EARTHQUAKE

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

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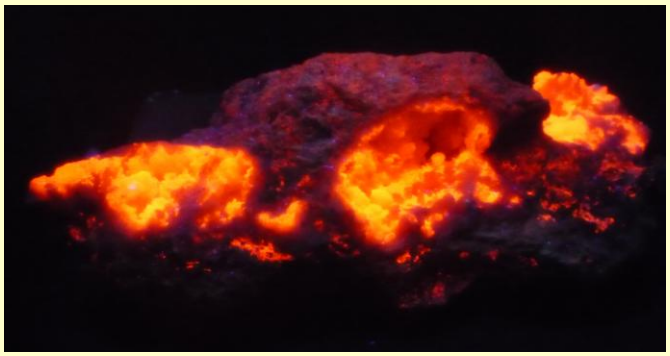
ESM'S RECENT AND FUTURE EVENTS

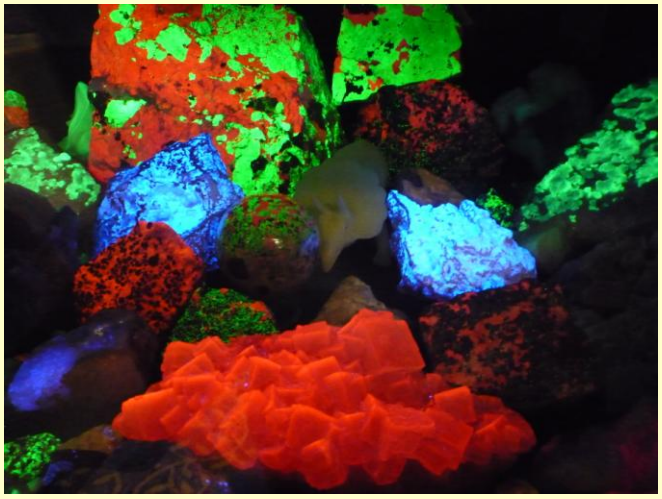
By Shirley Coté, Ray Grant and Harvey Jong

Board members of the Earth Science Museum attended the Minerals of Arizona Symposium sponsored by the Flagg Mineral Foundation in early April where Arthur L. Flagg's long lost "Coals of Fire" fluorescent calcite specimen was reintroduced.



"Coals of Fire" calcite from Ruby, AZ (S. Cote photo)

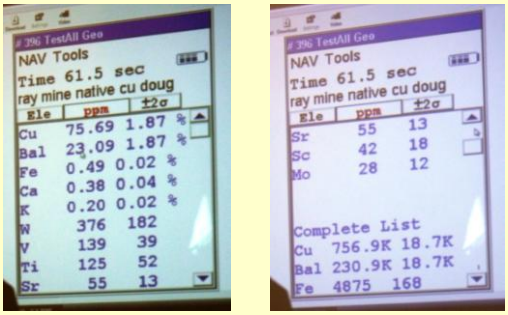
At the proceedings, the Flagg Mineral Foundation was the recipient of a fluorescent mineral donation consisting of an over two and a half foot wooden and glass box with both long and short wave UV lights and a collection of beautiful specimens some of which are shown below.



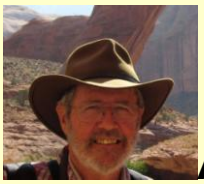
Prominent fluorescent minerals pictured: calcite (orange), willemite (green), scheelite (blue). (S. Cote photo)

Dr. Erik Melchiorre, Professor of Geology, California State University at San Bernardino, who has written several books on gold in AZ, gave a fascinating presentation on "In-situ gold nuggett formation in Arizona" on Saturday night. Participants at the symposium were then asked to bring rock and/or mineral samples to be tested for their chemical composition to the Sunday morning program where Dr. Melchiorre demonstrated the use of a portable XRF (X-Ray Fluorescence Spectrometry) analyser.

