MEMPHIS ARCHAEOLOGICAL AND GEOLOGICAL SOCIETY

MAGS Rockhound News

Volume 67 ◊ Number 08 ◊ August 2021 ◊ A monthly newsletter for and by the members of MAGS

August Meeting

Mid-Summer Indoor Rock Swap and Picnic

Our August indoor picnic and rock swap is back! Bring those rocks, minerals, fossils, and artifacts to swap or sell. Shoppers—even window-shoppers—are welcome. And bring your friends who have been thinking of joining MAGS.

50 desserts and no main dishes may appeal to some people, but let's get real. In order to have a good variety of all types of food, we're splitting up the alphabet. Find the letter your last name begins with in the following list:

- ✓ A-H: Desserts
- ✓ I-T: Appetizers, Side Dishes, Veggies
- ✓ U-Z: Main Course Dishes

MAGS will provide drinks and door prizes.

Juniors will join the adults. See you there!

In this issue

COLLECTING SAND

MIKE BALDWIN, DIRECTOR (YOUTH PROGRAMS)

If you look closely at the sand on the beach, or along a river or lake, or in the playground or your backyard, you can analyze it and determine what type of rock the sand was before it became sand. So here we go: [01] Collect sand in small amounts (say a heaping teaspoon or tablespoon full). [02] Put the sand from each

location in its own ziplock bag. [03] Seal and label each bag with the day and location it was found. [04] Use a hand-held magnifying glass—or a microscope if you have access to one—to look closely at your sand specimen. [05] Describe your sand in terms of color, roundness, and size of grains. For instance: the color

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MAGS AND FEDERATION NOTES

Memphis Archaeological and Geological Society, Memphis, Tennessee

The objectives of this society shall be as set out in the Charter of Incorporation issued by the State of Tennessee on September 29, 1958, as follows: for the purpose of promoting an active interest in the geological finds and data by scientific methods; to offer possible assistance to any archaeologist or geologist in the general area covered by the work and purposes of this society; to discourage commercialization of archaeology and work to its elimination and to assist in the younger members of the society; to publicize and create further public interest in the archaeological and geological field in the general area of the Mid-South and conduct means of displaying, publishing and conducting public forums for scientific and educational purposes.

MAGS General Membership Meetings and MAGS Youth Meetings are held at 7:00 P. M. on the second Friday of every month, year round. The meetings are held in the Fellowship Hall of Shady Grove Presbyterian Church, 5530 Shady Grove Road, Memphis, Tennessee.

MAGS Website: memphisgeology.org

MAGS Show Website: www.theearthwideopen.com or https://earthwideopen.wixsite.com/rocks

We aren't kidding when we say this is a newsletter for and by the members of MAGS. An article with a byline was written by a MAGS Member, unless explicitly stated otherwise. If there is no byline, the article was written or compiled by the Editor. Please contribute articles or pictures on any subject of interest to rockhounds. If it interests you it probably interests others. The 15th of the month is the deadline for next month's issue. Send material to lybanon@earthlink.net.

All 2021 DMC field trips have been cancelled and rescheduled to 2022. The next MAGS-sponsored trip is currently scheduled for October 2024.

Links to Federation News

- AFMS: www.amfed.org/afms_news.htm
- SFMS: www.amfed.org/sfms/
- DMC: www.amfed.org/sfms/_dmc/dmc.htm

Surprise Visitors

Carol Lybanon

We are enjoying our summer in Venice, Florida. One afternoon I heard a lot of bird noises in our front yard. There were these loud and beautiful birds in one of our trees. Of course I had to take pictures and then we had to look them up.

There was lots of information about these wild Nanday parakeets. There are several groups of these birds living wild in Florida. It is thought these birds escaped from pet shops or were pets that flew away. They come from South America and apparently are doing well in Florida.

Nandays have been banned from being imported into Florida and also into Tennessee (In 1992, Congress passed the federal Wild Bird Conservation Act, banning their import. Tennessee banned Nandays because they're known to travel in large flocks and may be agricultural pests). Farmers are afraid the Nandays will become problems by attacking crops.

They were fun to see and I hope they will come back.

Collecting Sand Continued from P. 1

depends on the color of original rock. A lot of beach sand is gray, because it is tiny grains of granite. Many Florida beach sands are white, due to bits of broken coral. Hawaiian sand is black or green, because it began as volcanic rock. Other black sands may contain a bit of iron (test these with a magnet). Other possibilities are light brown (granite or quartz); yellow (quartz); gold (mica); red (garnet) and pink (feldspar). Playground sand is usually gray (granite)

One collector uses 3x5 index cards to display her sands. She used a large star-punch to make the star-opening in the card, covered the back side of the star opening with clear packing tape, sprinkled sand in the opening and then covered the front of the star

with clear packing tape. It makes a very nice display and reference card.

