

Cedar Valley Gems



Cedar Valley Rocks & Minerals Society

Cedar Rapids, Iowa

cedarvalleyrockclub.org

CEDAR VALLEY GEMS

JUNE 2020

VOL. 46, ISSUE 6

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

Next CVRMS Meeting
Tues. June 16
7:15 pm

<<VIRTUAL MEETING>>

Join the Zoom Meeting
<https://us02web.zoom.us/j/88402839480>

featured presentation:
Several Short Videos

**Video Tours of
TUCSON GEM
AND MINERAL SHOWS**

Also Featuring:
Short Business Meeting
“Show Us Your Favorite Rocks”
“Tell Us What You Have Been Up To”



Newsletter
Summer Vacation
—CANCELLED—



The annual two-month summer vacation for **Cedar Valley Gems** has been **cancelled** this year. Because of the uncertain times, we will continue to publish the Newsletter this summer in order to keep members informed about the status of CVRMS events and other important information. But we can still enjoy our summer, if we **STAY SAFE**.



CVRMS May 19 **Virtual Meeting**

7:15p.m. Meeting called to order by Marv
21 members signed on.

MINUTES OF PREVIOUS MEETING reviewed. No corrections. Kim K made motion to approve, second by Dale. Minutes approved as published.

TREASURERS REPORT briefly given. No changes since last meeting. Scholarships not yet paid. Ray has notified the two colleges and Bill has notified VAST. There will be no field trips this summer so no need to rush the payment.

AUCTION: Still on a wait and see basis.

BUS TRIP: Still scheduled for 10/03/2020 Saturday. No decision to cancel needed until after Sept. Glen stated that this trip usually conflicts with Waterloo's agate hunt which is usually held on the first Sunday. Bill will take that into consideration for next trip.

PICNICS: We are still on wait and see. The parks are closed.

PROGRAM: Ray gave a shorter than usual talk about the Pre Illinoian period and where was the mighty Mississippi River? Warmly received and encouraged to give more.

SHOW AND TELL followed with some stories of arrowhead finds and various other proud finds and hobbies.

MOTION TO ADJOURN by AJ, second by Ray.

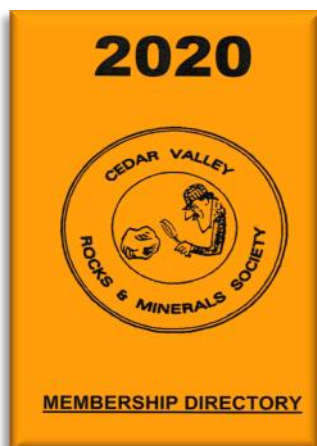
8:55p.m. Meeting adjourned

Respectfully submitted
Dell James, Secretary

The 2020 CVRMS
Membership Directory
has been mailed to
club members.
If you didn't get yours
contact:

Sharon Sonnleitner
sonnb@aol.com

396-4016



CVRMS Board Minutes May 26 **Virtual Meeting**

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

7:02 p.m. The meeting called to order via Zoom.

Brief review of Dale's emailed treasurer's report; no major changes. Refunds have been paid to show vendors. Motion by Bill to accept treasurer's report as published; second by Jay. Report approved.

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

Show Discussion: Hawkeye Downs has not yet returned \$1250 deposit due us for show, but the check is in the mail. Question whether to apply the \$1250 to our deposit to secure next year's show dates, May 27 and 28. Since next year's show was previously approved, consensus was to sign the contract.

Auction: Since businesses and events are opening up with some restrictions, should we hold Auction? Decision was to ask the sellers and members to get more info and input before next meeting. Jay will poll the sellers, Sharon will post questions on web site and Ray will include in Newsletter. The questions, **1.** should hold the auction with precautions or cancel? **2.** will you (members) help run the auction? and **3.** will you be there to bid? Dale will also poll via email.

Newsletter: Ray is willing to produce a newsletter during the summer (usually not published in July & August). Question about continuing these Zoom sessions for club meetings since it appears as though the picnics will not be happening. Since last meeting's Zoom session and Ray's presentation was well received, it was decided to have a Zoom meeting in June. Ray will show several short videos on past Tucson mineral shows.

Bus Trip: Still too early to make determination. 7 people signed up so far. Bill will call bus company for guidelines regarding the rules that will be employed as the pandemic troops on. Bill has until one month before trip to cancel.

Miscellaneous: Show and Tell was popular but need to have better control over who is talking. Interruptions are not good. Sharon will mute everyone except the presenter while he/she is telling about show-and-tell item. Everyone can unmute as soon as the presenter is done.

Kim has a concern about other people reposting outside articles on the club's Facebook page. Hopefully this will be limited and the page used for club information.

Kim expressed a concern about people improperly using private collection sites. The Code of Ethics in our membership directory states, #1 "I will respect both private and public property and will do no collecting on privately owned land without permission from the owner." Send them a copy if you know who they are.

Programs: Bill and Ray are currently not conducting any group programs. Requests will be handled individually and not until it is determined to be safe.

