



Volume 64 ♦ Number 06 ♦ June 2018 ♦ A monthly newsletter for and by the members of MAGS

# Climbing Kilimanjaro

*The Roof of Africa*

*June Program*



The name Mount Kilimanjaro or just Kilimanjaro evokes images of adventure and brings to mind a snow capped peak in faraway Africa. Made famous in part by Ernest Hemingway in his 1936 short story 'The Snows of Kilimanjaro' the mountain has drawn adventure seekers for over a century.

Kilimanjaro is a dormant volcano located in the East African country of Tanzania. Topped by eternal snows, the mighty Kilimanjaro is the highest free standing volcano in the world and dominates its landscape like no other mountain. By free standing, or non-massif, this means it is not part *Continued, P. 4*

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## JUNE 2018 ROCK SWAP

Cornelia and W. C. McDaniel will host the rock swap, which will take place Saturday, June 16, 10:30-2:30 (rain date Sunday). The address is 2038 Central Avenue, two blocks west of S. Cooper Street (see map on P 3). Members are asked to bring picnic type food to share; chairs would also be good. MAGS will



provide drinks and other supplies.

To join in the fun, everyone is asked to bring a brown bag holding a rock, mineral, or fossil. We will swap bags. It's more fun if everybody participates. You can bring a bagged item for each family member, or one for your entire family. You will take home the same number of *Continued, P. 3*

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 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](http://memphisgeology.org)

MAGS Show Website: [www.theearthwideopen.com](http://www.theearthwideopen.com)

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](mailto:lybanon@earthlink.net).

### June DMC Field Trip

WHERE: Coon Creek Science Center, McNairy County, TN

WHEN: Saturday, June 23, 10:00 A. M.-2:00 P. M. \$15 fee

COLLECTING: Upper Cretaceous marine shells and vertebrate remains

INFORMATION: Mike Mangrum, (615) 587-1733 or  
[TennRockGuy@gmail.com](mailto:TennRockGuy@gmail.com), Randy Gentry, (615) 566-8482 or  
[RGentry@biscanconstruction.com](mailto:RGentry@biscanconstruction.com)

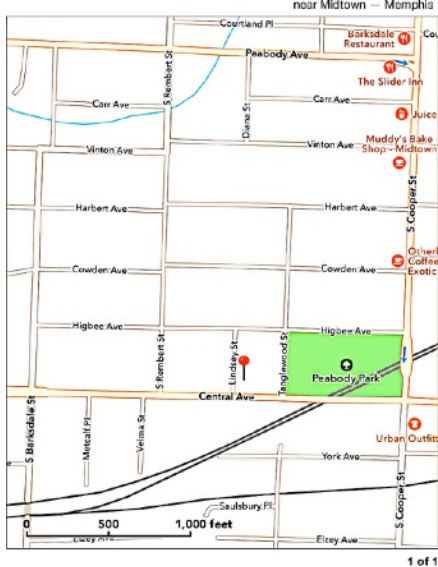
### Links to Federation News

- ➔ AFMS: [www.amfed.org/afms\\_news.htm](http://www.amfed.org/afms_news.htm)
- ➔ SFMS: [www.amfed.org/sfms/](http://www.amfed.org/sfms/)
- ➔ DMC: [www.amfed.org/sfms/\\_dmc/dmc.htm](http://www.amfed.org/sfms/_dmc/dmc.htm)

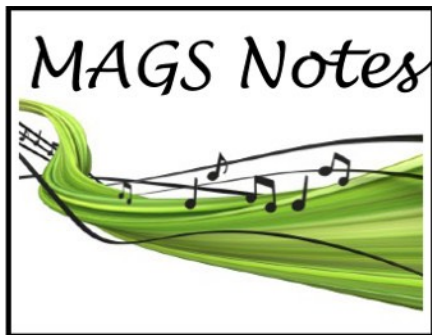
# MEMPHIS ARCHAEOLOGICAL AND GEOLOGICAL SOCIETY

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

*June 2018 Rock Swap* bags that you bring. There will also be other prizes, and fun for everyone.



