

The Paleo Times

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Rick Poropat, Editor

Rick's Ramblings

The May virtual meeting will be held on Friday, May 14 at 7:30 pm. Our program for the evening, *Collecting Chilean Shark Teeth*, will be presented by David Lukens.

Members will receive an email prior to the meeting which will include the meeting number and passcode plus instructions on how to log into Zoom. If you need assistance, please contact our Zoom guru, John Christensen at dwb@swbell.net.

There is a new item posted on the Calendar. We have tentatively scheduled our summer picnic for Sunday August 8 at the Kirkwood Park pavilion. The Covid situation at that time will determine if the event actually happens. More info to follow as we get closer to the event.

It is not too early to start making plans for MAPS Fossil Expo in October. Can you believe it has been two years since the last one? All of the dealer-designated rooms for the hotel show have been reserved but there are still rooms available for the rest of us. Check with the hotel, Northfield Inn Suites to see if they have a special rate for that weekend (October 22-24). You might also want to look into the Ramada Inn which is across the street. Both hotels are at the East Sangamon Ave. exit off I-55, about two miles east of the fairgrounds MAPS Expo location. All finalized EXPO information, including a location map and the sales table reservation form, will be coming out in mid-May to those on the MAPS email list. I will post that information in the newsletter when I receive it.

Locally, the Rock Hobby show, postponed from March, has been moved to the Eagles Lodge in Pacific, Missouri on May 22-23. Several of our club members will be vendors there. Check it out!

Although a couple of clubs I belong to are beginning to hold field trips again, EMSP is still on hold, at least until fall. Suggestions for fall trips include a weekend trip to Mississippi

Participation in any trip will be restricted to a limited number of people. As always, our club-sponsored trips are reserved for current club members in good standing.

If you have an idea for a field trip, especially to a local site, please pass that information on to a club officer.

Fossil of the Month



The fossil of the month for May is the Lower Ordovician gastropod, *Sinuopea (regalis?)* sp. Ulrich 1911, from the Gasconade Formation in Sullivan County, Missouri. The specimen is preserved in chert as an internal mold and is approximately 2 inches wide.

"The Gasconade Formation (Lower Ordovician) has been studied in the surface and subsurface in the Ozarks of Missouri and northeastern Oklahoma. The formation is mostly dolomite with a sandstone member at the base (Gunter) and frequent occurrences of chert bodies of different shapes particularly in the middle part.

The Gasconade Formation was deposited in the intertidal zone of a shallow sea. During the deposition of the middle part of the formation, the sea was shallower than during the deposition of either the upper or lower series.

events, DCWs are actually a really diverse phenomenon and that there might be a lot of drivers that produce this pattern in the fossil record," Barnes said. "These DCWs may represent a major macroevolutionary pattern."

The scientists used a statistical technique called a Bayesian change point algorithm to analyze fossil records from the Paleobiology Database, a public record of paleontological data maintained by international scientists.

The method allowed the researchers to search time series data for significant points where the data deviated from the pattern. They were able to identify negative jagged shifts in diversity and rule out that the organism went extinct immediately but instead persisted.

"So, you might be looking in the fossil record and you'll find tons of a type of brachiopod," Barnes said. "Each order has a handful of families and dozens of genera within those families. Then you might see a drop in diversity, and the majority of those genera disappear and perhaps there's only one family that continues to survive."

Those survivors can continue in their niche for millions of years, even into the present. But their lack of diversity makes them more susceptible to future environmental challenges or extinction events, the scientists said.

"I think these findings cause you to reexamine how you measure success," Barnes said. "It's quite possible for an animal group not to produce new families and new genera at a rate like it did before, but if it continues to survive for many millions of years, that's still some form of success. I think it raises a lot of questions about what it means to be successful as a fossil organism and what ultimately are the controls of origination."

Source: Penn State. "'Dead clades walking': Fossil record provides new insights into mass extinctions: Groups of animals that survive an event but never fully recover are more common and long-lasting than expected." ScienceDaily. ScienceDaily, 20 April 2021. <www.sciencedaily.com/releases/2021/04/210420160901.htm>.

Two jokes. With apologies to students of all ages.

Q: How do dinosaurs pass their exams?

A: With extinction!

Q: What was the wordiest dinosaur that ever existed?

A: Thesaurus!

