



Volume 65 ♦ Number 03 ♦ March 2019 ♦ A monthly newsletter for and by the members of MAGS

Crater of Diamonds State Park

Gem of a Find!

Mike Howard

March Program



Editor's Note: *Crater of Diamonds State Park, in Murfreesboro, Arkansas, is one of the only places in the world where the public can search for real diamonds in their original volcanic source.*

My talk will cover the geology, history of discovery and explo-

ration, unusual facts about the diamonds, things to see in the Park, how to hunt for diamonds, selected diamonds and their stories, other collectibles related to the Park, and some possible new minerals from the site.

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BE INVOLVED—IT'S MORE FUN

Thanks to those Members who have already signed up. Look for more emails from SignUp Genius about volunteering for the Memphis Mineral, Fossil, and Jewelry Show. We hope every Member will consider signing up.

We need volunteers for Friday, Saturday, Sunday, and Monday (April 26-29).



CAROL LYBANON

The shifts are set up in two-hour blocks; please sign up for more than one shift.

If you don't have email or are having a problem signing up, call Carol [(901) 757-2144]. **We need every Member to support the Show, so please volunteer.**

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

MAGS Show Website: 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.

March DMC Field Trip

WHERE: Ross Creek, Gruetli-Lager, Tennessee

WHEN: Saturday, March 23, 9:00 A. M.

COLLECTING: Pennsylvanian and Mississippian Carboniferous plants

INFORMATION: Charlie Jones, (423) 653-4479 [cell] or (423) 842-6441 [home]

Links to Federation News

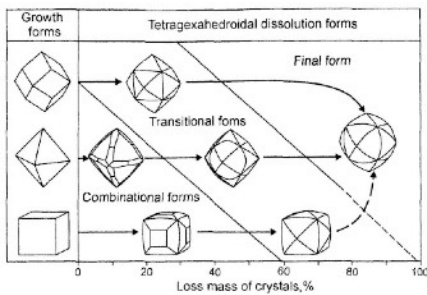
- AFMS: www.amfed.org/afms_news.htm
- SFMS: www.amfed.org/sfms/
- DMC: www.amfed.org/sfms/dmc/dmc.htm

*Crater of Diamonds State Park
Continued from P. 1*

shows an old washing pan left from one of the early commercial operations.—*Image by J. M. Howard.*



John Huddleston is pointing to the location of his discovery of the first diamonds on his property. *Image courtesy of Arkansas Parks Department.*



Resorption diagram, a key to understanding the shapes of diamonds from the Crater Of Diamonds Park. *Image of diagram taken by J. M. Howard from American Mineralogist article.*

Hospitality Volunteers for 2019

Have you signed up to help with hospitality? We need two Members each month. We only need 24 Members to cover hospitality for the year.

Our signup sheet is pretty

blank. We need one volunteer for March, April, and May. During the rest of the year we need two volunteers for each month. Please call Mildred Schiff at (901) 683-8446 and volunteer.



The duties take longer to read than to perform.

1. Before Meeting: Arrive around 6:30. Help set up and organize two tables. All items are located in a rolling cabinet.
2. Monitor snacks, drinks, ice.
3. After Meeting: Help clean up, put all items back in cabinet. Give away all open 2-liter bottles and discard all expired canned drinks.

Hospitality is an important part of our meetings. Everyone enjoys standing around, talking, and having refreshments. So please volunteer.

It is with great sadness that we inform you that Life Member **Clyde Chrisman** died February 1. The funeral service was held on Friday, February 8, at the St. Paul Lutheran Church in Winterset, Iowa. Online condolences can be left at ochiltree.com. Memorials may be directed to the St. Jude Children's Research Hospital and/or the Shriners Hospital for Children.

Save The Date

The 14th Annual Ben E. Clement Gem, Mineral, Fossil, and Jewelry Show will be held at the museum, in Marion, Kentucky, on June 1 and 2, 2019. For more information contact Tina Walker, Director, Ben E. Clement Mineral Museum, (270)965-4263 or www.clementmineralmuseum.org.



