Cedar Valley Gems

Cedar Valley Rocks & Minerals Society

Cedar Rapids, Iowa

cedarvalleyrockclub.org

CEDAR VALLEY GEMS | JANUARY 2021 | VOL. 47, ISSUE 01

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

Next CVRMS Meeting
Tues. January 19
7:15 pm

<<VIRTUAL MEETING>>

Join the Zoom Meeting
https://us02web.zoom.us/j/89343918607

featured speaker

Dr. John Hill

Central Iowa Rock and Mineral Society

"The Tucson Show and Stone Art (Pietre Dure)"

Pietre Dure Table Top

In his presentation John will first share some of his experiences at 2011 Tucson Gem Show and the annual Munich world gem shows. Then, he will review the history of *Pietre Dure* starting with ancient man through Rome and the Renaissance up to modern work done today in Florence, Italy, and in Fairfield, Iowa. Finally, he will discuss art in stone in the form of "*found objects",* pictures in stone, boxes, and floor mosaics. John will show several objects that illustrate the above categories of stone art that he has either found, made, or purchased.

A nearly 40-million-year-old skeleton belonging to what is popularly called a saber-toothed tiger went under the hammer on December 8 in Geneva, a year after its discovery on a U.S. ranch. The 37-million-year old, 90% complete skeleton is nearly four feet long and fetched $84,350 at auction. The few missing bones were reconstructed with a 3-D printer and added to the skeleton, which was reconstructed around a black metal frame. The original bones are those of a *Hoplophoneus*. Not strictly a true member of the cat family, they are an extinct genus of the *Nimravidae* family (commonly called saber-toothed tigers) that stalked around North America. It was found in South Dakota during the of summer 2019 by the ranch owner who saw a bone sticking out of the ground. Debate rages as to the right balance between the scientific value of such items and their worth on the open market. Some paleontologists insist animal or plant fossils are not decorative objects for collectors, but witness to the evolution of life on Earth and therefore scientific articles that ought to be studied and then shared with the public in museums. Before the sale Swiss collector Yann Cuenin noted, "I am all for museums, but I am also in favor of objects living among us; for there to be collectors, for pieces to be bought and sold -- that's what brings culture to life. https://www.thejakartapost.com/life/2020/12/10/saber-toothed-tiger-skeleton-sells-for-more-than-84000.html

CVRMS Dec. 15 Virtual Meeting

7:21 p.m. THE ZOOM MEETING WAS CALLED TO ORDER by Marv Hoag, President. There were 17 participants.

MINUTES REVIEWED. Motion to approve by Kim, second by Glen. Approved as published.

TREASURERS REPORT by Dale. Nothing new to report. A few donations have come in for Christmas basket. So far we have collected $460 and Dale has sent that off to the recipients. More is still being received. Calendars have been ordered but a slight delay in shipping.

RAY PRESENTED 2 VIDEOS, "*A visit to 2019 Cayuna Rock, Gem, and Mineral Show-Brainard, MN*" (complete with a Wizard) and "*Lake Superior Agate Hunting."* Discussion followed about the program and suggestions for others.

NEXT MONTH'S PROGRAM will be presented by a Des Moines Club member and it will be on mosaics. Do you know the difference between pietra dura, micro mosaics and mosaic jewelry? ZOOM in and find out. And to confuse things even more, look up intarsia.

NEW BUSINESS

CVRMS Auction will be held on July 17, 2021, at the Morton Building at Amana Campground. {*Ed: Changed to September 18-19 at December Board meeting*.} Jay and Sharon are working on the potential contributors. We could go for two days if we had enough lots.

Annual CVRMS Rock Show: Scheduled for November 6-7, 2021, at Hawkeye Downs.

Changes in MAPS show: Marv announced that for those interested in fossils, the MAPS show will no longer be held at Sharpless Auction. The scheduled October show will be relocated.

MISCELLANEOUS

Contract with Hawkeye Downs has not yet been finalized. One vendor is not returning. The Board will decide who will be an appropriate replacement.

Kim wanted to discuss how we can get more people to tune in to the ZOOM meetings. Advantages include such things as no need to wear pants, shorter meetings, you can leave whenever you want, and it is less intimidating than you think.

MOTION TO ADJOURN by Dale, second by AJ. Meeting adjourned 9:17 p.m.

Respectfully submitted,
Dell James, Secretary

CVRMS Board Minutes Dec. 22

7:05 P.M. THE MEETING CALLED TO ORDER by Marv via Zoom.

MEMBERS PRESENT: Ray Anderson, Sharon Sonnleitner, Marv Houg, Kim Kleckner, Dale Stout, Bill Desmarais, Dell James

TREASURERS REPORT by Dale. Monthly report sent out. Christmas basket donations $505.00 total.

AUCTION: Discussion regarding the upcoming auction in July. We still have September 18-19, our original dates, reserved. Question is should we plan on September rather than July? Vote was unanimous that we have the auction in September rather than July. This will give us another two months for things in the world to hopefully settle down. Jay will send out notifications to potential contributors. Mark our calendars for **September 18 and maybe 19, 2021** auction.

SHOW: Our annual show is set for **November 5-6-7 2021.** We still have no contract with Hawkeye Downs but after Christmas Sharon will contact them. JJL is retiring the business and we will discuss replacement at a later date.

MISCELLANEOUS: Bill reported on bus trip that may take place in October. Decided that we should wait until about May before we make any plans. If Wisconsin plays football the day we plan on trip, we are out of luck. Plan B will have to be in effect.

Marv gave an update on the state fossil crinoid project. Should we go with a broader base like crinoids? Or become specific with a certain species of crinoid. Lots of different opinions from people involved. The Board feels that it should be a generic crinoid since there are many varieties of crinoids— over 600— and Burlington, Iowa, has about 200 alone. If a child finds a crinoid, he probably won't care if it is a *Aerocrinus iola* or an *eretmocrinus trentor.* (Secretary notation). Marv will discuss further with his legislative friends.