MAP TO JUNE 16 ROCK SWAP



## June Field Trip

June 9—Magnet Cove near Malvern, Arkansas. Contact Jim Butchko at [butch513j@yahoo.com](mailto:butch513j@yahoo.com) for specific trip info.

## New Members

Marti Sue Cline  
Cahdlah Forsythe-Barrie  
Michele Gaur and family  
Adeli Gomero-Campos and family  
Shirley Hawkins  
Cindy Lynn

Ian McCormack  
Mary and Mike Mulkey  
Virginia Williams and family  
Raymond Carnahan and family  
Leanne Murray and family  
Dianne Weathers and family  
Glenn Andrews and family  
Sharon Drungell  
Claudia Sims

## June Birthdays

- 1 Pat Judd
- 6 Amy Coulson
- 14 Jan Harris
- 16 Ann Williams
- 17 Evelyn Blodgett
- 18 Debbie Schaeffer
- 19 William Kratz
- 20 Roger Lambert
- 21 Josh Box
- 25 Danielle Schaeffer
- Lauren Schaeffer
- Doris Johnston
- 28 Jacob Dunn
- 29 Zachary Loyd
- Cornelia McDaniel

## Hospitality

Thanks to all who signed up to work hospitality at the Membership Meetings. You make that part of the meeting work better.

The duties are simple:

1. Before Meeting: Arrive around 6:30. Help set up and organize tables. All items are located in a rolling cabinet.
2. Monitor snacks, drinks, ice.
3. After Meeting: Clean up, put all items back in cabinet.
4. Two Members per meeting.

Here is the schedule for the

next three months:

*June 8:* **Mildred Schiff** and **Carol Lybanon**

*July 13:* **Leo Koulogianos** and **Jan Harris**

*August 10:* **Rock Swap**

NOTE: We need hospitality volunteers for September.

## Adult Programs

Here are the programs for the next three months:

*June 8:* “Mt Kilimanjaro” (Keith Riding)

*July 13:* “Minerals of South Africa” (Jimmy McNeil)

*August 10:* Indoor Picnic and Rock Swap (see P. 1)

## Federation News

### Summary

#### AFMS

The current *A.F.M.S. Newsletter* has an article on “spear phishing,” an attempt by the bad guys to find the people in an organization who have access to certain types of information, and specifically target those people.

“Spear Phishing is an email targeted at a specific individual or department within an organization that appears to be from a trusted source. It's actually cybercriminals attempting to steal confidential information or to convince a person to send them money. These criminals know that those in our hobby are staffed by volunteers untrained in cyber security. In our hobby we have web sites that serve to share our hobby with our members and prospective members. We post past issues of

*Continued, P. 6*

# MEMPHIS ARCHAEOLOGICAL AND GEOLOGICAL SOCIETY

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*Climbing Kilimanjaro* of a mountain range.  
*Continued from P. 1*

The summit on Kilimanjaro is called Uhuru Peak and stands at 19,341 feet above sea level. To put this in perspective, the tallest mountain in the continental United States (the lower 48) is Mount Whitney which stands at 14,505 feet while Mount Everest stands at 29,029 feet.

Kilimanjaro was first summited in 1889 by Hans Meyer and Ludwig Purtscheller. The mountain is part of the Kilimanjaro National Park and is a major destination for climbers from around the world. As the highest mountain in

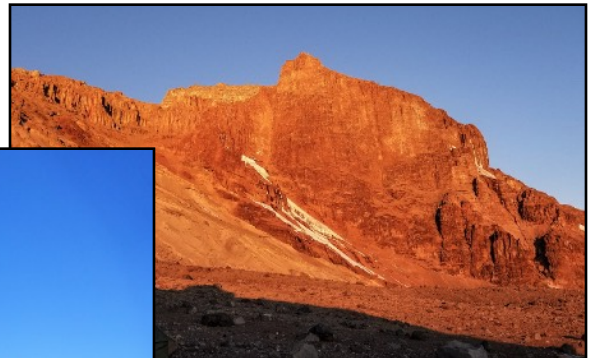
Africa, Kilimanjaro makes up one of the Seven Summits (highest mountain on each of the seven continents). The mountains that comprise the Seven Summits are:

