

The Paleo Times



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Rick Poropat, Editor

November Meeting

Our November meeting will be held IN-PERSON on Friday, November 12, 2021 at 7:30 pm in Room 203 on the second floor of the Earth and Planetary Sciences building on the Washington University campus. The program for the evening will be focused on the state of Texas and the Waco Mammoth Site and Glen Rose Dino track site, presented by David Lukens. There will also be a business meeting, Affton show sign-up sheet, snacks and possibly some more free fossil giveaways. You can't get these benefits on Zoom! Join us for an interesting and informative evening.

Due to Washington University COVID policy, all who attend this in-person meeting, regardless of your vaccination status, must wear a mask at all times while in the building. No exceptions! If you don't want to wear a mask, or are unable to do so because of medical or religious beliefs, please do not attend. I am sure that no one wants to jeopardize our standing with Wash. U. and our ability to meet there. This is the University's policy, not EMSP's and it will be enforced.

Warning: the building doors automatically lock at 7:30. Plan accordingly.

For new members, the new parking garage across from the Earth & Planetary Sciences building is now open. Parking is free after 5 pm but you must park in the yellow visitor area on the first level. Don't forget to take a ticket at the gate when you enter. You will need it to exit the garage.

To access this garage: from Big Bend Blvd., take Forest Park Parkway east to Hoyt Dr., turn right onto Hoyt and drive down into the garage.

Rick's Ramblings

Another MAPS Fossil Expo has come and gone and it appears to have been a great success. The Orr Building is fabulous and there is room to expand with even more tables. More table means more fossils to peruse

and add to your collection!

Although the food service provided by the Loess Club was good, it would have been nice to have a better selection of sandwiches (maybe burgers) and drinks.

It was great to meet with fossil friends not seen for more than two years. I saw many familiar faces from our club. The Missouri Fossil Hunters Facebook Group was also well represented by an information booth put together by Asa.

I had two tables this year and was able to unload (cheap) many of the fossils and books that I brought. Maybe three tables next year? I also added a few things to the family collection and made a few bulk purchases on behalf of EMSP. We even added a couple of new members to our roster.

The theme for 2022 Expo is *Lagerstätten* and articles are already being requested for publication. I will be writing one on the "Sunset Hills" locality and perhaps give a talk as well.

Did You Know?

Officially, a Lagerstätte: German from *Lager*' storage, *lair*' *Stätte*' place; (plural Lagerstätten) is a sedimentary deposit that exhibits extraordinary fossils with exceptional preservation, sometimes including preserved soft tissues. These formations may have resulted from carcass burial in an anoxic environment with minimal bacteria, thus delaying the decomposition of both gross and fine biological features until long after a durable impression was created in the surrounding matrix.

Lagerstätten span geologic time from the Neoproterozoic era to the present. Worldwide, some of the best examples are the Cambrian Maotianshan and Burgess Shales, the Devonian Hunsrück Slates and the Gogo formation, the Carboniferous Mazon Creek Biota, the Jurassic Solnhofen Limestone, the Cretaceous Santana and Yixian formations as well as

the Eocene Green River and Foulden Marr formations.

In the context of MAPS Expo, this definition is expanded to include unique localities such as the Crawfordville, Indiana crinoid beds, the Cincinnati Ordovician, the White River Badlands, Gray's Fossil Site, Hot Springs Mammoth Site and Bruce's Ardeola site, among others.

Can you think of others sites with unique flora, fauna and preservation?

Volunteers Needed

The Affton show is fast approaching and we are still in need of volunteers to fully staff our club booth. With the additional table, three volunteers per two-hour shift are required to keep the booth secure. Volunteers will be selling fossils and fossil-related items to the public, with the proceeds going to our club. All shifts for Friday night are filled, however slots are still open for Saturday (10am-7pm) and Sunday (10am-3pm). If you are able to fill a shift (in 2-hour increments), no experience necessary, please reply to this email no later than Friday November 12. Did I mention that volunteers get into the show for free on the day they volunteer? The front desk will have a list of our volunteers. Check in there. If you wish to check out the show, please do so before or after your shift.

Consignments

The addition of a 4th table in our Affton show booth will allow us to offer space to club members for selling consignment fossils, minerals and related items. 15% of the sale price will go to the club with the seller pocketing the rest. NOTE: those members with consignments are expected to work in the booth at least one 2-hour shift. At shows end, all consignment sales will be tabulated and consignees will receive a check in the mail for their total sales (-15%). If interested in consignment sales, contact Rick Poropat: poropatr@att.net.

