



# 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

November 2013  
Volume 2, Issue 11

## ESM EVENTS

By Shirley Coté, Ray Grant, Harvey Jong and Alice LaBonte

### Upcoming Family Events

Location: Arizona Museum of Natural History, 53 N. Macdonald, Mesa, AZ

Event: Geology Day - December 7<sup>th</sup>

Preregistration is required. Please contact Alison Stoltman 480-644-3553 or by e-mail at [Alison.Stoltman@mesaaz.gov](mailto:Alison.Stoltman@mesaaz.gov).

The museum will open early, at 9 a.m., for this special geology program and the admission is only \$2 for museum members and \$6 for nonmembers.

Unique, fun, hands-on learning experiences are designed for scouts, but are sure to capture the imagination and bring out the geologist in any child.

Webelos - plan to earn your geology pin while having fun making a rock collection, learning about volcanoes and making fossil imprint casts.

From 9 to 11:30 a.m., Earth Science Museum personnel will be on hand to help you build your very own mini mineral collection by choosing from a large assortment of rocks, minerals and fossils.

Other fun activities include large floor puzzles of different dinosaurs and the Paleo Dig Pit.

To view a complete list of activities, please visit their website at [www.azmnh.org](http://www.azmnh.org).

### Flagg Gem and Mineral Show

Friday, Saturday & Sunday

January 3, 4, 5, 2014 from 9-5 each day

Mesa Community College, southwest parking lot, Dobson Rd. north of Route 60 Superstition Freeway

FREE ADMISSION & PARKING

Free activities for children

Free mineral samples for teachers and children

Exhibits and special displays

Booths by local mineral and lapidary clubs, the Superstition Mountain Lost Dutchman Museum, the Cave Creek Museum and the Earth Science Museum

### EarthFest

We had another great showing this time at Arizona Forward's EarthFest Educator's Night at the Phoenix Zoo in October.



ESM's President Harvey Jong and ESM's Outreach Coordinator Mardy Zimmermann, met with Arizona educators to get the word out about our hugely successful outreach education program.

## Archbold Economic Geology Collection

On November 17, seven members of ESM's board and Flagg Mineral Foundation spent a few hours discovering the contents of 12 of the 35 boxes of rocks and minerals in the N. L. Archbold economic geology collection.



Pictured - Harvey, Ray, Dana, Doug at the storage facility  
Photo - S. Cote

The collection was donated to the ESM by the Flagg Mineral Foundation earlier this year. Once the rocks and minerals were unwrapped, the group discovered that the newspapers were from 1994 and the specimens were from all different parts of the US. There were rocks from Morenci, AZ to the Lake Superior region to Cornwall, PA. Specimens found included banded iron formations, other oxides, sulfides and pegmatites.

Most pegmatites are composed of quartz, feldspar and mica; in essence granite, an intrusive igneous rock, but the interlocking crystals are larger than 5 cm.

Banded iron formations (BIF's) are distinctive sedimentary rock units almost always of Precambrian age up to 3.7 billion years old. Typical BIF's consist of repeated, thin layers of iron oxide, either magnetite or hematite, alternating with bands of iron-poor shales and cherts.

Banded layers rich in iron were a common feature in sediments for much of Earth's early history but are now rare.



2.1 billion year old banded iron formation - Photo Wikipedia

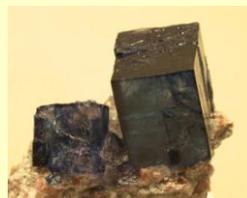
The world's iron and steel industry is based almost exclusively on iron ores associated with banded iron formations like those located in the Lake Superior region and in Western Australia.

## New Mexico Mineral Symposium

By Ray Grant

The 34<sup>th</sup> Annual New Mexico mineral symposium was held on November 9 and 10, 2013, in Socorro, NM. Fifteen great talks were given on Saturday and Sunday morning to a crowd of over 200 people. The symposium is always the weekend closest to Veterans Day in November. You can go to [geoinfo.nmt.edu](http://geoinfo.nmt.edu) and click on Mineral Museum and then Mineral Symposium to get information. Also, if you click on abstracts you can find the abstracts for all the past symposiums.

Arizona is always well represented; this year there were three talks about Arizona minerals and localities. The opening talk was "Blue Ice to Frozen Blue" about the deep blue halite from the Carlsbad potash district in New Mexico. An exhibit of these unique crystals was also displayed at the symposium. The featured speaker was Allan Young who spoke on "Collecting Thumbnail Minerals". The NM Symposium is always great and worth the effort to attend.



