Cedar Valley Gems

Cedar Valley Rocks & Minerals Society

Cedar Rapids, Iowa

cedarvalleyrockclub.org

CEDAR VALLEY GEMS **NOVEMBER 2020** **VOL. 46, ISSUE 11**

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

Next CVRMS Meeting
Tues. November 17
7:15 pm

<<VIRTUAL MEETING>>

Join the Zoom Meeting
https://us02web.zoom.us/j/86236658130

featured videos:

Rhodochrosite & Tourmaline

A series of short videos about the two gemstones and the mines that produce them (*including Alma King Rhodochrosite from the Sweet Home mine in Colorado*)

Earth Grows Fine Gemstones in Minutes

Rome wasn't built in a day, but some of Earth's finest gemstones were. Aquamarine, emerald, garnet, zircon and topaz are but a few of the crystalline minerals found mostly in **pegmatites** (*vein-like formations that commonly contain both large crystals and hard-to-find elements like tantalum and niobium*). Another common mineral is lithium. Pegmatites are formed when rising magma cools while still underground, and they feature some of Earth's largest crystals. South Dakota's Etta mine, for example, features log-sized crystals of lithium-rich **spodumene**, including one **42 feet** in length and weighing an estimated **37 tons**. Researchers have recently investigated how such large crystals form. In magmatic minerals, crystal size is traditionally linked to cooling time. Magma that cools rapidly, like rock in erupted lavas, contains microscopic crystals, for example. But the same magma, if cooled over tens of thousands of years, might feature centimeter-sized crystals. However, pegmatites cool relatively quickly, sometimes in just **a few years**, and yet they feature some of the **largest crystals on Earth**. *How can that be?* The researchers examined pegmatite crystals that were half an inch wide and over an inch long and determined that they grew in a **matter of hours**. Based on what they found, they determined that larger crystals like that could grow in a **matter of days**. Pegmatites form where pieces of Earth's crust are drawn down and remelted in the molten mantle. Any water that's trapped in that crust becomes part of the melt, and as the melt rises and cools, it gives rise to many kinds of minerals. Each forms and precipitates out of the melt at a characteristic temperature and pressure. But the water remains, making up a progressively higher percentage of the cooling melt. Eventually, there is so much water that it becomes more of a water-dominated fluid than a melt-dominated fluid. The leftover elements in this watery mixture can now move around a lot faster. So when a crystal starts forming, elements can get to it faster, which means it can grow faster. But they showed it was a few orders of magnitude faster than anyone had predicted. While the researchers didn't expect it to be that fast, the math and the physics were sound. http://www.geologyin.com/2020/10/earth-grows-fine-gemstones-in-minutes.html?+IN%29

CVRMS Oct. 20 Virtual Meeting

7:30 p.m. The Zoom meeting was called to order by Marv Houg, President -24 participants. A little difficulty getting started.

Minutes reviewed. Motion to approve by Dale, second by Kim. Approved as published.

Treasurer's report by Dale Stout. Checking balance $2977.51 .Motion to approve by AJ, second by Glen. Report approved.

Ray presented a program," *The Ballad of Big Al,*" located in Wyoming. Lots of questions and comments followed. Suggestions were made for other programs. Tourmaline, man-made stones? Glen suggested that Mineralogical Record may have programs available.

Old Business: Will we have a show in 2021? We currently have relinquished our March dates and may plan on May or June. The feeling is that the longer we wait, the better, until a later date when Covid 19 is better under control. The Board will discuss further at their next meeting.

New business:-Field trip suggestion to Marv that he could salt the areas with trilobites before the trip.

Deb from the quarry is planning another TAKO (*Take a Kid Outdoors*) program, tentatively the 3rd weekend in May, and is asking our help. More to come on this.

Misc: Dale introduced Rob Martier from MAPS who was interested in the *Big Al* video.

Motion to adjourn by AJ, seconded by Ashley.

8:45pm Meeting adjourned.

Respectfully submitted
Dell James, Secretary

Australia has issued new Opalized Fossils Stamps

https://auspost.au/shop/collectables/stamp-issues/australian-stamps/opalised-fossils

CVRMS Board Minutes Oct. 27

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

7:10 p.m. The meeting called to order by Marv via Zoom.

Treasurer's report. Dale reported nothing has changed.

Minutes of last meeting reviewed. Motion to approve as published by Bill, second by Ray. Minutes approved.

Old Business: Discussion centered around the club's finances and how we can safely raise more money. Sharon had sent a suggestion for review and discussion via email.

Suggest that we switch our dates and hold the rock auction May or June instead of the show. And the Show would be held in October sometime. *Pros for doing* this: Better control of crowds, fewer people to deal with, one day auction instead of two, maybe Covid would be under better control, plans will be the same as the original show theme, may be able to hold auction outside, utilize Zoom and Webcam for bidding at auction.