Kim had questions about some rocks that she is classifying for the auction.

Dale reported that the Hiawatha center where we normally hold meetings is not yet open.

General discussion about next programs from John Hill on mosaics and other area clubs with ZOOM meetings.

MOTION TO ADJOURN made by Ray, second by Dale. 7:55 meeting adjourned

Respectfully submitted
Dell James, Secretary

Billion-year-old Seaweed. Oldest Green Plant Fossil Ever Found

Virginia Tech paleontologists have made a remarkable discovery in China: one-billion-year-old microfossils of green seaweeds that could be related to the ancestor of the earliest land plants and trees that first developed 450 million years ago. The microfossil seaweeds, a form of algae known as ***Proterocladus antiquus***, are barely visible to the naked eyed at 2 millimeters in length, or roughly the size of a typical flea. The fossils are the oldest green seaweeds ever found. The tiny seaweeds once lived in a shallow ocean, died, and then became "*cooked*" beneath a thick pile of sediment, preserving the organic shapes of the seaweeds as fossils. Many millions of years later, the sediment was then lifted up out of the ocean and became the dry land where the fossils were retrieved. Previously, the earliest convincing fossil record of green seaweeds was found in rock dated at roughly 800 million years old. There are three main types of seaweed: **brown** (Phaeophyceae), **green** (Chlorophyta), and **red** (Rhodophyta), and thousands of species of each kind. Fossils of red seaweeds, which are now common on ocean floors, have been dated as far back as 1.047 billion years old. Some modern green seaweeds look very similar to the fossils, especially a group known as siphonocladaleans. These seaweeds display multiple branches, upright growths, and specialized cells known as akinetes. In short, our study tells us that the ubiquitous green plants we see today can be traced back to at least one billion years. The current hypothesis is that land plants -- the trees, grasses, food crops, bushes, even kudzu -- evolved from green seaweeds, which were aquatic plants. Through geological time -- millions upon millions of years -- they moved out of the water and became adapted to and prospered on dry land, their new natural environment. These fossils are related to the ancestors of all the modern land plants we see today.

Green seaweeds, which may have looked like this when they were alive, might be ancestors to all land plants

http://www.geologyin.com/2020/02/billion-year-old-seaweed-is-oldest.html

Spotlight Gemstones: Garnet

January's Birth Stone

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, was 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 beautiful blue rock and where in the world is it??

December's Photo

Last month's "*What in the World*" photos were 2 semi-precious, trillion-cut gem-stones (green and red for the holidays). The **green variety** is called **prasiolite.** It has been mined in Lower Silesia in Poland and has also been found near Thunder Bay, where basalt flows have overrun existing amethyst. As of February 2019, the only mine producing prasiolite is in Brazil, but even that is almost mined out. The green color is from iron (Fe^{2+}) in the approximately octahedral interstitial site. The **red variety** of quartz shown here is called **red citrine**. Citrine is a yellow-to-deep orange/red gem, but the deep reddish orange hue is most prized color. Citrine owes its color to iron (Fe^{3+}) clusters in the quartz. Although both varieties of quartz occur naturally, both can be produced artificially.

Rock Calendar
CVRMS EVENTS OF INTEREST
2021

Jan. 8 — Central Iowa Mineral Society
Monthly Meeting
<< VIRTUAL MEETING >>
speaker Dr. Ray Anderson
"Not of this World:
9 Meteorites in Iowa's History"

Jan. 12 — Blackhawk Gem & Min. Soc.
Monthly Meeting
<< VIRTUAL MEETING >>
speaker Jim Kraai
"Agate Features and Glossary"

Jan. 19 — CVRMS Monthly Meeting
<< VIRTUAL MEETING >>
speaker Dr. John Hill
"The Tucson Show and
Stone Art (Pietre Dure)"
more details on Page 1

Jan. 25 — 3 Rock Clubs Monthly Meeting
<< VIRTUAL MEETING >>
speaker Dr. Ray Anderson
"Iowa's New(ish) Bedrock Geology Map"

Sept 18-19— CVRMS Auction
Amana RV Park and Event Center
Amana, Iowa
more details to follow

Oct. 22-24 — MAPS 2021 Fossil Expo
Illinois State Fair Grounds
Springfield, Illinois
more details to follow

Nov. 6-7 — CVRMS Rocks, Fossil, & Minerals Show
Hawkeye Downs
Cedar Rapids, Iowa
more details to follow

Ask a Geologist

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

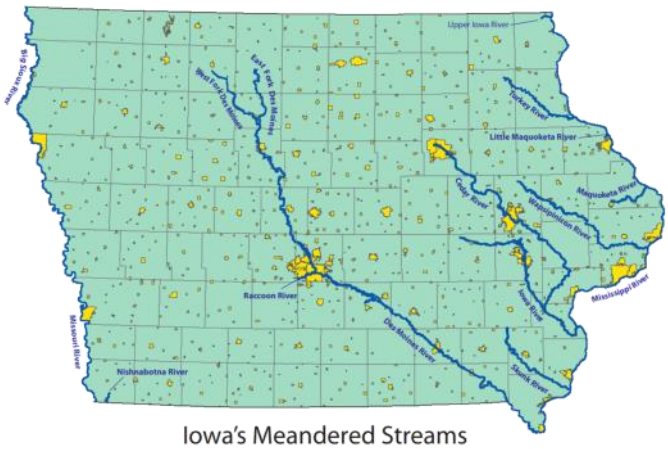
Ask a Geologist is a monthly column that gives CVRMS members an opportunity to learn more about a geologic topic. If you have a question that you would like addressed, please send it to rockdoc.anderson@gmail.com, and every month I will answer one in this column. Please let me know if you would like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

This Month it's a TWOFER

(1.) *IS IT ILLEGAL TO COLLECT ROCKS IN IOWA'S RIVERS?*

In some areas, YES !