- Everest-Asia-29,029'
- Aconcagua-South America-22,841'
- Denali-North America-20,308'
- Kilimanjaro-Africa-19,341'
- Elbrus-Europe-18,510'
- Vinson-Antarctica-16,050'
- Carstensz Pyramid-Oceania/Australia

It is estimated that approximately 35,000 people attempt to climb Kilimanjaro every year. However, the overall summit suc-

cess rate as published by the Kilimanjaro National park is only 45 percent.

Our June program will be presented by MAGS Member Keith Riding about his 2017 expedition climb of Kilimanjaro. Keith started his mountaineering career in 2010 and has climbed many iconic peaks throughout the world. Kilimanjaro was his third of the seven summits and he hopes to summit his fourth, Mount Elbrus, later this summer. In 2016 he went to the Himalayas to climb Cho Oyu- the 6th tallest mountain in the world- and got his first glimpse of Mount Everest. Come and learn what it takes to climb the world's highest peaks.



**Fabulous Tennessee Fossils**

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

**FTF 41*****Exogyra ponderosa***

Last issue I began a series focusing on the extinct oyster *Exogyra*, whose name means “outside circle” for the coiled shape of the two shells. The first species formally named and described within the genus *Exogyra* was *E. costata*, described by Thomas Say as *Exogyra costata* in 1820. Say’s specimens were collected from the Monmouth strata in New Jersey, specifically the Navesink Formation (a unit not unlike our own Coon Creek Formation). While *E. costata* was the first species described, it is not the ancestor species of the *Exogyra* lineage. That distinction belongs to *E. ponderosa*, which was named by our old friend Ferdinand Roemer, who also named the sponge *Astraeospongium meniscus* (see FTF 2 for more on Roemer’s background and FTF 3 for more on that sponge). Roemer described the first “*ponderosa*” specimen from Texas in 1849, more formally describing *E. ponderosa* again in 1852. *E. ponderosa* displays what is considered “basal” lineage morphology for the genus in that the shell surface, especially the left valve, is unornamented and nearly smooth (Figure 1), but appears to have developed weak costae, but no spines, as the lineage continued to evolve in the Late Cretaceous. Costae refer to a surface ornamentation found in many shells in which raised ridges are oriented vertical to the edge of the shell and radiate from the hinge area.

Kingdom Animalia  
Phylum Mollusca  
Class Mollusca  
Order Ostreoida  
Family Gryphaeidae  
Subfamily Exogyrinae  
Genus *Exogyra* (Say), 1820  
Subgenus *E. (Exogyra)*  
Species *E. ponderosa* Roemer, 1849

Sometimes these same features may be called ribs. They are interpreted to have added strength to shell construction, among other functions.

Work completed on the evolutionary history of *Exogyra* in the Atlantic and Gulf coast regions by Lloyd W. Stephenson in 1914, and later expanded upon by Abraham Lerman in 1965 (see last FTF for background on Stephenson and Lerman), listed the evolution of costae and spines as primary evolutionary trends of increasing complexity through time for *Exogyra*, and these features were clear enough to use to subdivide *Exogyra* into species and varieties within species.

In re-reading Lerman’s 1965 explanation that *E. ponderosa* became smooth by suppressing the onset of costae and spines earlier in growth than the later species, I realized that these earlier workers believed that the costate/spinose morphology was supposed to be the original “basal” genetic condi-

tion and the shell becoming smooth was supposedly achieved by genetically “turning off” those genes. In other words they believed that the more complex condition was suppressed through evolutionary time. In 1965, little was known about the process of heterochrony (changes in timing of development during growth) as a mechanism for species change and speciation. It is possible that costae are actually additions to the growth stages of the more “primitive” non-costate ancestral condition of *E. ponderosa* lineage. If so, this could also be an example of evolutionary changes that are today called “hypermorphies” (extended growth stages) in which new features (costae) are added to the growth stages of descendent species.

