



# 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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## ESM's Upcoming Outreach Events

By Shirley Cote, Harvey Jong & Ray Grant

### **"THE ROCK TALKER" COMING TO GLENDALE**

Earth Science Museum's Outreach Volunteer Lynne Dyer will be in the west valley.

Bring the kids and join Lynne Dyer, the Rock Talker, for an entertaining and informative presentation on rocks, minerals and fossils.

Lynne Dyer will display her personal collection of rocks, minerals and fossils, including some products we use in our everyday life. Children as well as adults will be amazed to discover the mineral ingredients in some common household products.

**"If it can't be grown, it must be mined."**

**Wednesday, August 6, 2014, 2-4 p.m.**

**Velma Teague Branch Library  
7010 N. 58<sup>th</sup> Ave., (58<sup>th</sup> Ave. & Glendale)  
Glendale, AZ.**



Lynne Dyer with her personal collection (Terry Dyer photo)

Join the Earth Science Museum & Mesa Community College for  
**EARTH SCIENCE DAY**  
Saturday, October 18, 2014  
10 a.m. - 4 p.m.

The Earth Science Museum, in association with Mesa Community College (MCC) Physical Science Department is organizing **EARTH SCIENCE DAY**, a one day event on Saturday, October 18<sup>th</sup> at the **Physical Science Building** on the MCC campus. This event represents a local culmination of the American Geosciences Institute's *Earth Science Week*, October 12-18, 2014, and you are invited to take part in this family-oriented celebration of the earth sciences.

**EARTH SCIENCE DAY** will be held from 10 a.m. - 4 p.m., and we will feature a variety of fun activities that will help children and adults gain a better understanding and appreciation for the earth sciences. These activities will include planetarium shows scheduled in the morning and afternoon, and earth science presentations including minerals and geology.

We are also promoting interest in the lapidary and mineral collecting hobbies by having local organizations host popular activities, such as Egg Carton Collections, Fossil Dig, and Spinning Wheels.

**FREE ADMISSION & PARKING**

Mesa Community College  
Dobson Rd. between Southern & US60  
Mesa, AZ



## Arizona Rocks 14

Text and photos by Ray Grant

The subject of the weathering of different types of rocks came up and this month I would like to do a little more with a description of spheroidal weathering. Three conditions are necessary to get the formation of rounded boulders. The weathered rocks: one, must have feldspar present; two, must be homogeneous (that is all the mineral grains should be near the same size); and three, the rocks must have little or no layering (Ferry, 1984).

In Arizona the most common rock to meet these criteria is granite. Much less common diabase will show it and rarely some volcanic rocks. The spherical boulders form underground. Ground water that seeps down fractures alters the feldspar to clay. Figure 1 shows how the water attacks faces, edges, and corners of granite and how this forms the spherical shape. The boulders are formed under the earth's surface as seen in figure 2. In an arid climate like Arizona, the weathered material, mainly clay and quartz grains in the case of granite, are removed by erosion. In a more humid climate soil and vegetation would cover the surface and hide the boulders.

The areas of spheroidal boulders that can be seen in Arizona are on the Beeline highway on the way to Payson, at Texas Canyon on I-10 east of Benson, at the Granite Dells in Prescott, and many other localities. If the granite does not meet the three criteria then granite will not show the boulders. Diabase at the Salt River Canyon shows spheroidal weathering but it is not as spectacular as the granite. (Reference: Ferry, John (1984) Landforms of Spheroidally Weathered Rock

in Smiley, T. L., et al., editors, *Landscapes of Arizona*, University of America Press, Lanham, MD.)

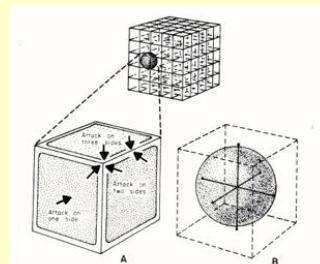


Figure 1. How groundwater attacks the rock to form the spheroidal boulders

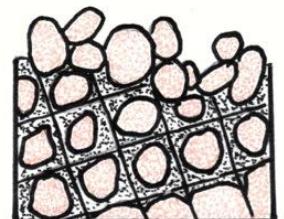
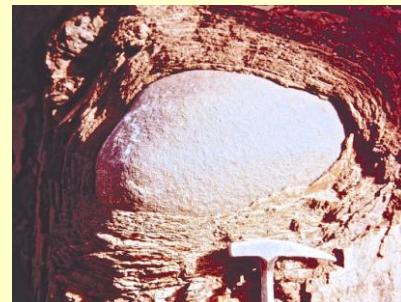