Editor's Note: *Lori Carter published a series of articles on sand in our July-October 2013 issues. She also gave our September 2015 meeting program.*

REF: *"Discover Nature In The Rocks" by Rebecca Lawton, Diana Lawson and Susan Panttaja.*

President's Message

MAGS Presents a

Mid-Summer Indoor Rock Swap and Picnic

Friday, August 13

Membership Meeting

At the church, same time

Bring food/drinks to eat and share

Bring Rocks to sell, swap, or just to donate to the club

Arrive early to help set-up

Stay late and help clean-up

Games and prizes

MAGS Presents a

Ready for Fall Rock Swap and Sale

Open to members and public

Labor Day, Monday, September 6

10-2 pm

3805 Melanie June Dr., Bartlett, Tennessee

From I-40, north on Whitten/Kirby Whitten, left on St. Elmo's, right on Melanie June.

Rocks and minerals

Fossils, geodes, petrified wood

jewelry, and beads

Packaged snacks and drinks

Bring your own tables and chairs.

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President's Message
Continued from P. 3

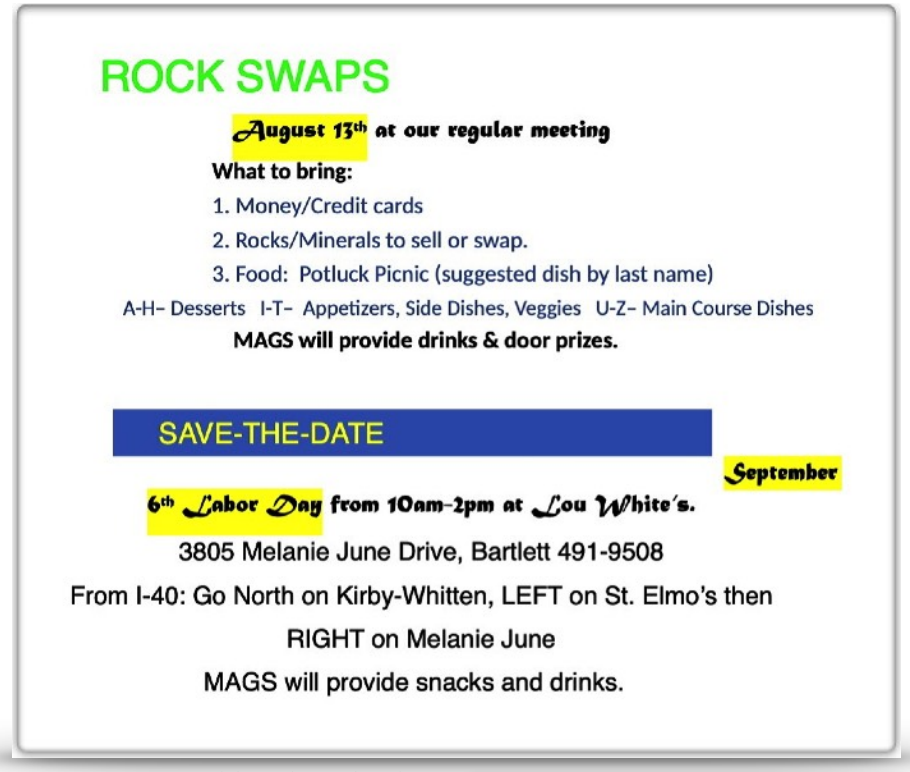
Sell or swap.

Two future events

November 12 and 13
Holiday Show—Memphis Mineral Fossil Jewelry
At Shady Grove

April 23/24, 2022
Memphis Mineral, Fossil, Jewelry Show—Back to the Agricenter

W. C.



Fossilized Tsunami Megaripples

Matthew Lybanon, Editor

Thanks, David Day, for tipping us off to this interesting discovery.

Scientists recognize five major mass extinctions during the Phanerozoic Eon, covering 541 million years from the start of the Cambrian Period to the present. The most recent one was at the Cretaceous-Paleogene (K-Pg) boundary, 66.04 million years ago. It is thought to be due to a large asteroid that struck the Yucatán Peninsula offshore near the present-day communities of Chicxulub Puerto and Chicxulub Pueblo, after which the crater is named.