Ray made motion to adjourn, seconded by Bill. 8:05 meeting adjourned.

Respectfully submitted
Dell James, Sec.

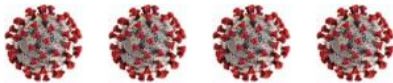


2020 CVRMS ROCK AUCTION?!

The CVRMS Board of Directors would like input from Members, Auction Sellers, and potential Bidders.

- 1. Should we have our annual Rock Auction, scheduled for September 19-20???
- 2. If we have the Auction, would you be willing to help us run it???
- 3. If we have the Auction, would you show up and participate by bidding???

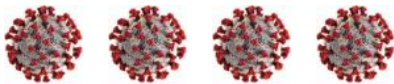
Please send your responses to these questions to: email—Ray Anderson (rockdoc.anderson@gmail.com) or phone Marv Houg (319)364-2868



DO YOU GET CVRMS EMAIL?

The CVRMS Board of Directors want to keep in touch with all members to be sure you have the most recent information about upcoming events. If you do not presently receive periodic Society email messages (most from Dale Stout) and would like them, please contact Dale with your current email address.

Dale Stout (dhstout55@aol.com)



DID YOU PAY YOUR 2020 DUES?

CVRMS Treasurer Dale Stout noted that many members have not yet paid their 2020 CVRMS dues. With all of the disruptions to our normal world and our temporary hold on monthly meetings, it is easy to forget. But, like you, we still have bills to pay, so please send your check for \$15 (per family) to Dale at:

Dale Stout
2237 Meadowbrook Dr. S.E.
Cedar Rapids, IA 52403



June's Birth Stone



June has three official birthstones, moonstone, pearl, and alexandrite. Of these, I think that alexandrite is the most interesting, so that is the birthstone that will be discussed this month. A relatively modern gem, alexandrite was discovered in Russia's Ural Mountain emerald mines. Legends claim that it was discovered in 1834 on the same day that future Russian Czar Alexander II came of age, hence the name honoring him. Because this unique gemstone changes colors from green to red (see example above), the national colors of Russia, alexandrite became Imperial Russia's official gemstone. Sometimes described as "emerald by day, ruby by night," alexandrite is a rare variety of the mineral chrysoberyl (an aluminate of beryllium with the formula BeAl₂O₄), a strongly pleochroic (trichroic) gem that will exhibit emerald green, red, and orange-yellow colors depending on viewing direction in partially polarized light. After Russia's mine deposits were exhausted, the popularity of alexandrite waned until new supplies were discovered in Brazil in 1987. Brazil, Sri Lanka and East Africa are now the main sources for alexandrite, though these are not as vividly colored as the original Russian stones.

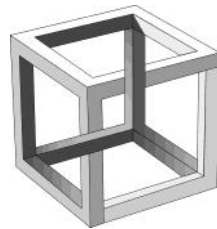
Because it's so scarce, fine quality alexandrite is practically unaffordable to the general public. Even lower quality stones are expensive and limited in supply. Since the 1960s, labs have grown synthetic alexandrite (not to be confused with simulated alexandrite, which is actually corundum or colored crystals infused with chromium or vanadium for color). Creating synthetic alexandrite is an expensive process, so even lab-grown stones can be costly. Color change is the most important factor when determining alexandrite's quality and value. The brighter the colors and the more dramatic the change from bluish green in daylight to purplish red under incandescent light, the more valuable the gem. Like most gems, alexandrite is weighed in carats. Higher clarity may weaken the stone's color change, so color is much more important than clarity in this case. Alexandrite is more expensive than most gemstones, including sapphires, rubies, emeralds and diamonds. Top-quality Russian alexandrite has sold for as much as \$10,000 per carat. Most of the original Russian stones belong to museums or private collectors. The few gemstones that are produced today only fit the budgets of the most discerning gem experts. Alexandrite is a solid investment because of its rarity, durability and historical significance.

<https://www.americangemsociety.org/en/alexandrite-overview>

What in the World?



What in the World is this strange mountain peak that looks like a cheese fondue??



May's Photo



Last month's "What in the World?" photo is the view looking back through Bridal Veil Falls at Pikes Peak State Park in Clayton County

from an overhanging limestone ledge. The falls are accessible via Bridal Veil Trail, a 0.5 mile hike down a series of wooden steps (seen in background of photo) that descend about 90 feet from the bluffs above. The limestone ledge that the falls cascade over is the McGregor Member of the Platteville Formation (Ordovician). The water continues down the bluff for an additional 400 feet to the Mississippi River. Along the way it cuts through a St Peter Sandstone valley fill exposure known as "Pictured Rocks." The sand grains, coated with iron oxide and other minerals, display numerous tints of red, yellow, and gray that shade into white and were collected and used by McGregor resident Andrew Clemens to produce beautiful and valuable sandbottle art in the late 1800s.

