MEMPHIS ARCHAEOLOGICAL AND GEOLOGICAL SOCIETY

MAGS Rockhound News

Volume 70 ◊ Number 05 ◊ Mary 2024 ◊ A monthly newsletter for and by the members of MAGS

The Crystalline Chronicles

Igneous and Metamorphic Rocks *Julie Johnson, U. Memphis*

Most igneous and metamorphic rocks have crystalline textures consisting of minerals that have grown together in an interlocking pattern, similar to the way puzzle pieces fit together. Mineralogy describes the identity of the minerals in rocks, while petrology is the study of how the rocks formed.

Igneous mineralogy and petrology focuses on rocks that form from the solidification of magma and lava. The rocks are classified based on their mineral composition, texture, and the conditions under

Continued, P. 3

In this issue

LYDIA NEW DOES IT AGAIN

MAGS Member Lydia New found the 3.5" drill/perforator shown in the photos on P. 3 in a creek in DeSoto County, Mississippi in April 2024. She is either a professional with a very clever disguise, or a young person with a **really** good eye for Native American artifacts.

David New, who sent the photos to *MAGS Rockhound News*, should be very proud . She's made yet another extraordinary find.

Drills might have been used for wood or other materials that required a bow and some endurance to create holes, while perforators would often be used by hand for thinner or softer materials like hides.

Photos, P. 3

2024 MAGS BOARD

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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 Membership Meetings are at 7:00 P. M. on the second Friday of each month May-October, and 10:00 A.M. on Saturday after the second Friday November-April. The meetings are held in the Fellowship Hall of Shady Grove Presbyterian Church, 5530 Shady Grove Road, Memphis, Tennessee.

MAGS Website: memphisgeology.com

MAGS Show Website: https://earthwideopen.wixsite.com/rocks

Memphis Archaeological and Geological Society

Find us on Facebook. The Memphis Archaeological And Geological Society Page is where you will see accurate information about MAGS events and about the Memphis Mineral, Fossil, Jewelry Show.

Please contribute articles or pictures on any subject of interest to rockhounds. The 20th of the month is the deadline for next month's issue. Send material to mlybanon@yahoo.com.

Go to https://www.southeastfed.org/sfms-field-trips/dmc-field-trip-program for the DMC field trip schedule and other information.

Links to Federation News

- AFMS: www.amfed.org/afms_news.htm
- SFMS: https://www.southeastfed.org/

The Crystalline Chronicles which
Continued from P. 1
they formed. Common igneous minerals include quartz, feldspars, micas, olivine, and others. The texture of igneous rocks can vary widely, from fine-grained (like basalt) to coarse-grained (like granite), depending on the cooling rate of the molten material.

Metamorphic mineralogy and petrology, on the other hand, deals with rocks that have undergone changes in mineralogy and texture due to increased heat, pressure, and/or chemically reactive fluids within the Earth's crust. Common minerals include quartz, feldspars, micas, garnet, and amphibole. Metamorphic rocks are classified based on their texture, mineralogy, and the degree of metamorphism they have undergone, ranging from low-grade (such as slate) to high-grade (such as gneiss).

This presentation will review mineralogy and petrology basics for igneous and metamorphic rocks, and introduce more nuanced topics about how the composition of a rock is intertwined with its formation, all of which are critical for accurate classification. We will also explore mineral assemblages that are not as common in igneous and metamorphic rocks.

Library Report

Nannett McDougal-Dykes, Librarian

The Telling of the World
Edited by W.S. Penn

These stories are richly illustrated with art - paintings, sculpture, drawings—created by modern Native American artists, and historically significant artifacts. Their work showcases the enduring spirit of Native American peoples who have found ways to survive and to continue telling their stories, revealing who they are for future generations. Words recounted by respected storytellers reveal a unique approach to the world, as well as a desire to pass along the knowledge necessary to lead a good life.

The art work shown in this book is amazing, and the stories and tales are truly a treasure. This is a coffee table book and will take a little time to read, but is well worth it.

