



# EARTHQUAKE

*e-Newsletter about what's movin' and shakin' at the Earth Science Museum*

Earth Science Museum, 3215 W. Bethany Home Rd., Phoenix, AZ 85017  
[www.earthsciencemuseum.org](http://www.earthsciencemuseum.org), [scote@earthsciencemuseum.org](mailto:scote@earthsciencemuseum.org), 602-973-4291

January 2019  
Volume 8, Issue 1

## ESM Outreach Update:

By Mardy Zimmermann, Outreach and Education Coordinator

January was a very busy month for ESM Outreach. The Flagg Show started us off with several activities. We did 308 Egg Cartons, which is down from previous years, but we had a cloudy Sunday and no longer have large Scout Troops as in the past. In addition, we served four teachers with kits and sample bags of 10 to 20 specimens for a variety of rocks, fossils and minerals. A big hit was our table of free information and geology booklets from AZGS. The Fluorescent tent was popular and had 1,846 visitors. We tried, but could not find many fossils that had more than a slight fluorescence. Big thanks to all who helped with these activities.

We have two science fairs, one elementary and one middle school, toward the end of January giving us the opportunity to test our new activity, Volcanoes and their history. We may have different activities for the different grade levels in the future. This is our year to experiment with ideas, including using a volcano model. Lynne and Terry Dyer and Doug Duffy and Shirley Cote have also been attending events and science fairs.

The end of January puts us on the brink of being able to inventory and organize our materials. The garage (24' x 30') will become ESM's home shortly. We will be very busy as storage of materials for our current projects will become easier, and we will have work-space for projects. Dick Z. has been getting shelves and cabinets at sales,

for his huge garage which is almost done, and we will be able to use some of them. An ESM work party will be coming up!

ESM furnished a Stem In-service for Teachers in Tucson with 35 sets of our Teacher Kits on Jan. 22. Mike Conway, AZGS, picked the kits up and took them to Tucson. This is a second outreach with kits we have done; we supplied another group with 24 last year. It helps us extend our service beyond the Phoenix area.

Lynne & Terry Dyer gave an earth science program to 10 adults at Rio Salado RISE in Surprise on January 15<sup>th</sup>.



On January 17th, they attended the Fulton Elementary Science Fair STEM event. 205 students and adults enjoyed the Dyer's earth science displays.

On Jan 23, they had 172 students and adults visit their display at Imagine East Mesa Science Fair.

The Dyer's upcoming events: 2/23 Gilbert Outdoors Expo at Riparian Preserve; 3/2 Webeloree in Mesa; and 3/9 at Pinal Geology Museum.



We are deeply saddened by the passing of long time ESM supporter and friend Janet Stoepfmann on Friday, January 4, 2019, after her courageous battle with cancer. Janet and her husband Ken Ryan administrators of the East Valley Academy visited the AZ Mining and Mineral Museum with their students each year when the museum was open.

### ***Janet's Life***

*Janet Stoepfmann was one who loved birds, rocks and minerals, travel, the zoo, Bach organ chorales and music by Domenico Scarlatti. Janet loved to play the harpsichord and collected gems and minerals. But her greatest passion was education and teaching. She and her husband Ken Ryan have dedicated the past 19 years of their lives teaching at East Valley Academy, a K-6 charter school in Mesa, AZ.*

*Janet would light up inside when talking about topics she was passionate about - and her knowledge was vast. She could intelligently and articulately discuss virtually any topic. This enthusiasm inspired her many students. She truly bore the light of knowledge and will be sorely missed.*

*Janet also authored two books: a children's book, "Ta'Aroa's Light", published in 2017 and based on a true story; as well as "Dirt for Making Things: An Apprenticeship in Maricopa Pottery", published in 1995.*

*She and her husband met at the Phoenix Zoo and were later married there in 1986. They were married for 32 years.*

*Janet earned her B.A. in Music from Barry College, Miami, Fl, and her M.M. from the University of South Florida, Tampa, FL. Her background experiences included: (a) Instructor at Phoenix College, Scottsdale Community College, Judson and Tesseract private schools; (b) classical music radio program host and writer; and (c) volunteer coordinator with Tempe Community Council and Arizona Project Challenge (a military youth corps/GED program). She was the Co-director (with her husband) of East Valley Academy Charter School, Mesa, AZ, since 1999.*