Rock Calendar CVRMS EVENTS OF INTEREST

2020

June. 18 - CVRMS Pot Luck Picnic
Ellis Park Overlook Shelter

******CANCELLED******

INSTEAD

**<< VIRTUAL MEETING >>
on ZOOM**

7:15 pm

see page 1

click on

<https://us02web.zoom.us/j/88402839480>

(link to also be sent via email)

July 21—CVRMS Pot Luck Picnic ??
Location to be announced.

Sept. 19-20—CVRMS Rock Auction ??
Amana RV Park and Event Center
Amana, Iowa

<https://www.cedarvalleyrockclub.org/auction.html>

Sept. 27-29 - Geode Fest and Rock Show
Chaney Creek Boat Access
Illinois Highway 96 N
Hamilton, Illinois

<http://www.keokukiowatourism.org/>

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.

Since I did not receive any "Ask a Geologist" questions for this month's newsletter, I thought I would share some interesting geologic information that I recently encountered. It has been known for quite a while that the largest volcano on Earth was Mauna Loa in Hawaii (in fact its also the tallest mountain on Earth if you measure it from its seafloor base). I recently read a preprint of an article that will come out on July 15 in *Earth and Planetary Science Letters* that identifies **Pūhāhonu**, an island in the Hawaiian island chain, is twice as large as Mauna Loa! The article was summarized in *Sci News* (<http://www.sci-news.com/geology/puhahonu-shield-volcano-08435.html>).

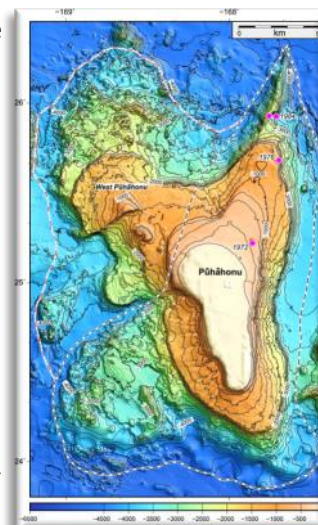
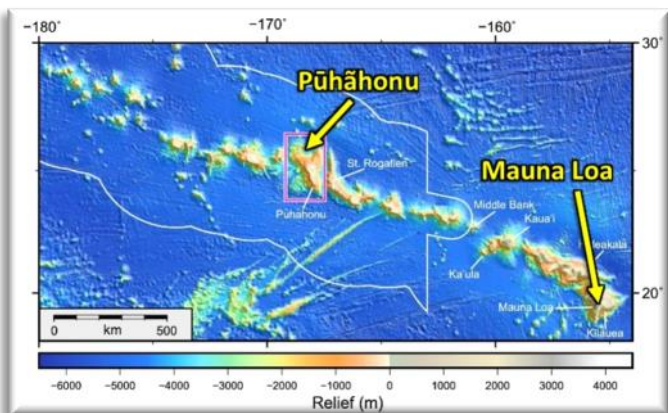
Pūhāhonu ("turtle rising for breath" in Hawaiian), a 13-million-year-old volcano in the northwest Hawaiian Ridge, is **twice the size of Mauna Loa volcano**, which was assumed to be not only the largest Hawaiian volcano but also Earth's largest known shield volcano, according to new research from the University of Hawai'i at Mānoa. Scientists and the public have long thought Mauna Loa, a culturally-significant and active shield volcano on the Big Island of Hawai'i, was the largest



Gardner Pinnacles. Image credit: Andy Collins, NOAA.

volcano in the world. "It has been proposed that hotspots that produce volcano chains like Hawai'i undergo progressive cooling over 1-2 million years and then die," said lead author Professor Michael Garcia, a researcher in the Department of Earth Sciences at the University of Hawai'i at Mānoa. "However, we have learned from this study that hotspots can undergo pulses of melt production. A small pulse created the Midway cluster of now extinct volcanoes and another, much bigger one created Pūhāhonu. This will rewrite the textbooks on how mantle plumes work." In 1974, Pūhāhonu, then called Gardner Pinnacles, was suspected as the largest Hawaiian volcano based on very limited survey data. Subsequent studies of the Hawaiian Islands concluded that Mauna Loa was the largest volcano, but they included the base of the volcano that is below sea level that was not considered in the 1974 study. The new bathymetric and gravity mapping, volume calculations and chemical analyses of rocks show that Pūhāhonu is the largest. "We are sharing with the science community and the public that we should be calling this volcano by the name the Hawaiians have given to it, rather than the western name for the two rocky small islands that are the only above sea level remnants of this once majestic volcano," Professor Garcia said. "Our study highlights Hawaiian volcanoes, not only now but for millions of years, have been erupting some of the hottest magma on Earth," the researchers said. "The work also draws attention to an infrequently visited part of the state of Hawai'i that has ecological, historical and cultural importance."

These images are from the July 2020 *Earth and Planetary Science Letters* article. The image on the left shows the location of the Pūhāhonu and Mauna Loa volcanos, 900 miles and 13 million years apart. The illustration on the right shows the elevation of Pūhāhonu above the sea floor. The flat top on the volcano shows the erosion of the volcano since its formation, eroded down to sea level except for the Gardner Pinnacles. Geothermal calculations on olivine crystals recovered from Pūhāhonu basalts showed the magma temperature of ~1700°C, hotter than any other Hawaiian magma, indicating a source mantle plume closer to the surface, probably accounting for the large volume of magma that was erupted.





