Cedar Valley Gems

Cedar Valley Rocks & Minerals Society

Cedar Rapids, Iowa

cedarvalleyrockclub.org

CEDAR VALLEY GEMS **MARCH 2023** **VOL. 49, ISSUE 03**

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

Next CVRMS Meeting

Tuesday Mar. 21

Hiawatha Community Center

101 Emmons St., Hiawatha - 7:15 pm

featured presentation

by Rhawn Denniston

Cornell College Geology Department

"83 Years (and Counting) of Cornell College Geology Field Classes"

Rhawn will be discussing Cornell College field geology through the years, starting with "Camp Norton," the field camp started by Neil Miner in Wyoming in the 1940s, and ending with his most recent field course to Utah. The title of the talk is "83 Years (and Counting) of Cornell College Geology Field Classes."

This This Pterosaur Had at Least 480 Hooked Teeth

The first thing you'll notice about this pterosaur is its smile. Researchers recently identified this strange species, which had 480 of thin, hooked teeth in its flared, flat jaws. Since the identification of the first pterosaur fossils in the formations of limestone in Germany in the 1700s, paleontologists have found hundreds of separate species of these ferocious flyers, all with their own shapes, sizes and lifestyles. Some were small, while others weren't. Some possessed wide wings, and some possessed slimmer, more slenderer ones. Some were stuck with an awkward slouching posture, whereas others stood upright and walked, waded and swam whenever they weren't soaring through the sky. And while some of these almost-dinosaurs benefitted from an abundance of tiny teeth, others boasted a smattering of big ones or no teeth at all. Now, a team of paleontologists has found another pterosaur species in the same formation of limestone. The jaws of this pterosaur are really long and lined with small fine, hooked teeth, with tiny spaces between them. And what's even more remarkable is some of the teeth have a hook on the end, which had never been seen before in a pterosaur. According to researchers, this abundance of hooked teeth helped the animal snatch shrimp and other small species out of the shallows of Late Jurassic lagoons and lakes, around 164 to 145 million years ago. These small hooks would have been used to catch the tiny shrimp and make sure they went down its throat and weren't squeezed between the teeth. "This rather serendipitous find of a well-preserved skeleton with near perfect articulation suggests that it must have been buried in sediment almost as soon as it had died."

https://www.discovermagazine.com/the-sciences/this-pterosaur-had-at-least-480-hooked-teeth

CVRMS Meeting February 21 — Minutes —

MEETING CALLED TO ORDER: by Marv Houg,President, 7:50 pm (Apologies for late start. 42 members present

GUESTS INTRODUCED: Sherry Wilcox, Richard Mishler, Mark McKay, Don Vobejda; Welcome to all.

MINUTES FROM LAST MEETING: approved as written with one exception Deanne Feller won the door prize. Not Diane Sellers as written. Approved as corrected.

TREASURER'S REPORT: by Dale. $17,450.25 in checking account. Motion to approve by Julie, second by Kim Kleckner. Treasurer's report approved.

SHOW MARCH 25 AND 26: Sharon has signup sheets for help and display cases. You can sign up online. **Friday** will include potluck. This is for all club members and vendors the club's way of expressing our thanks. **Saturday night** will be a catered meal from HyVee. Vote taken for roast chicken and beef, green beans almondine, party potatoes, and fresh fruit. The club supplies the dessert and drinks. **Club T-shirt's** with staff and bright green. See Sharon if you need one. **Egg carton day** March 5 at 2p.m. At Sharon's Place, 4800 Sunset Dr S.W. Cedar Rapids (*ed. Enough people have signed up)*. **Anybody with change of address**, phone, etc. let Sharon know so the new directory can be put together by show time. **Setup** starts Friday at 9:00 a.m.

SHOW: 5 vendors still out. Discussion regarding what to do. Will discuss further at board meeting. **Would like to see** auction announcement flyer ready for show.

PROGRAM: Ryan Clark, Iowa Geological Survey, "What's in a Map? Behind the Scenes Look at the Making of the Bedrock Geologic Map of Lee County, Iowa"

Des Moines club will help with wire wrapping class. 12 members showed an interest by show of hands.

OLD BUSINESS: Bills Big Bus trip. Another trip is planned—the one that was cancelled with the Covid shutdown. It is scheduled for September 30. Plan on leaving at 6 a.m. and returning at 6 p.m. More to follow.

NEW BUSINESS: The trailer needs new tires and lube for future life. Have an estimate of $600. Julie made a motion to approve up to $800 for tires/lube and any other repair needed. Seconded and approved. **River Products** is sponsoring **TAKO** (Take A Kid Outdoors) on May 20th. Marv unable to be there, but Matt will step in for Marv. The quarry will be open after the TAKO event for club members who help out at the event. **Laura Eilers** won door prize donated by Jeff. A big piece of quartz.

FIELD TRIPS: Matt is planning a trip to Sheffield for geodes in March or April. Literally pick them up from the ground.

MOTION TO ADJOURN by AJ. Seconded by Sherry. Meeting adjourned 9:50 pm .

Respectfully submitted
Dell James, Secretary

CVRMS Board Meeting February 28 — Minutes —

MEETING CALLED TO ORDER: by Marv at his house, 7:00 p.m.

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

LAST MONTH'S BOARD MINUTES: reviewed: Motion to approve by Kim, 2nd by Bill. Minutes approved as published.

TREASURER'S REPORT: Motion to approve report by Matt and 2nd by Jay. Treasurer's report approved.