Things to be considered: Vendors and consignors ok with this change? Dates available for show at Hawkeye Downs and Amana colonies? Sharon will check with Hawkeye and Dale with Amana. Jay will send email to consignors for input and will have to plan on fewer items maybe half as many. Sharon will develop questionnaire for Board members' review before sending out to members and bidders from last year. Dale can include in email. Ray in Newsletter.

Bus trip for next year; Postpone until October 2021? Bill says there is a possibility still. We have time to figure this out.

Christmas Party: This year with more families in crisis, it is more important that we contribute like we do every year to local groups that can get more bang for their buck. Since we won't be able to "pass the hat" we can virtually do this by sending your contribution to Dale for the Christmas fund.

New Business: River Products has approved the display cabinet and Dale will order as soon as he knows the delivery option that River products wants. Marv will check with Deb on this. Deb has a number of specimens, etc., for the case. We would supply some cool labels.

River Products will also hold their annual TAKO (Take a Kid Outside) at the quarry. Tentatively planned for 3rd weekend in May. If rainy, then the weekend following. Requesting our help and have some ideas like blasting for kids to watch from a safe distance.

Misc: Ray is open for suggestions regarding programs. Some suggestions he has received involve climate change issues, gemstones like Blue John fluorite, Rhodochrosite, tourmaline, any PBS programs available?? Marv suggested a Rick Steves Program about the Alps on PBS. Ray thanked everyone for suggestions.

Bill made motion to adjourn, seconded by Dale. 8:45pm meeting adjourned.

Respectfully submitted
Dell James, Sec.

CVRMS

ELECTION OF CVRMS 2020 OFFICERS AT NOVEMBER *ANNUAL* MEETING

The November 17 CVRMS meeting is our official ***Annual Meeting,*** which means that it is time for members to elect club officers. Since all officers except Directors serve a 2-year term and the full slate was elected last year, only Jay Vavra's term as **Director** expires this year; however, the Nominations Committee recommended that Jay be elected to a second 3-year term. Current officers are:

President	Marv Houg
Vice President	Ray Anderson
Treasurer	Dale Stout
Secretary	Dell James
Editor	Ray Anderson
Liaison	Kim Kleckner
Director '20	Jay Vavra
Director '21	Bill Desmarais
Director '22	Toby Jordan
Webmaster	Sharon Sonnleitner

Anyone interested in serving as Director may enter their name at the November 17 meeting, and club members present will vote to elect a Director for 2020-2023.

Spodumene [$LiAl(SiO_3)_2$]crystal

Spotlight Gemstones: Citrine / Topaz

November's Birth Stones

citrine

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 in 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 (10 lbs) 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 26 lbs in size, discovered in 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.

What in the World?

What in the World? Is pictured in this unusual photo?
(*partial credit will be given to those who have a clue*)

October's Photo

Last month's "What in the World" photo was a beautiful specimen of **Cobalt calcite (**$CoCO_3$**.),** also known as **spherocobaltite, roselite,** or **cobaltoan calcite.** It is a variety of calcite which owes its beautiful pink or purple color to small amounts of the accessory element cobalt. This sample was collected from the Agoudal Mine in the Bou Azzer District of Morocco, but it can also be found in the Congo, Italy, Australia, and the United States. Calcite is one of the most common minerals on the face of the Earth, comprising about 4% by weight of the Earth's crust and is formed in many different geological environments.

Rock Calendar
CVRMS EVENTS OF INTEREST

2020

Nov. 17—CVRMS Monthly Meeting
<< VIRTUAL MEETING >>
See page 1 for details

Dec. 15—CVRMS Holiday "Party"
<< VIRTUAL PARTY >>
details in Next Month's Newsletter

2021

Jan. 19—CVRMS Monthly Meeting
<< VIRTUAL MEETING >>
details to be announced

Mar. 20-21—CVRMS Fossil Rocks & Show
<< CANCELLED >>
may be rescheduled

May (?)—Special CVRMS Auction

We are trying to arrange a special, one-day auction in May

details to be announced

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.

