

New NMSZ Observations

Secrets from the New Madrid Seismic Zone's Quaking Past



At our September meeting Dr. Nathan K. Moran of CERI at the University of Memphis gave a fascinating presentation on the New Madrid earthquakes of 1811-1812. His presentation focused on contemporary historical accounts of these earthquakes, some of the

most powerful ever recorded in the United States. This article discusses the geophysics.

High-detail digital elevation maps, produced using high-resolution airborne lidar measurements, reveal new evidence of strong *Continued, P. 5*

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HOLIDAY PARTY

It's time to start thinking about our Holiday Party. This year our party will take place on Friday, December 13, at 7:00 P.M. You may notice the change in dates. The Board decided that it was more fun to have the party at night instead of our regular Saturday morning time. **This is a one-time, one-event change from our**



normal meeting schedule.

As in past years we ask that our Members bring a dish to share. There will be more information in the December newsletter. We are asking for volunteers to help set up, decorate, and take down. The more Members who participate, the more fun we will all have.

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CAROL LYBANON

MEMPHIS ARCHAEOLOGICAL AND GEOLOGICAL SOCIETY

MAGS Rockhound News ♦ A monthly newsletter for and by the members of MAGS

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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>



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/>

Holiday Party If you have any ideas for table decorations or activities, please let me know: sgcarol@earthlink.net.

You're Invited

Debbie Crawford McCown

You're invited to my new group 'MAGS' on GroupMe. Click here to join:

https://groupme.com/join_group/103795223/TbrXpLTY

Secrets Of The Earth's Mantle

Susan Goossens & Matthew Lybanon
Editor's Note: Thanks to Susan (Dee Dee) Goossens for discovering this topic and sending information.



A single grain of rock lodged in a diamond contains a never-before-found mineral.

A single grain of rock lodged in a diamond contains a never-before-found mineral, which could reveal unusual chemical reactions unfolding in the depths of the mantle

Scientists unearthed the mineral from a volcanic site in South Africa known as the Koffiefontein pipe. Shining diamonds speckle the dark, igneous rock that lines the pipe, and the diamonds themselves contain tiny bits of other

minerals from far beneath Earth's surface. Within one of them, scientists found a dark green, opaque mineral that they estimated was forged about 170 km underground.

The intense pressure and heat in the upper mantle transform carbon deposits into diamonds; the rocks trap other mantle minerals in their structures and can be pushed to the planet's surface by underground volcanic eruptions. By analyzing mineral inclusions in the diamonds, scientists can learn about chemical processes that occur far beneath the crust.

The researchers named the newfound mineral "goldschmidtite" in honor of geochemist Victor Moritz Goldschmidt, the founder of modern geochemistry, according to the study, published in *American Mineralogist*. "Goldschmidtite has high concentrations of niobium, potassium and the rare-earth elements lanthanum and cerium, whereas the rest of the mantle is dominated by other elements, such as magnesium and iron," study co-author Nicole Meyer (a Ph.D. student at the University of Alberta, who discovered the mineral) said in a statement. Potassium and niobium make up most of the mineral, meaning the relatively rare elements were brought together and concentrated to form the unusual substance, despite other nearby elements being more abundant, she said.

The odd mineral now lies in the Royal Ontario Museum in Toronto. But it isn't the only unusual mineral found included in a diamond. A diamond found in a Botswana mine contained a newly

identified silicate mineral dubbed davemaoite that can only have formed in Earth's lower mantle, researchers reported in *Science*. It was the first time that scientists managed to definitively prove that this type of lower mantle mineral—previously just predicted from laboratory experiments—actually exists in nature. The team named the mineral for well-known experimental high-pressure geophysicist Ho-kwang (Dave) Mao

The researchers concluded that the diamond with the mineral inclusion formed at depths greater than 660 km, the upper boundary of Earth's lower mantle. Using analytical techniques including X-ray diffraction, X-ray fluorescence imaging, and infrared spectroscopy, mineralogist Oliver Tschauner of the University of Nevada, Las Vegas, and colleagues identified the chemical makeup and structure of the new mineral, pegging it as a type of calcium silicate perovskite.