The Late Cretaceous sediment strata in Tennessee in which *Exogyra* occurs are subdivided into two primary “stages”: the older Campanian Stage (83-72 million years ago), which is usually overlain by the Maastrichtian Stage (72-66 million years ago). In West Tennessee the Demopolis Formation, and perhaps the absolute lowest Coon Creek Formation, are considered Campanian Stage; whereas, the Coon Creek Formation and overlying McNairy Sand and Owl Creek Formation are considered Maastrichtian in age. Consequently, *E. ponderosa* is general- *Continued, P. 6*

*Fabulous Tennessee Fossils* ly only  
*Continued from P. 5* found in  
 the De-  
 mopolis clays. For this reason,  
 species of *Exogyra* have worked  
 well as biostratigraphic indicators  
 of age of enclosing sediment, es-  
 pecially because these shells are  
 large, robust, and easily identified  
 in the field. The term “pon-  
 derosa” is derived from the Latin  
 for ponderous or heavy. Indeed  
 nearly all adult *Exogyra*, especially  
 later species, are noted for their  
 very thick shells. Shell thickness  
 can exceed two inches! Shells  
 much thicker than the modern  
 oysters we normally think of. So,  
 why so thick? To answer this we  
 will need to learn a bit more about  
 the other, later species of *Exogyra*  
 and their associated sediments and  
 organisms. Next article we will  
 look at *E. costata*.

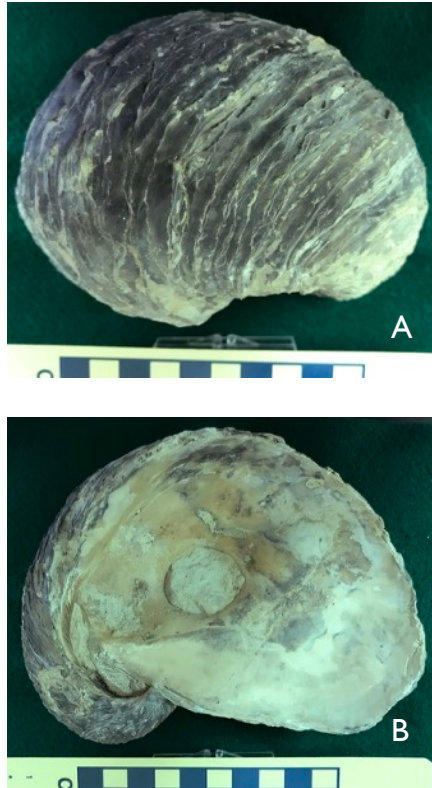


Figure 1. *Exogyra ponderosa* from the UTM Vanderbilt Collection (Photo by MAG; Scale in cm). A. Left valve showing external surface of concentric growth increments without costae. B. Internal surface of same specimen showing curved shell form from which the genus gets its name and a prominent single muscle scar (referred to as being monomyrian).

*Federation News Summary* newslet-  
*Continued from P. 3* ters for  
 reference  
 and so that prospective hobbyists  
 can see the enjoyment that we  
 bring to those who will participate  
 in it with us.

“In a spear phishing attack, threat actors use their acquired knowledge of the potential victims to target them, and that approach allows them to tailor the attack. These emails are more convincing and harder to detect than regular phishing emails. The attacker knows exactly who and what they're targeting.”

MAGS has been alerted to this issue in the recent past, and apparently it's still a problem.

SFMS

The President's Message in

the latest *Lodestar* (SFMS news-  
 letter) addresses a different type of  
 problem. In President Craig  
 Hamilton's own words, “SFMS -  
 NEEDS - a 2nd Vice President,  
 and an Assistant Treasurer  
 RIGHT NOW. Plus other Offi-  
 cers in the near future to fill board  
 positions.” Immediate Past Presi-  
 dent Teresa Polly is Acting 2nd  
 Vice President. Assistant Treasur-  
 er Barbi Beatty is listed as Acting  
 Treasurer, thereby creating a va-  
 cancy in the Assistant Treasurer  
 position. Clearly there are oppor-  
 tunities for MAGSters who want  
 to get involved in federation affairs  
 at the regional level.