Adult Programs

March: Mike Howard, "Crater of Diamonds"

April: "2019 Show Preview"

Junior Programs

March: Jane Coop, "What Are Fossils and How Do They Form?"

NOTICE! ALL PARENTS!!

The Youth Program in March will involve making a fossil...so have your young person bring something that they would like to press into clay to make a fossil.

Suggested items: shells, crinoid stems, shark teeth—any item strong enough to press into clay.

April: "2019 Show Preview" with the adults

May: Mike Baldwin, "The Last Ice Age"

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MEMPHIS ARCHAEOLOGICAL AND GEOLOGICAL SOCIETY

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

MAGS Notes

Continued from P. 3

Field Trips

March 16—Batesville, Arkansas, calcite, fluorite

April 20—Blue Springs, Mississippi, crabs, shells, sea life, fossils

May 18- 20 Mile Creek, Frankstown, Mississippi, sharks teeth, other fossils, Indian points

New Members

Joy and Shane Ashurst

Teresa Potter and Matt Bonner

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 rock and mineral show.

March Birthdays

- 3 Debi Stanford
- 5 Walter Davis
- 7 Payne Wilson
- 11 Nancy Folden
- 12 Mary Mulkey
- 14 Danny Baker
- 15 Kay MacLaughlin
- 17 Bob Cooper
- 18 Laura Brem
- 24 Kalissa Bearden
- 30 Hisami McNeil
- 31 Hunter Hill

New Library Books

Bruce L. Stinchcomb, *Jewels of the Early Earth*

Discovery: Dinosaurs, Usborne Children's Books

Dinosaur, Disney Books

GeoCentral, *Dig Into Fossils*

Jewelry Bench Tips by

Brad Smith

PROTECTING FINISHED SURFACES

I figure that any accidental scratch I make on a piece means about 15 minutes of extra sanding and polishing. So after finishing major surfaces I typically cover them with some masking tape to avoid any scratches when doing final work like cleanups and setting of stones. The blue masking tape used by painters works particularly well because it doesn't leave a sticky residue.



MAKE A TEXTURE HAMMER

An inexpensive hammer can be easily turned into a great texturing tool by grinding a pattern of narrow lines into its face.

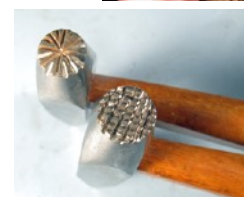
The tool I like to use to grind the pattern is a thin separating disc in a Foredom or Dremel. Be sure to hold the hammer and separating disc steady as you carve, and wear those safety glasses to protect your eyes.

For the pattern to work well, a major part of the face needs to be ground away leaving only small areas of high points. That way the high points will have enough force to emboss the pattern into your sheet metal.

My preference is to use small ball peen or cross peen hammers. They are quite inexpensive from tool dealers at swap meets and rock & mineral shows. There is no reason to buy an expensive hammer to experiment with creating your own textures.

And BTW, if you don't like the first pattern you create, simply file or grind it off and try again.

This is just one of the many tips in the new book, "More Bench Tips for Jewelry Making" See a sample chapter at <https://amzn.to/2KCcygh4>.



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Fabulous Tennessee Fossils

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

FTF 50

Tennessiella thoracica



We have reached a milestone—this is article 50 of Fabulous Tennessee Fossils. My past articles have covered individual fossils from across Tennessee; fossil finds by many of you; paleontologists who have been instrumental in unraveling Tennessee fossil riches; terms and concepts common to paleontology; cartoons and poems related to paleontology; and much more. How do we celebrate this 50th installment?