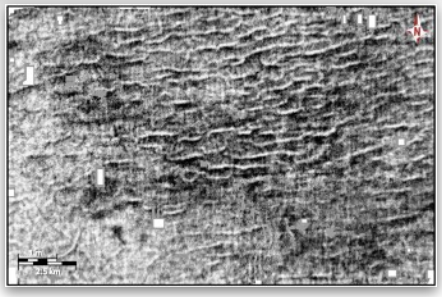
There is substantial evidence that the cause of the mass extinction that, famously, wiped out the dinosaurs, was this impact.Now researchers have discovered enormous ripples, engraved by the tsunami resulting from the impact, in sediments 1,500m below what is now central Louisiana.

"The water was so deep that once the tsunami had quit, regular storm waves couldn't disturb what was down there," according to University of Louisiana geoscientist Gary Kinsland.

So there the imprint of the tsunami ripples remained, coated with a fine layer of air-fall debris previously chemically linked back to the asteroid crater in the Gulf of Mexico, near the Yucatán Peninsula. The megaripples were eventually preserved beneath deep water shale during the Paleocene epoch that followed.

Previous modeling of this monstrous tsunami suggests its waves would have reached a staggering 1,500m high (nearly a mile) after the megaearthquake triggered by the collision, greater than 11 on the Richter scale.

"Tsunami continued for hours to days as they reflected multiple times within the Gulf of Mexico while diminishing in amplitude,"



the team wrote (see reference below). What carved out the ripples we can still detect today were the forces from the massive walls of water smashing into the shallow shelf near the shores, and reflecting back towards their source.

How did Kinsland and his co-authors find the megaripples? They did it by analyzing seismic imaging data for central Louisiana, gained from a fossil fuel company. They determined the imprinted ripple crests form a straight line right back to the Chicxulub crater and their orientation is consistent with the impact.

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Fossilized Tsunami Megaripples
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"These megaripple features have average wavelengths of 600 meters and average wave heights of 16 meters making them the largest ripples documented on Earth," the team wrote.

While the waves would have wrought devastation for thousands of miles, it was the global effects of climate-disrupting atmospheric changes from the impact that wiped out so many species, abruptly ending the Mesozoic. The team suspects more evidence of these post-collision tsunami ripples exists within seismic data around the Gulf of Mexico.

Ref: *Gary L. Kinsland, Kaare Egedahl, Martell Albert Strong, Robert Ivy, Chicxulub impact tsunami megaripples in the subsurface of Louisiana: Imaged in petroleum industry seismic data, Earth and Planetary Science Letters, Volume 570, 2021, 117063, ISSN 0012-821X, https://doi.org/10.1016/j.epsl.2021.117063.*

Fabulous Tennessee Fossils

Dr. Michael A. Gibson,
University of Tennessee at Martin

FTF 79

Jack's Trace Fossil

Jack Garrett, who is one of our UT Martin Coon Creek Science Center interns and a senior geology major with career plans in paleontology, came across a great fossil specimen a few weeks back. He and I were aiding geologists from Michigan and Indiana who were visiting the west-central Tennessee region under contract with the U .S. Geological Survey to look at old phosphate locations as part of an inventory project. The U. S. G. S.'s interest is actually not the phosphate, but on the rare earth elements (REE) associated with phosphate. The U. S. currently has no open mining for REE, even though they are critical in electronics, such as your cell phone; we import 100% of our REE. So, it was during those investigations that we came across a piece of "float" rock at the base of a roadcut. It was a broken piece of fine-grained, slightly wavy-bedded sandstone that had a pair of a very well-defined trace fossils with distinct morphology. Being familiar with the formations of the area, I realized that this trace had not been reported from these formations; however, it was of a type that is distinctive for reconstruction environments of deposition. My reason for introducing that trace fossil at this point in my written series on biotic interactions is to (1) share this commonly found trace with you so that you can also look for them and (2) to clarify the role trace fossils serve in biotic interactions analysis.

Trace fossils, also called ichnofossils, are a type of fossil represented by burrows, borings, bite marks, scratches, tracks and trails, footprints, etc. These are not actual "body fossils" (i. e., not teeth, bone, shell, tissue, etc.), rather they are "biogenic" sedimentary structures produced by organisms and represent behavior of an organism. This is where trace fossils fit into our ongoing look at biotic interactions as many of the biotic interactions that we have been looking at are represented by trace fossils (e.g., predation marks). All trace fossils represent behavior, but not all behaviors represent biotic interactions...at least not interactions with other organisms. Some behavioral interactions are with the surrounding environment, especially the sediment substrate for marine organisms living in and on the seafloor. "Biogenic sedimentary structures" preserve many behaviors due to interactions between the organism and the immediate environment and can include movement, grazing, resting, foraging, escaping, sleeping, digging, dying, and many more behaviors of the trace maker with the substrate.