Blue halite  
Carlsbad Potash district  
Philip Simmons specimen  
Photo by Ray Grant



## Arizona Rocks 6

Text by Ray Grant and Wikipedia, photos by Ray Grant

I wanted to add more about obsidian, briefly covered in Arizona Rocks 2. Obsidian forms when silica rich magma cools very fast, so fast those crystals can't form. This could happen if the volcanic eruption is under water or ice. Millions of years ago there was more obsidian in Arizona, but it is unstable and over time it changes from glass to form perlite. A technique for dating artifacts made from obsidian uses this hydration rate.

The best-known Arizona occurrence of obsidian is the Apache tears location near Superior. The obsidian formed from a volcanic eruption there about 15 million years ago. Since then, the hydration process has changed most of the obsidian to perlite and only small round remnants of the obsidian are left, the Apache tears. The perlite is being mined there for a light weight aggregate material.

A website, Sources of Archaeological Obsidian in the Greater American Southwest ([www.swxrflab.net/swobsrscs.htm](http://www.swxrflab.net/swobsrscs.htm)) has an interactive map of the obsidian locations in the southwest. The map has nine locations in Arizona and a couple on the New Mexico - Arizona border, and many others in the surrounding states. There are also a couple of additional Arizona locations in the text. You click on the location on the map and a detailed description of each of the locations comes up. There is township, range, and section data given for each locality, a fairly detailed description of what was found there and in some cases photographs and maps. There is a lot of chemical data for the obsidian as the goal was to identify the sources of obsidian used by prehistoric people. The obsidian from each of the various localities has a unique chemical composition. For example 220 samples of obsidian were analyzed from Pueblo Grande in Phoenix. Four were from the

Sand Tanks location, 67 were from the Saucedo Mountains locality and so forth. Obsidian was important to the native people and collected and exchanged all over the southwest.



Obsidian, Apache tears from Superior, AZ



Obsidian in perlite from Superior, AZ (the whole specimen was originally obsidian, but has changed to perlite by hydration).

Pure obsidian is usually dark in appearance, though the color varies depending on the presence of impurities. Iron and magnesium typically give the obsidian a dark brown to black color. Very few samples are nearly colorless. In some stones, the inclusion of small, white, radially clustered crystals of cristobalite in the black glass produce a blotchy or snowflake pattern (snowflake obsidian). It may contain patterns of gas bubbles remaining from the lava flow, aligned along layers created as the molten rock was flowing before being cooled. These bubbles can produce interesting effects such as a golden sheen (sheen obsidian) or an iridescent, rainbow-like sheen (rainbow obsidian).

# EXPLORE YOUR WORLD!

## Arizona Museum of Natural History

Text K. Christopher, AzMNH & photos from Wikipedia

The Arizona Museum of Natural History is located at 53 N. Macdonald Dr. in Mesa, AZ.

Museum hours are:

Tues. - Fri: 10 a.m. - 5 p.m.

Sat: - 11 a.m. - 5 p.m.

Sun: - 1 - 5 p.m.

On December 7, 2013, the Arizona Museum of Natural History will open their new exhibition "Cretaceous Seas".

During the Cretaceous Period (65.5-146 million years ago) the geography of the Earth was very different. The interior of what we know as the United States, including parts of Arizona was a large warm shallow sea called the Western Interior Seaway.

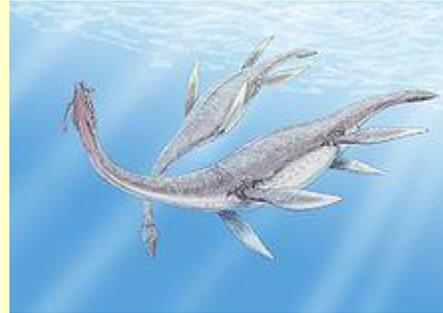
The Cretaceous Seas supported a wide range of large voracious predatory animals, including the long marine bony fish, *Xiphactinus*.



*Gillicus arcuatus* within the stomach of *Xiphactinus audax*, George F. Sternberg's most famous fossil find (The above specimen can be seen at the Sternberg Museum of Natural History in Hays, Kansas.)

During the Cretaceous Period, large predatory reptiles roamed the land and inhabited the seas. Sea reptiles included, mosasaurs, which were related to the modern-day monitor lizards such as komodo dragons. Another large sea reptile called

Plesiosaur brings to mind myths of the Loch Ness Monster.



Artist's reconstruction of *Plesiosaurus*

Other areas of interest in the museum include Dinosaur Hall, Dinosaur Mountain and the opportunity to put together dinosaur puzzles.



Dinosaur Hall - photo by S. Cote



Dinosaur Mountain - photo by S. Cote



Dinosaur puzzle - photo by S. Cote

**ESM's Upcoming Meeting**

The Earth Science Museum's next scheduled meeting is December 11<sup>th</sup> at the Burton Barr Library, located near Central Ave. and McDowel in Phoenix at 6:30 p.m. in Rm. B. Everyone is welcome to attend.