**April Board Minutes**

*Mike Baldwin*

Called to order 6:36. Attending:

Charles Hill, James

*Continued, P. 7*

**Member Show  
 Tickets**

It's time to pay for Member Show tickets. If tickets that you gave out were used at the Show, you've already gotten a message telling you how much you owe (you only pay for tickets that are used). The cost is \$2 per ticket through June 8, and \$3 per ticket after that. You can bring the money to the June 8 meeting, give the money to any Show Committee member, or mail a check made out to MAGS to the Show Treasurer:

Matthew Lybanon  
 2019 Littlemore Drive  
 Memphis, TN 38016

# MEMPHIS ARCHAEOLOGICAL AND GEOLOGICAL SOCIETY

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

*April Board Minutes* Butchko, Kim  
*Continued from P. 6* Hill, Mike  
Baldwin, David

Clarke, Carol Lybanon, Matthew Lybanon

**April Program:** April program will be a history of MAGS presented by Carol and Matthew Lybanon, followed by making necklaces for the Rock Zone, and placing stickers on customer bags. Juniors will join adults.

**Show:** Discussion about Show needs. There should be plenty of drinks for the hospitality tent. Charles will bring plenty of water. If there are not enough Rock Zone workers we may have to have some areas open at one time and others open at another. Mike will print and mount vendor layout signs, MAGS logo signs, and a new rock table sign.

**T-Shirts:** Matthew gave check for payment to Mike. There are 6 dozen sand-colored shirts and 6 dozen grey-colored shirts (various sizes). Mike and James will keep the shirts until the next Membership Meeting.

**Rock Swaps:** W. C. and Cornelia will host the June 16 rock swap. The August Meeting will be our annual indoor rock swap. In October we may go back to the Bartlett city park.

**Adult Programs:** April 13-History of MAGS; May 11-Amazing Crossword

Puzzles to Gem Trees Race; June 8-Mt. Kilimanjaro; July 13-Minerals of South Africa; August-Rock Swap; September 14-Lonnie Loooper Collection; October 12-Amber; November 9-TBA. December 14-Holiday Party.

**Field Trips:** We went to two different places on the Missouri trip. 15-20 people attended. No field trips are planned for the near future. Black Rock, Arkansas, is a possibility for May. Charles suggested a trip to Chunky Gal in North Carolina to collect rubies. There's a lot of corundum in that area. Charles and Emily collected some azurite on that trip but the cave is closed now because of white nose virus which is effecting the bats.

**Newsletter Awards:** 2017 contest for articles and newsletters published in 2016. MAGS won awards for adult articles, expert adult articles, features, special publication, and newsletter.

**Web:** Webpages have been updated for April.

Adjourned 7:30.

## April Meeting Minutes

*Mike Baldwin*

Called to order by President Charles Hill at 7:06. 36 members and 3 visitors attending.

The new MAGS T-shirts are on sale tonight for \$10 each. The shirts will also be on sale at the Show. Volunteer Sign-up sheet for the show is located at the membership table. Please sign-up tonight.

Four displays. W. C. McDaniel will host the June 16 rock swap. The August swap will be our annual indoor rock swap/picnic at the church. Please volunteer for the October swap. Debbie Schaeffer requested Members to bring snacks and/or drinks for Show vendors. We will put snack bags together Friday night. All Show volunteers will be provided an orange vest so they can be identified. Matthew Lybanon presented 2017 newsletter awards.

The program consisted of a video history of MAGS, put together by Carol and Matthew Lybanon. Following the video was a brief talk about the Show, the number of volunteers and hours of preparation and execution that are required for a successful Show. Members were encouraged to participate. Work in preparation for the Show included placing stickers on bags and then jewelry making for the Rock Zone.

Adjourned 8:30.