Lydia New Does It Again—Photos

Cold Case—Revisited

Matthew Lybanon, Editor

The March issue reported that the Tennessee Bureau of Investigation (TBI) reopened the investigation into the 1967 shooting death of Pauline Pusser, wife of former McNairy County sheriff Buford Pusser (made famous by the movie *Walking Tall*). No autopsy had been performed at the time.

On February 8, 2024, authorities exhumed her body. On April 8 the TBI confirmed the remains were reinterred over the weekend. The TBI stated that the investigation remains active and ongoing. They did not release any more details.

Shirley Ruth Chrisman

We're sorry to tell you of the loss of one of our Lifetime Members. Shirley Ruth Chrisman, age 89, passed away peacefully on Friday, March 22, 2024, at her home in Prescott, Arizona.

Shirley was born in Memphis on November 23, 1934. She and her late husband Clyde (Chris) Chrisman were a military family with five children. They returned to Memphis after several military postings. They spent their final years together in Winterset, Iowa. Shirley spent her final years in Prescott, Arizona.

In lieu of flowers, memorial contributions may be made to Friends of the Winterset Public Library, or a local library of your choosing.

Fire

Matthew Lybanon, Editor

Iceland is no stranger to volcanoes. It is one of the most volcanically active places in the world. The country is positioned above a geological hotspot, where plumes of hot material deep within the Earth rise towards the surface. But Iceland also sits on the boundary between the Eurasian and North America tectonic plates. These plates are very slowly pulling apart from each other, creating a space for magma to flow up. As the magma builds up underground, the pressure increases until it breaks through the surface in an eruption (at this point the hot rock is called lava).

The Reykjanes peninsula in southwest Iceland is where Reykjavik, Iceland's capital and largest city, is located. The last time the Reykjanes peninsula saw any lava flow was hundreds of years ago. It may have started as early as the 8th or 9th century and continued until 1240. Now the eruptions

have started again—but why has there been an 800-year gap?

The Reykjanes region has now had six eruptions in three years. The first eruption in Mt. Fagradalsfjall started on March 19th, 2021, after an increased seismic activity on the Reykjanes peninsula for over a year, dating back to January 2020. The eruption was steady in the valley of Geldingadalir for about 6 months, and was officially declared over in December 2021 after being quiet since September.

An eruption started again in Mt. Fagradalsfjall, in the valley of Meradalir on August 3rd, 2022. The fissures opened only 1 km north of the previous eruption site. The eruption lasted up to 3 weeks. The third eruption in three years started on the 10th of July 2023 at 16:40 and lasted about four weeks.

Another sequence of eruptions started at 11 pm on the 18th of December, 2023. This event was a bit different from the previous ones as it was developing closer to the town of Grindavík. There have been two more eruptions in the same location since then.

Several types of gases are released during a volcanic eruption, including sulfur dioxide. Copernicus Atmosphere Monitoring Service (CAMS), the European Union's climate change monitoring service, predicted that SO_2 emissions from the latest eruption were so vast that they would reach continental Europe, as far as Russia. The plume moved east from the North Atlantic across Ireland and the UK, reaching Scandinavia and travelling across the Baltic, reaching the Baltic States, Poland, and northwestern Russia.

Is Iceland entering a new vol-

Continued, P. 5

Fire

Continued from P. 4

canic era? "Over geological time, the tectonic plates are pulling apart at about the speed that your fingernails grow, so a few centimeters a year," explains Prof Tamsin Mather, an Earth scientist from the University of Oxford. "But they don't seem to smoothly pull apart—they go through these pulses of higher activity. And this is likely what we're seeing right now in the Reykjanes."

The rocks in the region show a pattern of periods of quiet lasting around 1,000 years—followed by eruptions that continue for a few centuries. "There's evidence for about three of these types of episodes in the last 4,000 years in this area" Prof Mather explains.

So this remarkable episode of volcanic activity, affecting other countries, may be normal—for Iceland. Scientists think this is just the start of a period of volcanic activity that could last for decades or even centuries. CAMS Director Laurence Rouil said that sulfur dioxide can impact air quality as well as the amount of ozone in the stratosphere, but that so far gases emitted from Iceland's latest eruption "have not yet been so severe." CAMS Senior Scientist Mark Parrington added that scientists don't expect the emissions to have an impact on surface air quality or climate. But they're keeping an eye on possible future emissions.