Blue diopside skarn. Photo: James St. John

Skarns are hard, coarse-grained metamorphic rocks that form by a process called **metasomatism** (*the minerals which compose the rocks are dissolved and new minerals are deposited in their place*). Skarns tend to be rich in calcium-magnesium-iron-manganese-aluminum silicate minerals, which are also referred to as calc-silicate minerals. These minerals form as a result of alteration which occurs when hydrothermal fluids interact with a **protolith** (*existing rock*) of either igneous or sedimentary origin. A skarn-type mineralogy may be formed during regional or contact metamorphism and from a variety of metasomatic processes involving a great variety of fluids. A skarn is formed by a variety of metasomatic processes during metamorphism between two adjacent lithologic units. Skarn can form in almost any lithology type such as shale, granite and basalt but the majority of skarns are found in lithology containing a limestone or a dolomite. The attractive rock shown here is a rare variety of skarn dominated by bluish-colored **diopside pyroxene** ("*violane*" or "*violan*") ($(Ca,Mg,Fe)_2Si_2O_6$). Violane is a coarse violet to light blue, manganese-rich variety of Diopside. Such rocks are called **diopside skarn**. Diopside is a pyroxene made of calcium, magnesium, and silicon – diopside commonly forms in skarns because the mineral dolomite can supply the calcium and magnesium while the igneous rock will supply silicon. This rock comes from a location in eastern Siberia known for the incredible blue color. The rock is a skarn, the term for a type of metamorphic rock commonly found when a magma chamber forms next to a limestone deposit. The edge of the limestone is heated, recrystallized, and often altered chemically by fluids coming off the magma. Locality: Dovyren Highlands, Buryatia Republic, Transbaikalia, eastern Siberia, Russia.

http://www.geologyin.com/2020/05/rare-blue-skarn.html?utm_source=feedburner&utm_medium=email&utm_campaign=Feed%3A+GeologyIn+%28Geology+IN%29

Some millipedes can live for years, but one particular millipede inadvertently made paleontology history 425 million years after its demise. A 425-million-year-old millipede fossil from the Scottish island of Kerrera is the world's oldest "bug" -- older than any known fossil of an insect, arachnid or other related creepy-crawly, according to researchers at The University of Texas at Austin. The findings offer new evidence about the origin and evolution of bugs and plants, suggesting that they evolved much more rapidly than some scientists believe, going from lake-hugging communities to complex forest ecosystems in just 40 million years. The team found that the ancient millipede fossil is 425 million years old, about the same age as the oldest fossil of a land-dwelling, stemmed plant (also from Scotland). Although it's certainly possible there are older fossils of both bugs and plants, Brookfield said that the fact they haven't

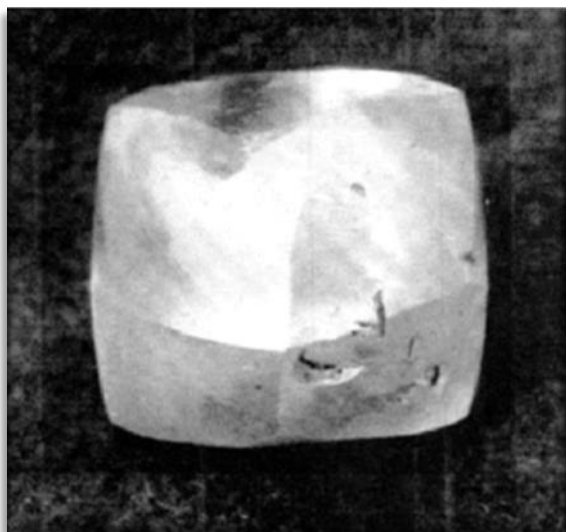


UT Austin scientists found that the fossil millipede *Kampecaris obanensis* was 425 million years old. Credit: British Geological Survey

been found — even in deposits known for preserving delicate fossils from this era — could indicate that the ancient millipede and plant fossils that have already been discovered are the oldest specimens. If that's the case, it also means both bugs and plants evolved much more rapidly than earlier estimates. Bountiful bug deposits have been dated to just 20 million years later than those fossils. And by 40 million years later, there's evidence of thriving forest communities filled with spiders, insects and tall trees. The millipede was dated by the difficult process of extracting zircons (microscopic mineral crystals used to precisely date rocks) from the ashy rock sediment in which the fossil was preserved. It's a process that takes practice to master. The zircons are easily flushed away when trying to loosen their grip on the sediment. And once they are successfully released from the surrounding rock, retrieving the zircons involves an eagle-eyed hunt with a pin glued to the tip of a pencil.

