



EARTHQUAKE

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

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ESM EVENT OCTOBER 19, 2013

By Shirley Coté, Dr. Ray Grant and Harvey Jong

Join the Earth Science Museum & Mesa Community College for **EARTH SCIENCE DAY** Saturday, October 19, 2013 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 19th 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 13-19, 2013, 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, presentations on minerals and geology, and a hands-on geology mapping exercise.

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

Schedule

- 10:00 - Earth Science Day opens
- 10:15 - **Planetarium Show** - TBA - seating is limited and free tickets should be picked up at the information table.
- 11:00 - Lecture and Demonstration on the Geologic mapping of Europa, a moon of Jupiter.
- 11:30 - How Geologic Maps are made, a demonstration and exercise to make your own map, location at Purgatory Flat behind the Physical Science Building.
- 12:30 - **Planetarium Show** - TBA - seating is limited and free tickets should be picked up at the information table.
- 1:00 - Lecture and Demonstration related to some aspect of Geologic mapping.
- 1:30 - How Geologic Maps are made, a demonstration and exercise to make your own map, location at Purgatory Flat behind the Physical Science Building.
- 2:30 - **Planetarium Show** - TBA - seating is limited and free tickets should be picked up at the information table.

OTHER FUN ACTIVITIES

Various organizations from around the Phoenix area will have other activities such as egg carton collections (12 samples for \$1.00) and spinning wheels that will have a small charge.

There will be a free dig for fossils activity and free mineral samples for kids and teachers.



Arizona Rocks 4

Text and photos by Ray Grant (except where noted)

A special rock usually related to granite is a pegmatite. The definition of a pegmatite is an intrusive igneous rock with very large crystals (usually over one inch in size and up to many feet in size). Most pegmatites consist of quartz, microcline, and some plagioclase making them granitic in composition. Pegmatites also may contain unusual minerals. Elements which are small such as boron, fluorine, lithium and beryllium and those which are large such as niobium, tin, and tantalum do not fit into common mineral structures and are left in the solutions forming pegmatites. About 120 different minerals are found in pegmatites in Arizona.

There were three major periods of granite pegmatite formation in Arizona, about 1.5 billion years ago in northwest to central Arizona, about 160 million years ago in southwestern Arizona, and about 60 million years ago in south-central Arizona.

The oldest pegmatites are the only ones in Arizona that have economic importance. The Kingman Feldspar mine operated for many years and was mined for feldspar (microcline) for ceramics. Some of the microcline was in masses 10 to 12 feet thick. Quartz, mica, beryl, and bismuth minerals have been commercially mined from Arizona pegmatites and exploration and limited production has occurred for lithium, tantalum and rare earths.

The economically important pegmatites were in the Kingman area, the Aquarius Mountains, and around Wickenburg. In the Phoenix area, pegmatites are found on Mummy Mountain. They have muscovite,

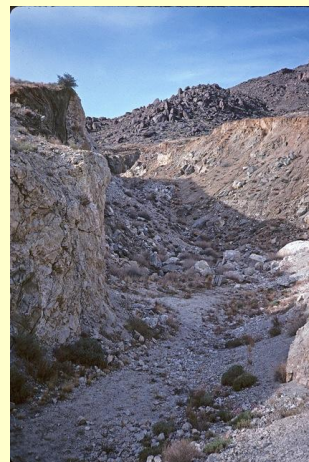
garnet, tourmaline, and a little beryl. Unfortunately they are now on private property and not very accessible to the public.



Map of the Arizona Pegmatite belt, the location of the 1.5 billion year old pegmatites.



Pegmatite dike on Mummy Mountain in Phoenix



Kingman Feldspar mine



Beryl with muscovite and quartz from a pegmatite in the Sierrita Mountains, Pima County
Barbara Muntyan specimen and Jeff Scovil photograph

EXPLORE YOUR WORLD!