*Janet's husband, Mr. Ken Ryan has an A.S. and a B.A. in Chemistry, with minors in Mathematics and Anthropology from Arizona State University. His background experiences include: (a) Interpreter at Casa Grande Ruins, Coolidge, AZ (Dept. of Interior, National Park Service); (b) Naturalist for The Phoenix Zoo and Director of the Zoomobile Program; (c) Lead Instructor and Instructor Trainer, OSHA Division, Arizona Chapter National Safety Council; and (d) Level IV Arizona Supreme Court Certified Defensive Driving Course Instructor.*

## Flagg Show Highlights

By Harvey Jong

For the past several Flagg Shows, the ESM has featured a free fluorescent mineral display. Since the 2019 show theme was “Fossils of Arizona”, we thought it would be appropriate to exhibit a case of fluorescent fossils. Mardy Zimmermann and I, however, suspected that this might be a challenge. We searched through boxes and boxes of fossils and managed to find only about 20 specimens that “glowed”. Most of these pieces were either very tiny or very large. Some had rather interesting patterns or shapes, but none were particularly bright. We finally settled on the following five fossils:



### Fluorescent Fossils

Top row: baculite section, shark's tooth, petrified wood

Bottom row: dinosaur bone, calcite in clam shell

For the rest of the display, we decided on an assortment of mostly Arizona fluorescent minerals that haven't been shown before. A few favorites, such as eucryptite and fluorite, were also included. While these specimens provided a nice array of different colors and highlighted the difference in brightness between minerals and fossils, the fossil theme now seemed to be “lost”.

So, to reconnect with the theme, we decided to add some fluorescent dinosaur models. This proved to be another challenge as we discovered that fluorescent dinosaurs are not widely available at either toy or craft stores. A trip to the dollar store along with some fluorescent paint provided a solution to this dilemma. For added contrast, the glowing dinos would be walking on a bright green landscape of small chalcedony roses.



### March of the Fluorescent Dinosaurs

Dimetrodon, stegosaurus, and tyrannosaurus

Here is a view of the overall display:



### Fluorescent Fossil, Mineral, and Dinosaur Display

The exhibit was well received where 1,846 visitors stopped by to check out what was glowing in the black tent.



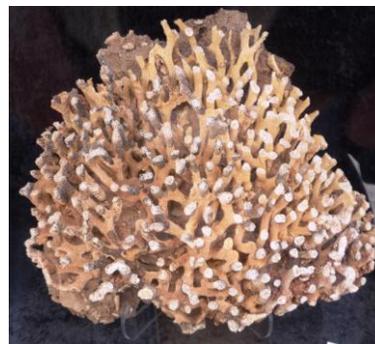
ESM Fluorescent Mineral Display at the 2019 Flagg Gem & Mineral Show



New this year at the Flagg Show, were the Arizona Museum of Natural History & Southwest Paleontological Society combined booth.



Syringopora sp. coral, John Christian collection



Fossil coral  
Dr. Jeff and Edith Langland collection



Arizona Museum of Natural History & Southwest Paleontological Society booth



Faden quartz for sale at the Flagg Mineral Foundation booth

Faden quartz is usually tabular group of quartz crystals with a white thread-like or string-like zone running through the interior. The term faden is a German word for "thread". They are found in the Alpine region of Europe, Pakistan, Russia and in Arkansas. Read more at

<http://www.geologyin.com/2018/05/what-is-faden-quartz-and-how-does-it.html#L8tWfrrL614jB110.99>



Arizona Museum of Natural History & Southwest Paleontological Society booth

## ESM Receives Donations at the Flagg Show

By Harvey Jong

The sharing of minerals and knowledge is one of the truly wonderful aspects of the Flagg Gem & Mineral Show. The ESM has been very fortunate in receiving generous donations of materials at each show, and the 2019 contributions include:

### Tugtupite from Greenland

William Rohtert, a geologist and gemologist, has been exploring Greenland in search of the rare gemstone mineral, tugtupite, which is known locally as “Tuktu”. He was involved with the recent acquisition by Smithsonian Institution’s National Museum of Natural History of Tuktu suite. The collection includes gem-grade rough, cabochons, jewelry, and a 3.2 carat faceted stone:



Part of the Smithsonian’s Tuktu Suite  
Photo courtesy of William Rohtert

At the Flagg Show, he donated the following unpolished, 12 gram tugtupite slab:



Tugtupite Slab Viewed Under White LED Light  
Dimensions: 4.2 x 3.5 cm x 0.5 cm thick

Tugtupite exhibits some amazing optical properties:

1. Tenebrescence where samples change color from white or light pink to vivid red or purple-red when exposed to sunlight or shortwave ultraviolet light. This color change is reversible over a period of weeks to months.
2. Fluorescence with an extremely bright pink to red response under shortwave ultraviolet (UV) and a strong orange glow under long wave. (See photos below.)
3. Phosphorescence where the glow gradually fades after an UV light has been removed.



Tugtupite Slab Viewed under Shortwave UV



Tugtupite Slab Viewed under Longwave UV

Many thanks to William for this incredible specimen!

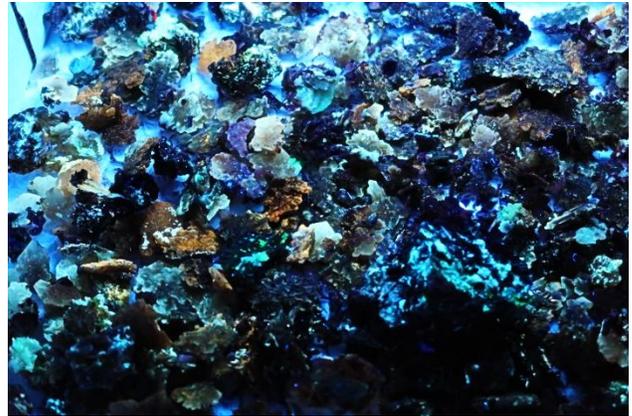
### Cerussite from Amethyst Hill

Stan and Sue Celestian provided a mineral found closer to home - cerussite from Amethyst Hill which is located northeast of Wickenburg. This locality is known for gray to dark brown, reticulated cerussite crystals. The crystals often involve repeated twins at 60° angles ("sixlings") which result in a snowflake-like appearance.



Flat of Amethyst Hill Cerussite Specimens

The cerussite is associated with baryte, and some samples, if relatively free of iron, may fluoresce under short- and longwave ultraviolet.



Crystals under Longwave UV

Thanks Stan and Sue!

### Minerals from the Flagg Foundation

The Flagg Foundation contributed two flats of miscellaneous minerals. A note of thanks goes to Bill Yedowitz for keeping the ESM in mind for donations.





## Arizona Rocks 68

Text and photos by Ray Grant

Desert varnish is a coating that rocks in arid climates get on their surface. Originally it was thought to be from the weathering of the underlying rock, but more recent studies show the varnish to be more complicated. It is composed of clay, manganese and iron oxides, bacteria, and a trace of a few other things.

The color of the varnish is tan, brown, red or black. The most obvious ones are the red (iron) and black (manganese). Most researchers now agree that when the rocks are wet, windblown clay will stick to the rock. This clay will then serve as a home for a number of different bacteria and these bacteria oxidize the iron and manganese to get energy and give the resulting coating the red and or black color. If the area or the rock exposure gets too much rain or water, the varnish will be washed away.

For thousands of years people have chipped away the darker varnish to expose the lighter rock underneath. These petroglyphs served as art, messages, and a record of the people's history. How long it takes the varnish to form seems to depend on a number of factors mainly related to climate, but some of the oldest petroglyphs have almost disappeared because new varnish has formed. This suggests that it takes at least thousands of years to form.



Desert Varnish chipped away to form petroglyphs at Newspaper Rock in Petrified Forest National Park



Desert Varnish on the walls at Canyon de Chelly above White House Ruin



## AZ Mining, Mineral & Natural Resources Educational Museum Update November 2018

<http://tinyurl.com/SupportMM-NREMuseum>

Guest Article and pictures by Charlie Connell

### Work Activities Saturday, January 26, 2019

We had a small, but effective (8) workers that arrived at about 08:30. They were Charlie Connell, Rick Herrem, Roger Camplin, Terry Horne, Doug Duffy, Shirley Cote, Bill Yedowitz and our leader Catie Carter.