We recently heard that a couple of Iowa **rockhounds** were confronted by a county Sherriff and a IDNR Conservation officer who told them that it was against the law to collect geodes in the Des Moines River. So we decided that it was time to clarify the State's river collecting laws. So after several calls I ended up speaking with Aaron Brees, IDNR Legal Services (whose areas of responsibility includes docks; fisheries; forestry; State lands, and waters; state preserves). Arron was very helpful, informing me that for the purpose of collecting rocks, Iowa lumps all rivers and streams into two categories, *meandered* and *not meandered,* as defined by the original public land surveys by the United States Department of the Interior. Meander lines were determined by the *"quantity of land in a tract bordering a lake or river."* (See Iowa Attorney General's Opinion http://skunkriverpaddlers.org/files/attorneygeneralopinion.htm#:~:text=Iowa's%20border%20rivers%20and%20lengthy,Little%20Maquoketa%20rivers%20were%20meandered). So, the State of Iowa owns the area of meandered rivers between the high water line on either bank. And, materials cannot be removed from State land without permission. As best I can tell, permits can be issued for artifact collection or mineral exploration (and mining). Arron said that neither of these permits were appropriate for rock collecting, and he thought that this was an area where new more specific laws are needed. So, maybe if we can succeed in getting the *crinoid designated as a State Fossil*, new laws may be our next legislative battle.



Iowa's Meandered Streams

Non-meandered rivers and streams are owned by the owners of the adjacent lands, and their permission should be obtained before collecting.

(2.) *WHAT IS THE DIFFERENCE BETWEEN PIETRA DURA AND INTARSIA?*

And, what the heck do either of those words mean?? During the CVRMS December Zoom meeting, Dr. John Hill was describing the talk he will present at our January 19 meeting, which will include one of his hobbies, *pietra dara*. Somebody asked what the difference was between pietra dura and intarsia, and someone suggested asking a geologist. So. . . .

The internet defines:

Pietra dura, (Italian: "hard stone"), in mosaic, any of several kinds of hard stone used in *commesso (Florentine) mosaic work*, an art that flourished in Florence particularly in the late 16th and 17th centuries and involved the fashioning of highly illusionistic pictures out of cut-to-shape pieces of colored stone. **Commesso mosaic**, is a method of piecing together cut sections of luminous, narrow gemstones to form works of art. Precise patterns are cut into a slab of (generally black) marble. Gems are then cautiously cut and meticulously inlaid into these patterns.

Intarsia is a knitting color work technique that involves knitting with blocks of color. They can be in any shape or design you like, but the key is that when you change colors, you don't strand the colors you're not working with across the back as is done in stranded knitting (also known as Fair Isle). **Intarsia** is also a **woodworking** technique that uses varied shapes, sizes, and species of wood fitted together to create a mosaic-like picture with an illusion of depth. After selecting the specific woods to be used within the pattern, each piece is then individually cut, shaped, and finished.

So, apparently **pietra dura** are **the stones** that are cut and trimmed to make *commesso* (or *Florentine) mosaics*. **Intarsia** describes the techniques to make similar pictures from **wood** or by **knitting**. We will find out more about **pietra dura** from John Hill during our January 19 CVRMS Zoom meeting.

The gemstone was given the name *'tanzanite'* by Tiffany & Co. after Tanzania, the country in which it was discovered, because the scientific name of **"blue-violet zoisite"** was not thought to be consumer friendly enough by Tiffany's marketing department, who introduced it to the market in 1968. In 2002, the *American Gem Trade Association* chose tanzanite as a December birthstone, the first change to their birthstone list since 1912. According to gemologists , the circumstances that led to the gem's formation 585 million years ago were so exceptionally unusual, that the likelihood of finding tanzanite anywhere else on earth is one in a million, making it a **thousand times rarer than diamonds**. Tanzanite is **so rare** because it is found and mined only in a 3 square-mile area at the foot of Mount Kilimanjaro in the Manyara region of Northern Tanzania. The

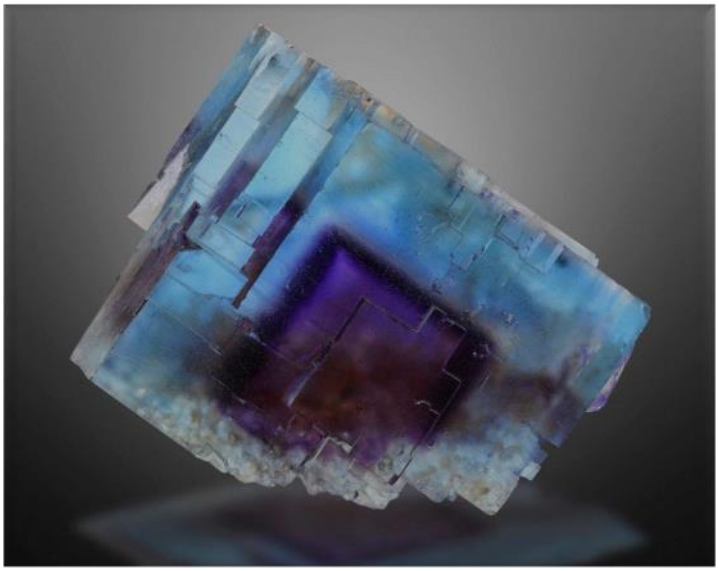
Tanzanite is noted for its remarkably strong trichroism, appearing alternately blue, violet and burgundy depending on crystal orientation

color of the mineral **zoisite** is variable, but green, blue to violet and pink to reddish in colors are the most comon. The typical color of tanzanite is **blue with a violet tinge.** In some lighter colored stones, the color is described as lavender. The color of the tanzanite is the most important factor in determining its price. **The blue color** of tanzanite is caused by small amounts of **vanadium** within the zoisite mineral structure. **Pleochroism** is a physical property in which the material appears to be different colors when viewed from different crystallographic directions. **Tanzanite is pleochroic**, meaning the purple, gray, blue and violet tones within the stone vary depending on the angle the stone is viewed from. There might also be a slight color change in incandescent light, when stones may appear to be more violet. Tanzanite is noted for its remarkably strong **trichroism**, appearing alternately blue, violet and burgundy depending on crystal orientation. Some specimens of tanzanite can be a distinct blue when viewed from one direction, and vary from violet to red when viewed from other directions.
http://www.geologyin.com/2017/06/pleochroism-in-tanzanite.html