Which brings me back to Jack's fossil. In figure 1, you can see a bedding plan surface of the sandstone that contains two very regular patterns. The patterns are nearly identical in form and size (1.3 cm in width), show a bilateral morphology consisting of "lobes" (2-3 mm in width) in a parallel to slightly alternating pattern along the bilateral axis, and have two clear "tubes" that run parallel near

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Fabulous Tennessee Fossils Continued from P. 5 the center of the bilateral axis. Some of the lobes appear to be at an angle to the central axis. The rock, lobes, and tubes are all composed on a quartz sandstone that is similar to the rest of the rock; however, the grainsize of the lobe sand is slightly larger. There is also a light gray clay that surrounds the lobes and infills the central area between the two parallel tubes. This clay is probably from the mud layer that was immediately on top of the sand bed itself and may have the actual layer being exploited by the burrowing organism. High-power microscope study of the lobes shows that there is an internal pattern to that sand that consists of a slight twisting pattern. In cross-section, the trace has a curved bilateral morphology that extends down into the rock approximately 1-3 millimeters. While we are focusing on these two more conspicuous traces for this essay, the rock does contain many other much smaller traces that are narrow "pin-prick" shapes and short "scratches".

After searching the published literature and comparing hundreds of photographs of identified traces and trace fossil taxa, we have tentatively nailed our trace down to a variety of the trace fossil *Nereites*. Notice that this is a genus name and a formal Linnaean taxonomic term. Trace fossils are behaviors produced by an organism (which has its on Linnaean name), but we treat them like organisms in that they get genus and species names just like the animal. This means that for every trace, there can be more than Linnaean name associated with it (the organism that makes the trace and the trace name). *Nereites* is usually a long, meandering to patterned trace that occurs along bedding planes and is generally excavated in muddy sediments after deposition events. There is even an entire "facies" named after it. It is usually associated with movement by various marine worms or arthropods (hence the bilateral nature) and often found in sediments that accumulated in deeper water environments below wave and storm activity. When they occur in a regular pattern, this behavior is thought to be an organizing feeding behavior like grazing. These environments are often where mud and sand interbed in pulses of sedimentation. The *Nereites*-producing animal is moving through the mud to feed or just locomote and produces this distinctive trace pattern. Jack and I will be spending another day or so at the site to locate the actual bed that this rock weathered out of. We fully expect to find entire bedding planes with this and other traces more extensively. With luck, there will be enough information that we will be able to add more understanding to the ancient environment of deposition for these rock units. Let us know if you have these trace fossils in your collection.

Nereites does represent a behavioral interaction between an organism and the substrate in the environment that the *Nereites*-producing organism lived. It is an important part of the overall branch of paleontology we call paleoecology and also includes what we have been calling taphonomy. However, the *Nereites* trace fossil is not preserving a true "biotic interaction" like the ones we have been discussing in the past few essays. Terms such as symbiosis, commensalism, predation, parasitism, etc. do not apply to these traces as those are biotic interaction terms. Biogenic sedimentary traces reflecting interactions with the environment use behavioral terms like walking, resting, hiding, foraging, grazing, burrowing, swimming, jumping, etc.

Figure 1. *Nereites* trace fossil collected by Jack Garrett from west-middle Tennessee between Savannah and Waynesboro (Photo by MAG, no scale—trace is 1.2 centimeters wide).

Wildacres Workshops

Each year SFMS holds Federation Workshop Weeks at the Wildacres Retreat, a privately owned conference center nestled in the North Carolina mountains near Little Switzerland. Most are filled, but there are still a few vacancies in Wire Wrap, Filigree, and Special Projects in August, and Gem Trees, Leather Gem ID, Electro-etching, and Inlay in September. Interested MAGSters can get more details on these classes, the instructors, and up-to-date information on vacancies, at sfmsworkshops.org.

Digging the Past

August 28th, 10:00 a.m. to 4:00 p.m.

A Celebration of Fossils, Geology and Archaeology at the Falls of the Ohio State Park,
201 W. Riverside Dr. Clarksville, IN 47129

Co-sponsored by Irving Materials, Inc. (IMI), Indiana Geological & Water Survey, the Mineral and Fossil Interest Club, and Indiana Division of Historic Preservation and Archaeology

Combining the best of archaeology and paleontology while giving kids and adults alike a unique, hands-on experience of both sciences.