SHOW 2023. Wonderful World of Agates: Ray has posters. 6 of them plus a dinosaur poster. **Also,** has speakers lined up for programs. **Programs** attendance has been rather sparse. Can we get more advertising going and club members could show more interest by attending programs. **Facebook** will be taken care of by Kim. Ray will send list of presenters and times to Kim. **Discussion about vendors** who have not signed contracts. How do we handle them. **Raffle license** has been applied for. Raffle prizes are lined up sort of. **Displays** are set. **Saturday catered dinner** already lined up roast chicken, roast beef, party potatoes, green bean almondine and fresh fruit. **Potluck on Friday night** with Dell preparing lunch on Friday for volunteers. **Egg carton day** is set up for Sunday, March 5, at 2:00p.m. **Newsletter will have** write-up describing the pot luck and the catered dinner. The charge for catered dinner is $16.00. Let Marv know if you are interested by March 20.

FIELD TRIPS: Matt will conduct a trip to Sheffield Sunday April 2nd for geodes. You can literally pick them up from ground.

OLD BUSINESS: Dale is working on the 501c3 info. **Bills Big Bus trip** is still on for September 30 and we may have already paid our deposit for the bus. More to come after the Show.

NEW BUSINESS: The club has always donated for the Science Fair with $200.00 to be given as prize money and support the fair itself. Motion made by Dale and 2nd Bill to drop 2nd place and increase the Senior 1st prize to $100 and Junior 1st prize to $50.00 with the remaining $50.00 to give to the Science Fair. Motion approved. **Wire wrap class** is a go after more info obtained; 15-20 people interested. Now we need to get hold of Des Moines club about when they could do it and need to check with Hiawatha Community Center for availability. More info to follow. Marv will contact the Des Moines Club.

OTHER BUSINESS: Kim said that April 21 she will conduct a STEM class at Echo Hill. **Bill and Ray** will do a STEAM class on March 31 and May 5. **Ray** will do his **gold** presentation to the Waterloo club.

MOTION TO ADJOURN by Bill, 2nd by Jay; adjourned 9:15pm.

Respectfully submitted
Dell James, Secretary

Bering Land Bridge Was Only Passable During Two Brief Windows, Study Finds

During the last ice age, the coastal route from Asia to North America was so treacherous, humans likely crossed over only during two time windows, when environmental factors were more favorable for the long and dangerous journey, a new study finds. The **first window** lasted from **24,500 to 22,000 years ago,** and the **other** spanned from **16,400 to 14,800 years ago**, according to the study, published Feb. 6 in the journal Proceedings of the National Academy of Sciences. During these periods, winter sea ice cover and sea ice-free summers would have likely given these travelers access to a diverse marine buffet, as well as ways to safely travel along the North Pacific coast. There are two main scenarios explaining how people may have first migrated to the New World. The older idea suggested that people made this journey on land when Beringia, the land bridge that once connected Asia with North America, was relatively ice-free. However, a growing body of evidence suggests that travelers used watercraft along the Pacific coasts of Asia, Beringia and North America before 15,000 years ago, when giant ice sheets would have made an overland journey extraordinarily difficult. To see how viable the coastal route may have been for migration at different times, scientists analyzed how changes in climate over the past 45,000 years might have influenced sea ice, glacier extent, ocean current strength, and food supplies on land and sea. The researchers developed climate models based on new data on sea ice variations and previously collected sediment samples from the Gulf of Alaska holding details about sea ice, sea surface temperatures, salinity and debris carried on ice. Their models revealed the two time windows, the first 2,500-year-long window and the second 1,600-year-long span, for year-round coastal migration, which would have enabled a favorable coastal route when the inland route was blocked. During those two windows, summer kelp forests would have helped keep travelers fed. Sea ice during the winter in those periods also may have supported migration; when stuck on the shoreline, sea ice can be relatively flat and stable, so ancient hunters could have walked on it and captured seals, whales and other prey to survive those winters, the researchers noted. "Rather than being an obstacle, sea ice may have partly facilitated movement and subsistence in this region. Other times during the past 45,000 years were likely less friendly to coastal migration. It is becoming clear that people entered the Americas by traversing the coast, and the new research takes the coastal migration hypothesis to the next level. https://www.livescience.com/bering-land-bridge-was-only-passable-during-2-brief-windows-study-finds

Spotlight Gemstone: Aquamarine

Aquamarine, the blue variety of the mineral Beryl and birthstone of March, is a rich, medium to dark blue colored stone produced in Brazil, Madagascar, Russia, and the USA , and it has long been a symbol of youth, health and hope. Recently, aquamarine from China and Columbia has come on the market, but they are generally a little bit more yellow. Aquamarine is a highly sought-after semi precious gem, which for centuries has been used in the creation and encrustation of jewelry and everyday items. Sailors of legend believed that mermaids' tails were made of Aquamarine. The lucky stone was thought to protect the sailors from drowning and ensure their safe return. The gem was believed to aid in digestion, and Roman physicians would employ Aquamarine to treat overeating and reduction of body fluid retention. Aquamarine was thought to possess the ability to reawaken the love in married couples. Roman legend also tells that it absorbs the atmosphere of young love; "*When blessed and worn, it joins in love, and does great things.*" It is also considered an appropriate gift for a Groom to give to his bride following the consummation of their marriage. To the Sumerians, Egyptians, and Hebrews, Aquamarine was the symbol of happiness and everlasting youth. Legend says that you should place your Aquamarine under a full moon, to help restore its look and renew its energy. Aquamarine colors range from very light blue all the way through to a deeply saturated Ocean blue. The best color is often called Santa Maria Blue and recently there has been a new find in Madagascar called Double Blue. The name Aquamarine comes from the Latin words "aqua" (Water) and "marina" (Sea). The largest stone ever found is from Minas Gerais, Brazil; It weighed 242 pounds and measured 19 inches x 17 inches. The largest cut Aquamarine is the ***Dom Pedro*** which now sits in the Smithsonian Institute. It finished weighing in at 10,363 cts and measured 14 x 4 inches.
https://www.gemrockauctions.com/learn/a-z-of-gemstones/aquamarine-information-the-blue-bery

What in the World?

