The Paleo Times

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Rick Poropat, Editor

October Meeting

Our next meeting will be held on Friday, October 11, 2019 at 7:30 pm in Room 203 on the second floor of the Earth and Planetary Sciences building on the Washington University campus. Our program for the evening will be "All About Echinoids", presented by Rick Poropat.

Good News! We no longer have to make the long walk from the Throop parking garage. The new parking garage across from the Earth & Planetary Sciences building is now OPEN. To access this garage: from Big Bend Blvd., take Forest Park Parkway east to Hoyt Dr., turn right onto Hoyt and enter the garage. If you want to use Hoyt from the Forsyth side of campus, don't do that! Hoyt DOES NOT go all the way through to access the garage!

Parking is free after 5 pm but you must park in the yellow visitor area and only on the lower levels. IF you park in the red zones you will receive a citation from Washington University. It is assumed that, when entering the garage, you will need to retrieve and validate a ticket in order to exit later on.

The Science Building doors that will be unlocked are the Hoyt-side front door and also the door up the hill. The freight doors by the rock pile will probably be locked. Remember that, as in the past, the building doors automatically lock at 7:30. Plan accordingly.

Treasurer's Report

A detailed report is available by request from the treasurer.

MS Field Trip Update

The field trip to Mississippi, scheduled for October 19, has been cancelled due to lack of interest. It will be rescheduled in February or March of next year.

Call for Papers

The theme for the 2020 MAPS Fossil EXPO is the Ordovician Period. Any paper dealing with Ordovician fossils, specific taxonomic groups, or interesting locations or collecting sites would be appreciated. The papers should be in Word, Times New Roman, size 12 Font, single spaced with one-inch margins, and e-mailed to one of the Digest Editors listed below by the first week of March 2020. Diagrams and Photos can be sent separately or imbedded in text. Please send to:

John Catalani: Fossilnautiloid@aol.com
Chris Cozart: CDCozart@aol.com

Calendar

Nov 22-24	St. Louis Mineral & Gem Society Show Affton White-Rogers Community Center
Dec. 7	EMPS Holiday Party Kirkwood Community Center
Mar. 13-15, 2020	Kansas City Gem & Mineral Show KCI Expo Center, Kansas City, MO.

Getting It Done in Nov.

A portion of our November meeting will be devoted to the election of new officers and board members for 2020. The positions are President, Vice-president, Secretary and Treasurer, plus two board members, a GSTLAESC representative, a newsletter editor and a field trip chair. If you are interested in running for one of these positions or want to remain in your current office, please voice your interest to President David Lukens by the end of October so that a ballot can be assembled.

Rick's Ramblings

The fossil sale scheduled for Saturday October 5th is on! This is not an EMSP-sponsored event, but is a private sale for the benefit of the club. It will, however, be for **EMSP Members Only**, since some of the material was culled from donated or club-purchased bulk material. Also included will be excess self-collected material that has accumulated in my garage over the last 20 years. This event will include fossils, minerals, rocks, geodes, etc. to be sold mostly as boxed lots with a few individually priced pieces. Prices will range from $1-$5/box/specimen.

The sale will be held at my home (128 W. Rose Hill Ave., Kirkwood, MO.) beginning at 10am. The material will be in the driveway around back of the house. Cash or checks will be accepted with *all proceeds going to EMSP.* In the event of rain, the sale will be moved to the garage. No early birds!

November Field Trip

Faye has organized a field trip to Vulcan Quarry near Parsons, Tennessee for early November. See attachment for pics and descriptions of the fossils to be found. You must be at least 18 years of age and an EMSP member to attend. Sign up at the October meeting or contact Faye. Trip Date**:** November 02, 2019.

We will meet at the quarry office (small stone building with the radio antennae on top and inside of the stone entrance) at 7:30a.m. sharp, to sign the club and quarry waivers, listen to a safety talk, and then be escorted back to the collecting area. The quarry closes at noon, so we must be out before then.

We will be collecting Devonian age fossils from the Ross formation. The Parsons facility is huge, and we have a very large area in which to collect. Be prepared to do some clambering over the tailing piles; they can be a bit steep. There are plenty of easier collecting spots along the quarry roads where we will be. The Devonian fossils are very abundant here; you can't help but step on them! Large crinoid stems and some calyxes, many brachiopods, bryozoan, several types of coral, and quite a few trilobite heads & tails can be found. Complete trilobites from here are rare. No one will go home empty handed!