**Rock & Gem Shows**

**November 2013-December 2013**

**30-1-WICKENBURG, ARIZONA:** Show and sale; Wickenburg Gem & Mineral Show; Hassayampa Elementary School; 251 S. Tegner St.; Sat. 9-5, Sun. 10-4  
Wickenburg Gem & Mineral Society

**January 2014 - February 2014**

**Jan. 3-5-MESA, ARIZONA**  
Phoenix Area's Largest Gem and Mineral Show the **42nd FLAGG GEM AND MINERAL SHOW at MESA COMMUNITY COLLEGE.**  
Friday, Saturday, Sunday, January 3, 4, and 5, 2014, 9 a.m. to 5 p.m. each day  
**Free Admission and Parking**  
Go to [www.flaggshow.info](http://www.flaggshow.info) for more information and directions

**Jan. 1 - Feb. 28-QUARTZSITE, AZ**  
<http://xpopress.com/QZ-show-schedule.html>

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**ESM Earth Science Investigation  
Team Membership Form**

\_\_\_\_\_ New Member      \_\_\_\_\_ Renewal

Membership levels:

\_\_\_\_\_ **ESI Family \$20**

\_\_\_\_\_ **ESI Individual \$10**

\_\_\_\_\_ **ESI Student (16 & under) \$5**

Membership benefits:

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

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**MANY THANKS TO OUR MAJOR DONORS!**

AZ Leaverite Rock & Gem Society  
[www.azleaverite.org](http://www.azleaverite.org)

Flagg Mineral Foundation  
[www.flaggmineralfoundation.org](http://www.flaggmineralfoundation.org)

Friends of the AZ Mining & Mineral Museum

Maricopa Lapidary Society

Mineralogical Society of AZ  
[www.mineralogicalsocietyarizona.org](http://www.mineralogicalsocietyarizona.org)

White Mountain Gem & Mineral Club  
[www.whitemountain-azrockclub.org](http://www.whitemountain-azrockclub.org)

Wickenburg Gem & Mineral Society  
[www.facebook.com/pages/Wickenburg-Gem-and-Mineral-Society/111216602326438](http://www.facebook.com/pages/Wickenburg-Gem-and-Mineral-Society/111216602326438)

Staples Foundation  
[www.staplesfoundation.org](http://www.staplesfoundation.org)

Stan & Susan Celestian  
Russ Hart  
Debbie Michalowski  
Dennis & Georgia Zeutenhorst

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Name: \_\_\_\_\_

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W. Bethany Home Rd., Phoenix, AZ 85017

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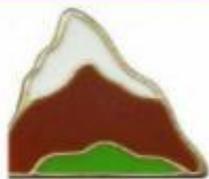
# The AzMNH

Presents

## Geology Day!



Learn about your favorite rocks and minerals! Have fun making a rock collection. Learn about volcanoes and make a plaster cast of a real fossil! This action packed morning will not only be fun, it will fulfill the requirements for a Geology Pin! This is one rock'n ROCK party that you won't want to miss!



Date: December 7, 2013

Time: 9:00am until 11:00am

Location: AzMNH 53 N. Macdonald, Mesa

Cost: \$6 per person or \$2 for members



To register, please contact the group booking line at 480-644-3553

*The tailgate show tradition continues!*

# 42<sup>ND</sup> ANNUAL FLAGG GEM & MINERAL SHOW



Top left: Grandview mine

Top right: 79 mine

Bottom left: Silver Bill mine

Bottom right: 79 mine

# Arizona Smithsonite

**JANUARY 3-5, 2014 9AM TO 5PM**  
**MESA COMMUNITY COLLEGE**  
**NE CORNER OF US 60 & DOBSON ROAD**



**SPONSORED BY  
FLAGG MINERAL  
FOUNDATION**

**FOR MORE INFORMATION:  
FLAGG MINERAL FOUNDATION  
P.O. BOX 41834  
MESA, AZ 85274  
[WWW.FLAGGSHOW.INFO](http://WWW.FLAGGSHOW.INFO)**

*Free Admission* ✕ *Free Parking* ✕ *Free Samples For Kids*

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**Editor E-Mail:**  
scote@earthsciencemuseum.org

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*We're on the Web!*

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

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**Mission**

Establish an innovative, world-class destination museum in the Phoenix area dedicated to inspiring all generations about earth sciences.

**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).

Please join us at the next ESM board meeting  
Wednesday, December 11, 2013, at the  
Burton Barr Library in Phoenix at 6:30 p.m.  
Rm. B.

Earth Science Museum  
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Phoenix, AZ 85017