XRF in the process of testing a sample of native copper in gangue (worthless material mixed with a wanted mineral in an ore deposit) from the Ray mine in AZ collected by Doug Duffy. (S. Cote photo)



XRF test results of the above sample. (S. Cote photo)



Arizona Rocks 11

Text and photos by Ray Grant

This is a summary for igneous rocks. Remember, geologists have hundreds of names for different igneous rocks, but the names given in the last 10 Arizona Rocks will work. To determine the name of an igneous rock two things are needed the texture and the chemistry (minerals present). If you say granite to a geologist, they know you mean a coarse-grained, light colored igneous rock with quartz. Quartz monzonite, granodiorite, and even quartz diorite are similar rocks and can't be named without specific information on the kind and amount of feldspar present. Most geologists would initially just call these rocks granite without more information.

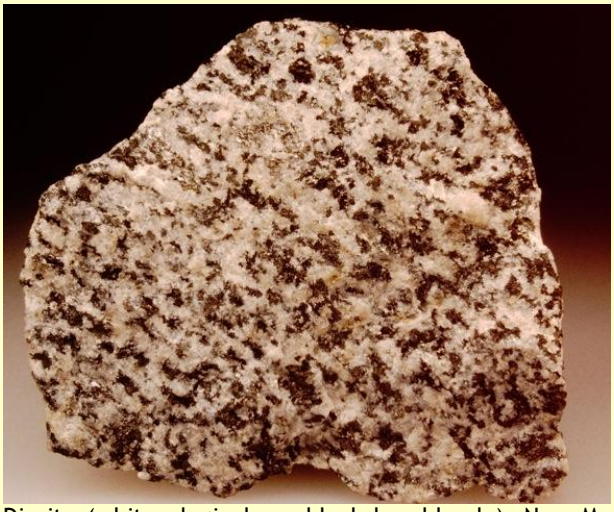
The texture of an igneous rock is generally related to its cooling history. The magma for fine-grained rocks cooled fast, for coarse-grained ones the magma cooled more slowly, and for most porphyries with two sizes of crystals, the magma cooled fast then slow. For rocks with a glassy texture the magma cooled so fast that crystals did not have time to form.

The chemistry of an igneous rock is a little harder to determine. For the coarse-grained rocks we use the minerals present. For the fine-grained rocks, where the minerals can't be seen, the color is the best guide. Light colored is felsite or rhyolite, dark colored is basalt, and gray color would be andesite. For more specific names an actual chemical analysis would be needed.

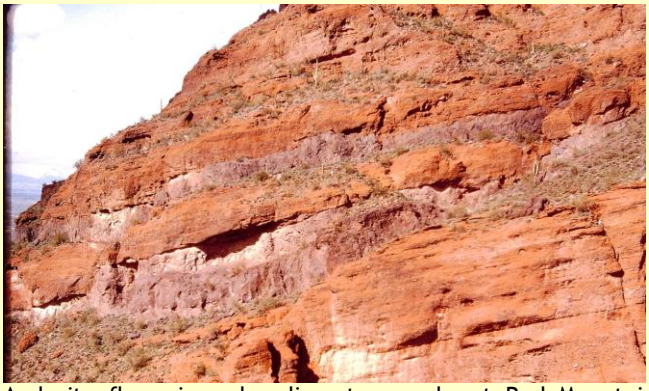
Stan Celestian has a great geology lab program on-line that he developed for ASU and I recommend if you want to learn more about igneous rocks this is the site to visit: http://www.asu.edu/courses/glg103/PDF%20labs/ and click on the igneous rock lab.

The chart on the following page shows the classification of igneous rocks using the names in the ten Arizona Rocks. The next Arizona Rocks will start sedimentary rocks.