Scientists had previously estimated that about 5%-7% of the lower mantle must be made up of this mineral, Tschauner says. But it's difficult to observe such deep-Earth minerals directly because minerals that are stable in the intense pressures of the lower mantle begin to rearrange their crystal structures as soon as the pressure lets up. But enclosing the mineral in the diamond preserved its structure.

Another intriguing aspect of this new mineral is that it's surprisingly rich in potassium compared with laboratory predictions, says Sang-Heon Shim, a geophysicist at Arizona State

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Secrets Of The Earth's Mantle University
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Tempe. Most experimental efforts to create the mineral came up with "nearly pure calcium silicate perovskite," Shim says. Scientists can only speculate right now what the source was for the extra potassium, but this unexpected composition hints that the lower mantle may be a more motley mix than thought, with complexity difficult to predict from lab studies alone.

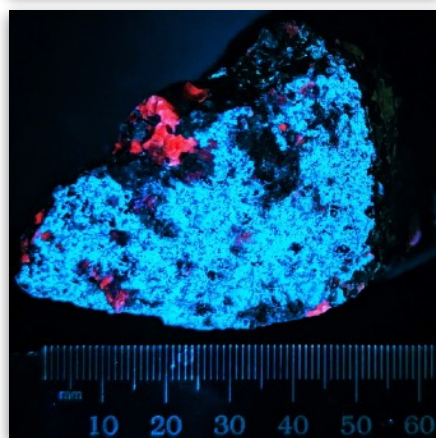
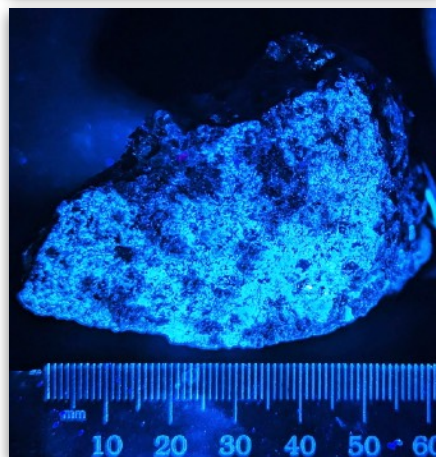
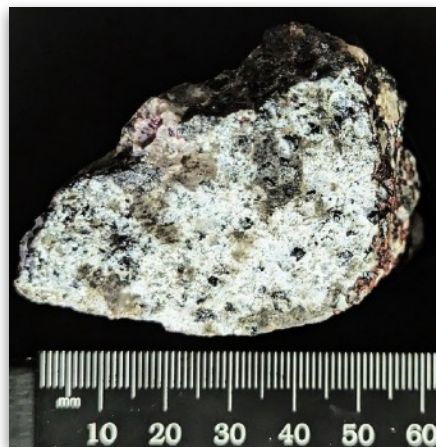
Ref:

1. Nicole A. Meyer et al. Goldschmidtite, $(K,REE,Sr)(Nb,Cr)O_3$: A new perovskite supergroup mineral found in diamond from Koffiefontein, South Africa. *American Mineralogist* 2019;; 104 (9): 1345–1350. doi: <https://doi.org/10.2138/am-2019-6937>

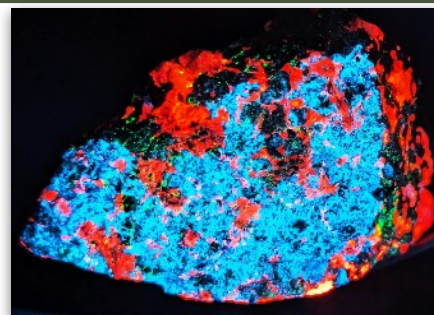
2. O. Tschauer et al. Discovery of davemaoite, $CaSiO_3$ -perovskite, as a mineral from the lower mantle. *Science*. Vol. 374, November 12, 2021, p. 891. doi: 10.1126/science.abl8568.

3. Y. Fei. Perovskite retrieved from the lower mantle. *Science*. Vol. 374, November 12, 2021, p. 820. doi: 10.1126/science.abm4742.

sphalerite or other zinc-bearing minerals and has been well documented as forming on/within the mine dumps, as well as in the oxidized portions of the ore zone within the mines.