The highest point on Earth got a bit higher Tuesday as China and Nepal finally agreed on a precise elevation for Mount Everest after years of debate. The agreed height of 8,848.86 meters (**29,031 feet**) - unveiled at a news conference in Kathmandu - was 86 centimeters (**2.8 feet**) higher than the measurement previously recognized by Nepal, and more than four meters above China's official figure. This discrepancy was due to China measuring the rock base on the summit and not - as with the new reading - the covering of snow and ice on the peak. Everest straddles the border of Nepal and China. Employing trigonometry hundreds of miles away on the Indian plains, British colonial geographers first determined Everest's height in 1856 at 8,840 meters (**29,002 feet**) above sea level. After Edmund Hillary and Tenzing Norgay Sherpa famously first reached the summit of Everest on 29 May 1953, an Indian survey readjusted the altitude to 8,848 meters (**29,028 feet**). That measurement was widely accepted, with the number appealing not only to ambitious mountaineers but also inspiring names for adventure clothing lines, restaurants and even a vodka brand. In 1999 the US National Geographic Society concluded the world's highest point was 8,850 meters (**29,035 feet**), but Nepal never officially recognized this - although it is widely quoted. China meanwhile conducted several surveys of its own, and in 2005 came up with a measurement of 8,844.43 meters (**29,015 feet**). That provoked a row with Nepal, which was only resolved in 2010 when Kathmandu and Beijing agreed that their measurements referred to different things - one to the height of Everest's rock and the other to the height of its snowcap. Nepal decided to conduct a survey - initially alone and later joined by China - after suggestions that tectonic plate movements including a major earthquake in 2015 may have affected the height. About 300 Nepali experts and surveyors were involved in the exercise - some on foot and others in helicopters - to reach data collection stations. Last spring, Nepali surveyors reached the summit of Everest with over 40 kilograms (**90 pounds**) of equipment, including a Global Satellite Navigation System (GNSS) receiver. They spent roughly two freezing hours collecting data as dozens of climbers stood on top of the mountain. Nepal was due to release the results earlier this year but then China became involved after a visit to Nepal in October 2019 by President Xi Jinping. This year a Chinese survey expedition had a more quiet working space on the summit as they were the only climbers on a mountain shut because of the coronavirus pandemic. Dang Yamin, an expert at the National Bureau of Surveying and Mapping, told Chinese state broadcaster CCTV that the final result was an average value between the measurements by Nepal and China, in accordance with scientific rules. "*Various countries have completed the measurement of the height... several times,*" said Padma Kumari Aryal, Nepal's land minister. *"The results have been different on different occasions, so today we end these speculations."*
https://www.sciencealert.com/mount-everest-has-officially-grown-taller-in-2020

Crystal Zoning

Crystal zoning is a texture developed in solid-solution minerals and characterized optically by changes in the color or extinction angle of the mineral from the core to the rim. This optical zoning is a reflection of chemical zoning in the mineral. For example, a plagioclase can be zoned from a Ca-rich core to an Na-rich rim. Zoning results from the mineral's inability to maintain chemical equilibrium with a magma during rapid cooling; the zonation represents a frozen picture of the continuous reaction series for that mineral.



Beautiful Zoning Purple Fluorite Crystals from Minerva Mine, Hardin Co., Illinois, USA

Zoning can be of three types, the first two applying mostly to plagioclase feldspars.

(a) Normal zoning is where the mineral is zoned from a high-temperature core composition to a low-temperature rim composition.

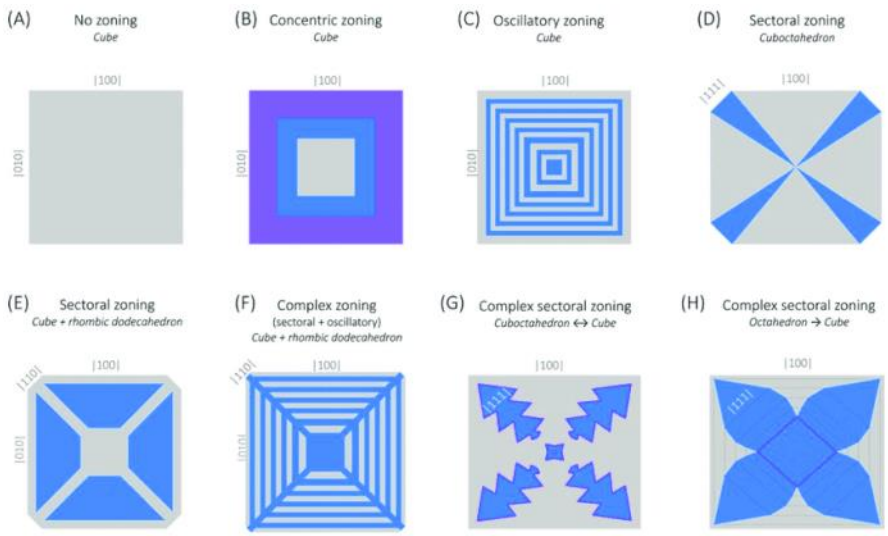
(b) Reverse zoning is where a mineral is zoned from a low-temperature core composition to a high-temperature rim composition.

(c) Oscillatory zoning is where the mineral chemistry continuously oscillates between high- and low-temperature compositions going from the core to the rim.