Granite from the Walker Butte Granite Quarry near Florence, gray is quartz, pink is microcline, white is plagioclase, and black is biotite. (Ray Grant photo)



Diorite (white plagioclase, black hornblende), New Mexico (Jeff Scovil photo)



Andesite flows in red sedimentary rocks at Red Mountain (Ray Grant photo)

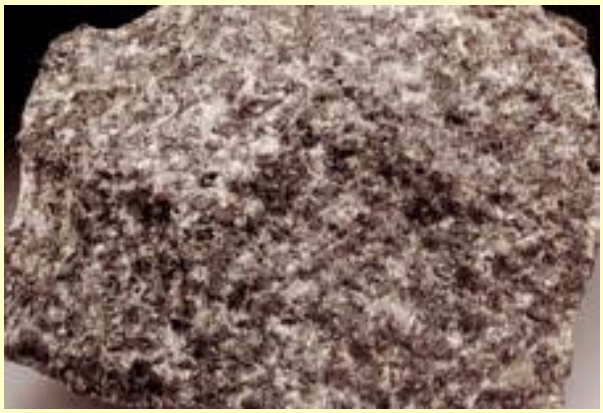
	Minerals and/or Color			
	Light Color	Gray Color	Dark Color	
Rock Texture	*Microcline Quartz*	*Plagioclase Amphibole*	*Plagioclase Pyroxene*	*Olivine Pyroxene*
Course-Grained	**Granite**	**Diorite**	**Gabbro Diabase**	**Peridotite Kimberlite**
Fine-Grained	**Felsite (Rhyolite)**	**Andesite**	**Basalt**	
Porphyritic (coarse and fine)	**Felsite Porphyry**	**Andesite Porphyry**	**Basalt Porphyry**	
Glassy	**Obsidian** Usually dark, but chemically like light colored rocks			
Fragmental	**Tuff** **Volcanic Breccia**			

Obsidian, Apache tears from Superior, AZ (Ray Grant photo)

Basalt porphyry - Altered feldspar crystals in basalt from western New Mexico (Ray Grant photo)

Typical explosive tuff showing ash and rock fragments, Superstition Mountains (Ray Grant photo)

Peridotite nodules mainly olivine in basalt at Peridot Mesa (Quarter for scale) (Ray Grant photo)



Diabase/gabbro with pyroxene (black) and plagioclase (white) (Ray Grant photo)

EXPLORE YOUR WORLD!

CAPITOL REEF NATIONAL PARK

Text & photos from NPS.gov

Located in south-central Utah in the heart of red rock country, Capitol Reef National Park is a hidden treasure filled with cliffs, canyons, domes and bridges in the Waterpocket Fold, a nearly 100-mile long warp in the Earth's crust. The Waterpocket Fold is a classic monocline: a regional fold with one very steep side in an area of otherwise nearly horizontal layers. The rock layers on the west side of the Waterpocket Fold have been lifted more than 7,000 feet higher than the layers on the east. Major folds are almost always associated with underlying faults. Waterpocket Fold formed between 50 and 70 million years ago when a major mountain building event in western North America, the Laramide Orogeny, reactivated an ancient buried fault. When the fault moved, the overlying rock layers were draped above the fault and formed a monocline.

Capitol Reef NP gets its name from the white domes of Navajo Sandstone in the park that resemble capitol building domes and reef for the rocky cliffs which are a barrier to travel, like a coral reef.

Nearly 10,000 feet of sedimentary strata are found in the Capitol Reef area. These rocks range in age from Permian (as old as 270 million years old) to Cretaceous (as young as 80 million years old.) The Waterpocket Fold has tilted this geologic layer cake down to the east. The older rocks are found in the western part of the park and the younger rocks are found near the east boundary.

This layer upon layer sequence of sedimentary rock records nearly 200 million years of geologic history. Rock layers in Capitol Reef reveal ancient environments as varied as rivers and swamps (Chinle Formation), Sahara-like deserts (Navajo Sandstone), and shallow oceans (Mancos Shale).

A water-filled pothole or "waterpocket" in Grand Wash, Capitol Reef NP.

White massive hogbacks of Navajo Sandstone in the distance and steeply dipping Dakota Sandstone in the foreground.