2021 Calendar

May 7-09	Central MO Rock & Lapidary Show Knights of Columbus Hall Columbia, Missouri
May 22-23	Rock Hobby Club Show The Eagles Pacific, Missouri
Jun 04-06	Mineral Area Rock Swap Missouri Mines State Historic Site, Park Hills, Missouri
Jun. 25-27	Bedford Swap/Show Lawrence County Fairgrounds Bedford, Indiana
Aug. 08	EMSP Picnic Kirkwood City Park
Aug 20-22	GSLAESC Show Machinists Hall Auditorium Bridgeton, Missouri
Oct. 22-24	MAPS Fossil Expo Orr Building, Illinois State Fairgrounds Springfield, Illinois
Nov. 19-21	Mineral & Gem Club Show Affton-Rogers Recreation Center
Dec. 11	EMSP Holiday Party Kirkwood Community Center

Tyrannosaurus rex Study

If one Tyrannosaurus rex - the school bus-sized meat-eating dinosaur that stalked the Cretaceous Period landscape - seems impressive, how about 2.5 billion of them?

Researchers on Thursday unveiled the first calculation of the total T. rex population during the estimated 2.4 million years that this fearsome species inhabited western North America during the twilight of the age of dinosaurs.

They considered factors including the size of its geographic range, its body mass, growth pattern, age at sexual maturity, life expectancy, duration of a single generation and the total time that T. rex existed before extinction 66 million years ago. They also heeded a doctrine called Damuth's law linking population to body mass: the bigger the animal, the fewer the individuals.

Their analysis put the total number of T. rex individuals that ever existed at about 2.5 billion, including approximately 20,000 adults alive at any one time.

Fossils of more than 40 T. rex individuals have been found since it was first described in 1905, providing a wealth of information about a beast that thrives in the popular imagination.

"Why iconic?" asked paleontologist Charles Marshall, who led the study published in the journal *Science*.

"Heck, a hugely massive killer with super-huge teeth, one that you would never dream up on your own if we didn't have the fossil record. So not only super-cool and beyond the imagination, but real. Like Godzilla, but actually real. And I think we like feeling small, and T. rex sure makes us feel small and vulnerable," Marshall said.

It was among the largest carnivorous dinosaurs, possessing a skull about 5 feet (1.5 meters) long, massive and muscular jaws with a bite force capable of crushing bone, a mouthful of banana-sized serrated teeth, a keen sense of smell, strong legs and puny arms with hands boasting just two fingers.

Perhaps the largest-known T. rex is a specimen named Sue at the Field Museum in Chicago, measuring 40-1/2-foot-long (12.3-meters), weighing an estimated 9 tons and living about 33 years.

The new study put the weight of the average adult T. rex at 5.2 tons, average lifespan at 28 years, generation time at 19 years, total number of generations of the species at about 125,000, and its geographic range at roughly 890,000 square miles (2.3 million square kilometers).

They calculated an average population density of about one T. rex for every roughly 40 square miles (100 square kilometers).

T. rex fossils have been found in Canada's Alberta and Saskatchewan provinces and the U.S. states of Montana, Wyoming, South Dakota, North Dakota, Utah, Colorado, New Mexico and Texas. T. rex apparently met a fiery end when an asteroid slammed into Mexico, exterminating three quarters of Earth's species.

While the uncertainties in the estimates were large and some of the assumptions may be challenged by other paleontologists, the study was a worthwhile effort to expand the understanding of this famous dinosaur, said Marshall, director of the University of California Museum of Paleontology and a University of California, Berkeley professor of integrative biology.

The formula could be applied to other extinct animals, Marshall added.

Paleontologist and study co-author Ashley Poust of the San Diego Natural History Museum said while 2.5 billion is a lot, it represents only about a third of Earth's current human population - and 20,000 is merely the size of a small town.

"They'd have to meet up over possibly long distances to mate, or maybe even care for their young," Poust said of Tyrannosaurus. "The numbers can seem big and cold, but I guess I see them as a pretty intimate window into their lives."

Source: Will Dunham, Edited by Rosalba O'Brien, Reuters, April 15, 2021.

Mass Fossil Site May Prove Tyrannosaurs Lived in Packs

Ferocious tyrannosaur dinosaurs may not have been solitary predators as long envisioned, but more like social carnivores such as wolves, new research has found.

Paleontologists developed the theory while studying a mass tyrannosaur death site found seven years ago in the Grand Staircase-Escalante National Monument in southern Utah, one of two monuments that the Biden administration is considering restoring to their full size after former President Donald Trump shrunk them.

Using geochemical analysis of the bones and rock, a team of researchers with the University of Arkansas determined that the dinosaurs died and were buried in the same place and were not the result of fossils washing in from multiple areas.

The new Utah site is the third mass tyrannosaur grave site that's been discovered in North America — bolstering a theory first developed 20 years ago that they lived in packs. However, more research needs to be done to make that argument, said Kristi Curry Rogers, a biology professor at Macalester College who wasn't involved in the research but reviewed the findings.

"It is a little tougher to be so sure that these data mean that these tyrannosaurs lived together in the good times," Rogers said. "It's possible that these animals may have lived in the same vicinity as one another without traveling together in a social group, and just came together around dwindling resources as times got tougher."