Over 250 tons of fossil collecting piles! Water to clean your finds.
10 to 3 hourly fossil bed hikes
Mock archaeology dig & Garbagology activity
Arts and crafts / Make and takes
Rock, fossil and artifact identification
Indiana Geological Survey activities & IMI Make a fossil activity
Discounted adult admission into the interpretive Center all day!
Groups welcome (RSVP encouraged)

Dig Geology!

Hands-on Archaeology!

Debut Novel

MAGS Rockhound News does not carry advertising, and that's not what this is. Alan Goldstein is a long-time park interpretive naturalist at the Falls of the Ohio State Park in Clarksville, Indiana, and an occasional contributor to this newsletter. If you've ever been to one of the mineral shows at the Ben E. Clement Mineral Museum in Marion, Kentucky, you may have met him there.

Alan let us know about his debut novel, which came out in June. It's a fantasy novel for upper elementary kids, but is for anyone who enjoys fun stories. The title is *The Dragon in My Back Yard*.

If you have grandchildren or nieces & nephews who enjoy reading, or you just think you might be interested, consider getting a copy —e-book or paperback—from Amazon. Alan offered to sell the books directly to MAGS Members and/or sign copies on request.

Here is the Amazon link: https://www.amazon.com/dp/B0974766S1/ref=sr_1_1?dchild=1&keywords=Alan+Goldstein&qid=1623522877&s=digital-text&sr=1-1.

And here is Alan's contact information, so you can get directly in touch with him:

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Clarksville IN 47129-3148
(812) 280-9970 (work)
agoldstein@dnr.in.gov (work)
deepskyspy@outlook.com (personal)

Summer Junior Reading

Thanks, Jane Coop, for these two reviews of books for junior fossil hunters.

Titanosaur: Discovering the World's Largest Dinosaur by Dr. José Luis Carballido and Dr. Diego Pol, Illustrated by Florencia Gigena; Scholastic, 2019; 40 pages

When a gaucho, or Argentine cowboy, sees a dinosaur display in a Patagonia museum, he tells the person at the front desk that his sheepdog has unearthed a bone just like those on display, "but *much* bigger." The museum's two paleontologists rush over and leave with him to investigate. Their excitement grows as they find first one enormous bone, and then another, and another. Soon, the paleontologists lead a twenty-person expedition that digs out more than one hundred bones from seven different dinosaurs. Ultimately, they uncover a full skeleton of the largest dinosaur ever found, a titanosaur that when alive weighed 70 tons. Buried for 120 million

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Summer Junior Reading Continued from P. 7

years, each bone is larger than an adult male. This fascinating story and informative sidebars make this book both educational and inspiring for future Indiana Joneses.

The World of Dinosaurs: *An Illustrated Tour* by Mark A. Norell;The University of Chicago Press, 2019, 256 pages

Filled with fresh information and eye-catching graphics. Mark Norell's book guides the reader, like a birding handbook, through the two great dinosaur halls at the American Museum of Natural History in New York City. But rather than just giving vital statistics on coloration or behavior—characteristics uncertain for long-dead creatures—it focuses on the discovery history of each significant fossil and its place on thje evolutionary timeline. Remains of *Coelophysus bauri*, unearthed in New Mexico in the 1880s, are shown along with a reconstructed portrait of the scaly "snake-necked carnivore" with a small reptile dangling from its mouth. The creature's hollow boned gave scientists the first indications that dinosaurs were the ancestors of modern birds. *Brontosaurus* and *Triceratops*, are included, of course, but confirmed dinophiles will revel in many less-familiar species that get equal time, from "frilled" *Dilophosaurus wetherilli* to *Corythosaurus causarius*, which wore a hollow bony crest, "reminiscent of a Corinthian battle-helmet."

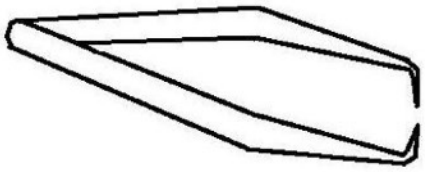
Jewelry Bench Tips by *Brad Smith*

FIND THE BALANCE POINT

With odd-shaped pendants or earrings it's often difficult to find the right place to attach a bail or loop so that the piece is balanced and hangs straight.