The salt deposits of a salt pan are zoned like bathtub rings, with less-soluble sulfates and carbonates at the outer margin and highly soluble sodium chloride (table salt) at the center. The crystallization of these salts can be compared with the evaporation of brine in a dish.

Various examples of growth zoning features typically found in hydrothermal fluorites

No apparent zoning **(A)** suggests crystallization under constant hydrothermal conditions, whereas ***concentric zoning*** **(B)** indicates discontinuous changes in the fluid chemistry over time; **(C)** is a typical representation of short-lived oscillating changes in the fluid chemistry. **(D,E)** ***Typical sectoral zoning*** in fluorite crystals with complex crystal habits **((D):** cuboctahedral, **(E):** cubic + rhombic dodecahedral faces**)** that is only visible in specific plane sections. **(F)** ***Combination of sectoral and oscillatory zoning*** in a cubic fluorite crystal. **(G)** ***'Fir-tree' zoning*** occurs when growth conditions (T/Eh) alternate over time and thereby favor different crystal morphologies (cuboctahedron ↔ cube), which proves pulsed crystallization (e.g., [106]). **(H)** ***'Petal-type' zoning*** is the result of a continuous change from octahedral growth to cubic growth; the red line marks the beginning of shape transition (modified from [104]).



http://www.geologyin.com/2020/12/crystal-zoning.html?

Scientists have discovered three vast canyons in one of the last places to be explored on Earth, under the ice at the South Pole. The deep troughs run for miles, cutting through tall mountains, none of which is visible at the snowy surface of the continent. Dr Kate Winter from Northumbria University, UK, and colleagues found the hidden features with radar. Her team says the canyons play a key role in controlling the flow of ice. And if Antarctica thins in a warming climate, as scientists suspect it will, then these channels could accelerate ice movement towards the ocean, further raising sea levels. "*These troughs channelize ice from the center of the continent, taking it towards the coast,*" explained Dr Winter. "*Therefore, if climate conditions change in Antarctica, we might expect the ice in these troughs to flow a lot faster towards the sea,*" she told BBC News. The biggest of the canyons is called **Foundation Trough**. It is over 220 mi long and 20 mi wide. To put that on a more recognizable scale - think of a deeply incised valley running between Cedar Rapids and Chicago. The two other troughs are equally vast. The **Patuxent Trough** is more than 190 mi long and over 10 mi wide, while the **Offset Rift Basin** is 95 mi long and 18 mi wide. And all of this relief is buried under many hundreds of meters of ice. To get to the floor of Foundation Trough, for example, you would need to drill through over 1¼ miles of ice cover. The three troughs together lie under and cross the so-called "*ice divide*" - the high ice ridge that runs from the South Pole out towards the coast of West Antarctica. This divide can be thought of as a kind of watershed. Ice flows away on either side, through the channels - towards the Weddell Sea in the east and the Ross Sea in the west. Computer modelers will now take the new information to try to simulate what it means for future warming scenarios. One important implication is that these canyons and their surrounding mountains will likely act as a brake on any ice which might attempt to flow from the east of the continent, through the Transantarctic mountains, to the west. "*People had called this area a bottleneck*," said teammember Dr Tom Jordan from the British Antarctic Survey (BAS). "*The thought was that if the West Antarctic Ice Sheet were to collapse then ice could flood out from the east. But the mountains we've found effectively put a plug in that bottleneck.*" The new study, published in the journal Geophysical Research Letters, represents the first result to come out of the PolarGAP project. This was funded in large part by the European Space Agency (ESA). The insights for Dr Winter's paper come from an airborne ice-penetrating radar. This will describe the layers and total thickness of the ice sheet. It will also map the shape of the basement rock. "*Remarkably, the South Pole region is one of the least understood frontiers in the whole of Antarctica*," said PolarGAP's principal investigator, Dr Fausto Ferraccioli from BAS. "*Our new aerogeophysical data will... enable new research into the geological processes that created the mountains and basins before the Antarctic ice sheet itself was born*." It is possible the troughs detected under today's ice sheet were dug out during a previous glacial period when the ice over the continent was configured in a very different way. http://www.geologyin.com/2018/05/giant-canyons-discovered-in-antarctica.html

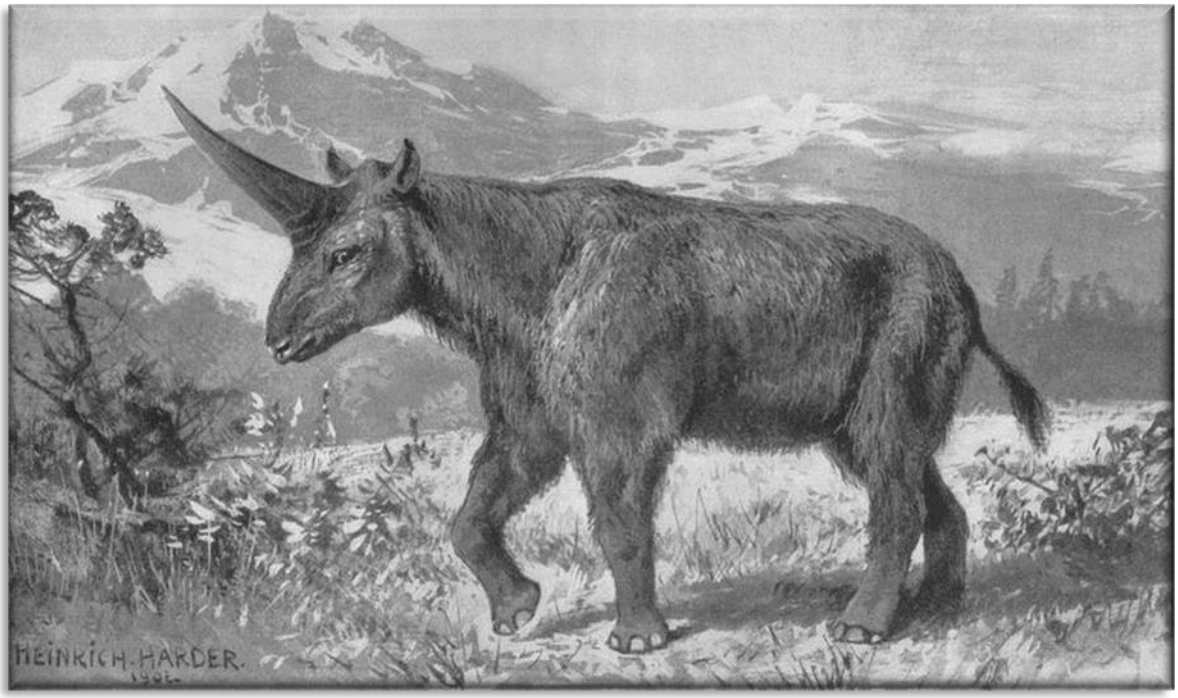
Exceptional azurite crystals on matrix from the famed Clara Mine, Wolfach, Black Forest, Baden-Württemberg, Germany