I have yet to write much about the State Fossil of Tennessee, *Pterotrigonia (Scabrotrigonia) thoracica*, regularly seen in the box heading above, smiling and waving while sitting on a rock in boots. As a young faculty member at UT Martin back in the late 1980s and early 1990s, I was fortunate to have the opportunity to begin the process to designate a state symbol, so that might make a good “anniversary issue” topic. As it turns out, discussion of this topic is timely, because in spite of legislative resolutions to commemorate natural resources of a state by erecting a namesake, science marches on. I will save the actual history of establishing our state fossil for a later essay. What concerns us here is that I must tell you that Tennessee now has a

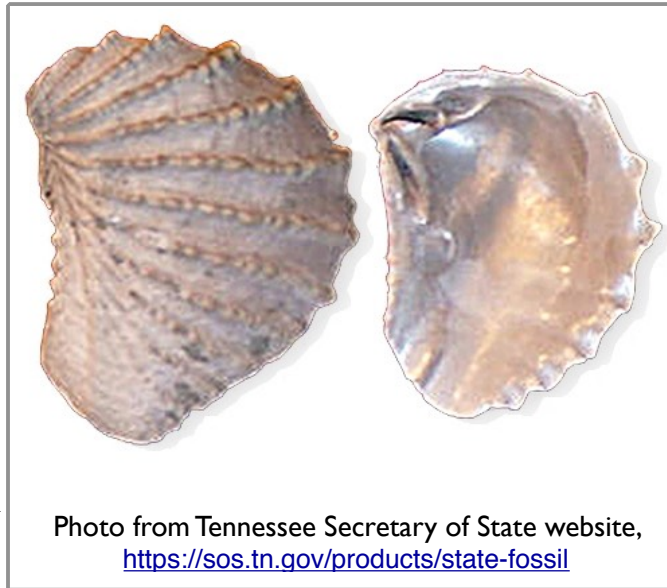


Photo from Tennessee Secretary of State website, <https://sos.tn.gov/products/state-fossil>

problem with its designated state fossil. Well, there is nothing actually wrong with the choice of the fossil; that choice remains valid and true. We will not have to change the image in the header box for this article! I do need to break the news to you that there is a problem with our state fossil and it is one that may pose us a challenge legislatively. Over the next year I may be approaching you, my fellow readers, for support to talk to your local legislators on behalf of “Ptero”.

In an earlier series of FTF articles I wrote about how names of fossils are determined and how sometimes names change as new information comes to light - science advances. In the earliest 1900s, when Trenton native and Vanderbilt graduate Bruce Wade did his original studies on the

Coon Creek fauna, which he published in 1926 as U.S. Geological Survey Professional Paper 137 entitled *The Fauna of the Ripley Formation on Coon Creek, Tennessee*, the mollusk seen above as “Ptero” was actually called *Trigonia thoracica*. *T. thoracica* had been described in 1834 by S. G. Morton and the name was valid as of 1927. Later, the genus *Trigonia* was re-evaluated and split into several other genera and subgenera. By the 1970s, *Trigonia thoracica* then became *Linotrigonia thoracica* and this is how it is listed in Harry Moore’s 1974 thesis on the Coon Creek fauna from the University of Tennessee at Knoxville. By the 1990s when I arrived on the scene, and original began to use the *Linotrigonia thoracica* name for these shells, even more work on revising the trigonids was in the works. I was informed by a late friend and colleague at the U. S. National Museum in Washington that they had indeed revised the taxonomy such that our *thoracica* specimens were now assigned to *Pterotrigonia (Scabrotrigonia) thoracica*.

So, in the middle 1990s that was the name we used when we lobbied the teachers of Tennessee, and later the legislature, to establish a state fossil,

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Fabulous Tennessee Fossils and they indeed did pick this iconic fossil. It was current, reflected science advancement, was distinctive. The long and difficult name, and the changes in the name, were exactly some of the reasons we chose the fossil. Think of the great educational mileage one gets by learning the combining of Latin and Greek prefixes, roots, suffices to make the words that have such descriptive meanings? To this day I still have entire classes of students repeat the name slowly and loudly as a group when I give lectures on the fossil. Repetere!