Uncut blue sapphire (above) and uncut green diamond (below)

On many occasions I have been asked about what kind of gems can be found in Iowa. Of course when most people talk about "gems" they are thinking of "*precious gems*" (diamonds, rubies, sapphires, and emeralds), but in Iowa our bedrock is dominated by sedimentary rocks, not rocks that commonly yield precious gems. We have some stones that would be called "*semi-precious gems*," such as fresh water pearls, chalcedony (including many varieties of agates), quartz, sphalerite, and other minerals most of which form as secondary minerals in sedimentary rocks. I've read reports of some gemstones, even precious gems, that have been found in glacial sediments and outwash in Iowa, and modern river sediments that are sourced from glacial sediments. One of the first reports of gemstones in Iowa dates back to 1912 when a sapphire was reportedly recovered from glacial gravel around Lake Okoboji in Dickinson County. It was reported in the Journal of the Iowa Academy of Science in 1914 by G. Muilenburg, who stated that *"In appearance it was very much like a piece of blue bottle glass but its superior hardness and peculiar luster, together with the fact that it was worn smooth and round, attracted the attention of the finder and led him to suspect that it might have some value. Subsequent examinations showed it to be a sapphire of good quality. The stone was cut by Messrs. Jurgens and Anderson of Chicago, and weighed, when cut, one and three-eighths carats. It is of the cornflower blue variety, which is most prized as a gem, and has the remarkable velvety luster which gives to a sapphire its value*." A second stone, a gem-quality green diamond was reportedly discovered in a gravel deposit at Dubuque. Its size was estimated to be between that of a pea and a small hazelnut (about five carats). June Zeitner reported in a 1964 *Midwest Gem Trails* that a jeweler purchased the stone for $1500 Other than those, a number of native copper specimens have also been discovered in Iowa, including a 64 pound specimen at the U. of IA Museum. The native copper we know came from Michigan's Keweenaw Peninsula, about 400 miles away; the sapphire and diamond from unknown deposits in Minnesota or southern Canada.

This sand from Lake Winnibigoshish in north central Minnesota appears generic brown on the shoreline. However, under the microscope its beauty is revealed. The pink and red grains are garnets and iron-rich agates. The black grains are magnetite and/or ilmenite, both iron minerals. The pistachio-green grains are epidote and the blue-green grains are diopside. Magnified 50 times.
Photo Source:*The Secrets of Sand* by Gary Greenberg, Dr. Carol Kiely, and Kate Clover

On numerous occasions I remember logging chip samples (the microscope study of the chips of rock that were brought to surface during well drilling, collected and bagged at 5 foot depth intervals as the drill progressed) from wells drilled into the sands of the Missouri River. I was always impressed by the number of sand-size gemstones that I would encounter. Sapphires, tourmalines, topaz, garnets, and all manner of cool grains, were carried down the Missouri from the Rocky Mountains. I look at Iowa's glacial till deposits as "rivers" carrying "sediments from Canada into Iowa. There should be many-many gemstones in this till river, it's just a question of finding and identifying them. Lots of you out there like to look for rocks in gravel pits. Don't forget to take a look at some of the smaller gravel pieces (acorn to pea size); these are the rocks that are your best bet for finding gemstones. Maybe some of you have already found these transported gemstones (precious or semi-precious). Please let me know (**email address below**) what you have found, and send me a photo if you have one. I would like to compile a list of gemstones found in Iowa that is more extensive than just a sapphire and a diamond.

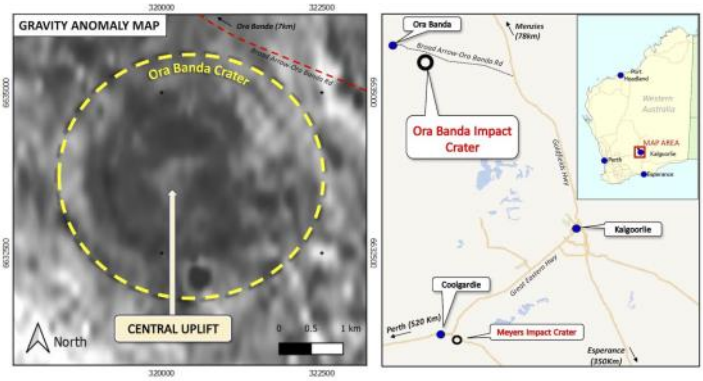
Ray Anderson (rockdoc.anderson@gmail.com)

Scientists have come closer to identifying the cause of Earth's worst mass extinction, by tracking down the geochemical trigger that may have started it all. Known as the ***Great Dying***, the Permian-Triassic extinction occurred around **252 million** years ago. Around **96 percent of marine species** and **70 percent of terrestrial vertebrate species** were killed off for good. New research has been completed, based on a study of fossil brachi-

Artist's rendering of the eruption of the Siberian Traps about 250 million years ago.