What in the World is this unusual spike-like piece of sandstone and how did they form??

February's Photo

Last month's **What in the World** photo showed a rock apparently crawling across Death Valley's Racetrack Playa. Sometimes these rocks, some weighing as much as 700 pounds, leave synchronized trails that can stretch for hundreds of yards. Recent studies have shown that the movement is produced by a rare combination of water, ice, and wind.

ROCK CALENDAR
CVRMS EVENTS OF INTEREST

2023

Mar. 21 — CVRMS Monthly Meeting
Hiawatha Community Center 7:15 pm
Dr. Rhawn Dennison
"83 Years (and Counting) of Cornell College Geology Field Classes"

Mar. 25-26— CVRMS Rks, Fos, & Min Show
*Hawkeye Downs
Cedar Rapids, Iowa
"Wonderful World of Agates"
see pps. 7 and 10 for details

Apr. 18 — CVRMS Monthly Meeting
Hiawatha Community Center 7:15 pm
Program To Be Announced

Apr. 16 — Black Hawk GMS Rock Show
Waterloo Center for the Arts
225 Commercial St
Waterloo, Iowa

May. 16 — CVRMS Monthly Meeting
Hiawatha Community Center 7:15 pm
Program to be announced

June 20 — CVRMS Pot-Luck Picnic
Ellis Park Overlook Shelter 6:30 pm
Rock Polishing

July 18 — CVRMS Pot-Luck Picnic
Wanatee Park Meadowlark Shelter 6:30 pm
Geode Cracking

Aug. 15 — CVRMS Pot-Luck Picnic
Morgan Creek Park Shelter 6:30 pm
Rock Bingo

Sept. 9 -10 — CVRMS Rock Auction
Amana RV Park and Event Center
Amana, Iowa

Sept. 19 — CVRMS Monthly Meeting
Hiawatha Community Center 7:15 pm
Program to be announced

Sept. 22—24 — Geode Fest

Ask a Geologist

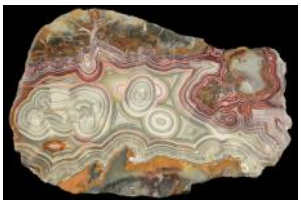
by Ray Anderson aka "Rock Doc", CVRMS Vice President

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

With "***The Wonderful World of Agates***" the theme of the **CVRMS Rocks, Fossils, and Minerals Show** coming up later this month, I thought I would take this opportunity to discuss what exactly is an agate.

The word agate is derived from Greek word for the rock, "***Achates,***" (the name of the river in Sicily where the stone was first discovered. Agates are a translucent variety of chalcedony made up almost entirely of silicon dioxide. Stones are typically black, white, or grey, but the most prized can be exceptionally colorful. Any color and banding in agates comes from impurities of other minerals. Quartz crystals in agate are colorless in their purest form. With the presence of **iron** they turn **red or brown**, with **manganese** they turn **pink** and with **chromium** a shade of **green**. The easiest agate stone to identify usually has clear distinct color bands. Some argue that to be classified as a **"true**" agate the stone must exhibit banding. However, there are several varieties that are not banded. Over the years there have been endless discussions regarding the use of trade names. From a geological perspective they can often be inaccurate and misleading. **Moss** and **dendritic** agate don't exhibit visible banding but feature inclusions known as dendrites. Often mistaken for organic matter, dendrites are crystal formations similar to those seen in ice on glass during winter. They're caused primarily by impurities of iron and manganese. The word "dendrite" comes from Greek for "tree" and refers to a "branching form." Stones with dendritic inclusions can sometimes be mistaken for fossils. Although frequently found within igneous rocks, agate can also occur in other rock types as well. Agate formation, which is exceptionally complex, begins when ground water containing silica enters the rock through cracks or holes then dries up leaving behind a residue of minerals. As the process repeats, multiple layers of minerals build up within the rock following the outline of the cavity. Once full the mass begins to crystallize. Quartz crystals often grow in any space left unfilled. When their tips point towards a void, the structure is known as a **geode.** Depending on the type of rock it forms in, agates can be incredibly resilient to weathering. It's not unusual for the nodule to survive long after the host rock has eroded. On Mohs scale of mineral hardness agate grades **7**. Natural agate tends to be characterized by concentric, curved or angular banding. Stones can also exhibit other curious and intricate patterns. Hundreds of different types of agate can be found around the world and many have been given trade names. These often indicate the locality where the stone is found or a particular color or characteristic. **Fortification agate** is a generic name for stones whose bands are arranged at sharp angles. The name comes from the shape, which was once believed to resemble the lines of a fortress. **Blue lace** and **crazy lace** are both types of fortification agate. **Botswana agate** comes from Botswana, **Brazilian agate** from Brazil, **fire agate** exhibits a distinctive flash of color caused by inclusions of hematite. **Polka dot agate** often but not always is spotted. Agatized dinosaur bone, despite the name, is not a natural agate at all. The word **"agatized"** is often, but not always, used as a prefix because it describes a process that has taken place. Agate is dependent on the presence of other minerals for its color. Black, white and grey stones are often dyed to make them more appealing to the wider commercial market. The practice of dying rocks and minerals can be traced back thousands of years. Agate has long been known to be porous with the ability to hold dyes particularly well. Despite everything that has been learnt about the formation of agate so much is still not fully understood. Historically, agate was highly valued by many ancient cultures including the Sumerians, Egyptians, Greeks and Romans. It was widely used for talismans, seals, vessels (container for liquids), beads and gemstones. One of the oldest of all minerals, references to agate can be traced back more than 2000 years to the writings of ancient Greek philosopher **Theophrastus** [c.370-285 BC]. The process of describing different agate types and their meanings can be found in his works *Theophrastus On Stones*. In this reference he compares the hardness of agate to onyx and talks about how one type differs from the other because of "*its irregular and uncertain manner of spots, clouds and variegations.*" The ancient Roman author, naturalist and natural philosopher **Pliny the Elder** [23 AD - 79 AD] also wrote about the properties and meaning of agate in his works "*Naturalis Historia.*" He states: *"Achates was a stone formerly in high esteem, but now held in none. It was first found in Sicily, near a river of that name; but has since been discovered in numerous other localities. In size it exceeds any other stones of this class, and the varieties of it are numerous, the name varying accordingly.*" An agate was believed to have been the second stone in the third row of the high priest breastplate. This religious garment from biblical times was adorned with twelve gemstones. It was worn by the Jewish high priest whilst presenting himself to God. The formation of agates has never been studied from start to finish in real time. Nor has it been possible to recreate agate in a laboratory setting. For this reason much of what is known is supposition.