A quick way to make a tool for this is to modify a set of tweezers. Any set of tweezers will work. Spread the tips, sharpen them with a file, and bend the tips at a right angle to point towards each other.

To use the tool, suspend the pendant or earring between two sharp points to see how it will hang.



DRILL BREAKAGE

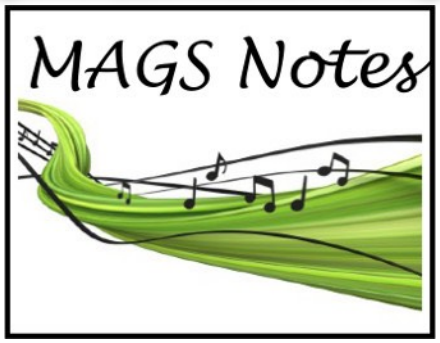
Using a small drill is difficult for a beginner, especially if it is hand held in a flexshaft or Dremel. They are easily broken if you push too hard or if you tilt the drill while it's in the hole.

Most problems, however, are the result of buying cheap drills that suffer from poor quality steel and/or inaccurately ground cutting edges. A good drill from jewelry supply companies is well worth the price.

Remember that drilling always goes easier with lubrication. A little wax or oil is all you need. Almost anything will work—3-IN-ONE, beeswax, mineral oil, injection wax, car oil, olive oil, or one of the commercial cutting waxes. The lubricant helps to move chips out of the hole and reduces friction of the drill against the side of the hole, keeping the drill cooler.

Smart Solutions for Your Jewelry Making Problems

amazon.com/author/bradfordsmith



🎵 Adult Programs

Current plans are for all Membership Meetings to held in person and at the church.

August 13: Indoor Rock Swap

September & October: TBD

🎵 Junior Programs

All programs presented by Mike Baldwin unless specified otherwise.

August 13: Indoor Rock Swap

September 10: "Native American Arrowheads and Points

October 8: "Fluorescent Minerals and How They Work"

🎵 Field Trips

Field trips are paused for August.

September & October: TBD

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MAGS Notes
Continued from P. 8

🎵August Birthdays

3	Mike Coulson
	Jane Brandon
5	Cate Cloer
12	Ron Brister
	David Murray
	Eli Dessinger
	Hendrix Dessinger
13	George Krasle
14	Rommel Childress
16	George Loud
	Lititia Brister
17	Sophia Coulson
	Christine Lemons
19	Heidi Kitkowski
23	Stephanie Blandin
25	Lenora Murray
28	Beth Day
	Susan Cohn

🎵New Members

Ellison Ann Loftis-Jones

Christopher (Chris) Stahl

🎵Want to Be a Member?

To become a MAGS Member, just go to our website at www.memphisgeology.org and print out an application form. There is a prorated fee schedule for new Members only. Mail the completed application along with the dues payment to the Membership Director shown on the form. If you are unable to print the application, you can pick one up at the sign-in desk at any of our Friday night Membership Meetings, or simply join at the meeting. Visitors are always welcome at our Membership Meetings but membership is required to attend our field trips.

The most important benefit of being a MAGS Member is getting to know and make friends with other members who have similar interest in rocks, minerals, fossils, and archaeology. All new Members will receive a New Member Packet, a MAGS ID card, and a monthly newsletter via email. Members are entitled to go on our monthly field trips and get free admission to our annual Show.

Ancient Carb Revolution

Matthew Lybanon, Editor

Editor's note: *"What Does the Fox Say?", in our June 2017 issue, also presents some archaeological evidence from Göbekli Tepe.*

"The old-fashioned idea that hunter-gatherers didn't eat starch is nonsense." So says Dorian Fuller, an archaeobotanist at University College London. Recent research supports this.

In May, Christina Warinner, a palaeogeneticist at Harvard, and her colleagues, reported the extraction of bacterial DNA from the dental plaque of Neanderthals, including a 100,000-year-old individual from what is now Serbia. The species they found included some that specialized in breaking down starch into sugars, supporting the idea that Neanderthals had already adapted to a plant-rich diet. Plaque on the teeth of early modern humans shared a similar bacterial profile, providing more evidence to suggest that they were eating starchy plants.

The finds push back against the idea that our ancestors spent their time sitting around campfires chewing on mammoth steaks. It's an idea that has penetrated popular culture, with proponents of the paleo diet arguing that grains, potatoes, and other starchy foods have no place on our plates because our hunter-gatherer ancestors didn't evolve to eat them.