opods in what today is the Southern Alps. The shells record seawater pH levels (affected by atmospheric CO_2 concentrations), which the researchers measured, concluding that roughly 252 million years ago there was a sudden, intense injection of carbon dioxide into the atmosphere, most likely from a gigantic series of volcanic eruptions in Siberia (called the Siberian Traps). The increased warming and ocean acidification would have killed off certain species very quickly, while increasingly nutrient-rich waters would then have depleted oxygen levels in the ocean over a longer time period, causing further extinctions. Researchers measured different isotopes of boron and carbon in the brachiopod shells to determine the seawater acidity using high-precision instruments like the large-geometry secondary ion mass spectrometer (SIMS). Combined with detailed computer models, the data could be used to re-enact the Great Dying. Scientists have long accepted that a series of volcanic eruptions in what is now Siberia were a key cause of the extinction. But this was the first time a reconstruction of the atmospheric conditions had been made in such detail. It provided more information on the underlying mechanisms of what happened on Earth at that time, and what the consequences were over the next several thousand years. Their study clearly linked the CO_2 rise with volcanic activity, suggesting that another factor – *the release of large amounts of methane by microbes on the sea floor* – wasn't so important.
https://www.sciencealert.com/scientists-find-the-geochemical-trigger-for-the-world-s-largest-ever-mass-extinction

A massive 100 million-year-old meteorite crater has been found while a company was drilling for gold in outback Western Australia. The impact crater is estimated to have a diameter of about 3 mi. Although not visible from the surface, experts found the crater using electromagnetic surveys. Located near the Goldfields mining town of Ora Banda, north-west of



Gravimetric map showing Ora Banda crater and location of the impact site

Kalgoorlie-Boulder, the crater is believed to be five times bigger than the famous Wolfe Creek crater in the Kimberley. Geologist and geophysicist Dr Jayson Meyers, said the find was significant and unexpected. *"This discovery was made in an area where the landscape is very flat. You wouldn't know it was there because the crater has been filled in over geological time,"* he said. The crater was discovered on land owned by Australia's third-largest gold-mining company, Evolution Mining. Using modern techniques, such as gravity surveying, geologists were able to map out the crater, and Meyers thinks their successful find will lead to more discoveries. Meyers said more discoveries could help scientists better predict when a meteorite may next strike Earth. Close inspections of drilling samples included telltale signs of a meteorite strike, including ***"shatter cones"***, which are known to form in the bedrock below craters or underground nuclear explosions. Meyers hypothesizes the meteorite had to have been quite large in diameter to cause such an impact. "*To cause an impact of that size, the asteroid would've been approximately 300-600 feet in diameter."* Scientists discovered the world's oldest meteorite crater in Western Australia's mid-west earlier this year. The **Yarrabubba crater,** located near Meekatharra in WA's mid-west, was found to be around 2.23 billion years old. That makes it over 200 million years older than the next oldest crater.

http://www.geologyin.com/2020/10/gold-miners-discover-100-million-year.html?

A New Mass Extinction Event Has Been Discovered, And It Triggered The Rise of Dinosaurs

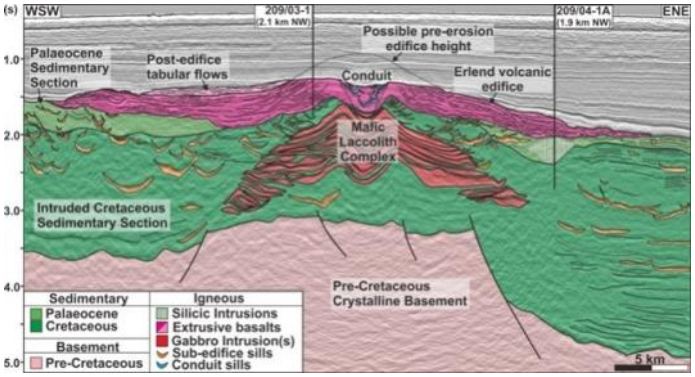
Huge volcanic eruptions **233 million years ago** pumped carbon dioxide, methane, and water vapor into the atmosphere. This series of violent explosions, on what we now know as the west coast of Canada, led to massive global warming only **20 million years after the Permian-Triasic "Great Dying.**" New research has revealed that this was a planet-changing mass extinction event that killed off many of the dominant tetrapods (*reptiles, amphibians, and mammals*) and heralded the dawn of the dinosaurs. Perhaps the best known mass extinction happened at the **end of the Cretaceous period, 66 million years ago**, when dinosaurs, pterosaurs, marine reptiles and ammonites all died out. That event was caused primarily by the impact of a giant asteroid that blacked out the light of the sun and caused darkness and freezing, followed by other massive perturbations of the oceans and atmosphere. Geologists and paleontologists agree on a roster of five such events, of which the end-Cretaceous mass extinction was the last. So the new discovery of a previously unknown mass extinction might seem unexpected. And yet this event, termed the **Carnian Pluvial Episode (CPE),** seems to have killed as many species as the giant asteroid did. Ecosystems on land and sea were profoundly changed, as the planet got warmer and drier. On land, it triggered profound changes in plants and herbivores. In turn, with the decline of the dominant plant-eating tetrapods, the dinosaurs were given their chance. The dinosaurs had originated some 15 million years earlier and the new study showed that, as a result of the **CPE**, they expanded rapidly in the subsequent 10 million to 15 million years and became the dominant species in the terrestrial ecosystems. The CPE triggered the *"age of the dinosaurs"* which lasted for a further 165 million years. It wasn't only the dinosaurs that were given a foothold. Many modern tetrapod groups, such as turtles, lizards, crocodiles and mammals date back to this newly discovered time of revolution.