The first picture is in natural light and shows an encrustation of



white to cream Hydrozincite. The second picture is in LW 365nm with the Hydrozincite responding with a nice blue color. The third picture is in MW 310nm and again the Hydrozincite is blue, and a bit of calcite is giving an orange red response. The fourth picture is in SW 254nm with the Hydrozincite a strong blue and the underlying calcite giving a strong orange red response. Careful examination of the photo also reveals tiny green specks of willemite associated with the calcite!

Enjoy the pictures!

Four Views Of A Specimen

Michael Howard

Another specimen from Franklin, New Jersey!

This specimen displays a weathered surface coating of Hydrozincite on a matrix of Calcite and Franklinite (NF, TL) from the Franklin Mine dumps, Franklin, Sussex County, New Jersey. Hydrozincite is a secondary mineral that forms from the weathering of

November Program



November 9 program: W.C. McDaniel, "Cornucopia of Rocks". Members participate in rock quizzes, displays, holiday sales, auctions, door prizes, and membership renewals.

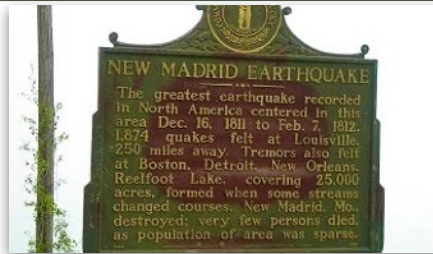
New NMSZ Observations shaking
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earthquakes in the New Madrid seismic zone in the central United States. The researchers mapped ridgetop spreading and sagging on bluffs in northwestern Tennessee that likely form during large earthquakes. These spreading features are located near the compressional Reelfoot fault, are concentrated on the surface above the fault plane, and more commonly spread perpendicular to the fault. These observations suggest that these features record one or more earthquakes on the southern Reelfoot fault since the deposition of the underlying silt ~30,000–11,000 years ago.

Human-swallowing fissures, a backward flowing Mississippi River, and so-called earthquake lights were just a few of the strange phenomena reported during the series of powerful intraplate earthquakes that occurred in the New Madrid Seismic Zone (NMSZ) between December 1811 and February 1812.

Those earthquakes, which took place in Arkansas and along the Reelfoot reverse fault in Missouri and Tennessee, made history as some of the strongest to occur east of the Rocky Mountains, but what about prior seismic activity in the New Madrid region? The New Madrid seismic zone has the highest seismic hazard east of the Rocky Mountains, but this elevated hazard is largely inferred from damaging earthquakes within the NMSZ that predate modern seismic instrumentation.

Aside from the earthquakes of 1811–1812, there is evidence for at least three other strong shaking



events since ~2350 BCE. Direct evidence of earthquakes in the NMSZ is poorly preserved due to climatic, anthropogenic, and geomorphic factors, such as erosion and deposition from the proximal Mississippi River and surface modification from farming.

The lidar data revealed linear ridgetop spreading features like scarps, called sackungen, that hadn't been previously described, says Ryan Gold, a geologist with USGS in Golden, Colorado, and a coauthor of the study. The researchers mapped the sackungen on bluffs in the Mississippi River valley in northwestern Tennessee. Those features "likely form or are reactivated during large earthquakes," the researchers wrote.

The sackungen were concentrated on the hanging wall of the Reelfoot fault, and their preferential orientation indicated ground motion perpendicular to the fault strike. These observations are consistent with the notion that at least one earthquake occurred on the southern portion of this fault since a layer of windblown sediment called the Peoria loess was deposited in this region approximately 11,000–30,000 years ago.

The trenching site is located 8 km from Samburg, Tennessee, a small town on the southeastern shore of Reelfoot Lake. The researchers performed radiocarbon and luminescence dating on sam-

ples collected from the four colluvial packages, and also measured the concentrations of lead and cesium isotopes in the samples.

Based on this dating, Gold reported (in a presentation at the Geological Society of America's (GSA) 2018 annual meeting) a history of four earthquakes (or earthquake sequences) that occurred before 1860, one of which occurred thousands of years ago in the early to middle Holocene and the rest of which occurred after 340 CE.

Besides bolstering the region's known seismic record, the team's analysis underscores the difficulty of predicting future seismic activity for this region, given the variable frequency of past earthquakes. The "nonperiodic earthquake recurrence has important implications for seismic-hazard and geodynamic modeling in the New Madrid Seismic Zone," the researchers wrote in the abstract for Gold's GSA presentation.