We worked on the following items, re-key of locks outside the museum, trip to the bone yard, installed new Pit winch and transporter mechanism, unsuccessful spraying of preservative on the stamp mill, installing the rest of the outside displays security chains recommended by Risk Management and setting up for this Fridays presentation from Brooks Jeffery, UA VP for Research and Museum Project Head on the current status of the project.

During this time Catie, Shirley and Doug conducted a walk around of the museum to Identify projects for our February work day. They found many items that a larger group could work on for the next work day. Catie will finalize the work list and come up with some schedule dates. Stay tuned for the specifics when the activity is put together.

We wrapped up our work activities at about 1 PM.

Catie replacing locks. This included replacing old locks with combination locks for the Museum Yard perimeter locks, stamp mill & Hoist house, and Bone Yard locks.



Rick installing the first of double gate chains to allow access of volunteers to the operation area. This will hamper access of children to that exclusion area



Finishing the last of (5) exclusion chains. This will satisfy Risk Managements observations



Roger unpacking and starting assembly of the winch.



Bill and Rick installing the winch on the 1 3/8" rod support.



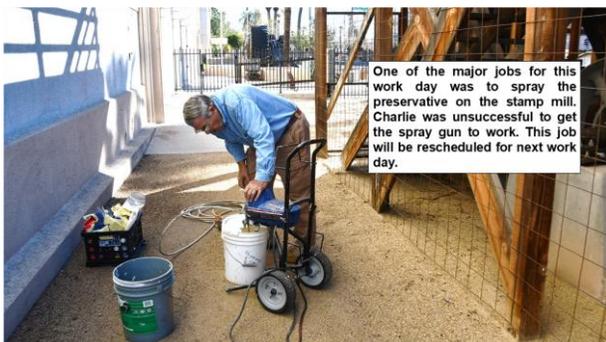
Installing the winch bucket transfer holder device on to the winch cable.



Testing the bucket lifting apparatus.



Making final adjustments of the clearance for the transfer device



One of the major jobs for this work day was to spray the preservative on the stamp mill. Charlie was unsuccessful to get the spray gun to work. This job will be rescheduled for next work day.



Shirley, Bill Doug and Terry emptied a steel drum that contained amethyst. There are several more drums that need to be emptied.

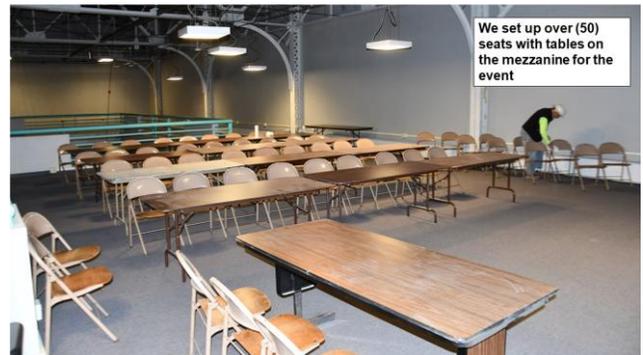
Doug Duffy photo



Doug Duffy photo



Everyone working hard to finish the task.



We set up over (50) seats with tables on the mezzanine for the event



The crew (left to right) Doug Duffy, Shirley Cote, Charlie Connell, Bill Yedowitz, Roger Camplin and Rick Herrem. Not in picture Catie (photographer) and Terry Horne

If you are interested in volunteering at the next museum workday, please contact Charlie Connell at [minercon@aol.com](mailto:minercon@aol.com) or Catie Carter at [cscarter@email.arizona.edu](mailto:cscarter@email.arizona.edu).

**Support the Museum**

<http://tinyurl.com/SupportMM-NREmuseum> your donations are appreciated!



# Rock & Gem Clubs



## Apache Junction Rock & Gem Club

Meetings are on the 2<sup>nd</sup> Thursday  
 Next Meeting: February 14, 2019, 6:30 pm  
[www.ajrockclub.com](http://www.ajrockclub.com)  
 @ Club Lapidary Shop  
 2151 W. Superstition Blvd., Apache Jct.