## MAGS Scenes



Herkimer Diamond from Show  
(Cahdlah Forsythe-Barrie)



Finds from Nonconnah Creek and Taco Bell(!)  
(Jennifer and Jon Flores)



Made at May Meeting  
(Cornelia McDaniel)

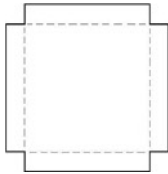
**Jewelry Bench Tips** by  
*Brad Smith*

REVOLVING SOLDER PAD

Often when we're soldering we have multiple pieces on the pad or a single piece and would like to work on several sides of it during the same heat.

One of the ways to deal with this is to put your solder pad onto a turntable. That way you can rotate each piece into position when you need to or can rotate the pad to reach another side of a larger piece.

All you need to make one of these is a piece of aluminum sheet and an inexpensive turntable assembly. A good hardware store will have both, although you can usually find the aluminum in the scrap pile of a local sheet metal shop.



To build a turntable for my 6 inch solder pad, I used a seven inch square piece of aluminum sheet and cut out 1/2 inch notches from each corner. Then I used a bench vise to bend the sides along the dotted lines to form a tray that cradles the solder pad. I attached the tray to the turntable assembly with a couple small flat-head machine screws and nuts.



QUENCHING

Do you hear that little hiss when some jewelers drop a hot piece from soldering directly into the pickle? That hiss sends small droplets of acid into the air that can rust nearby tools and can't be all that good to breathe. To avoid this, I keep a coffee cup of water at the solder station to cool a soldered piece before dumping it into the pickle. It's also useful for annealing metals and for cooling off tweezers

.....  
Pick Up a Few New Jewelry Skills With Brad's "How To Do It" Books, <http://amazon.com/author/bradfordsmith>

**Early East Africa Human Innovations**

*Matthew Lybanon, Editor*

Recently published archaeological research from Kenya pushes back the dates for various phases of human innovations. An international (six countries) collaboration has discovered that early humans in eastern Africa had—by about 320,000 years ago—begun trading with distant groups, using color pigments and manufacturing more sophisticated tools than those of the Early Stone Age. These newly discovered activities approximately date to the oldest known fossil record of *Homo sapiens* and occur tens of thousands of years earlier than previous evidence from eastern Africa. And in a second study, artifacts dating to 67,000 years ago from a cave near the coast of East Africa provide information on humans' ability to adapt to a range of habitats.

Three studies published this March in *Science* report evidence for human behavior emerging during a period of tremendous environmental variability. As earthquakes remodeled the landscape and climate fluctuated between wet and dry conditions, technological innovation, social exchange networks, and early symbolic communication would have helped early humans survive and obtain the resources they needed despite unpredictable conditions. The evidence comes from the Olorgesailie Basin (a sedimentary basin located in southern Kenya in the East African Rift Valley), which holds an archaeological record of early human life spanning more than a million years.

To better understand how climatic instability might have influenced the ecosystems in which the early humans at Olorgesailie lived, the research team integrated data from a variety of sources to assess and reconstruct the ancient environment. They analyzed large mammal fossils, which told a story of massive turnover in the region—most species previously common in the Olorgesailie Basin had disappeared, and were replaced by others previously unknown in the basin. Some of the new ones are familiar species found in eastern Africa today, though others—including a massive zebra—are now extinct.

The team also saw evidence of dramatic range shifts, with some animals—such as the springbok, known today only from southern Africa—appearing in the basin. The faunal evidence, together with additional geologi-

*Continued, P. 9*



# MEMPHIS ARCHAEOLOGICAL AND GEOLOGICAL SOCIETY

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## A Walk Around The Show

Photos by Jim Butchko



### Early East Africa Human Innovations Continued from P. 8

cal and paleoenvironmental indicators from Olorgesailie, show that the new adaptive behaviors that define earliest *Homo sapiens* were associated with large-scale changes in climates, faunas, and landscapes.