Fabulous Tennessee Fossils

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

FTF 110

Fishing in the Cretaceous

Spring weather is here and it is now time to do some fishing—fossil fishing, that is. No fishing poles are used in fossil fishing. Fossil fish are "caught" by digging sediment and picking through it looking for bone, scales, and teeth. When we think of the Cretaceous Coon Creek Formation, we normally visualize the numerous perfectly preserved invertebrates so easily extracted from the sandy clay sediment, such as our State Fossil *Pterotrigonia*, or *Crassatella*, or *Turritella*, and so many more. We might think of the extinct swimming reptiles, such as the mosasaur *Prognathodon*, plesiosaurs, or perhaps the turtle *Toxochelys*. A productive ocean such as that of the Coon Creek Formation should also abound in fish, but fish remains are not as well represented in the fossil record of the Coon Creek Formation. The occasional isolated fish vertebrae can be found, but are usually very small in size (less than 2 centimeters) and difficult to identify to taxon. Teeth, if the fish was a "toothy" fish, are nearly invisible due to their very small size as well. Despite this poor fossil record of boney fish material, we know that the Coon Creek Formation abounded with fish.

The most prolific evidence of fish in the Coon Creek Formation is in the form of the ear bones of the fish, which are called otoliths. Otoliths are made of $CaCO_3$ (calcium carbonate), just like the abundant invertebrate shells pristinely fossilized in the Coon Creek Formation. They are part of the inner ear of fish that allowed the fish to detect vibrations in the water (a form of hearing). Otoliths also functioned to provide balance to fish for swimming orientation. Because they grow "holoperipherally" (adding a new layer around the old in all directions), they can preserve a remarkable record of chemical conditions throughout the lifetime of the fish. As a fish ages, new layers of $CaCO_3$ are added to the otolith which also includes trace elements that are clues to the chemistry of the seawater in which the fish is living. University of Louisiana paleontologist Gary Stringer conducted an extensive otolith study on the Coon Creek Formation in 2016 and noted ten taxa of fish that included bonefish, conger eel, sea catfish, greeneyes, roughies, cardinal fish, and sweepers.

There is one conspicuous Cretaceous fish that is relatively abundant in the Coon Creek Formation and that is often preserved partially intact, at least the jaws are. This fish is *Enchodus ferox*, commonly called the "sabre-tooth herring", referring to the large fangs that protruded from its mouth indicating

Continued, P. 6

Fabulous Tennessee Fossils
Continued from P. 5

its predatory nature. The great University of Pennsylvania vertebrate paleontologist Joseph Leidy (1823-1891), who was also at Swarthmore College and the director of the Wagner Free Institute of Science, first described *E. ferox* in 1885. The genus was updated in 2007 by Jason P. Schein and Ron Lewis, both of Auburn University. In 2013, Schein and several others described a nearly perfectly complete specimen of *Enchodus ferox* skull from the Ripley Formation in Alabama (which is correlative with the Coon Creek Formation in Tennessee), becoming the first to describe the skull morphology of the genus.

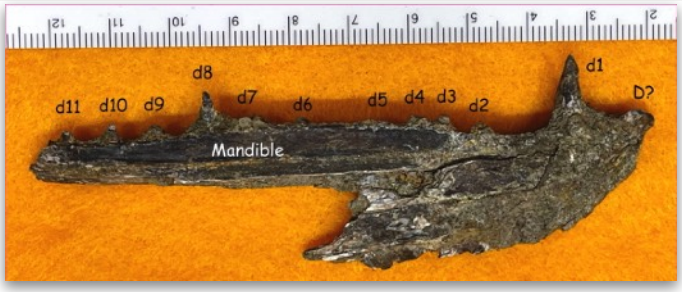


Figure 1. *Enchodus ferox* jaw (mandible) with short sabre-tooth (d1) from the Coon Creek Formation collected by amateur fossil collector Randall Seagraves. (Photo Credit: MAG).

