



Arizona Geological Society Newsletter

ARIZONA GEOLOGICAL SOCIETY, INC., TUCSON, AZ

AUGUST 2010

August 3, 2010 DINNER MEETING

Ray Grant will be our featured speaker. Please see the title and abstract below.

Where: Sheraton Four Points Hotel, Wild Cat Room, 1900 E. Speedway Blvd. in Tucson

When: Cash Bar at 6 pm, Dinner at 7 pm, Talk at 8 pm.

Cost: With reservation, members \$24, guests \$27, Students \$10.

Without a reservation a \$3 surcharge will be added (if the hotel is able to accommodate you).

RESERVATIONS: CALL 520.663.5295 by 5 p.m. on July 30, 2010. Indicate low-salt, vegetarian, or vegan meal preferences. A coffee/salad/roll/dessert option is also available for \$18. Please cancel if unable to attend. The hotel cannot guarantee that meals will be available without a timely reservation.

ABSTRACT

Geology and Mineralogy of the Grandview Copper mine, Grand Canyon, Arizona by Ray Grant

The Grandview mine (also called the Last Chance mine) is located on Horseshoe Mesa in the Grand Canyon. Pete Berry located the property in 1890. In 1892 and 1893 he and others built a four-mile long trail down 3,000 feet from the rim to the mine. Mining began in 1893. The copper ore was hauled by mule train to the rim. From there the ore was taken by wagon to the railroad at the South Rim and then by train to the smelter in El Paso. The mine workings were extensive considering the location. There were 7 levels with over 3000 feet of tunnel and hundreds of feet of shafts and winzes. Mining ended in 1916 and it is reported that a total of \$75,000 worth of copper was recovered.

The deposit is one of the many collapse breccia pipes located on the Colorado Plateau. Extensive cave systems formed in the Redwall limestone. This was followed by collapse of the overlying formations into the caves forming the breccias. Two types of breccia are found in the Grandview mine. One is composed of loosely cemented sandstone fragments and the other is a compact altered clay rich rock. Mineralization of this breccia occurred in several episodes from 200 to 260 million years ago. The Grandview deposit is unusual in that most of the breccia pipe has been eroded away and the breccia mined was all in the Redwall limestone. A study of the hydrogeology shows little surface water enters the mine workings. Although there are two springs nearby which show some arsenic contamination.

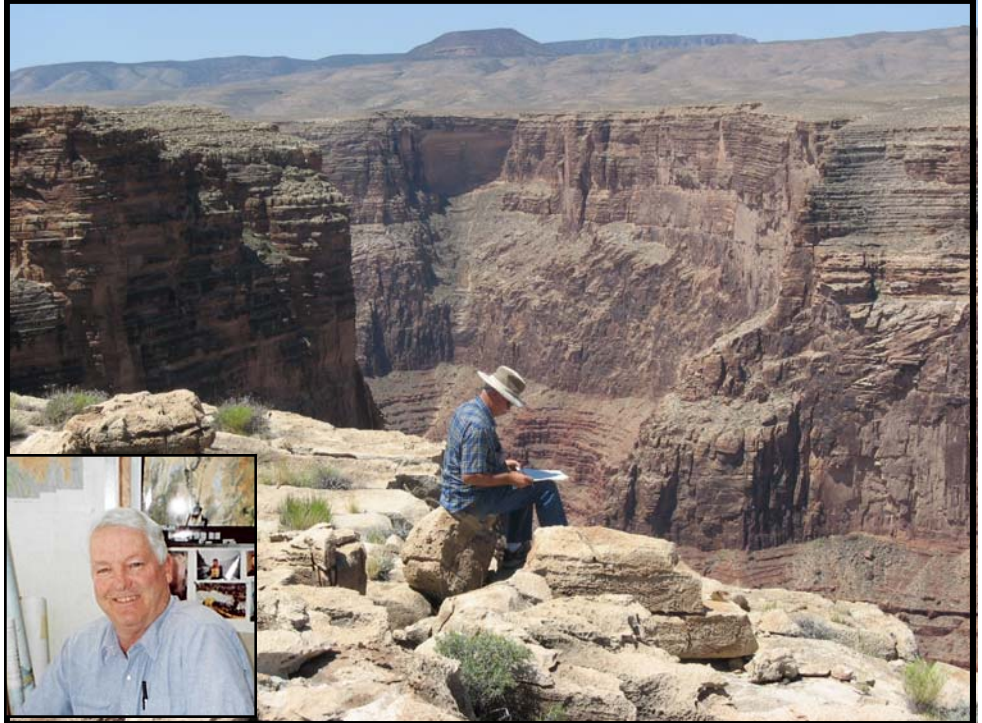
The Grandview mine is the major breccia pipe deposit known to mineral collectors and has produced many specimens for collections. Forty-two mineral species have been identified from the mine. They are mainly carbonates, sulfates, and arsenates of copper, zinc, uranium, lead, iron, aluminium, cobalt and calcium. These minerals formed from the oxidation and weathering of the primary minerals during the more recent erosion of the Grand Canyon. New for the Arizona mineral list are arthurite and philipsbornite and a new mineral species that has been named grandviewite.

