The Paleo Times

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Next meeting

Friday, September 14th at 7:30 pm in the New Earth and Planetary Sciences building at Washington University (see more details below).
The topic will be summer "show and tell" with some slide-show presentations. Bring your summer finds, pictures, and stories! We'll socialize over snacks and make some plans for field trips, etc. this fall. FYI, we are in the process of arranging for Peter Larson to speak to the club at a future meeting.

Upcoming Events

Now – Oct 7th: www.powellgardens.org, 816-697-2600
Powell Gardens in Kansas City will feature **life size dino** sculptures by **Guy Darrough**- including a T.rex and replicate of Missouri's hadrosaur.

Thanks

-To all of the club members that worked the booth or front table at the rock/mineral/ fossil show at Machinist's Hall in August. A partial list of those that helped with the show includes Carl Campbell, Tom Lee, Pete Smith, Abby Lee, Scott and Laura Garrett, the Stades, Bruce Stinchcomb, Rick Poropat and Carlton Laird. A lot of effort was made this time to better organize and store the fossils.
-To Tom and Keri Lee for assembling about 30 fossil starter kits. Several kits sold at the show. If these keep selling, we should make even more for future shows. Also, one of this year's Science Fair winners plans to attend September's meeting where he/she will be given a fossil kit and club membership.
-To members for submitting articles ☺

Event Reports

Cold Water Creek Trip: The Cold Water Creek trip lead by Rich Hagar was quite a success to say the least. About 8 club members (not including the Hagars) brought along screens expecting to find a few small Pleistocene bones. However, two giant beaver teeth (*Casteroides*) and the scull cap from the giant North American stag-moose (*Cervalces*) were found. A nice projectile point was also found by Lisa Hagar. The best find shocked even the trip leader, as he leap out of the canoe at the sight of a whole three foot Mastodon leg bone (tibia or humerus, not sure which) weighing ~85 lbs just sitting along the edge of the creek. This was a memorable trip indeed. Before the canoes got in the water, however, Rich Hagar took a serious tumble down the rip-rap. Rich was a real trooper and continued to lead the group, even though he had a very nasty contusion on his shin (yet another use for duct tape-bandages). Thanks go to the Hagars for such a successful trip.

The Picnic
There was a nice turnout of club members for the annual picnic in Kirkwood Park in late July. Members brought great dishes as always. A radio controlled dragonfly/helicopter and hungry but patient geese were a delight to the kids. Thanks go to Rick Poropat and Keri and Tom Lee for taking care of many of the picnic details.

Rock, gem, mineral show at the Machinists Hall
(formally at Queeny, then St. Charles)
We sold more than usual (total to come) ☺ We have cleaned out some of the rocks that we've been hauling around for years. We now need more quality donations. For more expensive pieces, the club could vote to buy some items. Perhaps we can send the awesome bargainer Rich Hagar to Tucson again. We could also buy some pieces from club members. At the end of the show club members helped better organize and pack the fossils for

storage. Hopefully, we can stay better organized in the future. Next time we should dig up a label maker and prettier price tags. I plan to buy some boxes from the Supply Warehouse for showing and selling the fossils.

Announcements:

-Club member **Dr. Bruce Stinchcomb** has turned his fascination with the earliest life on earth into a colorful published book titled **"World's Oldest Fossils**," published by Schiffer Publishing. The book features much of his collection and then some with nice color photographs explaining the Cambrian radiation. Copies will be available for purchase at the September meeting. The author probably won't mind autographs as well. Amazon.com has 4 left in stock as of 9-06-07.

-Keep the articles coming to me (Abby the secretary), or give me research ideas for articles please.

-What's the status of the raffle?

-New dino bones are back from the field. Time to visit the prep lab at the St. Louis Science Center for some cleaning and glueing!

-**Clarence Zacher** continues to write on Teratorns. He gave a talk earlier this year titled **"The Thunder Birds of Native American Legend and Lore"** at the St. Louis Westerners club that was complete with slides. Perhaps the fossil club should ask him to speak with the club? We do need to plan for more speakers, hint, hint…

Member Articles

Paleoecology reconstruction from trapped gases in a fulgurite from the late Pleistocene of the Libyan Desert
Rafael Navarro-González *et al.*, Universidad Nacional Autónoma de México [Inst. of Nucl. Sciences], Mexico City DF 04510, Mexico. Pages 171-174.
by Clarence Zacher

Lightning is a transient atmospheric event with evidence that can be "petrified" when it strikes the ground, heating, melting, and fusing the sand in soils to form glass tubes known as fulgurites. Fulgurites found in the Libyan Desert, the hyperarid core of the Saharan Desert, indicate that the region received rains in the past. The discovery of gases such as carbon dioxide (CO_2), carbon monoxide (CO), and nitric oxide (NO) trapped in glassy bubble of fulgurites has provided clues to the ecological environment at the time of lightning strike. These gases are not of atmospheric origin but rather are derived from the oxidation of organic matter present in the soil. Isotopic analysis of the gases further reveals that the organic matter was produced by plants that adapted to live in hot and arid climates. Today, such vegetation grows in southwestern Niger, about 600 km. south of the site where the fulgurite was recovered. Ratios of elements in fulgurite gases were typical of those in the modern soils of that region. The timing of fulgurite formation was obtained for the first time by thermoluminescence dating, indicating that the event took place 15,000 years ago in the late Pleistocene. The results imply that the semiarid Sahel region, which is currently located at 17°N, reached at least to 24°N at that time. The results also demonstrate that fulgurite gases and luminescence geochronology can be used in quantitative paleoecology.