Mississippi Fossil ID

Those of you who have attended a club or privately organized trip to collect Mississippi fossils with George Phillips, curator of Paleontology at the Mississippi Museum of Natural Science, know how difficult it is to identify things found at the localities we visit. George has identified the following links to articles identifying Oligocene fossils from the Smith County Lime Pit.

Thanks to Faye Whobrey for forwarding this information to us. Does anyone know of a link to identifying Oligocene echinoids found at the pit? How about the fossils from the Eocene roadcut we visited?

Bivalves - <https://www.mdeq.ms.gov/geology/work-areas/publications-and-map-sales/categories/bulletins/lower-oligocene-bivalvia-of-the-vicksburg-group-in-mississippi-19803/>

Gastropods, Scaphopods & Cephalopods - <https://www.mdeq.ms.gov/geology/work-areas/publications-and-map-sales/categories/bulletins/lower-oligocene-gastropoda-scaphopoda-and-cephalopoda-of-the-vicksburg-group-in-mississippi-19804/>

2021 Calendar

Nov. 19-21	Mineral & Gem Club Show Affton-Rogers Recreation Center
Dec. 11	EMSP Holiday Party Kirkwood Community Center

Fossil of the Month



The November "fossil of the month" is a yet unidentified deciduous leaf from the middle Eocene, Claiborne Group, Cockfield Formation exposed in the Puryear Clay Pit, Henry County, Tennessee. The specimen, about three inches long, was obtained at the recent MAPS Fossil Expo.

The Puryear clay pit is a classic middle Eocene fossil plant locality in western Tennessee, USA. Berry (1916, pg. 46) noted that "This is the most remarkable leaf-bearing clay that I have ever seen at any geologic horizon." Numerous taxa were published by Berry based upon material from Puryear and other middle and late Eocene localities in the southeastern United States (Berry, 1914a, 1914b, 1916a, 1916b, 1924, 1926, 1928, 1930). These comprehensive reports based on nearly 200 localities are outstanding contributions to paleobotany and continue to be important references for the study of fossil plants from the southeastern

United States. (and yet, this leaf is not illustrated in any of these studies.)

Palytological data from the Claiborne Group in Henry County, Tennessee, indicate that these clay lenses (or clay pits) are best considered to be late middle Eocene Cockfield Formation of the Claiborne Group; (Tschudy, 1973; Elsik, 1974; Elsik and Dilcher, 1974; Dockery, 1996). Based upon their vertical positions determined from topographic maps and overburden exposures observed in the field, Potter and Dilcher (1980, figs. 8.4, 8.5, table 8.1) compared 19 clay pits in western Tennessee. They suggested that (1) all clay pits appear to be restricted to the upper middle Eocene (Cook Mountain and Cockfield formations of the Claiborne Group) and (2) the Puryear clay pit is of intermediate age among all clay pits within late middle Eocene (Potter and Dilcher, 1980; Table 2).

The nature of the sediments in these clay pits, including the Puryear locality, indicates that they are the result of filling of abandoned river channels or of a typical oxbow lake depositional system (Dilcher, 1971; Potter, 1976; Potter and Dilcher, 1980). Three dimensional studies of several clay lenses having sharp and distinct lower boundaries with finely laminated bedding suggest rapidly formed deposits during a 2000- to 3000-year period with high rates of infilling by clay-sized particles (Potter and Dilcher, 1980).

"Once-in-a-lifetime" Tardigrade Found in Ancient Amber

In a new study published on Wednesday, researchers said they have discovered a 16-million-year-old fossil of a tardigrade, otherwise known as a water bear or moss piglet, in a piece of amber from the Dominican Republic. There have been just two fossils of the creatures ever found before, despite the invertebrates continued inhabitation of the planet.

The latest discovery is the first tardigrade fossil to be recovered from the current Cenozoic era, which began 66 million years ago, and has led to the naming of a new genus and species of tardigrade, *Paradoryphoribus chronocaribbeus*.

Tardigrades are microscopic eight-legged invertebrates that resemble squishy bears and are among the toughest creatures on Earth, with the ability to survive decades without food, extreme temperatures and even in the vacuum of space. Fossils of the creatures are ex-

tremely rare, with only two being found in history.

The creature is believed to be the best-imaged fossil tardigrade to date. Researchers were able to get a detailed look at the creature, seeing parts of its mouth and the needle-like claws that are 20 to 30 times finer than a human hair.

Finding a tardigrade fossil is a once-in-a-generation event, said Phil Barden, one of the researchers, in a statement put out by the New Jersey Institute of Technology.

"What is so remarkable is that tardigrades are a ubiquitous ancient lineage that has seen it all on Earth, from the fall of the dinosaurs to the rise of terrestrial colonization of plants. Yet, they are like a ghost lineage for paleontologists with almost no fossil record," he said. "Finding any tardigrade fossil remains is an exciting moment where we can empirically see their progression through Earth history."