Figure 1 shows a specimen a lower jaw of an *Enchodus* that was collected from one of the lithofacies of the Coon Creek Formation in Tennessee by amateur collector Randall Seagraves. The lithofacies of the Coon Creek Formation from which this specimen was collected is not the typical Coon Creek sandy-clay from the type-section at the UT Martin Coon Creek Science Center. Rather, it is carbonate-free, micaceous, and silty with few invertebrates due to heavy leaching in the sediment. This lithofacies, which occurs above the classic Coon Creek sediment horizon, is known to produce numerous other fish remains (teeth, scales, bone), such as squirrel fish, and bone and teeth from sea turtle, mosasaur, plesiosaur, and even hadrosaur.

UT Martin geology senior Natalie Hudson recently presented a poster presentation at the Southeastern Section of the Geological Society of America, held in Asheville, North Carolina, in which she described this specimen. As part of our study, we visited the collections held at the Museum of Science and History (MoSH), formerly the Pink Palace Museum, in Memphis. MoSH has several *Enchodus* jaws and numerous isolated sabre-teeth from the Coon Creek Formation and from many sites, including the site where our specimen was collected. The most defining feature of the genus *Enchodus* is the presence of the long sabre-tooth fangs. Our specimen does possess a short sabre-tooth (d1 in Figure 1), but not the very long teeth typical of the species. The position of the shorter sabre-tooth of our specimen is not terminal as in most *Enchodus ferox*, so it is possible that we are missing the primary sabre-tooth. Also, our jaw is smaller than most of the other *Enchodus* fossils found in the Coon Creek Formation, being only 10.5 centimeters long. Why the less developed sabre-tooth? We surmise that our fish was a juvenile specimen of *Enchodus ferox* that had not developed the distinctive fangs at this point in its life. Happy fishing!

More Valuable Than Gold?

Matthew Lybanon, Editor

A new announcement suggests there could be more to "fool's gold" than meets the eye. Pyrite sampled from the United States was found to contain a surprising amount of the chemical element lithium. The discovery of potential new sources of lithium is big news in the modern era, as the world looks to battery production for a greener future.

The most important use of lithium is in rechargeable batteries for mobile phones, laptops, digital cameras, and electric vehicles. Lithium is also used in some non-rechargeable batteries for things like heart pacemakers, toys, and clocks. Lithium metal is made into alloys with aluminum and magnesium, improving their strength and making them lighter. Aluminum-lithium alloys are used in aircraft, bicycle frames, and high-speed trains.

The surprise discovery was made during an investigation into whether old industrial sites could be a source of lithium. (The researchers are Shailee Bhattacharya, a sedimentary geochemist and doctoral student, and her advisor Professor Shikha Sharma, in the Isotopic and Biogeochemical Char-

Continued, P. 7

More Valuable Than Gold?
Continued from P. 6

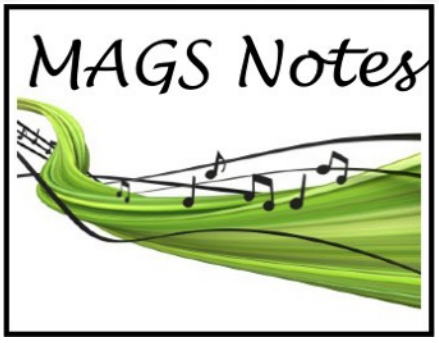
acterization of Geological Materials Lab at West Virginia University.) Such sites could include mining tailings. Their study focused on 15 middle-Devonian sedimentary rock samples from the Appalachian basin in the United States. Analyses revealed that there was a surprising amount of lithium in pyrite minerals in shale, which was an unexpected result. Pyrite's association with lithium "is unheard of" said Bhattacharya.

The discovery that pyrite minerals in shale were a particularly good source of lithium could be great news for the battery revolution—but the team urges people not to get too excited just yet. They don't yet know if the findings are site-specific, meaning pyrite everywhere might not contain as much lithium as the samples tested in this study, whose results were presented at the European Geosciences Union General Assembly 2024.