<http://www.geologyin.com/2020/05/worlds-oldest-bug-is-fossil-millipede.html?>

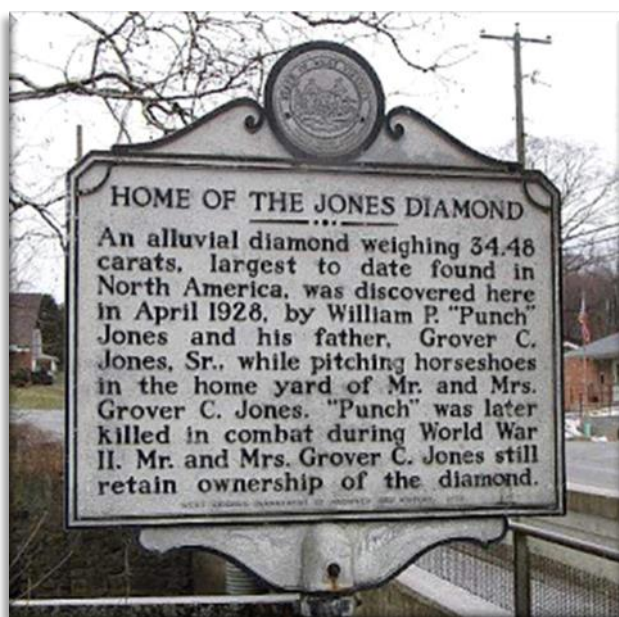
Rare, Mysterious Diamond Found in West Virginia



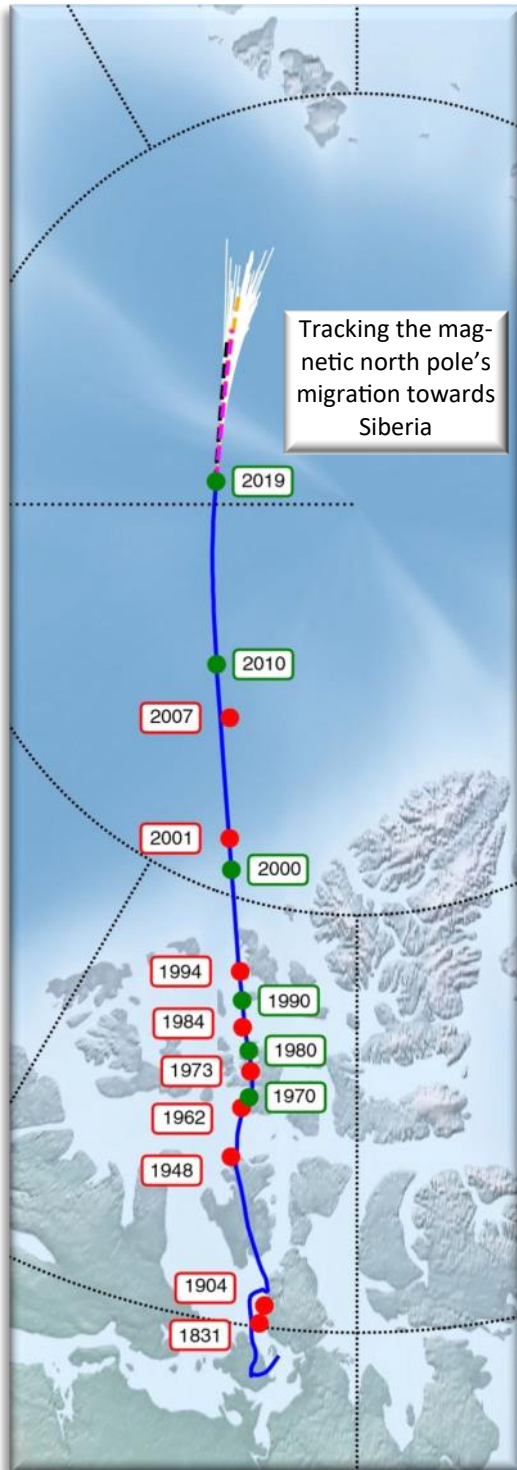
Diamonds don't exist naturally in West Virginia, yet one of the largest ever found was discovered accidentally in a horseshoe pit in Monroe County in 1928. Geologists are still at a loss to explain how it got there, though speculation has never died down. The diamond is an uncut naturally formed dodecahedral crystal, with 12 natural facets, weighing 34.48 carats and has a white color with a bluish tinge. It has the rare distinction of being the largest alluvial diamond ever discovered in North America. The bluish tinge is probably caused by fluorescence.