The first evidence of human life in the Olorgesailie Basin comes from about 1.2 million years



ago. For hundreds of thousands of years, people living there made and used large stone-cutting tools called handaxes. Beginning in 2002, the Human Origins Program team discovered a variety of small-

er, more carefully shaped tools in the basin. Isotopic dating revealed that the tools were surprisingly old—made between 320,000 and 305,000 years ago. These tools were carefully crafted and more specialized than the large, all-purpose handaxes. While the handaxes of the earlier era were manufactured using local stones, the Smithsonian team found small stone points made of non-local obsidian at their

*Continued, P. 10*

*Early East Africa Human Innovations Continued from P. 9*

Middle Stone Age sites. The team also found larger, unshaped pieces of the sharp-edged volcanic stone at Ologresailie, which has no obsidian source of its own. The diverse chemical composition of the artifacts matches that of a wide range of obsidian sources in multiple directions 15 to 55 miles away, suggesting exchange networks were in place to move the valuable stone across the ancient landscape.

The second study worked with data from the Panga ya Saidi cave in Kenya near the coast of East Africa. Until now, little was known about human history in East Africa over the last 78,000 years, with most archaeological research focused on the Rift Valley and in South Africa.

In addition to evidence of human occupation ranging from the Middle Stone Age to the Iron Age, researchers recovered plant and animal remains, helping them to recreate a timeline of the area's ecological history. Their findings suggest the area's climate and ecosystem—a forest-grassland ecotone, a transition between forest and grassland ecosystems—has remained stable over the last 78,000 years.

The ecological record confirms humans' ability to adapt to a range of habitats. Researchers recovered stone toolkits dating back to 78,000 years ago. The stone artifacts revealed a technological shift around the Later Stone Age, around 67,000 years ago. Archaeologists believe the adoptions of miniaturized stones

may reflect a shift in hunting strategies.

The artifacts—detailed in *Nature Communications*—suggest the cave was continuously occupied by early humans, offering additional proof that human populations in the region were able to survive the climatic effects of the Toba volcanic super-eruption 74,000 years ago, which archaeologists think all but wiped out the human race.



In addition to stone toolkits, researchers recovered incised bones, ostrich eggshell beads, marine shell beads and artifacts adorned with ochre—evidence of cultural innovations. Some of the beads were dated 65,000 years old, making them the oldest found in Kenya. Together, the artifacts found at Panga ya Saidi suggest human populations living in the region were healthy, stable and growing—in both size and cultural complexity—over thousands of years.

**References:**

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*Alan L. Deino, et al., "Chronology of the Acheulean to Middle Stone Age transition in eastern Africa," Science, 15 Mar 2018: eaa02216; DOI: 10.1126/science.aa02216*

*Ceri Shipton et al., "78,000-year-old record of Middle and Later Stone Age innovation in an East African tropical forest," Nature Communications, DOI: 10.1038/s41467-018-04057-3*

**Book Review:**  
**Gottfried Wilhelm Leibniz, *Protogaea***

*Matthew Lybanon*

People today have at least heard about tectonic plates, and they know that there are such things as fossils—even if the only prehistoric creature they can name is the dinosaur. These ideas are part of everyone's general knowledge. But there was a time when these ideas were new and strange, and it took courage to say that what "everybody knew" didn't fit with the evidence that a few people were uncovering.

Gottfried Wilhelm Leibniz (1646-1716) is better known today as one of the independent co-inventors of calculus (along with Isaac Newton). Newton was actually first, but Leibniz published first. This led to a brutal public battle which lasted to the ends of their lives. (The notation that we still use today for calculus is due to Leibniz.) And did I mention that Leibniz invented the binary number system?

Among his many accomplishments, Leibniz is considered by some to have founded the study of geology. In his *Pro-*

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## MEMPHIS ARCHAEOLOGICAL AND GEOLOGICAL SOCIETY

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*Book Review* *togaea* (for only Continued from P. 10 \$5,000 you can get an 18th-century Latin edition; a modern English translation from Amazon costs a bit less), Leibniz proposed that the Earth was originally hot, that it had cooled, formed a crust, and then water had condensed on its surface. He also explained the influence of volcanic activity on geological history. And not only geology—Leibniz also studied fossils. He even anticipated Darwin by proposing that the earliest animals were marine and that land animals came later.

