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, scote@earthsciencemuseum.org, 602-973-4291

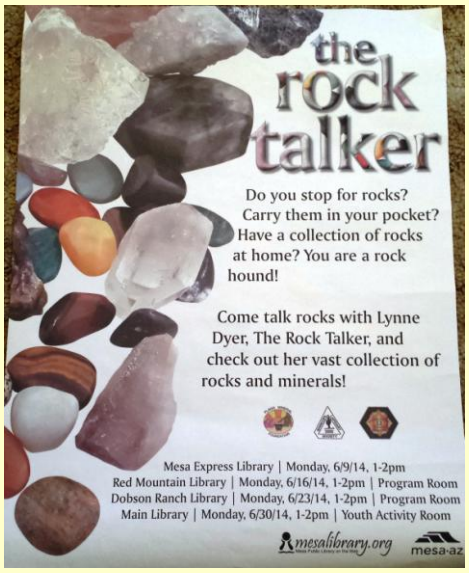
June 2014
Volume 3, Issue 6

ESM OUTREACH

By Shirley Cote, Ray Gran, & Harvey Jong

The Earth Science Museum's Outreach volunteers Mardy Zimmermann, VP Education and Outreach Coordinator, Tony Occhiuzzi, Alice La Bonte, Lynne Wheeler-Benker, Lynne & Terry Dyer, Cindy Buckner, Doug Duffy and Shirley Cote have more than doubled their service to schools and the community this past year. They served 4,428 students at 36 schools in the greater Phoenix area.

Additionally, ESM volunteers served 3,659 people at community events like the Flagg Mineral Show, the Flagg Mineral Foundation Mineral Symposium, Earth Science Day, school science fairs, scout groups, summer camps, community centers, and libraries. Furthermore, we engaged directly with teachers at the Arizona Science Teachers Association's yearly conference, at the EarthFest Educator's Night at the Zoo, Rock and Mineral Society meetings, and at an ASU/AZMNH teacher workshop.



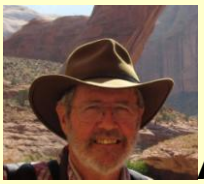
Mesa Public Library Poster (Lynne Dyer photo)

ESM Outreach volunteer Lynne Dyer is a very passionate person. One of her passions is rocks and minerals. Lynne so loves to talk to people about them that she has put together a number of posters and displays. For example, posters explaining the three different types of rocks, (igneous, sedimentary and metamorphic), fossils, copper and other ores and one on products we use in our everyday life with their associated minerals, just to name a few.

Lynne takes these posters and much more and sets up in schools, libraries, and even private homes to share her educational wisdom.


Lynne at Dobson Ranch Library (Terry Dyer photo)

Lynne Dyer's poster of everyday products and their associated minerals (S. Cote photo)

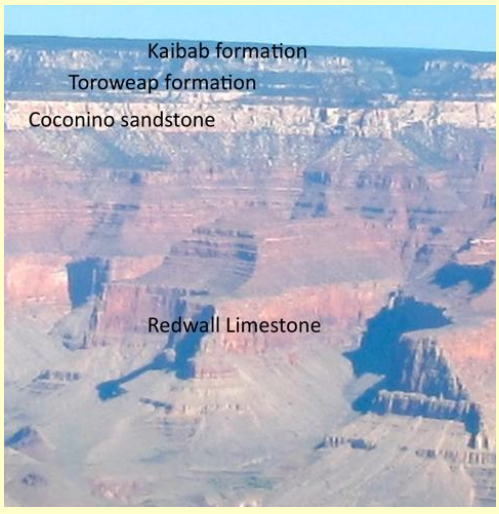


Arizona Rocks 13

Text and photos by Ray Grant

I want to take a digression this month and talk about the naming of rock units. This is more important for sedimentary rocks than it was for igneous rocks, although the same rules apply to all rocks. Rocks are broken into units called formations and a simple definition of a formation would be "a mappable unit". That is, it is large enough to show on a geologic map, so a small mass of rock only a few feet across would not qualify. There are other designations, a number of similar formations can be part of a group and a distinctive rock that is small and part of a formation would be a member.

In the United States the name of each formation consists of two parts, for example, Coconino sandstone, Redwall limestone, Toroweap formation, Kaibab formation. The first is the name of a locality, a place at or near where the formation is found and can be studied. The second part is the name of the rock type or if the formation consists of several rock types the word formation is used. The Toroweap formation has its type locality in Brady Canyon a side canyon to Toroweap Vallley and it is mainly limestone, sandstone and evaporites. The Kaibab formation is mostly limestone with some sandstone and dolostone, and it is named after the Kaibab Plateau. The Coconino sandstone is only sandstone and is named for the Coconino Plateau.