There are roughly 1,300 species of tardigrades that have been discovered, and according to National Geographic, they have been found in various environments on Earth: the deep ocean, sand dunes and freshwater mosses. The creatures are extremophiles, according to National Geographic, and some of the species can survive up to 30 years without food, temperatures ranging from absolute zero to above boiling, and even in the vacuum of space.

Finding tardigrades is no easy task, as they measure at just about a half millimeter in size. Barden tweeted on Wednesday that if it weren't for his co-author Brendon Boudinot, who spotted it next to the ants they had been analyzing, he "never would have spotted it."

Barden said that the discovery is just "scratching the surface" of understanding tardigrades.

"This study provides a reminder that, for as little as we may have in the way of tardigrade fossils, we also know very little about the living species on our planet today."

Source: Li Cohen, NBC News, 10/06/2021.

Rubies Linked to Early Life

While analyzing some of the world's oldest colored gemstones, researchers from the University of Waterloo discovered carbon residue that was once ancient life, encased in a 2.5 billion-year-old ruby.

The research team, led by Chris Yakymchuk, professor of Earth and Environmental Sciences at Waterloo, set out to study the geology of rubies to better understand the conditions necessary for ruby formation. During this research in Greenland, which contains the oldest known deposits of rubies in the world, the team found

a ruby sample that contained graphite, a mineral made of pure carbon. Analysis of this carbon indicates that it is a remnant of early life.

"The graphite inside this ruby is really unique. It's the first time we've seen evidence of ancient life in ruby-bearing rocks," says Yakymchuk. "The presence of graphite also gives us more clues to determine how rubies formed at this location, something that is impossible to do directly based on a ruby's color and chemical composition."

The presence of the graphite allowed the researchers to analyze a property called isotopic composition of the carbon atoms, which measures the relative amounts of different carbon atoms. More than 98 per cent of all carbon atoms have a mass of 12 atomic mass units, but a few carbon atoms are heavier, with a mass of 13 or 14 atomic mass units.

"Living matter preferentially consists of the lighter carbon atoms because they take less energy to incorporate into cells," said Yakymchuk. "Based on the increased amount of carbon-12 in this graphite, we concluded that the carbon atoms were once ancient life, most likely dead microorganisms such as cyanobacteria."

The graphite is found in rocks older than 2.5 billion years ago, a time on the planet when oxygen was not abundant in the atmosphere, and life existed only in microorganisms and algae films.

During this study, Yakymchuk's team discovered that this graphite not only links the gemstone to ancient life but was also likely necessary for this ruby to exist at all. The graphite changed the chemistry of the surrounding rocks to create favorable conditions for ruby growth. Without it, the team's models showed that it would not have been possible to form rubies in this location.

Source: University of Waterloo. "Some of the world's oldest rubies linked to early life." ScienceDaily.

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<www.sciencedaily.com/releases/2021/10/211021084608.htm.

New Science Center Exhibit

A new exhibit, *Tyrannosaurs, Meet the Family*, opened October 30th at the St. Louis Science Center. It will be on site until the end of the month. Tyrannosaurs: Meet the Family is an exhibition created by the Australian Museum and toured internationally by Flying Fish.

Think you know T. rex? Think again.

New discoveries are taking place about the T. rex of popular myth, of dinosaur toys and the Jurassic Park movies. The evolutionary history of the "king of the dinosaurs" is still being uncovered, with ancestor tyrannosaurs of all shapes and sizes now found in Asia and Europe as well as in North America and perhaps even

Australia!

Tyrannosaurs: Meet the Family explores the "most feared and revered" of all dinosaurs in new and different ways. The exhibition's specimens are not only spectacular in scale and form, but also reveal some of the most significant scientific discoveries in paleontology over the past decade.

The exhibition features Scotty, a life-sized replica of a T. rex skeleton discovered in 1991. She is the heaviest and oldest T. rex currently on record. When she was alive, she was almost 20 feet tall, nearly 40 feet long and tipped the scales at more than 19,000 pounds!



Editor's note. I have previewed this extensive exhibit and it is outstanding!



The MAPS Fossil Expo at the Orr Building on the Illinois State Fairgrounds. The building is so large that only one third of the room would fit in the image. There is also plenty of room to expand the show with as many as 100 additional tables.

Baby bird fossil is 'rarest of the rare'

Scientists have unveiled one of the smallest bird fossils ever discovered.

The chick lived 127 million years ago and belonged to a group of primitive birds that shared the planet with the dinosaurs.