Abstracted primarily from the Internet, with additions from *Science News*, Feb. 17, 2007, Vol.171, P.101.

My Thoughts on The Burlington Formation and its Crinoid Fossils

by John Stade

Some 320 million years ago, during the Mississippian period, much of Missouri, Illinois, and Iowa was covered by a large, warm, shallow sea. This sea was much like what you would find today around Bermuda or the Florida Keys. The tropical water was clear and shallow and teeming with life. The primary life form was the crinoid. Crinoids are quite uncommon in the ocean today, although they are still occasionally found. Some are found today at the bottom of abyssal trenches, the deepest part of the ocean, but during the Mississippian, crinoids were indicative of a calm, shallow, warm sea.

In addition to crinoids, one of their other echnoderm relatives was also found in abundance—blastoids. Blastoids differ in having a stem no thicker than a pencil lead and hair-like brachioles rather than the arms of a crinoid. Corals, bryozoans, and brachiopods were also fairly abundant' occasionally a trilobite crawled by, or a primitive fish called a bradyodont swam in the water above.*
The crinoid was actually an animal but looked like a plant. They are commonly referred to as sea lilies. The crinoid had a long, flexible stem, sometimes many feet long, and compose of segments occasionally as big as a quarter, but m ore often the size of Cheerios or smaller. The stem was held to the sea floor by a "holdfast" that resembled a plant's root system. At the upper end of the stem was a head bearing a number of arms with feather-like finger that waved in the water causing currents that transported food to the creature's mouths.

In the 320 million years since these crinoids lived, died, and fell to the sea floor, the old sea bottom was covered with many feet of sediments and compressed into limestone. The crinoids were so abundant in this sea that in places that in places this rock unit, named the Burlington, is composed entirely of broken pieces of crinoid stem. While the crinoid stem were being turned into limestone, dissolved silica in the water was being precipitated to form masses of chert. The Burlington chert was highly prized by the Indians for making arrowheads. In addition to the chert, silica sometimes replaced the calcite crinoid (much like silica replaced wood to form petrified wood) and left a chert fossil. Often the silica formed chert within and around the head or stem forming a positive and negative mold. Occasionally these are great fossils because they preserve details not otherwise seen.

As the Ozark dome uplifted, much of the Burlington was exposed at the surface, particularly north and west of the Ozarks. The name Burlington is derived from the city of Burlington, Iowa, where exposures of the formation were first described. In fact, the entire Mississippian period is named for limestones of this age exposed along the Mississippi River. The Burlington formation is exposed at the surface all around the Ozarks, south of Springfield, Missouri, into Arkansas, west into Kansas and Oklahoma, around Columbia in central Missouri, south along the Mississippi to Cap Girardeau, in the bluffs at Alton, Illinois, and northward along the Mississippi to Burlington, Iowa. In some places the exposures are 100 feet thick, and in many places in the Ozarks where the Burlington has been eroded, the residual chert covers the ground.

For fossil hunter, an outstanding Burlington locality is the Atlas Cement Quarry at Hannibal, Missouri. Although the Burlington is made up in some places almost entirely of broken pieces of stem, complete heads are relatively uncommon. However, they do occur in abundance at Hannibal. I wonder if perhaps the primitive sharks, the bradyodonts, with their crusher-type pavement teeth, did not feed on shellfish as has been proposed, but instead may have grazed on crinoid heads. These crusher teeth seem to be designed to crush crinoid heads are you would crush a walnut to get at the meat inside. Perhaps the heavy plates on the *platycrinites* evolved to discourage the bradyodonts, as did the spines on the *cactocrinus* or the horns on the *dorycrinus*. Perhaps the sea around Hannibal was separated from the open ocean by a barrier reef, which kept the grazers out. Or perhaps the crinoids were just so abundant that the fish couldn't get then all. In any event, the heads, and sometimes heads with arms still attached, are found in the Hannibal quarry.