Ref: Delano, J. E., Gold, R. D., Briggs, R. W., & Jibson, R. W. (2018). Coseismic sackungen in the New Madrid seismic zone, USA. Geophysical Research Letters, 45, 13,258–13,268.

<https://doi.org/10.1029/2018GL080493>

Library Report

Nannett McDougal-Dykes

The MAGS library has three new books, all ideal for juniors. They cover topics from dinosaurs (What child isn't fascinated by dinosaurs?) to why Native Americans respect pieces of broken pots scattered over the desert hillsides of the Southwest.

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Fabulous Tennessee Fossils

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

FTF 116

Thanksgiving Edition—Fossil Turkeys of Tennessee



November is for Thanksgiving. During Thanksgiving, most everyone will eat turkey, at least at some point. We all know the bird and that Benjamin Franklin championed it as the official national symbol for our fledgling commonwealth. We know numerous ways to prepare it for eating. Turkeys have also been slandered as being ugly and awkward, leading to the slanderous “you turkey” slang. Turkeys belong to the Order Galliformes, which contains the ground-feeding birds. Today, North America has six types of non-domesticated turkey: Eastern wild turkey, the Osceola wild turkey, Merriam’s wild turkey, Gould’s wild turkey, the Ocellated wild turkey, and the Rio Grande wild turkey. The Eastern wild turkey, which is the common turkey to the southeast, and the largest nesting bird in Tennessee that we see and hunt, and it goes by the scientific name *Meleagris gallopavo silvestris*. The genus name means “guinea fowl”. Note the use of a subspecies name.

Archaeological evidence indicates that *Meleagris gallopavo* has been widespread in North America since before the Late Pleistocene and, according to a 1980 book about the turkey by D.W. Steadman, it is the “most commonly reported late Pleistocene bird in North America.” The fossil record of the turkey extends back at least 20 million years (Early

Miocene Epoch of the Neogene Period) and it appears to have evolved in Mesoamerican or the southwest region of North America. Extinct species of “turkey” also exist (e.g., *Rhegminornis* sp. and *Proagriocharis* sp.) suggesting that the modern time period is not the biological acme (“heyday”) of the turkey group. Domestication of the turkey is believed to have occurred nearly 2kya in Pre-Columbian Mexico and it is the domesticated turkey that we fatten to eat for our dinners (or it receives an annual presidential pardon). The historic geographic range of wild turkey includes southern Canada throughout the United States into central Mexico. We know from our history classes that turkey was an important food source for Indigenous peoples and the early settlers, so the turkey has been under the influence of human selection for a long time. Unfortunately, habitat reduction (including the resulting elimination of wild turkey food sources like the American Chestnut tree), and over-hunting, all but eliminated wild turkey from much of Tennessee by the early 1900s, although modern conservation methods have managed to reestablish turkey in most places such that regulated hunting can continue.

Tennessee does have a meager fossil record of *Meleagris gallopavo*, according to the late Austin Peay

paleontologist Jim Corgan and Tennessee archaeologist Emanuel Breitburg, who published a revision of their *Tennessee’s Prehistoric Vertebrates* in 1996 (Tennessee Division of Geology Bulletin 84). In this book, Corgan expands upon his 1974 summary of fossils birds of Tennessee published in the journal *The Migrant*. In both publications, Corgan relied primarily upon an earlier work done by Robert W. Shufeldt in 1897, published in the *American Naturalist*, in which Shufeldt summarized expeditions lead by the University of Pennsylvania into Tennessee caves primarily. Fewer than ten sites are known for birds in Tennessee. The fossil record of birds in general in Tennessee is meager because they rarely fossilize, due to their delicate bone structure and migrant terrestrial lifestyle in an environment dominated by erosion processes, along with the fact that there are fewer avian paleontologists than other areas of paleontology. Caves have proved to be one place to find avian remains, but by far, the richest avian record is archaeological rather than paleontological (although most of these published reports do not distinguish between natural fossil bird remains and archaeological bird accumulations within a cave). Regardless, Shufeldt appears to be the first to have identified fossil turkey remains in Tennessee.