Dendritic Agate



Crazy Lace Agate

Brazilian Agate

Modified from https://www.stonemania.co.uk/crystals/a/agate

Astronomers Find 12 More Moons Orbiting Jupiter

The planet Jupiter is famed for its immense size (a radius of 43,440.7 miles or 11 times wider than Earth) and its Giant Red Spot, a storm that has raged on the planet for hundreds of years. The fifth planet from the sun is not only the biggest in our solar system, but it also, according to the International Astronomical Union's Minor Planet Center (MPC), has the most moons. Astronomers discovered 12 new moons around Jupiter over the past two years, making the total number of Jovian moons 92. The discovery knocks Saturn and its 83 confirmed moons out of first place. Both Jupiter and Saturn have tons of small moons that are believed to be fragments of bigger moons that have collided with comets, asteroids, and each other. As for the other planets in our solar system, Mercury and Venus are moonless, Earth has one, Mars has two moons, Uranus has 27 confirmed moons, and Neptune clocks in at 14. The MCP recently added the new moons to their list, said team member Scott Sheppard of the Carnegie Institution. The team's observations have also been submitted for publication. *"I hope we can image one of these outer moons close-up in the near future to better determine their origins,"* said Sheppard. Telescopes in Chile and Hawaii discovered the moons in 2021 and 2022 and follow-up observations confirmed their orbits. Sheppard says that they range from 0.6 miles to 2 miles in size. According to *Sky and Telescope*, all of the newly discovered moons circle Jupiter far from its surface and take over 340 Earth days to complete a single orbit. Nine out of the 12 moons are particularly distant, with MPC estimating that they have orbits longer than 550 Earth days. They are also quite small—only five out of the nine distant moons are believed to have a diameter more than five miles. These same nine moons also have retrograde orbits (the moons circle Jupiter in the opposite direction of its rotation). By comparison, the inner Jovian moons have prograde orbits, or orbits in the same direction of the planet's rotation. The retrograde orbits mean that the huge gravitational influence of the planet may have captured the moons and the smaller ones might be the remains of larger celestial bodies that were broken apart by collisions, according to Sheppard. We can also expect to learn more about Jupiter's moons over the next few years. The European Space Agency is sending the **Jupiter Icy Moons Explorer** (aka ***Juice)*** into space in April to study the gas giant and some of its largest moons. NASA is scheduled to launch the Europa Clipper in October 2024 to explore Jupiter's icy moon Europa, which might have an ocean beneath its frozen crust.

https://www.popsci.com/science/jupiter-most-moons-solar-system/

Newly Discovered Fossil Footprints from Grand Canyon National Park Force Paleontologists to Rethink Early Inhabitants of Ancient Deserts