## Daisy Mountain Rock & Mineral Club

Meetings are on the 1<sup>st</sup> Tuesday  
 (unless a Holiday then 2<sup>nd</sup> Tuesday)  
 Next Meeting: February 5, 2019, 6:30 p.m.  
[www.dmrmc.com](http://www.dmrmc.com)  
 @ Anthem Civic Building  
 3701 W. Anthem Way, Anthem



## Maricopa Lapidary Society, Inc

Meetings are on the 1<sup>st</sup> Monday  
 (unless a Holiday then 2<sup>nd</sup> Monday)  
 Next Meeting: February 4, 2019, 7:00 pm  
[www.maricopalapidarysociety.com](http://www.maricopalapidarysociety.com)  
 @ North Mountain Visitor Center  
 12950 N. 7<sup>th</sup> St., Phoenix



## Mineralogical Society of Arizona

Meetings are on the 2<sup>nd</sup> Thursday  
 (February meeting on the 3<sup>rd</sup> Thursday)  
 Next Meeting: February 21, 2019, 7:00 pm  
[www.msaz.org](http://www.msaz.org)  
 @ Franciscan Renewal Center,  
 5802 E. Lincoln Dr., Scottsdale

# Next Meeting



## Pinal Gem & Mineral Society

Meetings are on the 3<sup>rd</sup> Wednesday  
 Next Meeting: February 27, 2019, 7:00 pm  
[www.pinalgemandmineralsociety.org](http://www.pinalgemandmineralsociety.org)  
 @ Artisan Village  
 351 N. Arizona Blvd., Coolidge



## West Valley Rock & Mineral Club

Meetings are on the 2<sup>nd</sup> Tuesday  
 Next Meeting: February 12, 2019, 6:30 pm  
[www.westvalleyrockandmineralclub.com](http://www.westvalleyrockandmineralclub.com)  
 @ Painted Desert Academy  
 2400 S. 247<sup>th</sup> Ave., Buckeye, AZ



## White Mountain Gem & Mineral Club

Meetings are on the 1<sup>st</sup> Sunday  
 (unless a Holiday then 2<sup>nd</sup> Sunday)  
 Next Meeting: February 3, 2019, 1:00 pm  
[www.whitemountain-azrockclub.org](http://www.whitemountain-azrockclub.org)  
 @ VFW Hall  
 381 N. Central, Show Low



## Wickenburg Gem & Mineral Society

Meetings are on the 2<sup>nd</sup> Friday  
 (February & December on the 1<sup>st</sup> Friday)  
 Next Meeting: February 1, 2019, 7:00 pm  
[www.wickenburggms.org](http://www.wickenburggms.org)  
 @ Coffinger Park Banquet Room  
 175 E. Swilling St., Wickenburg



## Pinal Geology & Mineral Museum

### Pinal Museum and Club News

351 N. Arizona Blvd., Coolidge, AZ  
**Next Pinal Gem and Mineral Club meeting**  
**Wednesday, February 27, 2019**  
[www.pinalgemandmineralsociety.org](http://www.pinalgemandmineralsociety.org)



Pinal Gem and Mineral Society and Pinal Geology and Mineral Museum upcoming events:  
 Sunday, February 17 - Program "All Things Rocks" Geology of Pinal County and the Florence area by Ray Grant, 2PM at Pinal County Historical Museum, 715 South Main Street, Florence; free admission.

Saturday, February 23 - 9 to 12 AM, Class "How to identify minerals"

Saturday, March 9 - 9 AM to 2 PM, Touch Outer Space and Pinal Gem and Mineral Show

The Museum is open on Fridays and Saturdays from 10 a.m. to 2 p.m. (September - May)  
 We always need volunteers to open the Museum on those days if you can spare one day a month or more to help us please let me know at [raycyn@cox.net](mailto:raycyn@cox.net). If we have more volunteers, we will try to open more days. Otherwise, tours are possible by calling (520)723-3009 (Coolidge Chamber of Commerce) to schedule a time.