But it has become clear that early humans were cooking and eating carbs almost as soon as they could light fires.Researchers such as Laura Dietrich at the German Archaeological Institute has discovered that the people who built the ancient structures at Göbekli Tepe (an 11,600-year-old mountaintop archaeological site in southern Turkey) were fueled by vat-fulls of porridge and stew, made from grain that the ancient residents had ground and processed on an almost industrial scale. The clues from Göbekli Tepe reveal that ancient humans relied on grains much earlier than was previously thought—even before there is evidence that these plants were domesticated. And Dietrich's work is part of a growing movement to take a closer look at the role that grains and other starches had in the diet of people in the past.

The reference below details the body of research that supports the claims that our ancestors ate what researcher Soultana Valamoti of Aristotle University of Thessaloniki in Greece calls "the fast food of the past."

Ref: *Andrew Curry, How ancient people fell in love with bread, beer and other carbs, Nature* ***594****, 488-491 (2021), doi: https://doi.org/10.1038/d41586-021-01681-w*

June Board Minutes

Mike Coulson

Zoom meeting called to order at 6:30. Present: W.C. McDaniel, Bonnie Cooper, Bob Cooper, Dave Clarke, James Butchko, Nannett McDougal-Dykes, Mike Coulson, Melissa Koontz.

Old Business:

- The rock swap was very successful. We had a large crowd, 30-40f tables, and a good visitor from California attended. Thanks Jane Coop and Lou White for organizing.
- The church pastor says they don't need to go through the session for a show approval. Don't know how much they will charge.
- David Liles wrote in regard to show insurance refunds, said he has not heard anything on when the refunds will happen. Treasurer Barbi Beatty will write the checks.

New Business: News pending from the church on a fall show and its cost.

Show: Need to start thinking about a show at Agricenter for spring 2022.

Secretary: May minutes distributed via email to Board and summarized at meeting. Minutes approved.

Treasurer:

- Discussion over cost of facilities over past few months since COVID has reduced usage. W.C. suggests we return to a normal schedule for paying church the hourly rental long as conditions warrant; one check to cover April-September.
- One deposit made to club's account and two checks written for Ethernet and mailing supplies.
- Interest was posted on the CDs, strong balance in account.

Membership: One new Member. Bob will print and mail the June newsletter tomorrow.

Field Trips: Club had a good trip to Blue Springs and Frankstown with about 15 people attending. June 19 Field Trip to Hot Springs planned, for crystal collecting. The club will go to Coleman's Mine on Saturday and Wegner's Mine on Sunday. (trip postponed till fall). Future outings to be announced, including your of the Pink Palace and behind the scenes tour of the collection.

Adult Programs: Combination of live presentation and zoom worked well at May meeting. Opens up opportunities for presenters and Members who still have concerns over COVID. Dave is contacting James Johnson for a speaking spot. James is known by many and has led the club on several outings in Missouri. Schedule: June–Julie Morrow (ASU), The Greenbrier Site. July–Paul Edson-Lahm, Geology of the Portland Basin (Zoom). August–Indoor rock swap. September–Paul Brinkman, T-Rex Sue (at Field Museum) Later programs in the works. Dave will contact Luke Ramsey (Pink Palace) about a talk.

Junior Programs: Mike is on vacation so Junior Program will be folded into the adult program. Melissa will prepare a future program for the kids in Mike's absence.

Library: Many books returned to library at Membership Meeting, 22 new books and 9 new children's books added.

Rock Swaps: August: Indoor rock swap (tentative).

Editor: June Newsletter is out. Please send reports, articles, pics, recipes, book reviews, anything you can think of to Matthew for possible inclusion in the newsletter.

Web: Web site will be updated for June following this Board Meeting.

Adjourned 7:15.

June Meeting Minutes

Mike Coulson

Meeting began at 6:00 pm.

Presentation: Julie Morrow from Arkansas State University gave presentation on The Greenbrier Site (3IN1), summarizing past research on an exceptionally well-preserved Mississippian town in the White River Valley, including results of research geo-physical survey at the site.

Field Trip: Signup sheet and info on the June 19 trip to Coleman and Wegner Mine in Hot Springs were available. A fee will be charged for access to the mines. (Trip postponed till the fall.)

How Big Were Megalodons?

Matthew Lybanon, Editor

It's no surprise to MAGSters that amateurs have made some important contributions in our fields of interest. But would you be surprised to learn of a case where the amateurs were high school students?

It started when Victor Perez, then a doctoral student at the Florida Museum of Natural History (at the University of Florida in Gainesville), was guiding students through a math exercise that used 3D-printed replicas of fossil teeth from a real megalodon, and a set of commonly used equations based on tooth height, to estimate the shark's size.