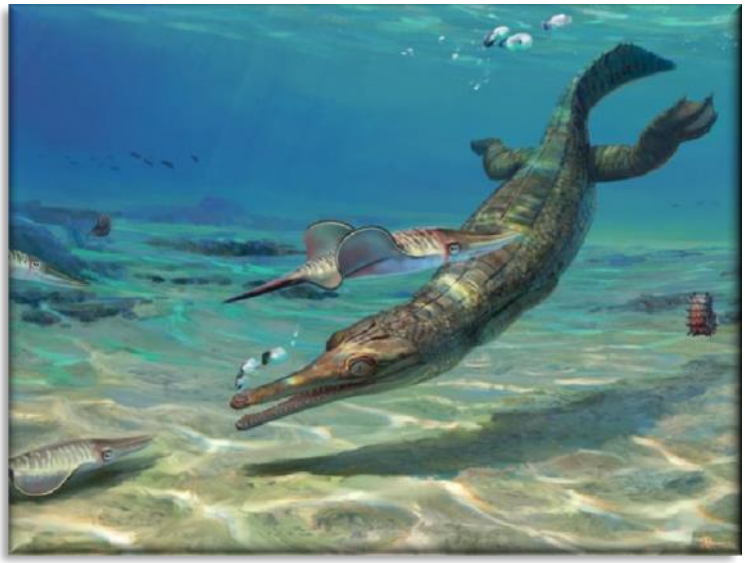
An international team of paleontologists has united to study important **fossil footprints** recently discovered in a remote location within Grand Canyon National Park, Arizona. A large sandstone boulder contains several exceptionally well-preserved trackways of primitive tetrapods (four-footed animals) which inhabited an ancient desert environment. The **280-million-year-old** fossil tracks date to almost the beginning of the Permian Period, prior to the appearance of the earliest dinosaurs. One hundered years after the first scientific article reporting fossil tracks from the Grand Canyon, new research on ancient footprints from the park is being presented in a scientific publication released this week. Paleontologists Dr. Heitor Francischini and Dr. Spencer Lucas first visited the Grand Canyon fossil track locality in 2017. The paleontologists immediately recognized the fossil tracks were produced by a long-extinct relative of very early reptiles and were similar to tracks known from Europe referred to as ***Ichniotherium*** (ICK-nee-oh-thay-ree-um). This is the first occurrence of *Ichniotherium* from the Coconino Sandstone and from a desert environment. In addition, these tracks represent the geologically youngest record of this fossil track type from anywhere in the world. *Ichniotherium* is a kind of footprint believed to have been made by an enigmatic group of extinct tetrapods known as the diadectomorphs. The diadectomorphs were a primitive group of tetrapods that possessed characteristics of both amphibians and reptiles. The evolutionary relationships and paleobiology of diadectomorphs have long been important and unresolved questions in the science of vertebrate paleontology. The measurable characteristics of the tracks and trackways indicate a primitive animal with short legs and a massive body. The creature walked on all four legs and each foot possessed five clawless digits. Another interesting aspect of the new Grand Canyon fossil tracks is the geologic formation in which they are preserved. The Coconino Sandstone is an eolian (wind-deposited) rock formation that exhibits cross-bedding and other sedimentary features indicating a desert. Therefore, the presence of *Ichniotherium* in the Coconino Sandstone is the earliest evidence of diadectomorphs occupying an arid desert environment. This discovery shows that tetrapods other than reptiles were living in those deserts, and, surprisingly, were already adapted to life in an environment of limited water.

Artists representation of the Coconino desert environment and two primitive tetrapods.

https://www.nps.gov/articles/grca-fossil-footprints.htm

Ancient Jurassic Predator Emerged From Ghost Ancestor, Scientists Say

In the Early Jurassic, before the mass extinction event that brought about the demise of most dinosaurs, the ancestors of crocodiles had a whole bunch of relatives living in the sea. Researchers have found the oldest fossils yet of these ancient marine predators in the United Kingdom and Morocco. They say the remains hint at a "ghostly" ancestor that has never been found in fossil form. Ancient "marine crocodiles" are known scientifically as **thalattosuchians**, of which numerous different species once existed. Although some thalattosuchians grew as long as 33 feet, the newfound creature measured about 7 feet and possessed short limbs and a long, strong tail. Their long, slender snouts resemble modern crocodiles, with enlarged jaw muscles that probably allowed them to snap up fish, octopus, or squid with impressive speed and force. Despite their outward appearance, these long-gone marine predators are not technically part of the Crocodylia order. In fact, scientists don't really know where to place thalattosuchians in the tree of life. They could be a sister group to crocodylians, or an ancient radiation that branched off long ago. One of the most complete skeletons of a thalattosuchian was recently unearthed in the UK. It is also the oldest example found yet, dated to around 185 million years. The species has been named *Turnersuchus hingleyae*, and researchers suspect its relatives are out there waiting to be discovered. Based on the fossil's morphology compared to other ancient crocodylians and thalattosuchians, experts think thalattosuchians' ancestors arose around 200 million years ago, toward the end of the Triassic Era. That's about the same time that ancient crocodylians are thought to have appeared themselves. To date, no fossils have yet been found of marine crocodiles that date back to this time, but that doesn't mean they don't exist. *"I expect we will continue to find more older thalattosuchians and their relatives,"* says vertebrate paleontologist Eric Wilberg from Stony Brook University in New York. "*Our analyses suggest that thalattosuchians likely first appeared in the Triassic and survived the end-Triassic mass extinction."* The other thalattosuchian fossil recently found in Morocco supports this timeframe as well. It's not as well preserved as the one in the UK, which means it can't be placed in a specific genus. That said, it is one of the only examples of a marine crocodile recovered outside of Europe, which suggests these predators were "*widely distributed as soon as the earliest Jurassic.*" The fossil record makes it look as though marine crocodiles simply appeared in the Early Jurassic out of nowhere, rich in diversity and spread across multiple regions, like Europe, China, Argentina, and Madagascar. But what happened, in reality, is probably more nuanced than that. Archaeologists need to find that older ghostly lineage to find where these creatures came from. Let the hunt begin.



Artistic representation of *T. hingleyae*.

https://www.sciencealert.com/ancient-jurassic-predator-emerged-from-ghost-ancestor-scientists-say

2023 ROCK SHOW INFORMATION FOR CLUB MEMBERS

SET-UP DAY FRIDAY

Starts at 9:00 a.m. March 24 (pop, coffee & free lunch for workers). Come when you can!

POTLUCK FRIDAY NIGHT AT 6:30

Friday night we invite our dealers to be our guests at a potluck at 6:30. Because we will have extra people eating, plan to bring a large dish or two to share. Drinks will be provided. Our members and dealers always rave about our great potlucks, so we have a reputation to uphold every year.