Fossils of birds from this time period are rare, with baby fossils seen as "the rarest of the rare".

Scientists say the discovery gives a peek into the lives of the ancient, long-extinct birds that lived between 250 and 66 million years ago.

The bird belonged to the enantiornithine family, most of which had teeth and clawed fingers on each wing, but otherwise looked much like modern birds.

"It's amazing to realize that many of the features we see among living birds had already been developed more than 100 million years ago," said Luis Chiappe, from the LA Museum of Natural History.

From nose to tail the hatchling was a bit shorter than the little finger of a human hand, and it weighed just 10 grams.

The bird died not long after leaving the egg, giving a window into a critical stage of development.

Researchers from the UK, Spain, Sweden and the US used state-of-the-art technology to study its fossilized bones.

Analysis in a synchrotron - particle accelerators that use very intense light to study minute matter - revealed that the chick probably could not fly at this stage.

The cartilage in its sternum (breast bone in the center of the chest) had not yet fully turned to bone.

Lead researcher Fabien Knoll of ARAID-Dinopolis and the University of Manchester said analysis of bone development can be used to study a host of evolutionary characteristics.

"New technologies are offering paleontologists unprecedented capacities to investigate fossils," he said.

The fossil was found many years ago in the famous Las Hoyas site in Spain. However, it has remained largely unstudied until now.

"Truth be told, the techniques we used to analyze it in the paper (such as synchrotron microtomography and elemental mapping) had not yet been developed when the specimen was discovered," said Dr Knoll.

Studying the process of bone development can explain a lot about a young bird's life and development. These early bird chicks may have been much like modern chickens, which have feathers and can move around from birth.

Or they might have been more similar to living love birds, which hatch with no feathers and their eyes shut, meaning they need parental care.

The research, published in the journal, *Nature Communications*, suggests the enantiornithines were very diverse in their behavior and development.

Source: Helen Bigs, BBC News, 05March2018.

Youngest Dinosaur Fossil Found in Montana

The dinosaur fossil believed to be the youngest ever found was discovered by Yale scientists in Montana's Hell Creek formation, a study published in *Biology Letters* revealed.

The 45-centimetre horn is understood to be from a triceratops.

The discovery of the fossil provided unprecedented support for the theory that dinosaurs were wiped out by a massive meteor or similar cosmic body that struck the earth.

Subscribers to the competing theory - that dinosaurs gradually became extinct before the cosmic impact - have pointed to the absence of any non-avian dinosaur fossils buried within 10 feet of the K-T boundary, a geological signature in the earth's crust that represents the meteor's presumed point of impact.

To all of our surprise the boundary was no more than 13 centimeters above this horn, and the significance is this indicates that at least some dinosaurs were doing quite well in this locale at the time of the meteor impact, Tyler Lyson, the study's lead author, told CTV.ca.

Avian dinosaurs are believed to have survived the cosmic event and evolved into modern-day birds.

The discovery does not entirely rule out the possibility that dinosaurs were already on their way to becoming extinct - fossil records indicate that dinosaurs were in decline prior to the cosmic event.

Having found one dinosaur in the gap doesn't necessarily falsify the idea that dinosaurs were gradually declining in numbers, Lyson told LiveScience. However, this find indicates that at least some dinosaurs were doing fine right up to the K-T boundary.

Although the researchers have been unable to determine the fossil's precise age, they are confident it is the youngest non-avian dinosaur fossil found thus far, and believe that it lived between tens of thousands of years to just a few thousand years before the impact.

Source: Ellen Killoran, International Business Times, 07/17/2011

(EMSP) is a registered Missouri not-for-profit organization dedicated to promoting the enjoyment and scientific pursuit of fossil collecting. It is open to all individuals interested in learning about the history of ancient life on earth. The club membership includes professional paleontologists as well as amateur hobbyists providing an open forum for the exchange of information as well as access to expertise on collecting, identifying, preparing and displaying fossils.

EMSP meetings are held on the second Friday of every month (except July, August and December) at 7:30pm in Room 203, on the second floor of the Earth and Planetary Sciences Building on the campus of Washington University. The building is located at the SW corner of the intersection of Forest Park Parkway and Hoyt Drive. Each meeting includes an informal exchange of information and speakers on a variety of fossil-related topics. Note: the building doors automatically lock at 7:30pm.

Club activities include occasional field trips led by experienced collectors, a great way to augment discussions at the monthly meetings. The club also participates in joint field trips with other paleo clubs, visiting fossil sites throughout the United States. EMSP is also proud to be involved in a partnership with the St. Louis Science Center as well as STEM outreach to classrooms, community events and science fairs.

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