The only known remains of megalodons are fossilized teeth and a few rare vertebrae. The most accepted methods for estimating the length of megalodons have used great white sharks as a modern proxy, relying on the relationship between tooth size to total body length. While great whites and megalodons belong to different families, they share similar predatory lifestyles and broad, triangular, serrated teeth.

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How Big Were Megalodons?
Continued from P. 10

But the size estimation methods present a challenge: To generate body length estimates, they require the researcher to correctly identify a fossil tooth's former position in the jaw. As in humans, the size and shape of shark teeth vary depending on where they're located in the mouth, and megalodon teeth are most often found as standalone fossils.

So, Perez (now the assistant curator of paleontology at the Calvert Marine Museum in Maryland) was ecstatic when fossil collector Gordon Hubbell donated a nearly complete set of teeth from the same megalodon shark to the Florida Museum in 2015, reducing the guesswork. Perez was also able to obtain three other similar sets of teeth to study.

The usual method for estimating shark size was: Match the tooth to its position in the shark jaw, measure the tooth from the tip of the crown to the line where root and crown meet ,and plug the number into an equation.

Perez collaborated with teacher Megan Higbee Hendrickson on a plan to incorporate them into her middle school curriculum at the Academy of the Holy Names school in Tampa.

"We decided to have the kids 3D-print the teeth, determine the size of the shark, and build a replica of its jaw for our art show," Hendrickson said.

After a successful pilot test of a few teeth with Hendrickson's students, Perez expanded the lesson plan to include the whole set of megalodon teeth, for high school students at Delta Charter High School in Aptos, California. Perez expected a slight variability of a couple millimeters in their results, but this time variations in students' estimates shot to more than 100 feet. The farther a tooth position was from the front of the jaw, the larger the size estimate.

"I was going around, checking, like, did you use the wrong equation? Did you forget to convert your units?" said Perez. "But it very quickly became clear that it was not the students who had made the error. It was simply that the equations were not as accurate as we had predicted."

After Perez detailed the lesson's results in a fossil community newsletter, he received an email from Teddy Badaut, an avocational paleontologist (amateur!) in France. Badaut suggested a different approach. Why not measure tooth width instead of height? Previous research had suggested tooth width was limited by the size of a shark's jaw, which would be proportional to its body length.

Ronny Maik Leder, then a postdoctoral researcher at the Florida Museum, worked with Perez to develop new equations based on tooth width. The researchers analyzed sets of fossil teeth from 11 individual sharks, representing five species, including megalodon, its close relatives and modern great white sharks.

By measuring the combined width of each tooth in a row, they developed a model for how wide an individual tooth was in relation to the jaw for a given species. Now when a paleontologist unearths a lone megalodon tooth the size of their hand, they can compare its width to the average obtained in the study and get an accurate estimate of how big the shark was.

Earlier studies had ball-parked the massive predator at about 50 to 60 feet long. The new, more reliable way of estimating the megalodon's size shows they may have gotten up to 65 feet long.

Perez cautioned that because individual sharks vary in size, the team's methods still have a range of error of about 10 feet when applied to the largest individuals. It's also unclear exactly how wide megalodon's jaw was and difficult to guess based on teeth alone—some shark species have gaps between each tooth while the teeth in other species overlap.

"Even though this potentially advances our understanding, we haven't really settled the question of how big megalodon was. There's still more that could be done, but that would probably require finding a complete skeleton at this point," he said.

Refs: *Perez, Victor J., Leder, Ronny M., and Badaut, Teddy. 2021. Body length estimation of Neogene macrophagous lamniform sharks (Carcharodon and Otodus) derived from associated fossil dentitions. Palaeontologia Electronica, 24(1):a09. https://doi.org/10.26879/1140*

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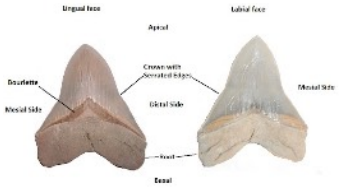

MAGS At A Glance

August 2021

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
1	2	3	4	5 Zoom Board Meeting, 6:30 pm	6	7
8	9	10	11	12	13 Membership Meeting, 7:00 pm, Mid-Summer Indoor Rock Swap and Picnic	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31	1	2	3	4

Mark your calendars for the Ready for Fall Rock Swap and Sale at Lou White's house on Labor Day, Monday, September 6, 10:00 am-2:00 pm.

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