Dinosaur leaves footprints in mud in an Argentine lake about 234 million years ago.

This event was first noticed independently back in the 1980s, but was thought to be restricted to Europe. First, geologists in Germany, Switzerland and Italy recognized a major turnover among marine faunas about 232 million years ago, termed the **Rheingraben event**. Then in 1986, British paleontologist Michael Benton recognized this independently as a global-scale turnover among tetrapods and ammonites. But with the early dating techniques it was impossible to be sure whether these were both the same event. The jigsaw pieces started falling into place when an episode of about 1 million years of humid climates was recognized throughout the UK and parts of Europe by geologists Mike Simms and Alastair Ruffell. Then geologist Jacopo dal Corso spotted a coincidence in timing of the **CPE** with the peak of eruptions of the *Wrangellia* basalts. Wrangellia is a term geologists give to a narrow tectonic plate that is attached to the west coast of the North American continent, north of Vancouver and Seattle. Finally, in a review of the evidence from Triassic-aged rocks, the signature of the **CPE** was detected – not only in Europe, but also in South America, North America, Australia and Asia. This was a global Event! The massive Wrangellia eruptions pumped carbon dioxide, methane and water vapor into the atmosphere, leading to global warming and an increase in rainfall worldwide. There were as many as five pulses of eruptions associated with warming peaks from 233 million years ago. The eruptions produced acid rains as volcanic gases mixed with rainwater. Shallow oceans also became acidified. The sharp warming drove plants and animals from the tropics and the acid rain killed plants on land, while ocean acidification attacked all marine organisms with carbonate skeletons. Life begun to recover, but when the eruptions ceased, temperatures remained high while the tropical rainfall ceased. This is what caused the subsequent drying of the land on which the dinosaurs flourished. It also led to a change in the global mechanisms by which calcium carbonate forms limestones and provides material for organisms like corals and mollusks to build their shells. The **CPE** marked the start of modern coral reefs, as well as many of the modern groups of plankton, suggesting profound changes in ocean chemistry. Before the **CPE**, the main source of carbonate in the oceans came from microbial ecosystems, such as limestone-dominated mud mounds, on continental shelves. But after the **CPE,** it was driven by coral reefs and plankton, where new groups of micro-organisms, such as dinoflagellates, appeared and bloomed. This profound switch in fundamental chemical cycles in the oceans marked the beginning of modern marine ecosystems. And there are going to be important lessons for how we help our planet recover from climate change. Geologists need to investigate the details of the Wrangellia volcanic activity and understand how these repeated eruptions drove the climate and changed the Earth's ecosystems. There have been a number of volcanically-induced mass extinctions in the history of the Earth and the physical perturbations, such as global warming, acid rain and ocean acidification, are among the challenges we see today. Palaeontologists will need to work more closely on the data from marine and continental fossil records. This will help us understand how the crisis played out in terms of the loss of biodiversity, but also to explore how the planet recovered.
https://www.sciencealert.com/scientists-identified-the-mass-extinction-that-triggered-the-dawn-of-the-dinosaurs

What Lies Beneath a Volcano?

The complex plumbing system beneath volcanoes has been revealed in the clearest detail ever, marking a "*major step forward*" in our understanding of how they are formed and behave. An international team of geologists has analyzed the subsurface geology of the Erlend volcano in the Faroe-Shetland basin of the North Atlantic, allowing them to produce a detailed 3-D map showing the volcano's inner workings. It was once a small volcanic island that last erupted 58 million years ago, and