Location: Parsons Quarry (Vulcan Materials Co)
150 Rock Crusher Road
Parsons, TN 38363

Required safety equipment and suggested things to bring:

1. Reflector vest (Required)
2. Hard Hat (Required)
3. Sturdy shoes (no sandals) (Required)
4. Eye Protection (Required)
5. Buckets or heavy backpack
6. Newspapers for wrapping specimens
7. Rock hammer, chisels
8. Water, drinks
9. Snacks
10. Pack a lunch as we will probably go to another location after this one
11. EMSP Members Only!

The Ross Formation of west-central Tennessee contains the most diverse and abundant Lower Devonian invertebrate fauna and the most fossiliferous member of the Ross is the Birdsong Shale.

The Birdsong Shale is well exposed in road cuts along State Highway 69 and in the many active and disused quarries of western Tennessee. It consists of highly fossiliferous alternating beds of argillaceous limestone and finely laminated shale.

The Birdsong Shale is informally divided into 3 distinct units based on faunal differences. The lower most unit was termed the 'Brachiopod Zone' by Dunbar (1919) due to the abundance of brachiopods within the shale beds. A thinner, middle bed of massive bryozoan rich limestone was termed the 'Bryozoan Zone', and an upper most bed of trilobite rich shale was named the 'Trilobite Zone'.

Fossil of the Month

The fossil for the month of October is the spiny echinoid, *Archaeocidaris wortheni* Hall, 1858, from the Lower Carboniferous (Mississippian, Meramecian Series) St. Louis Limestone in St. Louis

and spines, this extinct echinoderm lived from the Late Devonian through the Late Permian periods. Its fossilized remains have been found in Europe, Africa and North America. The pictured specimen is approximately five inches at its widest dimension. Note its association with the smaller echinoid, *Archaeocidaris illinoisensis* at the upper right.

The St. Louis Limestone is a large geologic formation covering a wide area of the Midwest of the United States and is named after an exposure at St. Louis, Missouri. The limestone is typically lithographic, light-to light-olive gray in color, dense, and fractures conchoidally. It is brecciated, especially in the lower part, and contains scattered chert beds. It sits conformally atop the Salem Formation and is mined locally for use in the production of cement and in road construction.

The depositional environment of the St. Louis Limestone is assumed to have been a warm shallow sea with frequent but slight undulations of both sea floor and neighboring landmass. These undulations allowed for argillaceous sediments (containing fine particles such as clay) to accumulate in thin, shaly layers in an otherwise totally limestone sequence. Well-preserved invertebrate fossils, including articulated crinoids are sometimes found at the contact between these sediments and the limestone.

Forams and bryozoans are the main fossil constituents followed by algae, fragments of disarticulated echinoids and crinoids, solitary and colonial corals, brachiopods and gastropods. Of the corals, *Lithostrotionella* and *Lithostrotion* are significant but have less obvious correlative value.

Half-a-billion-year-old tiny predator unveils the rise of scorpions and spiders

Two paleontologists working on the world-renowned Burgess Shale have revealed a new species, called *Mollisonia plenovenatrix*, which is presented as the oldest chelicerate. This discovery places the origin of this vast group of animals -- of over 115,000 species, including horseshoe crabs, scorpions and spiders -- to a time more than 500 million years ago. The findings are published in the journal *Nature* on September 11, 2019.

Mollisonia plenovenatrix would have been a fierce predator -- for its size. As big as a thumb, the creature boasted a pair of large egg-shaped eyes and a "multi-tool head" with long walking legs, as well as pairs of limbs that could all-together sense, grasp, crush and chew. But, most importantly, the new species also had a pair of tiny "pincers" in front of its mouth, called chelicerae. These typical appendages give the name to the group of scorpions and spiders, the chelicerates, which use them to kill, hold, and sometimes cut, their prey.

"Chelicerates have what we call either book gills or book lungs," explains Aria. "They are respiratory organs are made of many collated thin sheets, like a book. This greatly increases surface area and therefore gas exchange efficiency. *Mollisonia* had appendages made up with the equivalent of only three of these sheets, which probably evolved from simpler limbs."

The authors believe that *Mollisonia* preferentially hunted close to the sea floor, thanks to its well-developed walking legs, a type of ecology called benthic predation. Because *Mollisonia* is so modern-looking, chelicerates seem therefore to have prospered quickly, filling in an ecological niche that was otherwise left poorly attended to by other arthropods at that time. The authors conclude that the origin of the chelicerates must lie even deeper within the Cambrian, when the heart of the "explosion" really took place.

"Evidence is converging towards picturing the Cambrian explosion as even swifter than what we thought," says Aria. "Finding a fossil site like the Burgess Shale at the very beginning of the Cambrian would be like looking into the eye of the cyclone."