Azurite is a soft, deep-blue copper mineral produced by weathering of copper ore deposits. Azurite is one of two basic copper (II) carbonate minerals, the other being bright green malachite. Azurite crystals are monoclinic. Large crystals are dark blue, often prismatic. Azurite specimens can be massive to nodular. They are often stalactitic in form. Specimens tend to lighten in color over time due to weathering of the specimen surface into

malachite. Azurite is soft, with a Mohs hardness of only 3.5 to 4.

ttp://www.geologyin.com/2019/08/exceptional-azurite-crystals.html

Siberian unicorns lived alongside humans, and they were so much cooler than the mythical version



A reconstruction of what a Siberian unicorn might look like, by Heinrich Harder in 1908

All rhinos are unicorns, really—they just aren't pearly white and magical the way our myths say they should be. These powerful beasts get their strength from stocky muscles and keratinized body armor instead of rainbows and magic, but they're the only unicorns we've got. And one extinct species is named accordingly: the Siberian unicorn. ***Elasmotherium sibericum*** was the last remaining survivor of the *Elasmotherium* genus, which was once a large, diverse group of giant rhinos. Siberian unicorns were once thought to have gone extinct during a broad "*background extinction*" that occurred during the early and middle Pleistocene, which covers a period from around 126,000 to 2.5 million years ago. The species hadn't been studied much, but it was previously thought that *E. sibericum* died out roughly 100,000 to 200,000 years ago. But new research dating the fossilized molars of these ancient unicorns shows that they lasted all the way to the late Quaternary megafaunal extinction. That's the scientific name for the event you know as the end of the last ice age when many retroactively beloved animals—saber-toothed tigers and woolly mammoths, for instance—died out as the climate changed. The paper, published this week in the journal *Nature Ecology & Evolution*, dates the most recent fossils to around 35,000 to 39,000 years old. Humans started widely dispersing just before the megafaunal extinction, so there's been a lot of debate in the past about whether the widespread deaths of various species are due to overhunting or to climate change. In this case, though, it looks like the increase in temperature is what killed off these giant beasts. The researchers note in this recent paper that Siberian unicorns had some extreme adaptations that limited their diet, so when vegetation began to change *E. sibericum* simply couldn't change fast enough to survive. The lineages that begat modern antelopes and rhinos survived this extinction by evolving to eat a different diet, which they could do because they browsed and grazed on a variety of plants. Siberian unicorns couldn't. Based on the angle between the back of their head and their palate (the bone on the roof of your mouth), researchers think Siberian unicorns held their heads even lower than modern rhinos. This allowed them to eat vegetation very close to the ground. But when their ecological niche disappeared, so did they. The authors point out that extinction was especially likely because *E. sibericum* had a highly restricted geographic range, a small population size, and a low reproductive rate. Rhinocerotinae, the group that includes modern rhinos, survived while their *Elasmotherium* cousins died out. This paper also shows that the two groups had split long before, somewhere around 43 million years. Though they looked superficially similar, ancient rhinos were mostly part of a highly specialized group that simply couldn't survive a massive shift in climate. We know all of this now because this group of researchers decided to actually look at the evidence they already had in front of them. The 25 specimens they performed radiocarbon dating on were in various museum collections, but as they wrote in the study, no dating or genetic analysis had been done for the species. At last, these real-life unicorns are getting their day in the sun. https://www.popsci.com/siberian-unicorns/?utm_source=internal&utm_medium=email&tp=i-1NGB-Et-SI4-1CKV0T-1c-NjKL-1c-1CK9iT-l5QhULYYbi-a7sWK

Kilauea Volcano Erupts on Hawaii's Big Island

In Hawaii, this cursed year is going out with even more horror. The volcano Kīlauea on the state's Big Island erupted Sunday (Dec 20) night. In a statement at 9:30 that evening local time, the United States Geological Survey's Hawaiian Volcano Observatory said ***"an eruption has commenced"*** within the volcano's summit caldera. It began with a "glow within *Halema'uma'u crater,*" but soon, the bright orange brilliance grew and was coupled with thick plumes of rising dark ash and smoke. Lava boiled off the water lake that has sat inside Halema'uma'u crater since the 2018 eruption. USGS found that the lava that replaced it filled the crater to a depth of 32 feet in just two hours. It also sent a lava fountain shooting roughly 165 feet into the air. An hour after the eruption began, an earthquake rocked the island. USGS sensors put it at a magnitude of 4.4 on the Richter scale, which sent shakes across the Big Island. At least seven small earthquakes preceded the eruption, measuring between magnitude 2.5 to 2.7, sending a warning to officials something was afoot. Hawaii county's Civil Defense Agency has ordered all residents to stay inside their homes to avoid exposure to ash, which can irritate eyes and lungs. The National Weather service expects the southwest part of the Big Island will see ash fall, with the greatest risk in the communities of Pahala, Wood Valley, Naalehu, and Ocean View. For now, the lava remains contained in the crater, though, so at least there's that. The volcano last erupted in 2018, when it not only spewed lava and hot ash but also huge ballistic rocks and freaky blue flames while creating its own weather. That eruption lasted for weeks, and buried large portions of neighborhoods such as Leilani Estates in the volcano's East Rift Zone where the eruption was centered. Lava even reached the ocean, reshaping the contours of the island. Since that 2018 terror, Kīlauea has seen regular small earthquakes beneath its caldera and upper rift zone, probably caused by the intrusion of magma. In recent months, the Hawaiian Volcano Observatory said those earthquakes began taking place more frequently. It's unclear if the current eruption will follow the same course as the 2018 one.