History of the Diamond

On a certain day in April 1928, when William P. Jones (Punch Jones), and his father Grover C. Jones Sr. were pitching horseshoes, on the land surrounding their residence, in Peterstown, West Virginia, they noticed a shiny stone on the ground, which they thought was a shiny piece of quartz commonly found in the area. One of them casually picked up the stone and carried it into the tool shed, where he just deposited it in a wooden cigar box. The whole incident was forgotten for the next 14 years, and the stone remained undisturbed in the wooden cigar box. Even if the stone had been re-discovered from the box during this period, it would not have had any impact, as this period corresponded with the period of the "Great Depression," a period of harsh adversity, precipitated by a worldwide economic downturn, causing drastic declines in output, severe unemployment, and acute deflation. The depression was particularly long and severe in the United States and Europe. In 1942, William P Jones (Punch), re-discovered the stone in the wooden cigar box, dumped in the tool shed. This time he became very inquisitive about the stone, and was determined to find out more about the stone, its nature and if it had any monetary value. He carried the stone to Virginia Polytechnic Institute (VPI) — now Virginia Tech — in nearby Blacksburg, Virginia, and met the professor of Geology, Holden, who examined the stone. After a careful examination of the stone, the Professor concluded that the stone was a diamond. The Professor was genuinely shocked at Punch's discovery, as this was the first time he was seeing an alluvial diamond of that size, discovered from North America. The Jones family who were excited and overjoyed by the authentication of the stone as a diamond, lost no time in taking necessary precautions to safe guard their precious find. They dispatched the stone to the Smithsonian Institution for safe keeping and display at the Museum of Natural History. The Smithsonian Institution gladly accepted the stone and kept it in their custody until February 1964, when the Jones family informed the Institution that they needed to take back the stone. Having removed the stone from the Institution's custody, the Jones family deposited it in a safe deposit box in the First Valley National Bank, in Rich Creek, Virginia. Twenty years later in 1984, the Joneses sold the diamond for an unspecified amount to an anonymous buyer, at a Sotheby's auction held in New York. <http://www.geologyin.com/2020/05/rare-mysterious-diamond-found-in-west.html?>



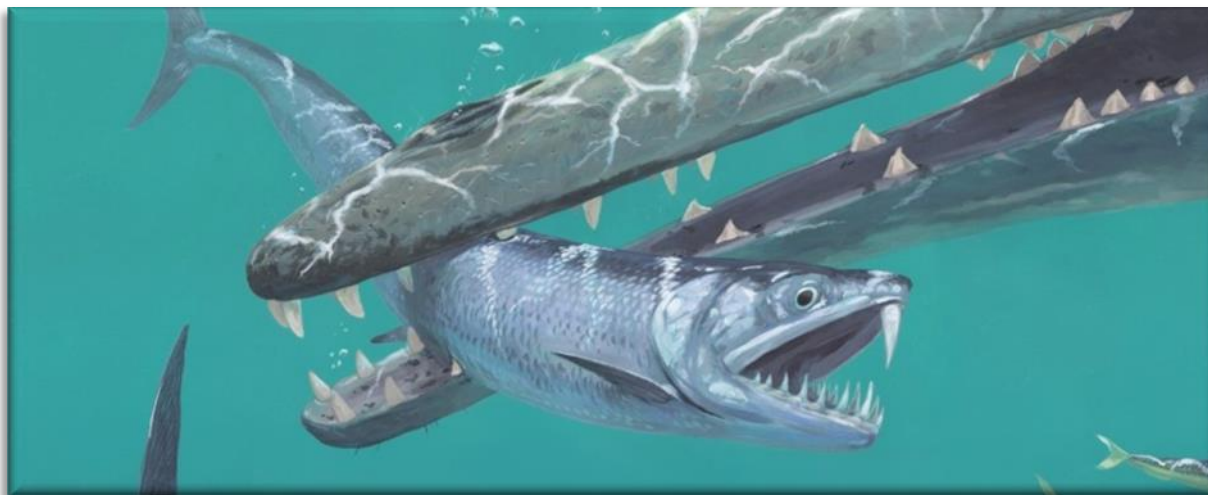
Earth's Magnetic North Is Moving From Canada to Russia, And We May Finally Know Why