The importance of the Burgess Shale and similar deposits, such as the Chengjiang biota in China, lies in their exceptional preservation of the earliest marine animal communities at a time of uniquely rapid diversification of body forms called the "Cambrian explosion." Fossil animals from these sites are notable for preserving an extensive array of morphological features, such as limbs and eyes, but also guts and, much more rarely, nervous system tissues.

Mollisonia was first described more than a century ago by the discoverer of the Burgess Shale, Charles Doolittle Walcott. However, so far, only rare exoskeletons of this animal were known. "It is the first time that evidence of the limbs and other soft-tissues of this type of animal are described, which were key to revealing its affinity," says co-author Jean-Bernard Caron, Richard M. Ivey Curator of Invertebrate Palaeontology at the Royal Ontario Museum (Canada). The exceptionally well-preserved fossils come from a new Burgess Shale site near

"Marble Canyon is the biggest spotlight of my career
so far. This area keeps giving us wonderful treasures year after year," says Caron, who has been leading the Royal Ontario Museum's Burgess Shale expeditions for the past 10 years. "I would not have imagined that we could, in a way, rediscover the Burgess Shale like this, a hundred years later, with all the new species we are finding."

The specimens of *Mollisonia plenovenatrix* described in this new research are better preserved than the ones found at the original Walcott quarry that is located about 40 kilometers northwest of the Marble Canyon quarry. Many other fossils found at Marble Canyon and surrounding areas have already played a critical role in our understanding of the early evolution of many animal groups. These notably include the vertebrates, our own lineage, thanks to numerous and exceptionally well-preserved specimens of the primitive fish *Metaspriggina walcotti*. Many new species await to be described; the latest one, a "flying saucer-like" new predatory arthropod with huge rake-like claws called *Cambroraster falcatus*, was just recently published on July 31, 2019.

The Burgess Shale fossil sites are located within Yoho and Kootenay national parks and are managed by Parks Canada. Parks Canada is proud to work with leading scientific researchers to expand knowledge and understanding of this key period of earth history and to share these sites with the world through award-winning guided hikes. The Burgess Shale was designated a UNESCO World Heritage Site in 1980 due to its outstanding universal value and is part of the Canadian Rocky Mountain Parks World Heritage Site.

Mollisonia will be among the many exceptional fossils from the Burgess Shale planned to be on display in the ROM's future new gallery, The Willner Madge Gallery, Dawn of Life, scheduled to open in 2021.

Source: Royal Ontario Museum. "Half-a-billion-year-old tiny predator unveils the rise of scorpions and spiders: A new species, Mollisonia plenovenatrix, is presented as the oldest chelicerate." ScienceDaily.
<www.sciencedaily.com/releases/2019/09/190911130402.htm>.

Dust from a giant asteroid crash caused an ancient ice age

About 466 million years ago, long before the age of the dinosaurs, the Earth froze. The seas began to ice

Advances argues that the ice age was caused by global cooling, triggered by extra dust in the atmosphere from a giant asteroid collision in outer space.

There is always a lot of dust from outer space floating down to Earth, little bits of asteroids and comets, but this dust is normally only a tiny fraction of the other dust in our atmosphere such as volcanic ash, dust from deserts and sea salt. But when a 93-mile-wide asteroid between Mars and Jupiter broke apart 466 million years ago, it created way more dust than usual. "Normally, Earth gains about 40,000 tons of extraterrestrial material every year," says Philipp Heck, a curator at the Field Museum, associate professor at the University of Chicago, and one of the paper's authors. "Imagine multiplying that by a factor of a thousand or ten thousand." To contextualize that, in a typical year, one thousand semi trucks' worth of interplanetary dust fall to Earth. In the couple million years following the collision, it'd be more like ten million semis.

"Our hypothesis is that the large amounts of extraterrestrial dust over a timeframe of at least two million years played an important role in changing the climate on Earth, contributing to cooling," says Heck.

"Our results show for the first time that such dust, at times, has cooled Earth dramatically," says Birger Schmitz of Sweden's Lund University, the study's lead author and a research associate at the Field Museum. "Our studies can give a more detailed, empirical-based understanding of how this works, and this in turn can be used to evaluate if model simulations are realistic."

To figure it out, researchers looked for traces of space dust in 466-million-year-old rocks, and compared it to tiny micrometeorites from Antarctica as a reference. "We studied extraterrestrial matter, meteorites and micrometeorites, in the sedimentary record of Earth, meaning rocks that were once sea floor," says Heck. "And then we extracted the extraterrestrial matter to discover what it was and where it came from."