Now for the difficult news. Are you sitting down? Science has continued in its quest to better understand molluscan taxonomy and systematic relationships since our 1998 state declaration of *Pterotrignonia* (*Scabrotrignonia*) *thoracica* as Tennessee's Official State Fossil, and the creation of the "Ptero Award" by the Tennessee Earth Science Teachers to acknowledge outstanding contributions by legislators, business, societies, and individuals for contributions to Earth

science education in Tennessee. (Each plaque has an actual fossil attached to it.) Yes, you guessed it, someone has revised this group yet again and changed names (gasp)! In 2015, South African paleontologist Michael Cooper re-evaluated the genus *Pterotrignonia* and proposed revisions (published in English in a German scientific journal). Yes, you guessed it, our beloved Tennessee fossil has been re-assigned to a new genus, *Tennessiella* (no change to the species—*Tennessiella thoracica*). Is this the final word? Not necessarily. Do we Tennesseans or other scientists have to accept this change? Maybe, time will see. It will take time for scientists to study and respond to the proposed changes. What do we do about our state symbol, change? Perhaps. How does a state change a state symbol? Legislatively of course. Who makes this happen? Don't worry folks, I am always looking for a good "educational moment" to teach about science. I see lemonade in this bunch of lemons that Cooper has delivered us. Stay tuned!

Jewelry Bench Tips
Continued from P. 4

Be More Productive With
Brad's "How To" Books
amazon.com/author/bradfordsmith

Save Another Date

The 2019 SFMS Workshop at William Holland will take place Jan 9-14, 2019. You can find all the details at

www.sfmsworkshops.org.

For questions, please contact Kristine Robertson at (863) 640-2887 or kristine@kmarella.com.

January Field Trip and More

Kim Hill

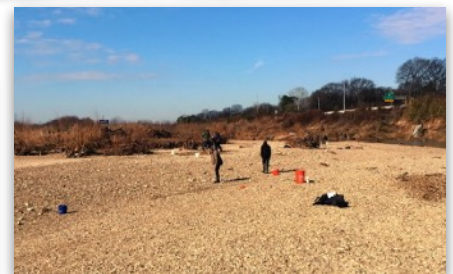
The weather finally cooperated and we had the January field trip at Nonconnah Creek at Perkins. It was great for a day of

rock hunting and there was plenty of gravel to search.



We had a great turnout and once everyone was there we quickly made the short walk to the creek and scattered to hunt. Leo and Jan went out of their way to help those unfamiliar with hunting the agates, corals, and other treasures of Nonconnah. Thanks, guys!

There was one beautiful Indian point found and I'm pretty sure there were plenty of other nice specimens.



Our next trip is to the limestone quarry in Batesville, Arkansas, where we will hunt for calcite and possibly fluorite. I made an awesome find of calcite crystals there on the last trip. It's about a two hour trip to Batesville, and there are nice hotels close to the quarry.

The trip is Saturday, March 16; we will meet at the quarry at 9:30. You will need a hard hat and strong sensible shoes, something to dig with or a pry bar, something to carry your finds in, and something to wrap the more fragile specimens in.

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Memphis Mineral, Fossil and Jewelry Show



Rocks, Fossils, Minerals, Gems, Lapidary Equipment, Jewelry and Beads

THE EARTH WIDE OPEN

Sat. April 27, 9-6 | Sun. April 28, 10-5

Agricenter International 7777 Walnut Grove, Memphis

Presented by the Memphis Archaeological and Geological Society

2019 GRAND DOOR PRIZE Amethyst Cone

Adults - \$5, 2 day pass - \$8 12 & under - \$2 Scouts in Uniform - Free www.theearthwideopen.com info@theearthwideopen.com 901-692-7518 / 901-490-3575



Show19

Memphis Mineral, Fossil, and Jewelry Show

Go to www.theearthwideopen.com and check out the countdown clock. It keeps on ticking and you must get busy before and when it reaches one day. The list below provides some of the busy things you can do:

- Volunteer.
• Market the show via emails, social media, and hardcopies.

March Meeting Assignment

Bring nonperishable packages of crackers, candy, cookies, chips, and nutritional bars. These items will go into the dealer hospitality bags that will be packed on Friday of the Show week.

- Pick up postcards, Show tickets, posters.
• Volunteer.
• Sign up for the hospitality dinner.



