



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
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KEY SUPPORTERS OF THE ESM

By Shirley Coté, Harvey Jong, and Ray Grant

We want to thank the following rock, gem, and mineral societies for their support of the Earth Science Museum.

These societies welcome guests at their meetings.

Arizona Leaverites Rock and Gem Society

425 E. Greenway Dr.
Tempe, AZ 85282

Meeting Place: ASU Main, PSF Rm. 566

Day of Month: 4th Tuesday, 7:30 p.m., except July, August and December

Club Specialties: Field trips, education and lapidary

Flagg Mineral Foundation

P. O. Box 41834
Mesa, AZ 85274

www.flaggmineralfoundation.org

Meeting Place: North Mountain Visitor Center
12950 N. 7th St., Phoenix

Day of Month: Usually every other month on a Thursday (dates are not fixed) at 7 p.m., except June through August

Club Specialties: Gem show, Minerals of Arizona Symposium

Maricopa Lapidary Society, Inc.

P. O. Box 36683
Phoenix, AZ 85067-6683

Meeting Place: North Mountain Visitor Center
12950 N. 7th St., Phoenix

Day of Month: 1st Monday 7 p.m., except July, if 1st Monday is a holiday, meeting is 2nd Monday

Club Specialties: Lapidary, education, field trips

Mineralogical Society of Arizona

P.O. Box 30031
Mesa, AZ 85275

www.mineralogicalsocietyarizona.org

Meeting Place: Franciscan Renewal Center, 5802 E. Lincoln Dr., Scottsdale, AZ 85253 (check website for exact room location each month)

Day of Month: 2nd Thursday, 7 p.m., from September through June

Club Specialties: Interesting informative programs, monthly field trips. Juniors are welcome.

White Mountain Gem & Mineral Club

P. O. Box 3504
Show Low, AZ 85902-3504

www.whitemountain-azrockclub.org

Contact: Nanz Marshall 928-537-2524

Meeting Place: VFW Hall, 381 N. Central, Show Low, AZ 85902

Day of Month: 1st Sunday, 1:00 P.M., meets every Month - December - Christmas party members only

Club Specialties: Educational presentations, field trips, classes, gem show.

Wickenburg Gem and Mineral Society, Inc.

P.O. Box 20375
Wickenburg, AZ 85358

<http://www.wickenburggms.org>

Contact: wickenburggms@hotmail.com

Meeting Place: Coffinger Park Rec. Rm., Coffinger Park, Wickenburg, Az 85390

Day of Month: 2nd Friday 6:30 p.m., except July, August and September

Club Specialty: Field trip every 3rd Saturday, Annual Show Thanksgiving weekend.



Arizona Rocks 15

Text and photos by Ray Grant

A reminder: naming rocks can range from relatively simple to complex. This was especially true in igneous rocks where a chemical analysis would yield information for a special rock name. For sedimentary rocks there is less variety of possible minerals and compositions, but a detailed study might yield a special name. The names used in this column are generally the names a geologist would use when working in the field without any special studies on the rock.

Like breccia (Arizona Rocks 12) conglomerate is a clastic sedimentary rock with particles greater than 2 millimeters (1/12 of an inch) in size. Particles this size are called gravel (2mm is rather an arbitrary size, but it is the one on which geologists have agreed). The difference is that the pieces in a breccia are angular while those in conglomerate are round. The gravel has been abraded so that the sharp edges and corners have been worn down. Normally this would be caused by transportation over a distance as this tumbles and rounds the pieces. The most common way for the gravel to be moved is by running water in a stream or river. Conglomerates can also be found forming from beach gravel, rounded by the waves, or from glacial gravel moved by ice, although the glacial material may not be as rounded.

Most river deposits will have sand and possibly clay mixed with the gravel, so the question is how much of the material must be gravel size to call the rock conglomerate, 20%, 30%, or more than 50%? There does not seem to be a consensus on this and a small amount of gravel stands out in the rock so the name conglomerate is commonly used even for relatively small amounts of gravel.

In Arizona there are a number of conglomerates, but they are too thin to be a formation (see Arizona Rocks 13). In the young Precambrian rocks around the Salt River Canyon and on the Apache Trail are the Scanlan and Barnes Conglomerate members of other formations. The Cambrian Tapeats Sandstone has some conglomerate layers around Payson and in the Grand Canyon. These are too thin to even be classified as a member. The Triassic age Shinarump Conglomerate is a member of the Chinle Formation and is under the Petrified Forest rocks. In the Basin and Range of southern Arizona, there is lots of conglomerate or sand and gravel deposits from the rivers carrying material from the ranges and filling the basins.



Shinarump Conglomerate (Triassic age) in exhibit at the Wupatki National Monument Visitors Center



Basin fill conglomerate and present day stream at Boyce Thompson Arboretum.

EXPLORE YOUR WORLD!

TIMPANOGOS CAVE NM

Text & photos from NPS.gov

Timpanogos Cave National Monument, designated as such in 1922, is located in the Wasatch Mountains in Northern Utah approximately 40 miles south of Salt Lake City. The caves are open seasonally from mid-May to late September.

Timpanogos Cave was established as a National Monument to preserve its features of unusual scientific interest and importance - features like its abundance of helictites, the coloration in its formations, its display of fault-controlled passages, and its alpine surroundings.