Extracting the extraterrestrial matter -- the tiny meteorites and bits of dust from outer space -- involves taking the ancient rock and treating it with acid that eats away the stone and leaves the space stuff. The team then analyzed the chemical makeup of the remaining dust. The team also analyzed rocks from the ancient seafloor and looked for elements that rarely appear in Earth rocks and for isotopes --

different forms of atoms -- that show hallmarks of coming from outer space. For instance, helium atoms normally have two protons, two neutrons, and two electrons, but some that are shot out of the Sun and into space are missing a neutron. The presence of these special helium isotopes, along with rare metals often found in asteroids, proves that the dust originated from space.

Other scientists had already established that our planet was undergoing an ice age around this time. The amount of water in the Earth's oceans influences the way that rocks on the seabed form, and the rocks from this time period show signs of shallower oceans -- a hint that some of the Earth's water was trapped in glaciers and sea ice. Schmitz and his colleagues are the first to show that this ice age syncs up with the extra dust in the atmosphere. "The timing appears to be perfect," he says. The extra dust in the atmosphere helps explain the ice age -- by filtering out sunlight, the dust would have caused global cooling.

Since the dust floated down to Earth over at least two million years, the cooling was gradual enough for life to adapt and even benefit from the changes. An explosion of new species evolved as creatures adapted for survival in regions with different temperatures.

Heck notes that while this period of global cooling proved beneficial to life on Earth, fast-paced climate change can be catastrophic. "In the global cooling we studied, we're talking about timescales of millions of years. It's very different from the climate change caused by the meteorite 65 million years ago that killed the dinosaurs, and it's different from the global warming of today -- this global cooling was a gentle nudge. There was less stress."

It's tempting to think that today's global warming could be solved by replicating the dust shower that triggered global cooling 466 million years ago. But Heck says he would be cautious: "Geoengineering proposals should be evaluated very critically and very carefully, because if something goes wrong, things could become worse than before."

While Heck isn't convinced that we've found the solution to climate change, he says it's a good idea for us to be thinking along these lines.

"We're experiencing global warming, it's undeniable," says Heck. "And we need to think about how we can prevent catastrophic consequences, or minimize them. Any idea that's reasonable should be explored."

Source: Field Museum. "Dust from a giant asteroid crash caused an ancient ice age." ScienceDaily. ScienceDaily, 18 September 2019.

Ancient parrot in New Zealand was 1m tall, study says

A giant parrot that roamed New Zealand about 19 million years ago had a height of 1m (3ft 3in) - more than half the average height of a human, a new study has found. The remains of the parrot were found near St Bathans in New Zealand's southern Otago region. Paleontologists have dubbed the new species *Heracles inexpectatus* in recognition of its unusual size and strength.

Weighing just over one stone (7kg), the bird would have been two times heavier than the kākāpo, previously the largest known parrot. Given its size, the parrot is believed to have been flightless and carnivorous, unlike most birds today.

"There are no other giant parrots in the world," Professor Trevor Worthy, a paleontologist at Flinders University in Australia and lead author of the study, told the BBC. "Finding one is very significant."

The bones - initially believed to belong to an eagle or duck - were kept in storage for 11 years until earlier this year, when a team of paleontologists reanalyzed them.

The parrot's beak would have been so big, Mike Archer of the University of NSW Paleontology said, it "could crack wide open anything it fancied".

The professor told AFP news agency the parrot "may well have dined on more than conventional parrot foods, perhaps even other parrots". However, because the parrot had no predators, it is unlikely that
it was aggressive, Prof Worthy told the BBC.

"It probably sat on the ground, walked around and ate seeds and nuts, mostly," he said.

Paul Scofield, the senior curator of natural history at Canterbury Museum, told AFP that researchers were "putting our money on it being flightless".

The discovery of large birds is not uncommon in New Zealand, once home to the moa, a now-extinct species whose height reached an estimated 3.6m (11ft 8in).

St Bathans, where the giant parrot's leg bones were excavated, is an area known for its abundance of fossils from the Miocene epoch, which extended from 23 million to 5.3 million years ago.

"We have been excavating these fossil deposits for 20 years, and each year reveals new birds and other animals... no doubt there are many more unexpected species yet to be discovered in this most interesting deposit."

Source: BBC Reel, 07Aug2019

The Eastern Missouri Society for Paleontology (EMSP) is a registered Missouri not-for-profit organization dedicated to promoting the enjoyment 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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