Rock & Gem Shows in Arizona

Courtesy of Rock & Gem Magazine
http://www.rockngem.com/show-dates-display/

June 2014

6-8—FLAGSTAFF, ARIZONA: Annual show; Coconino Lapidary Club; Silver Saddle Outdoor Market; corner of Rte. 89N and Silver Saddle Rd.; Daily 9-4; free admission; rough, finished, jewelry, fossils, raffles; contact Becky Cox, 6666 Snowflake Dr., Flagstaff, AZ 86004, (928) 380-6657; e-mail: bcox@fusd1.org

August 2014

1-3—PRESCOTT VALLEY, ARIZONA: Annual show; Prescott Gem & Mineral Club; Tim's Toyota Center; Glassford Hill and Florentine Rd.; Fri. 9-5, Sat. 9-5, Sun. 9-4; adults $4, seniors and students $3, children (12 and under) free; 50 dealers, rough rock, slabs, cabochons, fossils, gems, minerals, jewelry, beads, equipment, findings, kids' activities, member displays, fluorescent mineral display, raffles, demonstrations; contact Judy Sullins, Prescott Gem & Mineral Club, PO Box 3923, Chino Valley, AZ 86323, (928) 445-1117; e-mail: sullinsjs@cableone.net; Web site: www.prescottgemmineral.org

October 2014

11-12—SIERRA VISTA, ARIZONA: 40th Annual Show; Huachuca Mineral & Gem Club; Cochise College; 901 N. Colombo Ave.; Sat. 9-5, Sun. 10-4; free admission; jewelry, mineral specimens, beads, lapidary supplies, raffle, fluorescent display, geode sales and cutting; contact Maudie Bailey, 5035 S. San Carlos Ave., Sierra Vista, AZ 85650, (520) 378-6291 or (520) 249-1541; e-mail: gmbailey@msn.com; Web site: huachucamineralandgemclub.info

November 2014

8-9—LAKE HAVASU CITY, ARIZONA: Annual show; Lake Havasu Gem & Mineral Society; Lake Havasu Community Center; 100 Park Ave.; Sat. 9-5, Sun. 9-4; adults $2, children (under 12) free; contact Sue Kirk, 1100 Pueblo Dr., Lake Havasu City, AZ 86406, (928) 302-1531; e-mail: macsuzy@mac.com

15-16—PAYSON, ARIZONA: Annual show; Payson Rimstones Rock Club; Mazatzal Hotel & Casino Event Center; Hwy. 87 at Mile Marker 251; Sat. 9-5, Sun. 10-4; adults $2, children (under 12) free; gems, minerals, specimen rocks, fossils, lapidary equipment, jewelry and findings, slabs or rough material, gold prospecting equipment, dealer displays, club displays, Educational Corner, fluorescent display, sand painting, beading, Spinning Wheel, silent auction; contact Margaret Jones, PO Box 884, Pine, AZ 85544, (928) 970-0857; e-mail: margieaberry@gmail.com.

Each year, the American Geosciences Institute organizes Earth Science Week to help the public gain a better understanding and appreciation for the Earth Sciences and to encourage stewardship of the Earth.

To help celebrate Earth Science Week, the Earth Science Museum in cooperation with the Physical Science Department of Mesa Community College (MCC) will sponsor our second annual **Earth Science Day on October 18, 2014 from 10 a.m. - 4 p.m. at MCC**. This year's theme is "Earth's Connected Systems".

Join us for this FREE family fun event featuring a fantastic fluorescent mineral display, Earth Science lectures and planetarium shows.

Make your very own rock, mineral & fossil collection (12 samples) for just a dollar at the Leaverite Rock & Gem Society's booth.

Or try your luck at the spinning wheels of the Maricopa Lapidary Society and the Mineralogical Society of Arizona booths for just a quarter.

ESM's Upcoming Annual Meeting

The Earth Science Museum's next scheduled meeting is our Annual Meeting of the Members and Board meeting on May 14th, 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

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Maricopa Lapidary Society

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www.mineralogicalsocietyarizona.org

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www.whitemountain-azrockclub.org

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Staples Foundation
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Russ Hart
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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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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 Annual member and Board meeting Wednesday, May 14, 2014, at the Burton Barr Library in Phoenix at 6:30 p.m. Rm. B.

THANK YOU FOR YOUR CONTINUING SUPPORT!!!

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