"While the primary ores of Li (pegmatite, salar brine, and volcanic-associated clay) are generally well-understood, it would be desirable to identify additional Li sources that could be safely and economically exploited," the researchers wrote in their abstract. "Using material from previous industrial operations (e.g., mine tailings or drill cuttings) as a source of additional Li would be attractive as it would generate little or no new waste material."

Scarcity isn't so much the problem as our capacity to produce it, so new potential sources like pyrite could be very good news indeed. The fact that the new source may require minimal processing makes the news even better.

Ref: *Bhattacharya, S., Dix, M. C., Sharma, S., Wylie, A. S., and Wagner, T.: Potential lithium enrichment in pyrites from organic-rich shales, EGU General Assembly 2024, Vienna, Austria, 14–19 Apr 2024, EGU24-369, https://doi.org/10.5194/egusphere-egu24-369, 2024.*



🎵 Adult Programs

May 10: Dr. Julie Johnson, Earth Science

June 14: TBD

July 12: Ryan Pudwell, Nonconnah Creek

🎵 Junior Programs

May-July: Same as Adult Programs.

🎵 Field Trips

May 4: 20 Mile Creek

June: Chucalissa

*July/August:*Arkansas

🎵 Rock Swap

May 25: At Lou White's residence

🎵 New Members

Andrew Fields, spouse Sarah-Hunter Simanson, and children Addison and Emerson Fields

🎵 May Birthdays

4	Joel Webster
9	Carol Lybanon
10	Julie Lybanon
11	Mary Elliott
12	Trace Hartmen
	Pam Crumpton
16	Robert Duncan
17	Dave Kitkowski
20	Michele Robbins
25	Amber Shields
28	Colby Wrasse
29	Susan Boyd

This year's Show was a big success, thanks in large part to the MAGS Members who volunteered to help. They really seemed to enjoy being a part of the biggest rock, mineral, jewelry show in this part of the country. Look for more pictures in next month's issue of *MAGS Rockhound News.*

February Board Minutes

Josh Anderson

Editor's Note: *There was no March Board Meeting, so the February minutes were not approved until the April Board Meeting, which was held after the publication date of our April issue.*

Zoom meeting called to order 6:36 pm. Present: W.C. McDaniel, Christine Anderson, Joshua Anderson, Nannett

McDougal-Dykes, Bonnie Cooper, Matthew Lybanon.

Secretary: Minutes submitted via email, presented to Board, and approved.

Treasurer: Report approved. Notes: 2024 SFMS renewal check has been mailed. Our cost for renewal was $370.50 ($1.50 x 247 members). Per email from SFMS we should receive an invoice for club liability insurance and show insurance in a few weeks. The liability insurance is a per member charge and the show insurance is a lump sum per show.

Bonnie has the club's taxes to file and hope to have it done by the next board meeting. Deadline is some time in May.

Membership: No new Members. 247 total Members including youths and adults.

Field Trips: February, Nonconnah Creek w/ Ryan Pudwell. March, Crow Creek, Arkansas, w/ David Clarke.April 20, Earth Day at Chucalissa (MAGS table).May 4, 20 Mile Creek, joint trip with N. Miss Club. June 15, Chucalissa; MAGS will have family day event. July/August ,Arkansas, Blanchard Creek Cave tour, fossil hunting in Sylamore Creek,possible side trip to Leslie. September, TBA. October, DMC date/site TBA. November, TBA.December, no trip.

Youth Programs: Position empty, need chair.• Adults and youths folded together for now.

Adult Programs: Need speakers for new year. Will coordinate with W.C. for possible candidates. • February, W.C., Tucson show.• Upcoming presenter list (order not firm): Dr. Parish; Catherine Justis, Wolf River; Dr. Julie Johnson, U of M Geology; Ryan Pudwell, Nonconnah Creek.

Library: No report.

Editor: Email request for articles and pictures.

Rock Swaps: None scheduled.

Show: No report.