**Rainbow Petrified Wood at Pinal Geology Museum**  
 Photos by Shirley Coté



**Dinosaur corner at the Pinal Geology Museum**

**65th Annual  
Tucson Gem and Mineral Show®  
February 14 - 17, 2019**

**WULFENITE  
IS LOVED**

Tucson Convention Center  
260 South Church Avenue • Tucson, Arizona 85701

Thursday: 10:00 a.m. - 6:00 p.m.  
Friday: 10:00 a.m. - 6:00 p.m.  
Saturday: 10:00 a.m. - 6:00 p.m.  
Sunday: 10:00 a.m. - 5:00 p.m.

Tickets go on sale Thursday, January 16, 2019 at all TCC Ticket outlets.

Admission is \$13.00 (\$12.00 plus \$1.00 facility tax) per adult.  
Children 14 and under free with a paying adult

Friday, February 15, 2019 is Military (active & retired) and Senior Citizens Day (62 and older),  
receive \$2.00 off the regularly priced ticket (cannot be used with any other discount).

2-day tickets will be available for a cost of \$22.00 (cannot be used with any other discount).

Clip this for a \$2.00 OFF coupon on one adult General Admission ticket!  
(Cannot be used with any other discount.)

**TUCSON  
GEM & MINERAL  
SOCIETY**

(520) 322-5773  
www.tgms.org  
5727 E. Blackledge Drive  
Tucson, AZ 85714



Scan code for  
information on our  
Tucson Gem and  
Mineral Show!

**FEATURING:**  
Retail Dealers | Exhibits  
Jr. Ed. Area | FREE Lectures  
"Micro" Room  
Hourly Giveaways at the Raffle Booth  
Silent/Live Auctions  
Saturday Night Banquet & Awards



## Artisan Village of Coolidge presents

### INTRODUCTION TO GEOLOGY – MINERAL IDENTIFICATION



**DATE:** SATURDAY, FEBRUARY 23, 2019

**TIME:** 9:00AM-NOON

**COST:** \$20.00 (STUDENTS FREE WITH PAYING ADULT)

**LOCATION:** PINAL GEOLOGY AND MINERAL MUSEUM, ROOM 2  
ARTISAN VILLAGE OF COOLIDGE,  
351 N. ARIZONA BLVD., COOLIDGE, AZ

**INSTRUCTOR:** RAY GRANT

**CONTACT:** RAYCYN1@MAC.COM

The class will include lecture material and hands on work with specimens. It will cover properties of the most common minerals and how to identify them.

**PLEASE, PRE-REGISTER NOW AT: [WWW.ARTISANVILLAGEOFCOOLIDGE.ORG](http://WWW.ARTISANVILLAGEOFCOOLIDGE.ORG)**



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**4th ANNUAL  
TOUCH OUTER SPACE**

**PINAL  
GEM &  
MINERAL  
SHOW**

**MARCH 9, 2019**

**PINAL GEOLOGY & MINERAL MUSEUM: 351 N. ARIZONA BLVD, COOLIDGE, AZ.  
9:00 AM - 2:00 PM**

DR. CARLETON MOORE WITH PIECES OF MARS, THE MOON, THE ASTEROID VESTA AND METEORITES.  
MINERAL DEALERS, EARTH SCIENCE EDUCATION, TOUR MUSEUM.