Cross-section through the volcano, showing the lava flows and underlying magma chamber. The seabed can be seen at the top of the image

is now buried and preserved underneath 1 km of sediment on the sea floor. Instead of observing one large magma chamber beneath the volcano, the map reveals a complex amalgamation of smaller volcanic rock formations. It also suggests the long-assumed concept of a vertical, cylinder-like conduit that connects magma chambers and volcanoes—the *'balloon and straw'* – is oversimplified. The map is revealed as part of a paper published in the journal *Geology,* co-authored by geologists at the universities of Aberdeen, Adelaide, and Oslo. The team looked at seismic data provided by energy data company TGS, to understand the interaction of volcanic rock with petroleum systems in the far north of the Faroe-Shetland Basin, an area with significant gas reserves. One researcher said: "*Much of our understanding of how magma is moved around the Earth's crust is still conceptual, but by producing the clearest images yet of the complex plumbing systems that underlie volcanoes, we can see things with our own eyes. This is a major step forward in terms of advancing the science around how volcanoes are formed and behave.*" Others added: "*Understanding how molten rock makes its way from the chamber, through the Earth's crust, to the volcanoes where it is erupted is one of the biggest challenges facing geologists," and understanding how magma is stored prior to eruptions is essential in assessing volcanic hazards, but it is extremely difficult to directly observe magma chambers. Active volcanoes are challenging places to work and collect data, whilst ancient volcanoes and their underlying plumbing systems are rarely completely preserved. That is what makes our findings so valuable. These images reframe our understanding and suggest that models for predicting volcanic eruptions will need to be modified*."

http://www.geologyin.com/2020/10/what-lies-beneath-volcano.html

Dendrite Minerals

A crystal dendrite is a crystal that develops with a typical multi-branching tree-like form. Dendritic crystallization forms a natural fractal pattern. Dendritic crystals can grow into a supercooled pure liquid or form from growth instabilities that occur when the growth rate is limited by the rate of diffusion of solute atoms to the interface. The surfaces of limestones are often marked by black or red-brown deposits known as mineral dendrites. The term "dendrite" comes from the Greek word *dendron*, which means "**tree.**" They are deposits of hydrous iron or manganese oxides formed when supersaturated solutions of iron or manganese penetrate the limestone and are precipitated on exposure to air at the surface. The minerals represented can include hollandite, coronadite, and cryptomelane. Apparently they are never pyrolusite, despite what you may see in textbooks. It's not possible to tell the min-

Dendrites in quartz crystal.

Manganese dendrites on a limestone bedding plane from Solnhofen, Germany.

In **paleontology**, dendritic mineral crystal forms are often mistaken for fossils. These pseudofossils form as naturally occurring fissures in the rock are filled by percolating mineral solutions. They form when water rich in manganese and iron flows along fractures and bedding planes between layers of limestone and other rock types, depositing dendritic crystals as the solution flows through.

http://www.geologyin.com/2020/09/dendrite-minerals.html

Tiny, Little-Winged Dinosaurs Were Probably Worse at Flying Than Chickens

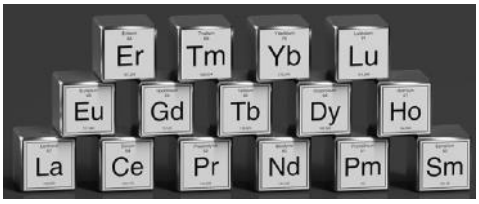
The discovery of two small dinosaurs with bat-like wings a few years ago was a palaeontologist's dream. Just how flight evolved in birds is something we're still trying to nail down, and looking at this early evolution of bat-like wings in dinosaurs could give us a clue. But a team of researchers has now pointed out that just because you have wings, it doesn't necessarily mean you're actually any good at flying. *Yi qi* and *Ambopteryx longibrachium* are two species of theropod dinosaurs that lived around 160 million years ago, both of which had unusually elongated fingers, and a skin membrane stretching between them, similar to a bat's wing. This is an entirely different kind of wing to the one theropod dinosaurs evolved to fly with – the dinosaurs that eventually became birds. And, unlike them, after only a few million years, *Yi* and *Ambopteryx* became extinct, which is the first hint that these unusual wings could not match those birds-to-be. However, weird wings on extinct critters mean it's likely multiple types of wings (and therefore flight) evolved over the years, and that *Yi* and *Ambopteryx*'s attempts were not the winning strategy. But before you can write off *Yi* and *Ambopteryx* as complete evolutionary flight failures, you have to know how good (or bad, as the case may be) the two species were at flight. In 2015, when *Yi* was found, that team of researchers suggested that the size of its wings and other flight characteristics could mean it was a gliding creature – however it's unlike any other glider we know of, and its center of mass might have made even gliding difficult.