Figure 2. Formation of the boulders underground and later erosion exposing them on the surface



Spheroidal granite boulder on the Beeline highway between Mesa and Payson



Spheroidally weathered diabase in a road cut at Salt River Canyon



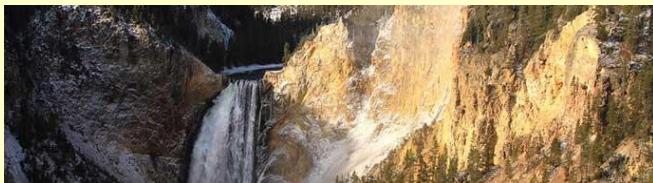
Granite hill without spheroidal boulders north of Coolidge

# EXPLORE YOUR WORLD!

## YELLOWSTONE NATIONAL PARK (2)

Text & photos from NPS.gov

In addition to visiting the geysers, brilliantly colored hot springs, bubbling mudpots and steaming fumaroles at Yellowstone National Park, you can stand at the edge of Lower Falls at the Grand Canyon of the Yellowstone and visit the Yellowstone Petrified Forest.



Lower Falls of the Yellowstone (NPS/Restivo)

The canyon below the Lower Falls was at one time the site of a geyser basin that was the result of rhyolite lava flows, extensive faulting, and heat beneath the surface (related to the hot spot). No one is sure exactly when the geyser basin was formed in the area, although it was probably present at the time of the last glaciations. The chemical and heat action of the geyser basin caused the rhyolite rock to become hydrothermally altered, making it very soft and brittle and more easily eroded. Evidence of this thermal activity still exists in the canyon in the form of geysers and hot springs that are still active and visible. The Clear Lake area (Clear Lake is fed by hot springs) south of the canyon is probably also a remnant of this activity.

According to Ken Pierce, U.S. Geological Survey geologist, at the end of the last glacial period, about 14,000 to 18,000 years ago, ice dams formed at the mouth of Yellowstone Lake. When the ice dams melted, a great volume of water was released downstream causing massive flash floods and immediate and catastrophic erosion of the present-day canyon. These

flash floods probably happened more than once. The canyon is a classic V-shaped valley, indicative of river-type erosion as opposed to a U-shaped valley indicative of glaciation. The canyon is still being eroded by the Yellowstone River.

The colors in the canyon are also a result of hydrothermal alteration. The rhyolite in the canyon contains a variety of different iron compounds. When the old geyser basin was active, the “cooking” of the rock caused chemical alterations in these iron compounds. Exposure to the elements caused the rocks to change colors. The rocks are, in effect, oxidizing; the canyon is rusting. The different colors indicate the presence or absence of water in the individual iron compounds. Most of the yellows in the canyon are the result of iron present in the rock rather than sulfur, as many people think.



The Petrified Tree, located near the Lost Lake trailhead, is an excellent example of an ancient redwood, (similar to many found on Specimen Ridge) that is easily accessible to park visitors. The interpretive message here also applies to those trees found on Specimen Ridge. (NPS photo)

Specimen Ridge, located along the Northeast Entrance Road east of Tower Junction, (hike required) contains the largest concentration of petrified trees in the world. There are also excellent samples of petrified leaf impressions, conifer needles, and microscopic pollen from numerous species no longer growing in the park. Specimen Ridge provides a superb “window” into the distant past when plant communities and climatic conditions were much different than today.

## **ESM's Upcoming Meeting**

The Earth Science Museum's next scheduled Board meeting on August 13<sup>th</sup>, 2014, at the Burton Barr Library, located near Central Ave. and McDowell in Phoenix at 6:30 p.m. in Rm. B. 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**  
 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.

## **MANY THANKS TO OUR MAJOR DONORS!**

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[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

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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, August 13, 2014, at the Burton  
Barr Library in Phoenix at 6:30 p.m. Rm. B.

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

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