You can watch a livestream of the eruption here.
http://www.geologyin.com/2020/12/kilauea-volcano-erupts-on-hawaiis-big.html?

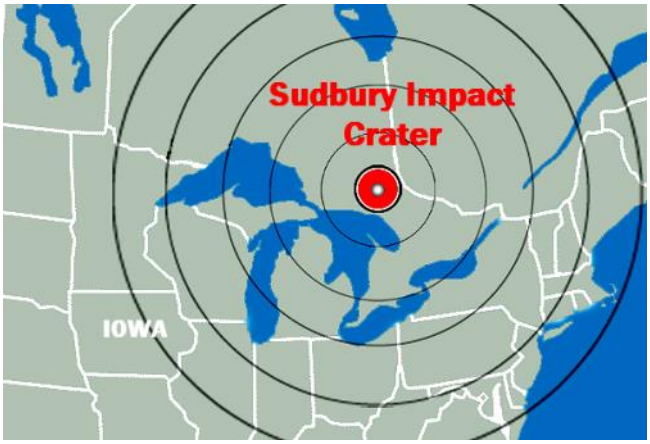
Rainbow Obsidian

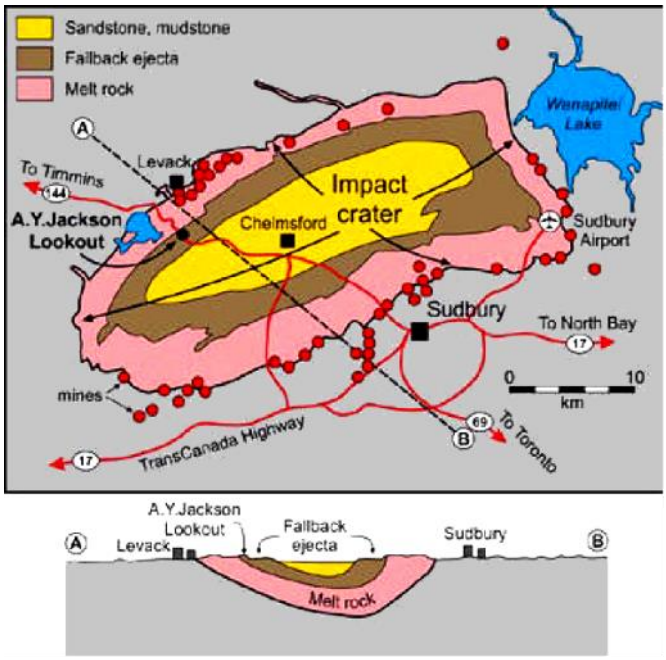
Obsidian is a naturally occurring **volcanic glass.** It is formed during the eruption of felsic lavas, which are distinguished by having high concentrations of the chemical element silica. Because of their high silica content, felsic lavas do not behave like the mafic, or silica-poor, lavas we see on the island of Hawaii.

Silica forms bonds with oxygen in lava creating linked molecule chains. These linked molecule chains are called polymers and the process of forming them is called polymerization. Polymers increase the viscosity, or resistance to flow, of the lava. **Obsidian** is dense volcanic glass, usually rhyolite in composition and **typically black** in color. **Obsidian with multicolored iridescence is caused by inclusions of magnetite nanoparticles.** The inclusion of magnetite nanoparticles create thin-film interference which causes an iridescent, **rainbow**-like sheen (**fire obsidian**). Obsidian is often formed in rhyolite lava flows where the lava cools so fast that crystals do not have time to grow. Glass, unlike crystals, has no regular structure and therefore fractures in smooth, curved shapes. The intersections of these fractures can form edges sharper than the finest steel blades. For this reason, obsidian was used by many native cultures to make arrowheads and blades. Even today, surgeons use the knife sharp edges in operations. Rainbow obsidian is relatively rare, produced at the Rainbow mine and Middle Fork Davis Creek, California, Glass Buttes (Obsidian Buttes), Lake County Oregon, and the La Revoltosa Mine, Jalisco, Mexico.
http://www.geologyin.com/2020/09/rainbow-obsidian.html?