Continued, P. 7

MEMPHIS ARCHAEOLOGICAL AND GEOLOGICAL SOCIETY

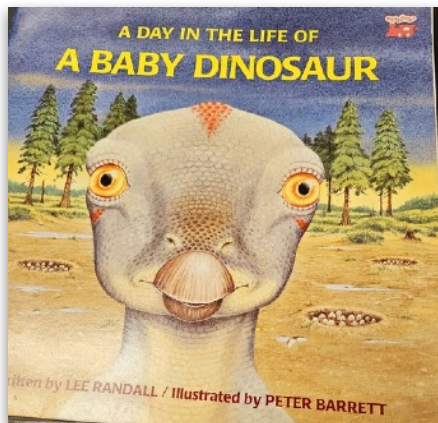
MAGS Rockhound News ♦ A monthly newsletter for and by the members of MAGS

Fabulous Tennessee Fossils The most extensive and diverse avifauna find in Tennessee is Cheek Bend Cave, exposed along the Duck River in middle Tennessee. Archaeologists Paul W. Parmalee and Walter E. Klippel from the University of Tennessee, Knoxville (and McClung Museum) studied the fauna in the late 1970s. Approximately 4.5 meters of cave sediment were excavated, with the bottom half being of Late Pleistocene age and the top half being of Early Holocene age (as it only contained modern fossils). They identified over 60 bird species in

the cave deposits, most dating from the Late Pleistocene and concentrated in the upper Holocene portion of the deposit. They did not list *Melegaris gallopavoas* occurring in the Pleistocene portion of the deposit, which only lists by name 29 of the 60 species recovered. They did not separately list the Holocene species identified in the deposit, nor did they mention *Melegaris* in any of the discussion about the deposit. We can only assume from the publication that turkey was not part of the avifauna of the deposit.

So, would the "Paleoindian paleontologist" have discovered fossilized turkey bones in Tennessee? Maybe. We know that fossils were used by the Indigenous Americans from their inclusion in archaeological sites. We also know that turkey bones have been found associated with archaeological sites, so it is reasonable to conclude that there may be turkey fossils out there to be found. I know of no studies that have gone back to try and date the turkey remains found at any of these Tennessee sites, but that would be a useful study to undertake, I think. Happy Thanksgiving!

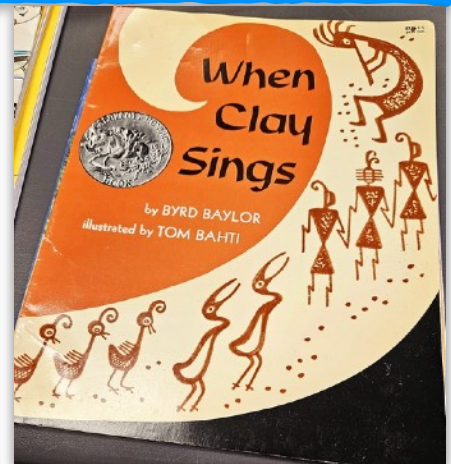
Library Report Continued from P. 5



A Day in the Life of a Baby Dinosaur tells the exciting Story of a young Duckbill Dinosaur from the day it hatches until it grows up to be 30 feet long and weighs 2 tons. Based on the latest scientific discoveries, this book brings the amazing world of dinosaurs to life with dramatic illustrations and lively, informative text.



What an amazing book this is: Dino Facts, What We Know Now, Pronunciation Guide, Dino Art. For the parents there are wonderful games and activities in the back of the book. A world map shows where the fossils of the dinosaurs in the book have been found. Finally, a glossary defines words found in the book. What more could you ask for in a book?



When Clay Sings is a book dedicated to the artist who created these designs and to the museums which preserve them. There are wonderful pictures that illustrate the tales they tell. This is a beautiful book—in text, in illustration, in design, in concept. It's a lovely little book to introduce children to Native American pottery and design.



MEMPHIS ARCHAEOLOGICAL AND GEOLOGICAL SOCIETY

MAGS Rockhound News ♦ A monthly newsletter for and by the members of MAGS

October

October was a busy month for MAGS.

Some MAGSters went to the Central Arkansas Gem, Mineral, & Jewelry Show.