Tonto Natural Bridge State Park

Text is from signage at the park and Dr. Ray Grant

Tonto Natural Bridge is one of the world's largest known travertine bridges and arches over the clear waters of Pine Creek.

The naturally forming bridge is 150 feet wide, 183 feet high and 400 feet long. It is estimated that the volume of rock is 200 million cubic feet. This geologic wonder is the result of thousands of years of nature's handiwork and is still growing.

The travertine here is formed by deposition of calcium carbonate in small amounts. A constant flow of mineralized water from a perennial spring supplies the ever-growing travertine formations.

According to the State Geologist, The Tonto Natural Bridge went through five stages of development:

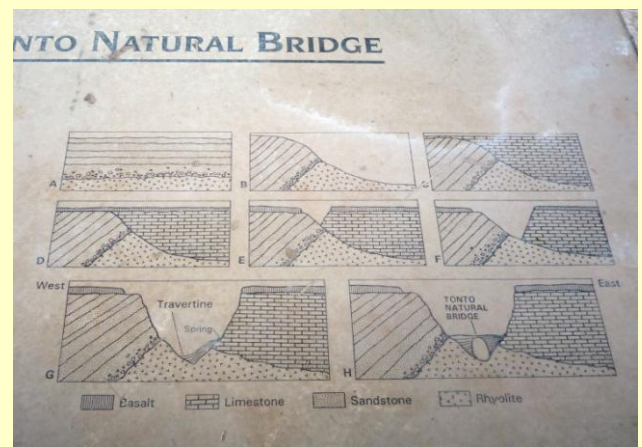
Stage 1 The area around Pine Creek was covered by a volcanic lava flow of red rhyolite. This rhyolite was eroded and purple quartz sandstone was deposited over it (A). Then these older rock layers were lithified, faulted, tilted and eroded (B).

Stage 2 The area was then covered by the ocean and layers of sand, mud, and limestone were deposited (C).

Stage 3 Following some erosion of the sedimentary layers, volcanic eruptions covered the area with basalt forming a cap rock. This basalt can be seen at the top of the hill before descending down into the park (D).

Stage 4 Over the years, faulting and erosion created the narrow Pine Creek Canyon (E).

Stage 5 Starting two million years ago, up until 10,000 years ago, during the Ice Age, the climate was much wetter in Arizona. Rainwater seeping underground through fractures and weak points in the rock resulted in the dissolving of the limestone (F). When the water carrying the dissolved limestone emerged as springs, calcium carbonate was deposited forming a travertine dam (G). Pine Creek eroded under the travertine to form the Tonto Natural Bridge (H).



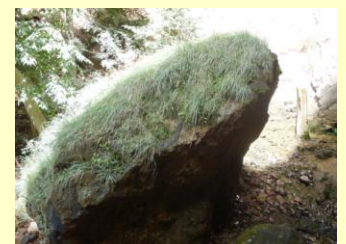
Pictorial stages of bridge development



Water dripping onto the rocks allows lichen, moss and even grass to grow on the rocks.

The "Troll"
Rock covered with grass.

Caption texts and photos
S. Coté



ESM's Upcoming Meeting

The Earth Science Museum's next scheduled meeting is October 9th 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.



EARTH SCIENCE INVESTIGATION TEAM

The Earth Science Museum invites you to join in the journey and adventure of building a new science museum. Our mission involves inspiring all generations about the earth sciences, and you can help fulfill this mission by joining the EARTH SCIENCE INVESTIGATION TEAM.

The Earth Science Museum's Earth Science Investigative Team is exploring new frontiers in earth science education. Become a team member where your contributions will help educate Arizona students about the earth sciences through hands-on outreach programs; create an Earth Science Education Center; and build an innovative, world-class museum.

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ESI 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

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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

Stan & Susan Celestian
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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, October 9, 2013, at the Burton
Barr Library in Phoenix at 6:30 p.m. Rm. B.

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