Our planet wears its magnetic field like an oversized coat that just won't sit comfortably. All that sliding means the north magnetic pole is destined to move ever closer to Siberia's coastline over the coming decade. There's no conspiracy behind it - but the geological forces responsible have been something of a mystery. Now, we might be a little closer to understanding what's going on. Researchers from the University of Leeds in the UK and the Technical University of Denmark have analyzed 20 years of satellite data, finding that a monolithic competition between two lobes of differing magnetic force near the core is likely to be behind the pole's wanderlust. When the precise position of Earth's magnetic north was located for the first time back in 1831, it was squarely in Canada's corner of the Arctic, [on the Boothia Peninsula](#) in the territory of Nunavut. Ever since, fresh sets of measurements have recorded this spot has drifted north by an average of around 9 miles every year. Advanced technology means we can now keep a careful watch on the pole's location with unprecedented accuracy. Prior to the 1970s, the north magnetic pole's position was like a drunken staggerer. Since then, it's had a mission, marching in a straight line, building speed. Since the 1990s, its movement has quadrupled in speed, to a current rate of between 30 and 37 miles a year. In late 2017, the pole's sprint brought it within 240 miles of the geographical north pole. On its current trajectory, we can expect it to be anywhere between 240 and 410 miles further along its journey in ten years, bringing it within a whisker of the northern limits of the East Siberian Sea. The rapid displacement is a concern for navigation systems that rely on pinpoint calculations of the pole's location, forcing the US National Geophysical Data Center to [fast track its usual updates](#) to the World Magnetic Model last year. What the world really needs is a solid idea of the physical mechanisms behind this displacement, allowing for accurate predictions on the planet's magnetic movements. So Earth scientists Philip Livermore and Matthew Bayliff from the University of Leeds in the UK and Christopher Finlay from the Technical University of Denmark reviewed 20 years of geomagnetic data from the ESA's [Swarm mission](#). The pole's heading lines up neatly with two anomalies called negative magnetic fluxes, one deep beneath Canada, and the other below Siberia. *"The importance of these two patches in determining the structure of the field close to the north magnetic pole has been well known for several centuries,"* the researchers note in their [recently published report](#). These large lobes of magnetism grow and shrink with time, having a profound effect on the magnetic field we perceive on the surface. Between 1970 and 1999, changes to interactions between the flowing mantle and the planet's dense, spinning core caused the patch beneath Canada to elongate, reducing the corresponding magnetic field's strength to drop up top. *"Now historically, the Canadian patch has been winning the war and that's why the pole has been centered over Canada,"* Livermore told BBC Radio 4's *Today* program [in a recent interview](#). *"But in the last few decades, the Canadian patch has weakened and the Siberian patch has strengthened slightly, and that explains why the pole has suddenly accelerated away from its historical position."* While this means we can expect the pole to continue racing for a little longer, it doesn't tell us precisely where it will stop, how long it will stop for, or when it might return. There is an incredible amount we don't know about the engine whirring away inside our planet's guts. Given that [extensive geological records](#) hint at significant fluctuations in its protective magnetic field, we really ought to know a lot more than we do. We're going to need more models like this if we're to have a hope of predicting just where our planet's poles will end up in the future. <https://www.sciencealert.com/russia-is-stealing-magnetic-north-from-canada-and-this-could-be-what-s-behind-it>

Scientists Have Discovered Huge Sabre-Tooth Anchovies From Prehistoric Times

Anchovies. You know 'em. Real piscine pipsqueaks. People put 'em on pizza. Before they were a polarizing flavor bomb, though, anchovies used to be a terror of the seas. As fossil records newly reveal, millions of years ago anchovies over 3 feet long hunted the oceans with gnashing fangs and one single long, curving, sabre-like incisor in their top jaws. Fossils of two different species of predatory fish from the Eocene Epoch (55 million years ago) have been identified as closely related to modern anchovies, which forage-feed rather than actively hunt for their prey. It's certainly a peculiar relationship - but the appearance of both of these long-extinct species, paleontologists believe, can be linked



to the Cretaceous-Paleogene extinction event that wiped out the non-avian dinosaurs 66 million years ago. The two fossils were found near Belgium and

Pakistan. The former, named *Clupeopsis straeleni*, was [first described in 1946](#), and came in at about 1.5 feet long. The latter was excavated more recently, in 1977, but had been tucked away in a museum collection. It wasn't until the team made a closer study that they realized it was a previously unknown species. It measured around 3.5 feet in length, and its wicked fangs inspired its new name - *Monosmilus chureloides*, after the Churel, the Urdu word for a shapeshifting, vampire-like demon with big fangs. Although the two ancient fish differ in size and several minor physical features, they were remarkably similar — not least because of that single giant tooth. The team, led by paleontologists from the University of Michigan, made careful comparisons between the two and several modern fish, and determined that the fossil finds belonged to a previously unknown clade of [clupeiform](#) fishes. That's the order of ray-finned fish that includes herrings and anchovies. And they could even be stem [engraulidae](#) - the anchovy family. But most clupeiformes, including anchovies, are planktivores. They don't have vicious teeth, or snapping jaws of the kind found on *C. straeleni* and *M. chureloides*. These indicate a predatory hunting style, with the single large tooth perhaps used to impale or trap their fishy prey. So what does this mean? Well, after the Cretaceous-Paleogene extinction, many ecological niches were left empty. The life that remained went through a diversification boom, including a massive expansion of ray-finned fishes. During the Cretaceous, shark remains dominate the fish fossil record. In the early Paleogene, [ray-finned fishes rose to the fore](#). But this would have been a highly competitive time, too; not every species was successful. Exactly how and why *C. straeleni* and *M. chureloides* then faded away is impossible to know, but it's likely they were out-competed by rival predators. It just goes to show that survival of the fittest doesn't always mean the most aggressive with the scariest teeth. Turns out your pizza topping had the best survival strategy all along.