# 2019 ANTHEM GEM & MINERAL SHOW

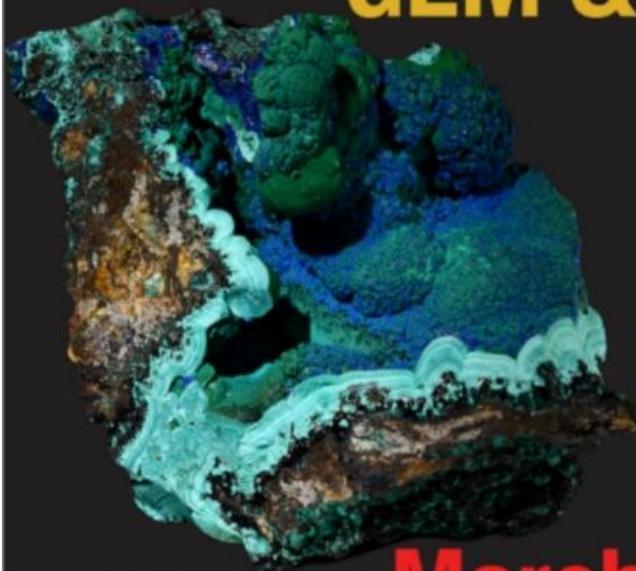


Photo by Stan Celestian

**March 16th-17th**

**@ Boulder Creek High School  
40404 N. GAVILAN PEAK PKWY  
ANTHEM, AZ**

**SATURDAY MARCH 16 9am—5pm**

**SUNDAY MARCH 17 10am—4pm**

**[www.dmrmc.com](http://www.dmrmc.com)**

Find us on 

**Kids Activities, Jewelry, Gems, Minerals, Fossils,  
Fluorescents, Beads, Wire Wrapping, Geodes, Raffles**

**Adults \$4, Seniors and Students \$2, and Kids 12 and under are FREE**

**ESM's Meeting Notice**

ESM's next meeting will be at the Burton Barr library, 1221 N Central Ave, Phoenix, on Tuesday, March 19, 2019, at 6:30 p.m. Room B.

**BECOME A MEMBER!**  
Join the Earth Science Museum's



**IS IT TIME TO RENEW YOUR MEMBERSHIP?**  
Please renew today! 😊😊😊

----- cut here -----  
**ESM Earth Science Investigation  
Team Membership Form**  
\_\_\_\_\_ **New Member**      \_\_\_\_\_ **Renewal**

Membership levels:  
\_\_\_\_\_ **ESI Family \$20**  
\_\_\_\_\_ **ESI Individual \$10**

**Membership benefits:**

- ◆ Monthly e-newsletter *Earthquake*
- ◆ Official team membership card
- ◆ Knowledge that your contribution is making a difference in earth science education.

**MANY THANKS TO OUR MAJOR DONORS!**

- AZ Leaverite Rock & Gem Society
- Flagg Mineral Foundation  
[www.flaggmineralfoundation.org](http://www.flaggmineralfoundation.org)
- Friends of the AZ Mining & Mineral Museum
- Maricopa Lapidary Society  
<http://maricopalapidarysociety.com/>
- Mineralogical Society of AZ  
[www.msaz.org](http://www.msaz.org)
- Payson Rimstones Rock Club
- Sossaman Middle School
- White Mountain Gem & Mineral Club  
[www.whitemountain-azrockclub.org](http://www.whitemountain-azrockclub.org)
- Wickenburg Gem & Mineral Society  
<http://www.wickenburggms.org>  
[www.facebook.com/pages/Wickenburg-Gem-and-Mineral-Society/111216602326438](https://www.facebook.com/pages/Wickenburg-Gem-and-Mineral-Society/111216602326438)
- Staples Foundation  
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**Earth Science Museum**

3215 W. Bethany Home Rd.  
Phoenix, AZ 85017

**Phone:**

602-973-4291

**Editor E-Mail:**

scote@earthsciencemuseum.org

*We're on the Web!*

Visit us on  and at:  
[www.earthsciencemuseum.org](http://www.earthsciencemuseum.org)

**Mission**

Our Mission is to excite and inspire all generations about earth sciences through educational outreach.

**Vision**

We envision a community where students and the general public have curiosity about, passion for, and understanding of the underlying principles of earth sciences.

For more information about the ESM, how to become a member or how to arrange for a school visit or Community function, go to:  
[www.earthsciencemuseum.org](http://www.earthsciencemuseum.org).

**NOTICE:**

ESM's next meeting will be at the Burton Barr library, 1221 N Central Ave, Phoenix, on Tuesday, March 19, 2019, at 6:30 p.m. Room B.

**THANK YOU FOR YOUR CONTINUING INTEREST & SUPPORT!!!**

**EARTH SCIENCE MUSEUM  
NON-PROFIT BOARD OF DIRECTORS**

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Mardy Zimmermann	VP Outreach
Robin Evans	Treasurer
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Bob Holmes, Chris Whitney-Smith

**Earth Science Museum**

3215 W. Bethany Home Rd.  
Phoenix, AZ 85017