We just weren't sure. A new study, by researchers in the US and China, has now looked into the flight potential of *Yi* and *Ambopteryx* in a lot more detail, and come to the conclusion that they really weren't good at getting their little feet off the trees they lived in. *"Using laser-stimulated fluorescence imaging, we re-evaluate their anatomy and perform aerodynamic calculations covering flight potential, other wing-based behaviours, and gliding capabilities*," the team writes. "*We find that Yi and Ambopteryx were likely arboreal, highly unlikely to have any form of powered flight, and had significant deficiencies in flapping-based locomotion and limited gliding abilities."* The team's analysis of the fossils (*Yi* pictured above) was able to pick up tiny details in soft-tissue that you can't see with normal light. Then the team modelled how the dinosaurs might have flown, adjusting for things such as weight, wingspan, and muscle placement (all stuff we can't tell just from the fossils). The results were… underwhelming. "*They really can't do powered flight,*" says first author, biologist Thomas Dececchi from Mount Marty University. "*You have to give them extremely generous assumptions in how they can flap their wings. You basically have to model them as the biggest bat, make them the lightest weight, make them flap as fast as a really fast bird, and give them muscles higher than they were likely to have had to cross that threshold. They could glide, but even their gliding wasn't great.*" So, according to Dececchi and his team's model, we're looking at flying capabilities considerably worse than a chicken, perhaps worse than the flightless New Zealand parrot, the kakapo, which is also mostly limited to gliding from trees, but can at least flap to control descent. But although it's a bit sad for *Yi* and *Ambopteryx*, it's good news for us – the findings give even more evidence that dinosaurs evolved flight (or at least tried to) multiple times. As the team points out, considering all the types of bats, gliders, flying squirrels, and other gliding or flying mammals, maybe it shouldn't be a surprise. "*We propose that this clade was an independent colonization of the aerial realm for non-avialan theropods. If true, this would represent at least two, but more likely three or more attempts at flight (both powered and gliding) by small pennaraptoran theropods during the Mesozoic,*" the team writes in their paper. "*Given the large number of independent occurrences of gliding flight within crown mammals, this should perhaps be unsurprising, but it does create a more complex picture of the aerial ecosystem.*" Seems like some things don't change much, even in a hundred million years. https://www.sciencealert.com/these-little-winged-dinos-might-have-been-worse-at-flying-than-chickens

Gigantic Dinosaur Footprints Are Found on the Roof of a Cave

Tyrannosaurus rex was a dinosaur that lived up to its name. If you were to visit its haunts between 68 and 66 million years ago, you wouldn't find another carnivore quite like it. Growing up to 40 feet long and weighing as much as nine tons, the dinosaur was far larger than any other meat-eater of the time. The largest non-*T. rex* carnivore was about the size of an adult human, with a huge gap between these smaller raptors and the tyrant king. And that's strange. In other times and places, habitats were full of carnivorous dinosaurs of all sizes. How did the "tyrant lizard" come to stomp out the competition? They were not the first or only form of meat-eating dinosaur around. In fact, the earlier tyrannosaurs that lived around 160 million years ago were tiny, with *much more blade-like teeth and weaker bites*. It was only around 80 million years ago that tyrannosaurs staged their coup in the Northern Hemisphere. That's when tyrannosaurs showed a big change, with deeper, bone-crushing skulls, small arms and increased speed and agility. These changes go along with the proliferation of horned dinosaurs and duck-billed dinosaurs (both favored prey), and the sudden absence of other forms of predatory dinosaurs may have given tyrannosaurs an opening to evolve into new roles. Paleontologists know very little about the middle of the Cretaceous period, and this is the critical time when tyrannosaurs were starting to change. And there's lots more to uncover about what tyrannosaurs ate at different times in their lives. There are specimens of the duckbill *Edmontosaurus* with bite marks from teenage tyrannosaurids, but experts should keep an eye out for tyrannosaur bite marks on smaller prey. Not to mention fossil feces (or coprolites) from younger tyrannosaurs that might contain bones that can identify the tyrannosaur menu. The upshot, though, is that dinosaurs need to be understood on their own terms. How they lived is fundamentally different from any creature alive today, and, in the case of tyrannosaurs, that's partly because of their impressive size. An animal that is born from an egg the size of a volleyball that winds up as big, or bigger, than an elephant cannot help but pass through many ecological niches as it grows. That means that big dinosaur species weren't just one animal that behaved the same all its life. A single *T. rex*, Holtz says, is practically the equivalent to an ecological community. https://www.discovermagazine.com/planet-earth/how-t-rex-came-to-rule-the-world