Some of the sedimentary rock formations in the Grand Canyon

Sedimentary rocks like those just described can be traced for long distances. The Toroweap formation covers 25,000 square miles in northern Arizona, and is easily recognized in the Grand Canyon as the tree covered slope below the Kaibab cliff that forms the rim of the canyon and above the Coconino cliff.

An example of an igneous rock formation is the Tea Cup granodiorite found east of Florence. Here is the original description: "Tea Cup granadiorite is here named for the Tea Cup Ranch (headquarters in NW1/4, sec.7, T.5S., R.13E). Typical exposures along the wash in the SE1/4, sec. 36, T.4S., R.12E., which yielded rocks for study and analysis are designated its type locality." The Tea Cup granodiorite is only found between Florence and Kelvin and covers a few hundred square miles. Many times igneous rocks on a geologic map are just labeled with the name of rock such as rhyolite or granite; they are not given a formation name because they may only be present in a small area.

Spheroidal weathered Tea Cup granodiorite on the Florence-Kelvin Road

Metamorphic rocks are named the same way with formations such as Pinal schist, Vishnu schist, Estrella gneiss. The Estrella gneiss is named after the Sierra Estrella Mountains and is found there and at South Mountain and the White Tank Mountains.

Estrella gneiss at the west end of the South Mountains

EXPLORE YOUR WORLD!

YELLOWSTONE NATIONAL PARK

Text & photos from Wikipedia and NPS.gov

Aerial view of Grand Prismatic Springs; Hot Springs, Midway Geyser Basin. The vivid colors in the spring are the result of pigmented bacteria in the microbial mats that grow around the edges of the mineral-rich water. (Wikipedia photo)

Yellowstone National Park, America's first National Park, was established in 1872. Yellowstone contains half the Earth's geothermal features including 300 geysers (the world's largest collection) and thousands upon thousands of brilliantly colored hot springs, bubbling mudpots and steaming fumaroles. These hydrothermal features would not exist without a source of plenty of water (snow and rain) from the surrounding mountains and the underlying magma body that releases tremendous heat. The cold water slowly percolates through layers of permeable rock riddled with cracks. Some of this cold water meets hot brine directly heated by the shallow magma body. The water's temperature rises well above the boiling point but the water remains in a liquid state due to the great pressure and weight of the overlying water. The result is superheated water with temperatures exceeding 400°F.

The superheated water is less dense than the colder, heavier water sinking around it. This creates convection currents that allow the lighter, more bouyant, superheated water to begin its journey back to the surface following cracks and weak areas through the rhyolitic lava flows. This upward path is the natural "plumbing" system of the park's hydrothermal features.

As hot water travels through this rock, it dissolves some silica in the rhyolite and this silica can precipitate in the cracks and at the surface.

At the surface, silica precipitates to form siliceous sinter, creating the scalloped edges (as seen in Emerald Spring pictured below) of hot springs and the seemingly barren landscapes of hydrothermal basins.

Emerald Spring (NPS photo)

Geysers are hot springs with constrictions in their plumbing, usually near the surface, that prevent water from circulating freely to the surface where heat would escape.

Echinus Geyser (NPS photo)

When the silica rich water splashes out of a geyser, the silicous sinter deposits are known as geyserite.

ESM's Upcoming Meeting

The Earth Science Museum's next scheduled Board meeting will be on August 13th, 2014, 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.

BECOME A MEMBER!

Join the Earth Science Museum's

esi: Earth Science Investigation team

MANY THANKS TO OUR MAJOR DONORS!

AZ Leaverite Rock & Gem Society
www.azleaverite.org

Flagg Mineral Foundation
www.flaggmineralfoundation.org

Friends of the AZ Mining & Mineral Museum

Maricopa Lapidary Society

Mineralogical Society of AZ
www.mineralogicalsocietyarizona.org

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

Wickenburg Gem & Mineral Society
www.facebook.com/pages/Wickenburg-Gem-and-Mineral-Society/111216602326438

Staples Foundation
www.staplesfoundation.org

Anita Aiston
Stan & Susan Celestian
Russ Hart
Will & Carol McDonald
Debbie Michalowski
Dennis & Georgia Zeutenhorst

_ _ _ _ _ _ _ _ cut here _ _ _ _ _ _ _ _ _

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.

_ _ _ _ _ _ _ _ cut here _ _ _ _ _ _ _ _ _

Name: _____

Address: _____

City, State, Zip: _____

Email: _____

Phone Number: _____

Mail form & payment to: Earth Science Museum 3215 W. Bethany Home Rd., Phoenix, AZ 85017

For Office Use Only

Card given/mailed: _____
Database updated: _____
Distribution Lists updated: _____
Expires: _____ Card ID # _____

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

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

THANK YOU FOR YOUR CONTINUING INTEREST & SUPPORT!!!

Earth Science Museum
3215 W. Bethany Home Rd.
Phoenix, AZ 85017