The quarry has been operating at Hannibal for over a hundred years and is absolutely huge. The rock here is ideal for making Portland cement. A thick deposit of high -grade limestone is in direct contact with a thick deposit of shale, the Hannibal shale. These are the two ingredients for Portland cement. The limestone, calcium carbonate ($CaCO_3$), is heated to drive off the carbon dioxide (CO2), leaving calcium oxide (CaO). This is mixed with the shale, which is primarily silicon dioxide (SiO_2). This is Portland cement. When mixed with sand and gravel and the proper amount of water, the calcium oxide (and silicon dioxide react to form a calcium silicate ($CaSiO_3$) mineral. This mineral binds the sand and gravel together to form a "rock" called concrete.

In the Hannibal shale at the bottom of the quarry, many fish teeth can be found. Most of them are extremely small, and it takes a good eye to see them. Perhaps they are so small because they did

not have any juicy crinoids to eat. Crinoids found it difficult to live in the water that laid the Hannibal shale. Shale is compacted mud probably similar to what you would find in the Mississippi delta today. The continued inflowing of mud would have suffocated the crinoids. Something occurred with the transition to the Burlington time so that the mud was no longer being deposited, the water cleared up, and the crinoids flourished. Perhaps the river bringing in the mud moved its mouth as the Mississippi has done in the Louisiana delta. In any event, the crinoids proliferated. The rock in the quarry is composed of an infinite number of crinoid stem segments of several different species. Several other fossil localities have a limited number of species, but the Hannibal quarry has a wide diversity. The entire formation is exposed here, and different species occur in zones. This represents a difference in the dominant species at the time. The Burlington formation can be divided into these zones based on the dominant crinoids present. In the case of a couple of species, slight changes show how they evolved from the bottom to the top of the formation.

As mentioned above, relatively few complete crinoids are found in the Burlington. In fact very few large segments of stem over one or two inches in length are found. This may be due to wave action separating the heads and arms and breaking up the stems. In some other localities complete crinoids are the rule rather than the exception. In these environments a rapid influx of silt into the clear water where the crinoids lived suffocated the crinoids and buried them quickly before they could be broken up and scattered. The seems to be the case with the crinoids in the Warsaw at the I-44 and I-270 intersection by the Chester at Star Landing in Missouri, and at Flora, Hecker, and Anna in Illinois, and in the Girardeau at Cape Rock near Cape Girardeau. In these localities the crinoids are found in inter-bedded shales and limestones.

If most of the fossil collectors in this area were asked to name their half dozen favorite localities, the cement quarry at Hannibal would probably be included on ever list. It is, indeed, a great place to find fossils. However, the rock is quite hard, and there seems to be a natural law that says the better the specimen the larger the rock it is in. the sledgehammer is often necessary, and one bigger than what you have along would be nice. The gasoline-powered saw with masonry blade is often the only way to collect some of the specimens. Occasionally a specimen can be found completely weathered out. We found a beautiful, complete *dorycrinus* head lying completely free in the mud. Usually the best place to look is on a naturally-weathered surface. We were lucky enough to be in the quarry once after the overburden had been stripped away and a few rains had washed away most of the rest of the remaining dirt, but before the actual quarrying had begun. The surface of the rock was just covered with half-exposed crinoid heads and blastoids. They still required some work with a hammer and chisel to remove them. But, this effort is well worthwhile because of the number of fabulous specimens waiting for the next lucky person who happens to stumble by.

*There is a fabulous diorama of a Mississippian sea floor at the St. Louis Science Center. The Burlington formation must have looked much like this when the crinoids were alive.

Membership info

Our treasurer, Pete Smith will accept dues payment for a full year. Dues are $15.00 per household per year and are payable on the anniversary date printed on your newsletter address label. See Pete at the next meeting or mail a check (payable to Eastern Missouri Society for Paleontology) to:

EMSP
P.O. Box 220273
St. Louis, MO. 63122

Can't find your newsletter, just when you need it for a trip? Then sign up for the e-mail version. This also says the club money so we can bring in speakers (once we pick some…) E-mail requests to **motirek@gmail.com**

Meetings are held the 2nd Friday of every month (except July, August, and December) in room 203 of the new Earth & Planetary Sciences Building on the campus of Washington University. The Earth & Planetary Sciences building is on the southwest corner of Hoyt Drive and Forest Park Pkwy. There is a large parking lot just across the street.

What is EMSP?

The Eastern Missouri Society for Paleontology (EMSP) is a 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 life on earth. The club membership includes professional paleontologists as well as amateur hobbyists. The EMSP provides an open forum for the exchange of information and 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 the Earth and Planetary Sciences Buildingon the campus of Washington University. Each meeting includes an informal exchange of information and speakers on a variety of fossil-related topics.

Weather permitting, field trips to fossil collection localities around the St. Louis area are held each month. Led by experienced collectors, these trips are a fun way to augment discussions at the monthly meetings. The club participates in joint field trips with other paleo clubs, visiting fossil sites throughout the United States. EMSP is also a proud to be involved in partnerships with the St. Louis Science Center and the Greater St. Louis Association of Earth Science Clubs, Inc.

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