New Business:

1. Website, Social Media, Digital Media Board Discussion 2/1/2024
   - General Information: W.C. McDaniel, Lead
     - Delist web coordinator, field trip, and other empty positions. Keep in bylaws. Propose committees instead of officer/coordinator.
     - W.C. outlines vision for all sites, including website redo as simple and basic; easy to use.
     - Must contain:
       - Current and accurate information
       - Easy navigable
       - All sites have linkage to other club sites
     - Ensure password/access codes shared to Board Members
   - Show Website Information: Bonnie & W.C. McDaniel
     - Status: active
     - Wixsite: Board voted yes to use this platform to build new site.
     - Add links for Facebook, club website, and delete old/invalid links.
     - Bonnie asks for suggestions to improve site
   - Club Website Information: Bonnie & W.C. McDaniel
     - Status: active-www.memphisgeology.com
       - Board Members updated on website
       - Ownership :MAGS now owns www.memphisgeology.com
       - Updates: Recommendations needed to be sent to Bonnie by 2/9/24:
     - Update forms, update links, archive newsletters
   - www.memphisgeogy.org is defunct. Do not own this site and it is inoperable.
   - Facebook Site Information: All information is correct and accurate. The site is updated and active.
   - Facebook Event for Show 2024: Josh will create a Facebook event and forward link to W.C. for distribution.
   - Instagram :Defer to social media committee. Need volunteers.
2. April Meeting Date Change: W.C. cannot make 4/13/24 so we decided to move the April meeting to 4/6/24 and to make this meeting a Show work event. All approved.

Old Business: None.

Quarreling Sun and Moon?

Matthew Lybanon, Editor

In ancient China it was thought that a celestial dragon attacked and devoured the Sun during a solar eclipse. There are other colorful myths and misconceptions about these celestial events. MAGSters now understand why they happen, and several of us traveled to nearby places in the path of totality of the April 8 total solar eclipse.

The path cut through Arkansas from southwest to northeast, so there were options. Some of us went to Wal-

Continued, P. 9

Quarreling Sun and Moon? *Continued from P. 8*

nut Ridge, a little northwest of Jonesboro. It's a pretty small town, with a population just a little over 5,000. But it has a good airport, and an airport is a good place to watch the sky—no trees, and plenty of parking.

When WWII started the U.S. wasn't training nearly enough pilots. So there was a program to build training facilities in a hurry and get them operating. One location was the Moran Community just north of Walnut Ridge.

At the time the Walnut Ridge Army Air Field was completed it was the largest facility of its type in the Southeast Training Center. Aside from the main air field, with three runways, there were five auxiliary fields in neighboring communities. At its peak the facility had 250 aircraft and over 150 flight instructors, who trained over 5,000 students. 4,641 graduated.

After the war the training facility shut down. Some of it was sold off, but 1,866 acres were given to Walnut Ridge to be a public airport. We parked on the grass along with hundreds of other cars. Perfect for watching the eclipse.

The Walnut Ridge airport offers another attraction: the Wings of Honor Museum. We were expecting a small-scale, small-town museum but it's really a VERY good museum. And it's FREE; they get by on donations. It's definitely worth a trip from Memphis.

Eclipse picture from Walnut Ridge and other locations are shown below. One picture comes from a cousin who is a professional photographer. He viewed the eclipse from Harrisburg, Illinois.

Thanks for the pictures, Christine & Josh Anderson, Jim Butchko, Bob & Bonnie Cooper, Gloria Klauser, Cornelia & W.C. McDaniel, Debbie Schaeffer, and Harold Schroeder. Sorry if we missed anyone.

MAGS At A Glance

May 2024

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
28	29	30	1	2 Zoom Board Meeting, 6:30 P.M.	3	4 Field Trip, 20 Mile Creek (joint with NMGMS)
5	6	7	8	9	10 Membership Meeting, 7:00 P. M., "The Crystalline Chronicles"	11
12 	13	14	15	16	17	18 DMC Field Trip
19	20	21	22	23	24	25 Rock Swap, Lou White's residence
26	27 	28	29	30	31	1

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