/tiny-cone-shaped-creature-gets-twig-tree-life-180961783/*

FYI: Letter from Emily Walsh (Chair of the Cornell College Department of Geology) to CVRMS member Clarence Burns thanking him for his donation from the sale of rocks and supplies at the 2016 Rock Auction.



cornellcollege.edu

Cornell College

January 9, 2017

Clarence Burns
509 Grandview Dr.
Marshalltown, IA 50158

Dear Mr. Burns:

Thank you *so much* for your generous gift to the Cornell College geology department! We have added the money to the principal of one of our student-research funds (The Paul Garvin fund), to help build our annual funds available for supporting student research. Cornell College geology majors all pursue at least one block of capstone research, with most students working on their research over more than one block and possibly the summer. The geology faculty feel that it is important to provide meaningful, hands-on research experiences to each student and, when possible, to expose our students to other academic and research settings. Most majors have the opportunity to travel while pursuing their research, either to other universities to use research equipment or to the field area to collect data/samples. Because we are a small department in a small college, the financial resources provided by our student-research funds are vital for allowing our students these experiences. Although not all of our students continue in geology, those who do feel well prepared for future research projects, because they've already had the chance to carry out an original research project at Cornell. Even for those who do not continue in geology, the experience of having completed an independent research project builds confidence and teaches valuable skills that are highly attractive to future employers. Now, thanks to you, the students will have even better opportunities for research and travel experiences.

Thank you. We *really* appreciate your gift. It is extremely generous and thoughtful of you, and it makes a huge difference for our students!

Sincerely,

Emily Walsh

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Club meetings are held the 3rd Tuesday of each month from September through November and from January through May at 7:00 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.

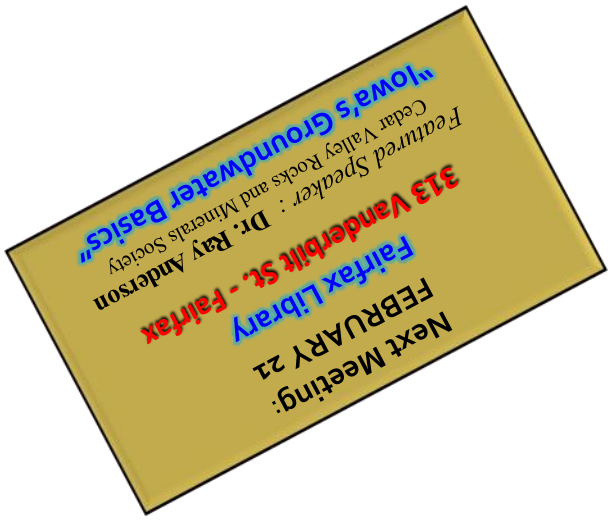
CEDAR VALLEY ROCKS & MINERAL SOCIETY

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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