CATERED DINNER SATURDAY NIGHT AT 6:15

For everyone's convenience, HyVee will cater a buffet dinner on the Show floor right after the show closes Saturday for members and dealers. Menu: choice of beef or chicken, party potatoes, green beans almondine, and fresh fruit, with dessert and drinks furnished by the club. Cost is $16.00. Reservations are required. Let Marv know if you are planning to attend the dinner by Mar 20 (319-350-9435). Pay at the dinner.

The Mysterious Origin of Dragons

Dragons hold a special place in the world of mythical beasts. But where did the idea for dragons come from in the first place? How did these magnificent creatures squirm and soar their way into our imaginations and mythology? No one knows, of course, but the origin of dragons may have been more scientific than it seems. But let's start with legend. According to medieval legend, the town of Klagenfurt in Austria was founded on a marsh that was home to a *lindwurm*, or wingless dragon. Those wanting to settle in the area had to first deal with the dragon before founding Klagenfurt. As is traditional with dragons, this one gobbled up anyone who tried to cross the marsh. Fortunately, a local duke funded the building of a stone tower in the swamp. (Local legend is not specific on how the builders avoided becoming dragon chow.) Once the building was complete, the locals fished for the dragon from the safety of the tower, using a chain for line, a bull for bait and presumably a hefty hook. Eventually, they captured the beast. At this point in history, the dragon seems to have been little more than an enormous and fearsome water snake. But in the way of creatures both biological and mythical, it evolved. By 1287, the city's coat of arms shows the monster as having the head of a wolf, the body of a bird and the tail of a snake. Within a few centuries, it had grown legs, evolving into something we would recognize today as a typical flying, fire-breathing dragon. In the sixteenth century, some people found a fossilized skull they thought belonged to a dragon, proving the *lindwurm* legend. As it turned out, the skull belonged instead to a wooly mammoth. That sort of confusion may have been at the root of all dragon myths, as well as stories surrounding other mythical creatures. As a scientific discipline, paleontology was born in the 18th and early 19th centuries because of the work from scientists such as Charles Lyell and Georges Cuvier. But people have been finding fossils as long as humans have walked the earth. The ancient Greek historian Herodotus wrote of fossils and concluded from them that Egypt had once been under water (and described some of the bones he examined as having belonged to winged serpents). Adrienne Mayor, a classical folklorist and historian of ancient science at Stanford University, has argued that ancient people conceived dragons and other mythical creatures after finding fossils of even more ancient creatures. In her book *The First Fossil Hunters*, Mayor shows how fossils influenced Greek and Roman stories about bygone creatures, and not just dragons. She also says that the idea of human giants and larger-than-life heroes could have come from the discovery of the outsized bones of prehistoric mammals. If Mayor is right, dragons are not entirely fictional beings. The people who imagined them and told stories about them were imagining and telling stories about animals that once walked the Earth. They got the details wrong, just as we often do when studying ancient fossils. But even when they were far from accurate, the stories our ancestors told about dragons and their mythical kin have enriched culture and no doubt inspired a lot of science as well.

https://www.discovermagazine.com/the-sciences/the-mysterious-origin-of-dragons

What Is Rainbow Obsidian?

Made of silicon dioxide, **rainbow obsidian** is formed when lava cools at different times and traps layers of magnetite nanoparticles. The presence of these magnetite nanoparticles imparts the rainbow colors in this volcanic glass. At a glance, this iridescence can be subtle. But it appears more brightly when the stone is held in the light. It has no definite shape or form, making it amorphous. Rainbow obsidian has many names. It is also known in the gem trade as black obsidian, rainbow sheen obsidian, sheen obsidian, and iris obsidian. In terms of hardness, it is rated 5 to 5.5 on the Mohs scale. Being a soft stone, rainbow obsidian scratches easily and is used to make jewelry items such as rings, earrings, pendants, and necklaces.

The History of Rainbow Obsidian

In ancient cultures and civilizations, obsidian was widely fashioned as a weapon or cutting tool. It forms smooth and sharp edges when broken so they are an ideal material for making a number of tools. Native American tribes used obsidian to create knives, spears, arrowheads, and carving and scraping tools. While obsidian is mostly present in locations where there is volcanic activity, the widespread trade of obsidian has made it reach thousands of miles farther outside its area of origin. It even became a carving tool in Easter Island or Rapa Nui in Polynesia. It is believed that in the 13th to 16th centuries, inhabitants of Rapa Nui used obsidian cutting tools to shape those iconic human figures with oversized heads called the moai. The Greeks and Ancient Aztecs used obsidian as a mirror because of its glassy finish. At present, obsidian's sharpness is very well regarded in modern medicine. Because of its tensile strength and incredibly fine edge that rivals that of diamond, obsidian blades are used in surgery. Some surgeons prefer obsidian blades over steel scalpels because the former "cause very little trauma to tissue, heal faster, and heal with less scarring," says Dr. Lee Green, professor and chairman of the Department of Family Medicine at the University of Alberta. Rainbow obsidian can be found in Brazil, China, India, Madagascar, Mexico, Russia, Switzerland, and the United Kingdom.