About 100 people, including quite a few MAGS Members, went on the MAGS-sponsored DMC Field Trip. Many thanks to Alan Parks and Memphis Stone & Gravel Co. for leading the trip, providing lunch, and everything else they did to make this field trip a success



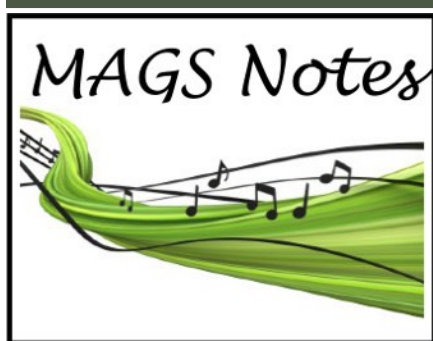
MAGS Member Dr. Ryan Parish gave the program at the October Membership Meeting.



Thanks, Christine Anderson, Nannett McDougal-Dykes, and Bill McManus, for sending photos.

MEMPHIS ARCHAEOLOGICAL AND GEOLOGICAL SOCIETY

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Adult Programs

November 9: W.C. McDaniel,
“Cornucopia of Rocks”

December 13: Holiday Party

January 11, 2025: Jane Coop,
“Gemology”

Junior Programs

November 9: TBD

December 13: Holiday Party

January 11, 2025: TBD

Field Trips

January or February, 2025:
Graceland.

November Birthdays

1 W.C. McDaniel
8 Josh Anderson
17 Gabriella Wrasse
18 Cathie Jacobs
19 Nina Riding
20 Will Kitkowski
21 Tabitha Lambert
22 Melba Cole
23 Jacob Brown
25 Gloria Klauser
26 Dylan George
28 Diane Donohue
Alan Parks
29 Eve Webster
30 Robert Neill

New Members

Mary Davis

Gary DeGutis and Regina Tutor

September Board Minutes

Josh Anderson

Zoom meeting called to order 6:30 P.M. Present: W.C. McDaniel, Christine Anderson, Joshua Anderson, Nannett McDougal-Dykes, Bonnie Cooper, Matthew Lybanon.

Secretary: Reviewed August 2024 Board meeting minutes and presented to Board. Minutes approved.

Treasurer: Report approved.

Field Trips: October, DMC trip to Memphis Stone and Gravel. About 30 people signed up so far. November, Crystal dig in Arkansas (Need a leader). December, Open.

Youth Programs: Mike Baldwin is helping the program restart activities.

Adult Programs: 2025 mostly booked. 2024 programs: September, Kent Moran, CERI. October, Dr. Ryan Parish, U. of Memphis Archaeology. November, Exploring the Theobald Collection, W.C. McDaniel (in progress will update).

Library: *A First Look at Dinosaurs* added, book report submitted for newsletter. A book on Egyptology will be obtained and donated to MAGS on behalf of Leigh Butchko.

Editor: Requests three months of material and events be given to editor in advance of publication. The last date to submit materials is the 20th of each month.

Rock Swaps: None scheduled.

Show: No new Show news for 2025

New Business: None.

Old Business: Discussed expenses report submitted by treasurer. List meeting venue of requirements discussed. To move forward on budget or venue items, President W.C. McDaniel asks all further communication

is to be brought forward with a formal motion.

Adjourned 7:07 P.M.

Jewelry Bench Tips by Brad Smith

WINDING JUMP RINGS



If you need a few jump rings the same size, it's easy to grab a round rod and wind as many as you need. But when you need a lot of them, some form of winder saves a lot of time. A variable speed screw gun makes quick work of winding the coils. Screw guns are quite inexpensive at discount stores and are remarkably handy for odd jobs in the shop and around the house.

To wind a coil, just bend a right angle on the end of the wire about a half inch long and insert this into the screw gun chuck. Then wind slowly, keeping a tight coil. I like to rest the end of the mandrel on the edge of the table or bench pin. Finally, one note of caution. If you are winding an entire length of wire, be careful as you get near the end of the wire. If the end passes under your thumb, it can cause a nasty scratch or cut.

See More of my Smart Solutions for Jewelry Making Series
<http://amazon.com/dp/B0BQ8YVLTJ>

MAGS At A Glance

November 2024

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
27	28	29	30	31	1	2
3 	4	5 	6	7	8	9 Membership Meeting, 10:00 A.M., "Cornucopia of Rocks"/DMC Field Trip
10	11 	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28 	29	30

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