Helictites are spiral formations that seem to defy gravity. In the Chimes Chamber in Timpanogos Cave, there are hundreds of 6 to 10 inch long helictites. These formations are created by capillarity attraction, hydrostatic pressure, and tiny (0.008 to 0.5 millimeter) central canals (Hill & Forti 1997). In simpler terms, water is pushed and pulled through small openings where the forces of capillary attraction and hydrostatic pressure are greater than the force of gravity.

Timpanogos Cave contains formations displaying colors of green and yellow. Chemical analysis shows this rare green and yellow coloring to be from nickel incorporated into the crystal structure. X-ray analysis of the yellow mineral shows it to be calcite, while the green mineral is mainly aragonite. (White & Gundy 1974)

Note: Aragonite and calcite have the same chemical composition, calcium carbonate (CaCO_3); the difference is in the configuration of their atoms.

The passages in Timpanogos Cave are greatly controlled by faulting. Looking at a map of the cave, one sees many paralleling passages following the fault trends. Along the cave tour, visitors can see these fault lines running along the passages. The initial pathways that water followed were these faults. In some areas of the cave like the Imagination Room, passages dip along the bedding planes and follow the direction of the fault lines. Looking at the map of the cave, one wonders if other cave passages exist above or below these known passageways, following similar fault lines.

Timpanogos Cave is surrounded by an alpine environment. The cave trail adds to the remoteness of the cave and offers spectacular views of the geology. Unlike other show caves, this hike through the alpine environment to get to the cave is unique. Because of the elevation, the cave escapes the polluted air and contaminated watersheds. The cave is closed about 6 months out of the year due to heavy snowfalls. The cold winters and warm summers allow the cave to keep a stable 45°F temperature year round.



The Cave entrance signals the end of your hike along the 1.5 mile trail up approximately 1100 vertical feet.



View of the trail from the top and the “Last Chance” restroom.



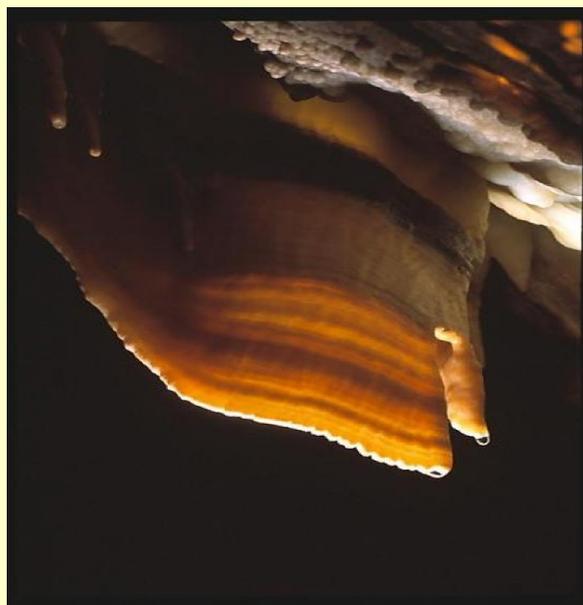
American Fork Canyon and Utah Valley from the cave trail.



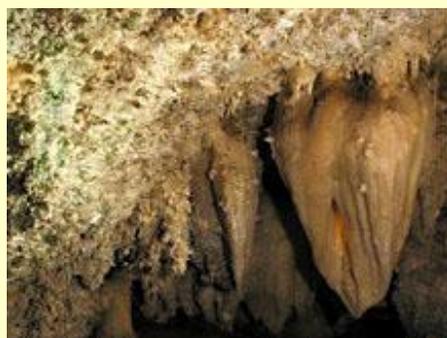
A close view of Frostwork - a form of aragonite which is an unstable form of calcite.



This formation is called Flowstone and was made over a thousands years by flowing water carrying dissolved minerals. The flow of water caused this formation to look very much like a frozen waterfall.



Cave Bacon forms on slanted surfaces, and is called “bacon” instead of drapery, when the characteristic layers are present.



Greenish Helictites surrounding the Heart of Timpanogos (Jon Jasper photo)

ESM's Upcoming Meeting

The Earth Science Museum's next scheduled Board meeting on September 10th, 2014, at the Burton Barr Library, located near Central Ave. and McDowel in Phoenix at 6:30 p.m. in Rm. A. Everyone is welcome to attend.

BECOME A MEMBER!
Join the Earth Science Museum's



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**ESM Earth Science Investigation
Team Membership Form**

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_____ ESI Family \$20

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_____ 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.

MANY THANKS TO OUR MAJOR DONORS!

AZ Leaverite Rock & Gem Society
www.azleaverite.org

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Maricopa Lapidary Society

Mineralogical Society of AZ
www.mineralogicalsocietyarizona.org

White Mountain Gem & Mineral Club
www.whitemountain-azrockclub.org

Wickenburg Gem & Mineral Society
<http://www.wickenburggms.org>
www.facebook.com/pages/Wickenburg-Gem-and-Mineral-Society/111216602326438

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www.staplesfoundation.org

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We're on the Web!

Visit us on  and at:
www.earthsciencemuseum.org

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.

Please join us at the next ESM Board meeting Wednesday, September 10, 2014, at the Burton Barr Library in Phoenix at 6:30 p.m. Rm. A.

THANK YOU FOR YOUR CONTINUING INTEREST & SUPPORT!!!

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