The Lore of Rainbow Obsidian

The Mayan prophets not only used obsidian spheres for scrying for its reflective properties, but also due to its ability to discern the truth. Its sharpness was believed to be able to pierce through the darkness, uncover the truth, and increase the accuracy of predicting the future. In some cultures, the stone is used as an amulet that repels the devil. https://stonebridgeimports.com/a/657-what-on-earth-is-rainbow-obsidian

4 Dragons That Have Entered the Fossil Record

Old-school paleontologists would have frowned upon a colleague referring to a fossil find as anything like a dragon. Certainly in the early days of this branch of science, it must have been a tad exasperating to explain to non-scientists that the giant bone they found in the local quarry, or ground up for some folk remedy was *not* evidence of a legendary cryptid, but was instead a precious artifact worthy of preservation and legitimate study. But if additions to the fossil record over the past couple of decades are anything to go by, paleontologists have loosened up a little. Many seem all too happy to describe their finds, and even give them scientific names, in terms that reference popular dragon lore. And why not? If referring to a new fossil find in *dragon-y* terms garners more public interest and attention to your work and your field, then what's the harm? As proof, here are four examples of dragon discoveries that caught our attention.

1. Argentina's Dragon of Death (2022)

The most recent entry in this list, let's be clear, is not a dinosaur. It's actually a pterosaur, the biggest pterosaur ever found in South America. Two examples were uncovered in the Argentinian province of Mendoza, the biggest of which had a wingspan of roughly 30 feet, about the size of a modern hang glider. Dating to the late Cretaceous period, these large-skulled, flying reptiles died more than 86 million years ago, but time did not erode their ability to impress the researchers who found them. The fossils were named as two examples in the species ***Thanatosdrakon amaru***. The species name, *amaru*, refers to an Incan deity and means, essentially, *flying serpent*. The genus name is literally Greek for *dragon of death*. The fossils, and a life-sized reproduction of one of those dragons, is on display at the National Univ. of Cuyo in Mendoza.

2. Australia's Spear-Mouthed Dragon (2021)

Another pterosaur, whose discovery was announced a year earlier than Argentina's death dragon, didn't have quite the wingspan of its South American counterpart. The fossil that was uncovered did, however, possess a spear-like mouth and a row of teeth straight out of *House of the Dragon*. Dating to more than 150 million years ago, the pterosaur holds pride of place as the largest flying reptile yet discovered in Australia. It didn't hurt its public profile that, in announcing the find, the University of Queensland team who analyzed the fossil was unabashed in describing their discovery in the fieriest, most dragon-like way. "It's the closest thing we have to a real dragon," gushed one member of the team in a news release. "This thing would have been quite savage." When the university news release announcing the find is pleased to call it a savage thing, you know it's impressive. The paleontology team eventually settled on the official name of ***Thapunngaka shawi*.** The genus name is derived from Indigenous words that literally mean *spear mouth*, while the species name acknowledges one Len Shaw, a local fossil hunter who initially discovered the unidentified specimen in 2011. The Aussie dragon is currently on display in a Queensland museum.

3. The Amazing Dragon of Lingwu, China (2018)

Visually, ***Lingwulong shenqi*** may be the biggest letdown of dinosaurs on this list. After all, there's little about it that would immediately bring to mind visions of a rapacious, fire-breathing monster: no terrifying wingspan, no sharply angular horned head. It wasn't even a meat-eater, but a gentle giant of a herbivore. From a pop-culture perspective, the most dragon-like thing about this dinosaur is its name, which translates, in Mandarin, as "amazing dragon of Lingwu," the Chinese city near where the specimens were found. From a scientific perspective, however, this dragon's discovery was both exciting and unexpected. As *Discover* noted when the study describing it was first published, this 174-million-year-old diplodocoid was, by a good 15 million years, the oldest of its kind known to date, certainly the earliest example known in China. At a stroke, the discovery of this creature reset the evolutionary timeline of one of the most massive dinosaurs ever to stride the planet. That's an amazing dragon.

4. *Dracorex Hogwartsia*, U.S. (2004)

Of course, we saved the most dragon-like, dragon-named, dragonesque fossil for last. It was found in South Dakota, in part of the Hell Creek Formation, one of the most famous and productive areas of fossil discovery in the world. This almost-complete skull is festooned with hornlike spikes, an unusual configuration for this dinosaur, which was determined in 2006 to be a previously unknown type of ***Pachycephalosaurus***. Dubbed a "total paleontological surprise" by no less an authority than the famous Robert Bakker, the skull presents a fierce aspect indeed, although pachycephalosaurs were not predators. This particular herbivore dates as far back as 90 million years. The paleontologists who made the initial find decided to donate the skull to the Children's Museum of Indianapolis. With an ear for the kind of nomenclature likely to excite their target audience (and Harry Potter fans everywhere), the museum chose the specimen's official name, *Dracorex hogwartsia*. It means, you'll never guess, **"Dragon King of Hogwarts."**

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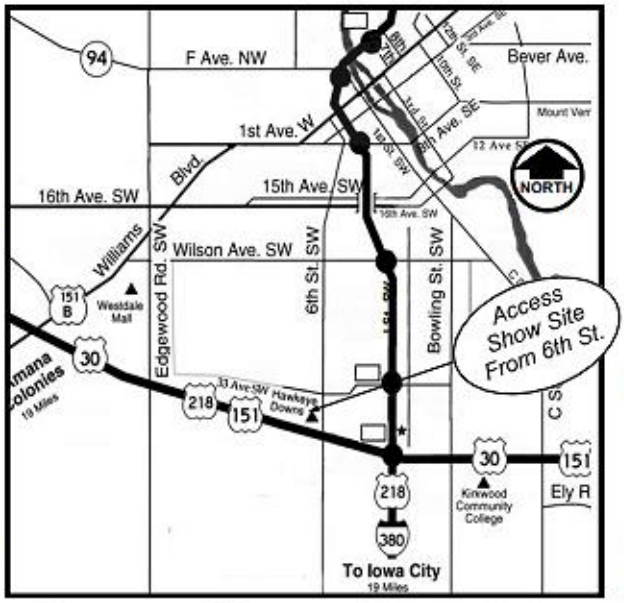