<https://www.sciencealert.com/huge-sabre-toothed-anchovies-once-hunted-the-world-s-oceans>



Why 536 Was "The Worst Year To Be Alive"

Ask medieval historian Michael McCormick what year was the worst to be alive, and he's got an answer: "536." Not 1349, when the Black Death wiped out half of Europe. Not 1918, when the flu killed 50 million to 100 million people, mostly young adults. But 536. In Europe, "*It was the beginning of one of the worst periods to be alive, if not the worst year,*" says McCormick, a historian and archaeologist who chairs the Harvard University Initiative for the Science of the Human Past. A mysterious fog plunged Europe, the Middle East, and parts of Asia into darkness, day and night—for 18 months. "*For the sun gave forth its light without brightness, like the moon, during the whole year,*" wrote Byzantine historian Procopius. Temperatures in the summer of 536 fell 35°F to 37°F, initiating the coldest decade in the past 2300 years. Snow fell that summer in China; crops failed; people starved. The Irish chronicles record "*a failure of bread from the years 536–539.*" Then, in 541, **bubonic plague** struck the Roman port of Pelusium, in Egypt. What came to be called the **Plague of Justinian** spread rapidly, wiping out one-third to one-half of the population of the eastern Roman Empire and hastening its collapse, McCormick says. Historians have long known that the middle of the sixth century was a dark hour in what used to be called the **Dark Ages**, but the source of the mysterious clouds has long been a puzzle. Now, an ultraprecise analysis of ice from a Swiss glacier by a team led by McCormick and glaciologist Paul Mayewski at the Climate Change Institute of The University of Maine has fingered a culprit. At a workshop at Harvard in 2018, the team reported that a cataclysmic volcanic eruption in Iceland spewed ash across the Northern Hemisphere early in 536. Two other massive eruptions followed, in 540 and 547. The repeated blows, followed by plague, plunged Europe into economic stagnation that lasted until 640, when another signal in the ice—a spike in airborne lead—marks a resurgence of silver mining, as the team reports in *Antiquity*. To Kyle Harper, historian at The University of Oklahoma, the detailed log of natural disasters and human pollution frozen into the ice "*give us a new kind of record for understanding the concatenation of human and natural causes that led to the fall of the Roman Empire—and the earliest stirrings of this new medieval economy.*" Ever since tree ring studies in the 1990s suggested the summers around the year 540 were unusually cold, researchers have hunted for the cause. Three years ago polar ice cores from Greenland and Antarctica yielded a clue. When a volcano erupts, it spews sulfur, bismuth, and other substances high into the atmosphere, where they form an aerosol veil that reflects the sun's light back into space, cooling the planet. By matching the ice record of these chemical traces with tree ring records of climate, a team led by Michael Sigl, now of the University of Bern, found that nearly every unusually cold summer over the past 2500 years was preceded by a volcanic eruption. A massive eruption—perhaps in North America, the team suggested—stood out in late 535 or early 536; another followed in 540. Sigl's team concluded that the double blow explained the prolonged dark and cold. Mayewski and his interdisciplinary team decided to look for the same eruptions in an ice core drilled in 2013 in the Colle Gnifetti Glacier in the Swiss Alps. The 230-foot-long core entombs more than 2000 years of fallout from volcanoes, Saharan dust storms, and human activities smack in the center of Europe. The team deciphered this record using a new ultra-high-resolution method, in which a laser carves 120-micron slivers of ice, representing just a few days or weeks of snowfall, along the length of the core. Each of the samples—some 50,000 from each meter of the core—is analyzed for about a dozen elements. The approach enabled the team to pinpoint storms, volcanic eruptions, and lead pollution down to the month or even less, going back 2000 years, says volcanologist Andrei Kurbatov. A high-resolution ice core record combined with historical texts chronicles the impact of natural disasters on European society. In ice from the spring of 536, scientists found two microscopic particles of volcanic glass. By bombarding the shards with x-rays to determine their chemical fingerprint, they found a close match to glass particles found earlier in lakes and peat bogs in Europe and in a Greenland ice core. Those particles in turn resembled volcanic rocks from Iceland. The chemical similarities convince geoscientist David Lowe of The University of Waikato in Hamilton, New Zealand, who says the particles in the Swiss ice core likely came from the same Icelandic volcano. But Sigl says more evidence is needed to convince him that the eruption was in Iceland rather than North America. Either way, the winds and weather systems in 536 must have been just right to guide the eruption plume southeast across Europe and, later, into Asia, casting a chilly pall as the volcanic fog "*rolled through,*" Kurbatov says. The next step is to try to find more particles from this volcano in lakes in Europe and Iceland, in order to confirm its location in Iceland and tease out why it was so devastating. A century later, after several more eruptions, the ice record signals better news: the lead spike in 640. Silver was smelted from lead ore, so the lead is a sign that the precious metal was in demand in an economy rebounding from the blow a century before, says archaeologist Christopher Loveluck of the University of Nottingham in the United Kingdom. A second lead peak, in 660, marks a major infusion of silver into the emergent medieval economy. To Loveluck it suggests gold had become scarce as trade increased, forcing a shift to silver as the monetary standard. "*It shows the rise of the merchant class for the first time,*" he says. Still later, the ice is a window into another dark period. Lead vanished from the air during the **Black Death** from 1349 to 1353, revealing an economy that had again ground to a halt. "*We've entered a new era with this ability to integrate ultra-high-resolution environmental records with similarly high resolution historical records,*" Loveluck says. "*It's a real game changer.*"

<https://www.sciencemag.org/news/2018/11/why-536-was-worst-year-be-alive>

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