Geologists Solve Crucial Mystery Surrounding Rare Earth Element Deposits



An international team of scientists has helped to unravel a longstanding mystery about how **rare earth element** deposits form underground – and sometimes seem to disappear without a trace. Rare earth elements (**REEs**) are a set of 17 valuable chemical elements that are incredibly important in manufacturing technological devices, being used as critical raw materials in everything from smartphones to disk drives, wind turbines, satellites, electric vehicles, medical equipment, and more. Although their name suggests they are rare, they can in fact be relatively abundant resources in Earth's crust; their scattershot dispersion makes them difficult to isolate and extract from under the surface, let alone in environmentally friendly ways. Because of this, concentrated REE deposits are a highly coveted natural resource, and scientists are continually looking into devising new and better ways of finding and securing the valuable minerals. In a new study led by geologist Michael Anenburg from Australian National University, researchers wanted to explore the chemical mechanisms by which REEs form under the surface, specifically in and around igneous carbonatite rocks. Although carbonites and their altered and weathered derivatives provide most of the world's REE, no unified model explains all features of these deposits, strongly impairing exploration. To investigate the mineralization processes behind carbonatite-associated REE deposits, Anenburg and his team used laboratory simulations to observe what happens when carbonatite rock heats up under high pressure, before cooling and depressurizing, much like it would in natural magmatic processes. Putting small amounts of synthetic carbonatite into silver or nickel capsules in a piston-cylinder apparatus, the researchers subjected the samples to temperatures of up to 2,192°F at pressures up to 2.5 gigapascals (GPa), before gradually decompressing and cooling them down to 392°F and 0.2 GPa. Before the experiment, it had been thought that certain ligands (molecules capable of binding to REEs, including chlorine and fluorine) were necessary to make REEs soluble, capable of mobilizing to concentrations that were economic to extract. But the experiment showed that alkaline chemicals (sodium and potassium) are required to transport the REEs. The alkali-bearing carbonatites can form REE-rich fluids that can migrate long distances while retaining high REE solubilities. Of course, just because we've seen this in lab conditions, doesn't necessarily mean we'd observe the same exact reactions in the open systems of nature, in which the presence of water and all other sorts of chemicals in the environment could change things. Still, it's a step forward, and one that overhauls our knowledge on the background processes involved in REE formation and concentration. https://www.sciencealert.com/scientists-solve-chemical-mystery-to-help-pinpoint-precious-rare-earth-elements

BOARD OF DIRECTORS QUESTIONARE

We are proposing a change in the dates of the 2021 CVRMS Rock Show and Auction. Please read thru the note, fill out the questionnaire, and return it to Sharon Sonnleitner.

HI FELLOW ROCKHOUNDS,

Cedar Valley Rocks & Minerals Society is hoping to hold our annual rock auction in late spring of 2021 and move our annual show to fall of 2021. This switch in scheduling for our show and auction would be just for 2021 and is driven by the projected course of Covid-19 in 2021.

The plan includes:

- Hold a 1-day auction on a Saturday or Sunday in the first half of May, probably from 9:00am to about 7:00pm
- Require all who help with set-up to have quarantined for 2 weeks
- Prefer that in-person bidders quarantine for 2 weeks in advance of the auction
- Require Masks be worn at all times in the building and in the seating area
- Require Social Distancing at all times
- Have Hand Sanitizer available
- Keep at least one garage door open when people are in the building
- Have auction lots available for view as usual; also have lots pictured on the club website, if possible
- During bidding, have bidders seated outside, socially distanced in the shade, weather permitting. If weather doesn't cooperate, bidders will be seated socially distanced inside
- As each item comes up for sale, project it on a screen using a webcam, instead of walking it out to bidders
- Broadcast the auction via Zoom and allow bidding via Zoom - Have one spotter just monitoring athe Zoom bidders
- Items must be picked up on the day of sale unless other arrangements are agreed upon in advance.
- Place group orders for sub sandwiches from Casey's for lunch and for dinner, with drinks, desserts, chips and limited cold sandwiches available on site
- QUARANTINE MEANS: Very limited, masked and socially distanced contact with people outside your household and no contact with anyone testing positive for Covid.

To move forward with our plans, we would like your input. Please let us know your thoughts by completing the following survey and returning it by November 30, 2020, via mail OR send your answers in an email to:

Sharon Sonnleitner
4800 Sunset Dr SW
Cedar Rapids IA 5240
sonnb@aol.com

Circle your choices

NAME:				
Yes	No	Probably	Probably Not	Would you attend the auction as outlined above in person?
Yes	No	Probably	Probably Not	If you would not attend in person, would you attend via Zoom?
Saturday		Sunday	Either	What is your preference for day?
Comments:				
Yes	No	Probably	Probably Not	**CONSIGNERS for the Sept 2020 auction ONLY:** Would you commit to this auction, assuming your number of lots would be reduced to approximately ½ the number you requested for the 2020 auction?
Yes	No	Probably	Probably Not	**CLUB MEMBERS & INTERESTED NONMEMBERS:** Would you help at the auction after having quarantined for 2 weeks prior to the event?

2020 Officers, Directors, and Committee Chairs

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

Club meetings are held the 3rd Tuesday of each month from September through November and from January through May at 7:15 p.m., at the Hiawatha Community Center in the Hiawatha City Hall, 101 Emmons St., Hiawatha IA. The December meeting is a potluck dinner held 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
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Cedar Rapids, IA 52403

CVRMS website:
cedarvalleyrockclub.org

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