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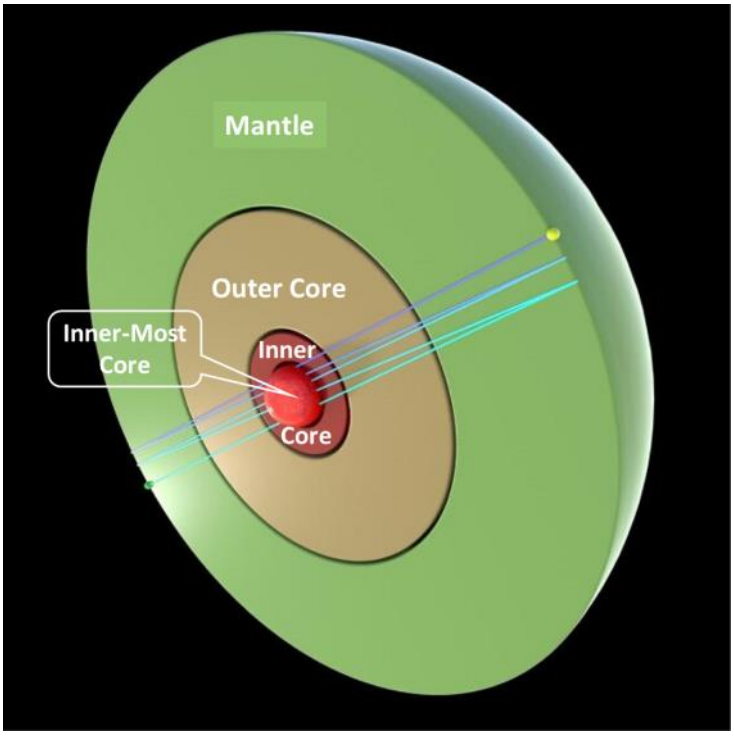
Ancient After a 20-Year Search, Scientists Have Finally Found Earth's True Innermost Core

Our home planet is seeming more like a jawbreaker the more we learn about its interior. A new analysis of Earth's innards suggests the presence of an inner core within the inner core (a dense ball of iron at the very center of our planet). This could reveal some previously unknown details about the history of Earth's formation and evolution, suggesting a significant global event early in our planet's history. Earth's interior structure consists of a series of concentric layers, from the crust to the core. At the very center, with a radius of about 762 miles is the inner core, the densest part of our planet, a solid ball mostly composed of iron and nickel, comprising less than 1 percent of Earth's volume. This inner core is like a time capsule of Earth's history. As the inner core grows, the solidification process releases heat and light that drives convection in the outer liquid core (the engine that powers the dynamo that converts kinetic energy into magnetic energy and maintains Earth's global magnetic field). That magnetic field is thought to keep harmful radiation out, and the atmosphere in, allowing life to thrive. Changes in the inner core could thus trigger changes in the dynamo, which in turn could have implications for Earth's habitability over time. But studying the inner core isn't easy. We can't just pop down there and drill into it; instead, we have to rely on seismic waves that bounce around inside the planet, changing as they encounter volumes of varying density. Over 20 years ago, scientists identified the presence of another, even *"innerer"* core inside the inner core. They called it the inner-most inner core, and other studies have supported its existence; but finding out more about it has remained difficult, partly because it's obscured by so many other layers, and partly because placing seismic stations in the right spots can be hard to do. However, the number of global seismic monitoring stations around the globe is continuing to grow, constantly recording the imperceptible shuddering of the planet beneath our feet. And now seismologists Thanh-Son Phạm and Hrvoje Tkalčić from the Australian National University (ANU) in Australia have figured out a way to squeeze data on the innermost inner core out of those recordings. *"This study uses the ever-growing global seismograph network to produce global stacks for some significant seismic events individually,"* they write in their paper. *"This study reports a previously unobserved and unutilized class of seismological observations of reverberating waves through the bulk of the Earth along its diameter up to five times. To our knowledge, reverberations from more than two passages are hitherto unreported in the seismological literature."* When a giant quake rattles Earth, the event generates waves that ripple through the planet, traveling through and bouncing off structures within. This is how scientists have obtained such a detailed map of what's inside Earth. But when the seismic waves hit a boundary, the wave that bounces off (a reverberation, like an earthquake "echo") is much weaker. Previously, scientists had not reported more than two passages of a seismic event through the planet. By stacking the data, adding a collection of seismic signals together into a single trace, Phạm and Tkalčić were able to amplify the signal from several major seismic events, thus breaking this record. For the first time, they identified three-, four-, and five-fold seismic reverberations, which in turn allowed a more detailed probe of the inner core than previously achieved. The different travel times of pairs of waves inferred the presence of the innermost inner core no wider than 404 miles across, made of dense iron. This structure could be the result of a fundamental change in the growth of the inner core at some point in Earth's past. The research, Phạm and Tkalčić say, means we now have sufficient evidence of the existence of the innermost inner core, and that future efforts should focus on characterizing it, the outer inner core, and the boundary between the two. And it demonstrates that the answers we seek may be already waiting in the data for someone to uncover. *"The findings reported here are a consequence of the unprecedentedly growing volume of digital waveform data and will hopefully inspire further scrutiny of existing seismic records for revealing hidden signals that shed light on the Earth's deep interior,"* they write.



The ray paths of fivefold reverberations along Earth's diameter.

https://www.sciencealert.com/after-a-20-year-search-scientists-have-finally-found-earths-true-innermost-core

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