Meteorite Crash Turned Earth Inside Out

A devastating meteorite collision caused part of the Earth's crust to flip inside out billions of years ago and left a dusting of a rare metal scattered on the top of the crater, says new U of T research. The study, published in *Nature*, examines the devastating effects of meteorite impacts on the Earth's evolution. Researchers from the University of Toronto and the Geological Survey of Canada studied the remains of a 155 mile-wide crater in Sudbury, Ontario, known as the Sudbury Igneous Complex, caused by a collision with a Mount Everest-sized meteorite 1.8 billion years ago. They discovered that the meteorite burrowed deep into the Earth's upper crust - which measures an average of 20 miles-thick, and caused the upper crust to be buried under several miles of melted rock derived from the lower crust. The dynamics of meteorite impacts remain a source of debate among researchers and, until now, there has been little hard evidence to prove a meteorite could pierce through the Earth's upper crust and alter its compositional makeup. *"It had not really been appreciated that large impacts would selectively move material from the bottom of the crust up to the top,"* says lead researcher James Mungall, a University of Toronto geology professor. "*This has been suggested for the Moon at times in the past but ours is the first observational evidence that this process has operated on Earth."* In the study, Mungall, his graduate student Jacob Hanley and Geological Survey researcher Doreen Ames concluded Sudbury Igneous Complex is predominantly derived from shock-melted lower crust rather than the average of the whole crust as has been previously supposed. The researchers discovered a subtle but significant enrichment of iridium, an extremely rare metal found mainly in the Earth's mantle and in meteorites. Due to the low magnesium and nickel content found in the samples they concluded that the iridium came from the meteorite itself rather than the Earth's mantle. The discovery of the iridium allowed the researchers to paint a picture of what happened billions of years ago, when a meteorite collided with the earth at a velocity exceeding 25 miles per second and caused a shock melting of 6,500 cubic miles of the crust. "*The impact punched a hole to the very base of the crust and the meteorite itself was probably vaporized,"* says Mungall. This collision, he says, caused a plume of iridium-enriched vaporized rock to surge up and recondense on top of the impact site. Simultaneously, the cavity collapsed within minutes or hours to form a multi-ring basin 50-70 miles in diameter and up to 4 miles deep. *"Picture a drop falling into a cup of milk, thus producing a bowl-shaped depression for a moment before the milk outside rushes back in to fill the hole,"* says Mungall. *"Now imagine that the falling drop of milk is a rock 6 miles in diameter, and the resulting depression is 20 to 25 miles deep."* The Sudbury Basin is the second oldest very large impact crater site in the world but is one of the most accessible and well preserved. The oldest one, South Africa's two-billion year-old Vredefort Crater, has eroded over time and only the basement remains. Another impact site, the Chicxulub Crater in Yucatan Peninsula, believed to be responsible for the extinction of the dinosaurs, lies buried under beds of limestone.





The Sudbury impact occurred just north of the current Lake Huron. The originally round crater was deformed shortly after its formation when Greenland crashed into Laurentia (North America) during the formation of the supercontinent of Columbia. It has subsequently been deeply eroded.

http://www.spaceref.com/news/viewpr.html?pid=14341

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Club meetings are held the 3rd Tuesday of each month from September through November and from January through May at 7:15 p.m., at the Hiawatha Community Center in the Hiawatha City Hall, 101 Emmons St., Hiawatha IA. The December meeting is a potluck dinner held on the 1st Tuesday at 6:30. June, July, and August meetings are potlucks held at 6:30 p.m. at area parks on the 3rd Tuesday of each month

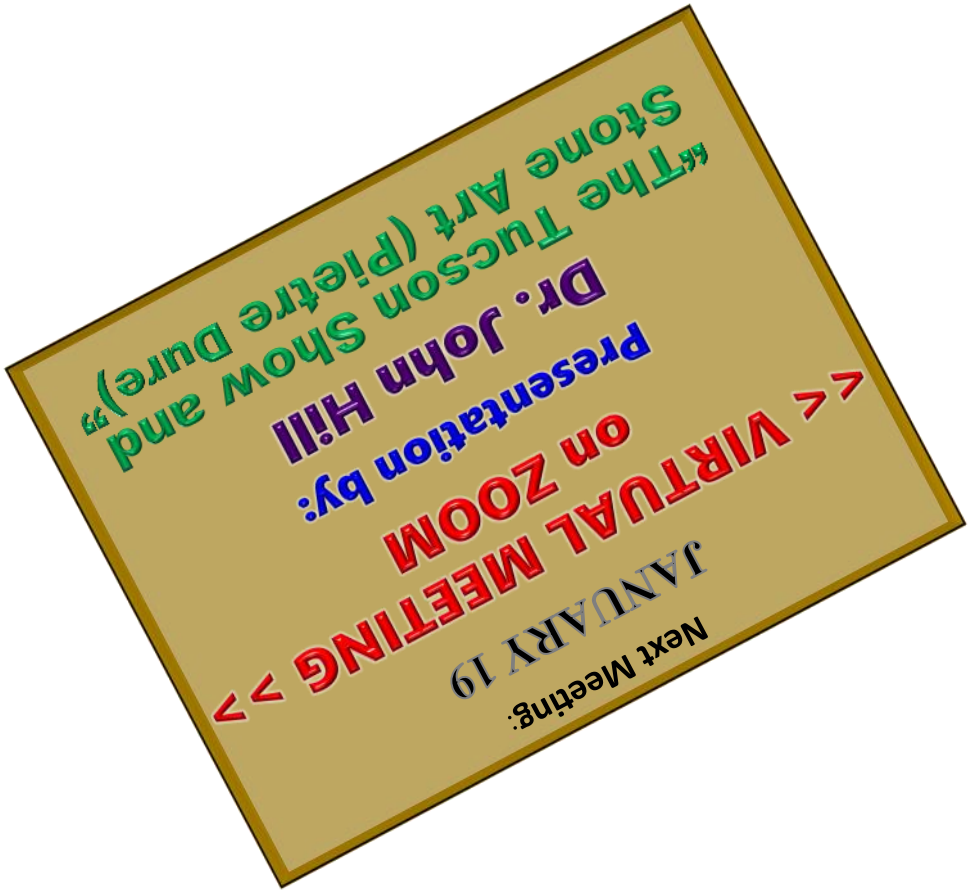
CEDAR VALLEY ROCKS & MINERAL SOCIETY

CVRMS was organized for the purpose of studying the sciences of mineralogy, geology, and paleontology and the arts of lapidary and gemology. We are members of the Midwest (MWF) and American (AFMS) Federations. Membership is open to anyone who professes an interest in rocks and minerals.

Annual dues are $15.00 per family per calendar year. Dues can be sent to:

Dale Stout
2237 Meadowbrook Dr. SE
Cedar Rapids, IA 52403

CVRMS website:
cedarvalleyrockclub.org



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