January Field Trip and More Don't forget water and snacks. There will be more information at the March Membership Meeting.

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Here's a list of upcoming field trips, and I want everyone to keep in mind the trips to the Illinois geode festival in late September 2019, and Gainesville, Florida, in March of 2020 to hunt for sharks teeth and sea life fossils like megalodon, dolphin, dugong, etc .

- March 16-Batesville, Arkansas; calcite and fluorite

- April 20-Blue Springs, Mississippi; crabs, shells, sea life fossils
• May 18-20-Mile Creek, Frankstown, Mississippi; sharks teeth, other fossils, Indian points
• June 22-Malvern, Arkansas; novaculite (confirmation pending)
• July 20-Turkey Creek, Starkville, Mississippi; marcasite, marine shells
• August 17-Parkin, Arkansas; Museum

- September 27-29-Geode Fest, Illinois
• October 19-DMC trip, Memphis Stone and Gravel (confirmation pending)

January Board Minutes

Mike Coulson

Called to order 6:40. Present: W. C. McDaniel, Mike Baldwin, Kim Hill, Matthew Lybanon, Bonnie Cooper, Bob Cooper, James Butchko, Mike Coulson, David Clarke, Jane Coop.

Announcements: Mike agreed to continue as Webmaster and Matthew agreed to continue as

Continued, P. 8

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January Board Minutes Editor. Motion made, Board approved. A final copy of the MAG's history book, including the new section for 2018, is complete. Mike will blend the new 2018 page into existing history pdf document. A copy will be placed in the library.

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Secretary: Mike Baldwin presented the December minutes. Board reviewed and passed.

Treasurer: December Treasury Report summary, Rent paid through June 2019. SFMS Renewal fee paid. Still has web domain to pay as well as show insurance and IRS taxes. Motion carried to approve Treasury Report. Approved.

Membership: 50 renewals so far. Two new Members in January; a few others pending. Suggestion made to send out an email reminder.

Field Trips: Planned field trips include January 19 trip to Nonconnah Creek, February 16 trip to Richardson Landing or Sugar Creek. Charles Hill is planning a week long trip in late March to North Carolina. Most agree it is best to schedule field trips a week after the Membership Meeting rather than the day after the meeting. Some possible trips on the horizon are the Geode Festival in Illinois, shark and possibly megalodon teeth hunt, Parsons, Wegner Quartz Crystal Mines, and other options Kim is looking into. Carol passed along a folder of past field trip information to Kim, with maps and locations.

Adult Programs: Ryan Smith will talk about the Parkin site in Cross County, Arkansas, at the January 11 meeting. February 8 Jane Coop will present on dinosaur digging. March 8, Mike Howard. Dave will continue soliciting and scheduling speakers.

Junior Programs: January 11 the youth will be working and experimenting with colored sands on paper to create artwork expressing the recent exploration of Mars by NASA's InSight. Other programs include February Mountain Building and Contour Map Reading, March will cover The Last Ice Age. Mike B. is planning to make a youth sign-in sheet to be used at every meeting. He bought 28 plastic boxes to hold specimens the youth will receive each month. Jane's program is May 10, Sept ember 13 Kim will present on Native American lore and artifacts. Mike proposed that we offer a badge program for the kids, similar to the Scout Merit Badge. To not distract from main program, youth could work 15 minutes at beginning of program time.

Library: Nannett was not present but the need for a wheel to repair a book cabinet was discussed.

Show: 29 of 30 contracts have been received. Larry Gilmore's business is up for sale. First time dealers, Wings and Things, are coming up from Alabama. Jane volunteered to clean rocks for Show. Show Committee will meet at Agricenter boardroom January 7, January 28, February 25.



6th Annual Dig It! Gem, Mineral & Fossil Festival

A fun family event at
Amqui Station
303 Madison Street, Madison, TN
Near the Nashville Public Library in Madison

Saturday, April 6th, 2019
10 am to 4 pm

Educational Programs Throughout the Day
Lots of activities for children

<http://www.rockhound.org/swap>
Or contact us at: swap@rockhound.org



ROCKS, MINERALS, FOSSILS, SLABS, ROUGH & GEM VENDORS!