In 1673 Leibniz accepted a position working for Duke Johann Friedrich of Hanover (in what is now Germany). Leibniz's friend and boss Johann Friedrich died in 1679, and his brother Ernst August became Duke. Leibniz convinced the new duke that he could increase the court's revenue stream by draining the water that had seeped in and filled the silver mines in the nearby Harz mountains. Ernst August grew tired of the project after the costs had ballooned and the project had failed to produce results by 1683, and at the end of that year cut off his funding. During his travels visiting mining operations Leibniz never missed an opportunity to study fossils and geological formations. He looked at the minerals for evidence of their origins, and his insights were at times astounding. When he found an enormous prehistoric tooth in 1692, he took it as proof not of some ancient monster, but rather as evidence suggesting that oceans once covered the Earth. He also proposed that the early Earth was molten.

The soap opera that follows happens to be true—it really happened. Here's an outline.

Leibniz proposed to write a short history of his employer Ernst August's family, the house of Brunswick-Lüneburg. If Leibniz could show that the family was related to the House of Este, one of the oldest and most noble in Europe, then it would lend a great deal of credibility to Ernst August's ambition of furthering his family's fortunes. Leibniz found evidence that the two families actually were related, so the Duke had a noble pedigree.

Meanwhile, in England, Princess Anne became Queen in 1702. Her main qualification was that she was Protestant, but Parliament cut her family out of succession to the throne by passing the *Act of Settlement*. Switch to Germany. Leibniz's success in showing that his boss's family was related to the noble House of Este ultimately, in 1692, enabled the elevation of the Hanoveran dukes to the electorate of the Holy Roman Empire.

Next, several flashbacks and scene changes. Elizabeth Stuart, the daughter of King James I (king when Shakespeare wrote his plays), married Frederick, an elector in Germany. Their daughter, Sophia, married Ernst August, the Duke of Hanover (Leibniz's employer). One of their children was George Ludwig, who became duke when his father died. The *Act of Settlement*, passed by Parliament the year before Princess Anne ascended to the throne, named the descendants of Sophia—sufficiently noble, thanks to Leibniz—as being

in line for the British crown. Because of rules of inheritance based on the fear of ending up with a Catholic king, George Ludwig was first in line. In 1714 Queen Anne died and (thanks to Leibniz) George Ludwig became King George I of England. The current Queen Elizabeth II is a direct descendant.

George still wanted the history of his family, and Leibniz was still obliged to write it. It occupied the rest of his life and he never finished it. However, he did finish one part, the preface. In it Leibniz went all the way back to the beginning—the formation of the Earth. That preface was the book mentioned earlier: *Protogaea*.

Leibniz didn't invent all of modern geology and paleontology, but in this remarkable book he set down quite a few of its principles—and in his day they were radical ideas. Look at the world Leibniz lived in. His ideas didn't come out of nowhere. Leibniz lived during an era when a lot was going on intellectually. As a student at the University of Leipzig he was introduced to the writings of Francis Bacon, Kepler, Galileo, and Descartes, just to mention a few outstanding examples. Also, not long before Leibniz was born Galileo was convicted of heresy for asserting that the Earth revolves about the Sun. Most people then had little or no education—a real contrast to the great thinkers (intellectually speaking, those great thinkers were that era's "1%"). Leibniz absorbed, consolidated, and expanded the new ideas of the great thinkers. Read *Protogaea* and be amazed.

# MAGS At A Glance

## June 2018

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
27	28	29	30	31 Board Meeting, 6:30 pm, St. Francis Hospital	1	2
3	4	5	6	7	8 Membership Meeting, 7:00 pm, Keith Riding, "Climbing Kilimanjaro"	9 MAGS Field Trip, Magnet Cove, AR
10	11	12	13	14	15	16 Rock Swap, McDaniels, 10:30 am-2:30 pm
 17	18	19	20	21 	22	23 DMC Field Trip, Coon Creek, McNairy County, TN
24	25	26	27	28	29	30

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