In 2014, Bureau of Land Management paleontologist Alan Titus discovered the site, which was later named the Rainbows and Unicorns quarry because of the vast array of fossils contained inside. Excavation has been ongoing since the site's discovery because of the size of the area and volume of bones.

"I consider this a once-in-a-lifetime discovery for myself," Titus told reporters during a virtual news conference. "I probably won't find another site this exciting and scientifically significant during my career."

The social tyrannosaurs theory began over 20 years ago when more than a dozen tyrannosaurs were found at a site in Alberta, Canada. Another mass death site in Montana again raised the possibility of social tyrannosaurs. Many scientists questioned the theory, arguing that the dinosaurs didn't have the brainpower to engage in sophisticated social interaction, Titus said.

"Going that next step to understand behavior and how animals behave requires really amazing evidence," Joseph Sertich, curator of dinosaurs at the Denver Museum of Nature & Science, said at the news conference. "I think that this site, the spectacular collection of tyrannosaurs but also the other assembled pieces of evidence ... pushes us to the point where we can show some evidence for behavior."

In addition to the tyrannosaurs, researchers have also found seven species of turtles, multiple fish and ray species, two other kinds of dinosaurs and a nearly complete skeleton of a juvenile *Deinosuchus* alligator. These other animals do not appear to have all died together.

Paleontology groups have been among those pushing the federal government to restore the Bears Ears National Monument and Grand Staircase-Escalante to their original sizes to protect the region's rich paleontological and archaeological record.

Interior Secretary Deb Haaland visited southern Utah earlier this month as she prepared to submit recommendations on whether to reverse Trump's decision to downsize the monuments. Titus said he showed Haaland some of the fossils at his lab during her visit and said she "appreciated getting to see the material."

"The (Bureau of Land Management) is protecting these fossils as national treasures," Titus said. "They're part of the story of how North America came to be and how ultimately we came to be."

Source: By Sophia Eppolito, Associated Press/Report for America, 04/19/2021.

Cephalopods: Older Than First Thought?

The possibly oldest cephalopods in the earth's history stem from the Avalon Peninsula in Newfoundland (Canada). They were discovered by earth scientists from Heidelberg University. The 522 million-year-old fossils could turn out to be the first known form of these highly evolved invertebrate organisms, whose living descendants today include species such as the cuttlefish, octopus and nautilus. In that case, the find would indicate that the cephalopods evolved about 30 million years earlier than has been assumed.

"If they should actually be cephalopods, we would have to backdate the origin of cephalopods into the early Cambrian to backdate the origin of cephalopods into the early Cambrian period," says Dr Anne Hildenbrand from the Institute of Earth Sciences. Together with Dr Gregor

Austermann, she headed the research projects carried out in cooperation with the Bavarian Natural History Collections. "That would mean that cephalopods emerged at the very beginning of the evolution of multicellular organisms during the Cambrian explosion."

The chalky shells of the fossils found on the eastern Avalon Peninsula are shaped like a longish cone and subdivided into individual chambers. These are connected by a tube called the siphuncle. The cephalopods were thus the first organisms able to move actively up and down in the water and thus settle in the open ocean as their habitat. The fossils are distant relatives of the spiral-shaped nautilus, but clearly differ in shape from early finds and the still existing representatives of that class.

"This find is extraordinary," says Dr Austermann. "In scientific circles it was long suspected that the evolution of these highly developed organisms had begun much earlier than hitherto assumed. But there was a lack of fossil evidence to back up this theory." According to the Heidelberg scientists, the fossils from the Avalon Peninsula might supply this evidence, as on the one hand, they resemble other known early cephalopods but, on the other, differ so much from them that they might conceivably form a link leading to the early Cambrian.

The former and little explored micro-continent of Avalonia, which -- besides the east coast of Newfoundland -- comprises parts of Europe, is particularly suited to paleontological research, since many different creatures from the Cambrian period are still preserved in its rocks. The researchers hope that other, better preserved finds will confirm the classification of their discoveries as early cephalopods.

The research results about the 522 million-year-old fossils were first published in the nature journal *Communications Biology*. Logistic support was given by the province of Newfoundland and the Manuels River Natural Heritage Society located there. The publication in open-access format was enabled in the context of Project DEAL.

Source: University of Heidelberg. "Cephalopods: Older than was thought? Fossil find from Canada could rewrite the evolutionary history of invertebrate organisms." ScienceDaily. ScienceDaily, 23 March 2021.

<www.sciencedaily.com/releases/2021/03/210323131233.htm>.

The Greek and Latin combination *Tyrannosaurus rex* means "King of the tyrant lizards".

The Eastern Missouri Society for Paleontology (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.

Eastern Missouri Society for Paleontology (EMSP)
P.O. Box 220273
St. Louis, MO. 63122



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