The Middle Tennessee Rockhounds promote mineralogy,
paleontology, geology, and collecting plus related arts & sciences.
Meetings every 3rd Tuesday in Brentwood. Visitors are welcome.
info@rockhound.org www.rockhound.org

FREE ADMISSION *FREE PARKING*

Rock Swaps: Rock swaps won't begin until June when we have warmer weather.

Editor: Send newsletter material to Matthew by 15th of the month; can accept as late as 20th. Newsletter goes out 1st day of the month. Usually starts on 22nd of month. Check contact info and let Matthew know if there are any changes.

Web: January updates made. Mike B. suggested blind posting the membership directory. Only Members would know how to access pdf containing contact information, phone numbers, email addresses, etc. The file would be updated when directory is updated. Discussion followed this suggestion; several didn't think this info should be out there on an unsecured or password protected page. Board decided not to have directory made public even at a hidden address.

Old Business: Carol passed folder of things including IRS letter from 1961 to Bonnie. Also passed one to Kim on field trips.

New Business: IRS letter from 1961 was found. The club needs the letter to file for non-profit mailing status. The status would save us around 20 cents per postcard. W. C. gave Bonnie the forms to file for receive reduced postage status. She will look into filling out and filing.

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January Board Minutes
Continued from P. 8

List of things W. C. would like to see us work on:

- Encore program
- Membership Meeting support, get electronics sorted out and used efficiently.
- Hospitality sign up sheet, Mildred Schiff agreed to handle; she didn't want to be on Board.
- Displays, discuss ways to display. What constitutes a display?
- Social media review, enhancements, anything we can do to improve our presence.
- Backup for web, Mike C. volunteered.

Discussed door prizes, auctions, etc. for Membership Meetings. Most felt it was fun.

Adjourned 7:45.

January Meeting Minutes
Mike Coulson

Called to order 7:05.

Two new Members, 3 visitors plus about 35 Members signed in tonight. Last chance to renew membership and sign up to be eligible for the book drawing, "Agates of Lake Superior."

Announcements: W. C. McDaniel circulated a sign-up sheet to identify volunteers to help out the club. Help is needed in the following areas, room setup, hospitality setup and help out with other duties as needed. Members are encouraged to display their collection (whether found, bought or made) and collecting interests. Cards for each display will be dropped into a box for a drawing. At the end of year all slips will go into big drawing for a grand prize. Purchase raffle tickets for a chance to win a prize, 3 for \$1, and proceeds will go to the club.

Field Trips: January 19 field trip to Nonconnah. Access point is I-240 and Perkins close to where the Mall of

Memphis was located. If you sign up, leave your phone number in case the trip is cancelled due to high water. Info and directions are on sign up sheet. In February the club is hoping to go to Richardson Landing, again dependent on water levels.

Show: April 27 and 28. Grand prize is amethyst with multiple facets.

Displays:

1. Kim Hill displayed fossilized horse bones, a bear jaw bone and Indian points found at Richardson Landing.
2. Carol Lybanon displayed ammonites she found in Texas, north of Dallas. One of her hobbies is creating beautiful stained glass pieces. The one displayed has a small ammonite in the center with colored glass circling the fossil.
3. Jan Harris finds agates and unusual rocks at Nonconnah Creek. Leo talked about his finds at Nonconnah. He traded some local agates for unusual rocks from the north-west US.
4. Jane Coop displayed a collection of fossilized pinecones dating to the Jurassic and Triassic Periods.

Program: The adult program featured a presentation by Ryan Smith titled "Archeology of Parkin Archeological State Park."

Adjourned 8:10.

Field Trip Rules

W. C. McDaniel

Over the past several months MAGS has added several new Members, and I would like to remind all Members of some basic MAGS field trip rules. We should also be aware of and follow the Dixie Mineral Council (DMC) and American Federation of Mineralogical Societies (AFMS) rules and Code of Conduct.

1. Field trips are open only to current MAGS Members. Exception: If MAGS participates in any field trip sharing program with other clubs those Members may participate if it is a shared trip and there is field trip insurance for the club.
2. All Juniors must be accompanied by a MAGS adult Member on all field trips.
3. A field trip bulletin will be published by MAGS providing all required trip information. Bulletins will be distributed via email or at Membership Meetings. They will not be posted on the web or published in the newsletter.
4. Each Member will be responsible for obtaining, reading, and following all information and guidelines provided in the field trip bulletin.
5. MAGS Members will not contact private landowners to obtain permission to collect on sites where the owner has granted the club permission to collect. In addition, when on a private collecting site you do not have MAGS permission to use the club name or your membership in the club to gain access to a site. A Member who is unsure of the location will seek a decision by the Board of Directors.
6. MAGS Members will not visit (in advance) a collecting site once it is scheduled and published as a club field trip. Exceptions are public and/or fee places or locations with multiple collecting

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Field Trip Rules sites. A Mem-
Continued from P. 9 ber who is un-
sure of the loca-
tion will seek a decision by the
Board of Directors.

- 7. Do not go to a site ahead of the group on the day of the field trip. Meet and convoy with the rest of the group so that everyone will have equal access to the site.
- 8. Field trip insurance is for club approved field trips and events. It does not cover individuals nor is it transferable to another club's field trips or activities.

Show Volunteer Prizes



Sign up to volunteer for the Show (see P. 1) to be eligible to win one of these prizes.

Harder Than Diamonds

Matthew Lybanon, Editor

Everybody knows that diamond is the hardest material. But “everybody” may be wrong.

The gemstone lost its title of the “world’s hardest material” to man-made nanomaterials (e. g. Borazon, cBN) some time ago. Now a rare natural substance looks likely to leave them all far behind, at 58% harder than diamond.

By considering large compressive pressures under indenters (hardness testers), scientists have calculated that a material called wurtzite boron nitride (w-BN) has a greater indentation strength than diamond. The scientists also calculated that another material, lonsdaleite (also called hexagonal diamond, since it’s made of carbon and is similar to diamond), is even stronger than w-BN and 58% stronger than diamond, setting a new record.

This analysis marks the first case where a material exceeds diamond in strength under the same loading conditions, explain the study’s authors, who are from Shanghai Jiao Tong University and the University of Nevada, Las Vegas.

The first, wurtzite boron nitride, has a similar structure to diamond, but is made up of different atoms. The second, the mineral lonsdaleite, or hexagonal diamond, is made from carbon atoms just like diamond, but the atoms are arranged in a different shape. Only small amounts of wurtzite boron nitride and lonsdaleite exist naturally or have been made in the lab, so until now no one had realized their superior strength. Rare mineral lonsdaleite is sometimes formed when meteorites containing graphite hit Earth, while wurtzite boron nitride is formed during volcanic eruptions that

produce very high temperatures and pressures.

Wurtzite boron nitride may turn out most useful of the two, because it is stable in oxygen at higher temperatures than diamond. This makes it ideal to place on the tips of cutting and drilling tools operating at high temperatures, or as corrosion-resistant films on the surface of a space vehicle, for example.

The conclusion that these materials are harder than diamond comes from a calculation (since the materials are extremely rare). From the reference’s abstract, “We show by first-principles calculations that large normal compressive pressures under indenters can compel w-BN into a stronger structure through a volume-conserving bond-flipping structural phase transformation during indentation which produces significant enhancement in its strength, propelling it above diamond’s. We further demonstrate that the same mechanism also works in lonsdaleite (hexagonal diamond) and produces superior indentation strength that is 58% higher than the corresponding value of diamond, setting a new record.”

Until recently, normal compressive pressures under indenters have not been included in the calculations of ideal shear strengths of crystals from first principles, but latest developments have enabled researchers to consider their effects, resulting in surprising discoveries like the one shown here. Still, experimenting with w-BN and lonsdaleite will be challenging, since both materials are difficult to synthesize in large

Continued, P. 11

Harder Than Diamonds quantities.
Continued from P. 10 However,

another recent study has taken a promising approach to producing nanocomposites of w-BN and c-BN, which may also provide a way to synthesize nanocomposites containing lonsdaleite and diamond.

Ref: Pan, Zicheng; Sun, Hong; Zhang Yi; and Chen, Changfeng. "Harder than Diamond: Superior Indentation Strength of Wurtzite BN and Lonsdaleite." *Physical Review Letters* 102, 055503 (2009).

New Patagonia Dino

Matthew Lybanon, Editor

Patagonia is a sparsely populated region at the southern end of South America, shared by Argentina and Chile. The region comprises the southern section of the Andes mountains and the deserts, pampas, and grasslands to the east. Patagonia is one of the few regions with coasts on three oceans, with the Pacific Ocean to the west, the Atlantic Ocean to the east, and the Southern Ocean to the south.

The Mesozoic and Cenozoic deposits of Patagonia have revealed a most interesting vertebrate fauna. The ones that capture the public's fancy are—not surprisingly—dinosaurs.

Charles Darwin's voyage on the Beagle lasted almost five years, sailing from Plymouth Bay, England, on December 27, 1831, and arriving in Falmouth on October 2, 1836. Its first landfall in South America was in 1832, and Darwin spent considerable time on land—much of it in Patagonia. Darwin



found this area to be of great geological appeal that lent itself to the field application of the new knowledge acquired through the recent publication of the first volume on geological principles by the geologist Charles Lyell. It was here where he found enormous fossils of immense, extinct quadrupeds

The June 2014 issue of MAGS Rockhound News contained an article on the discovery in Patagonia of what was then (and still may be) thought to be the biggest dinosaur known (the previous "biggest" was also excavated in Patagonia). A program at the March 2018 Membership Meeting included a description of a visit to the museum in Patagonia whose paleontologists excavated that dinosaur skeleton.



Now, paleontologists have uncovered a dinosaur unlike anything


ever seen before. Alive some 140 million years ago, these herbivores featured long, forward-pointing spikes running along their necks and backs. These spikes may have served a defensive role, but their exact purpose is a mystery. The new species of dinosaur is called *Bajadasaurus pronuspinax*. "Bajadasaurus" refers to the geological formation where its fossils were found, the Early Lower Cretaceous Bajada Colorada Formation in (where else?) Northern Patagonia, Argentina. "Pronuspinax" means "bent over forward spine," owing to its most distinctive feature. The fossilized remnants of this creature, including a nearly complete skull with some teeth, were uncovered in 2013 by paleontologists from several Argentina institutions.

Bajadasaurus was a sauropod. It lived 140 million years ago in what is now Argentina, and it belonged to a subgroup of sauropods called dicraeosaurids—medium-sized sauropods with distinctive vertebrae and long spines along their necks and backs. Analysis of the *Bajadasaurus* skull and teeth suggests they grazed on low-lying plants. Their eye sockets were located near the roof of the skull, allowing them to keep watch for predators while they munched on foliage.

Ref: Pablo A. Gallina, Sebastián Apesteguía, Juan I. Canale & Alejandro Haluza, *A new long-spined dinosaur from Patagonia sheds light on sauropod defense system. Scientific Reports* 9, Article number: 1392 (2019). <https://doi.org/10.1038/s41598-018-37943-3>

MAGS At A Glance

March 2019

SUNDAY	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
24	25	26	27	28 Board Meeting, 6:30 pm, St. Francis Hospital (March Meeting)	1	2
3	4	5 	6	7	8 Membership Meeting, 7:00 pm, "Crater of Diamonds"	9
10	11	12	13	14	15	16 MAGS Field Trip, Batesville, AR, 9:30 am
17 	18	19	20 SPRING	21	22	23 DMC Field Trip, Ross Creek, Gruetli-Lager, TN, 9:00 am
24	25	26	27	28	29	30
31 Show Committee Meeting, 6:30 pm, Agricenter	1	2	3	4	5	6

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