Ray Grant received his A.B. degree in geology from Lafayette College and his Ph.D. degree in geology from Harvard University. Ray retired from Mesa Community College in Mesa, Arizona after teaching geology at there for 31 years. He is co-author of *Mineralogy of Arizona*, third edition. Ray has organized and co-chaired a Minerals of Arizona Symposium for the past 18 years. He is currently Chairman of the Arizona Mineral and Mining Museum Foundation. He and Marcus Origlieri are working on a new edition of the *Mineralogy of Arizona* and are actively looking for information about Arizona minerals and localities.

August Member Spotlight—George Billingsley

George Billingsley's distinguished and enviable career at the US Geological Survey has been spent exploring the many mysteries of the Grand Canyon, where many of the formative events in his life have taken place. He was born in Barrow, England in 1945, and moved to the U.S. in 1947. He received B.S. and M.S. degrees in geology from Northern Arizona University. George met Susan D. Varin while in college in 1966 on a hike into Hance Rapid in Grand Canyon. Thousands of miles, several worn out boots, and eight years later they married and continue hiking and river running on the Colorado Plateau. George and Susan have two children, Ryan and Marijka. He lives and works in Flagstaff.

How did you first become interested in geology? As a kid working on the family ranch and farm wondering where all those dang old rocks came from. Some had names, some we named. When I got to college I began to learn about rocks and the landscapes they came from.



What was your first job? My first jobs were part time as an assistant geologist at the Museum of Northern Arizona 1967 to 1979 and as a Park Ranger at Walnut Canyon National Monument and Havasu Campground in Grand Canyon National Park 1969-1970 which helped pay for school.

After graduating, I continued part time as a geologist with the Museum of Northern Arizona mapping Canyonlands and Capitol Reef National parks in Utah, and eastern Grand Canyon. I went on a Colorado River trip in 1968 that made the rocks in Grand Canyon much more accessible. I got into running the Colorado River during the summer seasons starting in 1970 with Grand Canyon Expeditions and conducting geology trips down the river. Susan and I ran as a man and wife team and she became one of the few women guides on the river in the early 70's. I spent most of my time mapping geology in the canyon during the winter months.

What is your most memorable field experience? There are many memorable experiences while mapping and exploring the Grand Canyon. Getting hung up on 200-foot high cliffs, nearly freezing in January (camping on the north rim at 41 degrees below zero), nearly dying of heat in August (highest temp I recorded was 129°F in the shade at 202 Mile Canyon). I was always worried that I might fall into the Colorado River and drown as I never learned how to really swim other than dog paddle a short distance. But it sure was fun to learn and see new geology.

What do you consider your greatest professional achievement? There are two I am proud of:

- 1) Discovering, naming, and describing the latest rock formation in Grand Canyon, the Surprise Canyon Formation of Late Mississippian age with Stanley S. Beus, and
- 2) Geologic mapping of over 14,000 square miles of the Grand Canyon Region that has taken me 42 years to do so far. I'm almost finished. I plan to finish all 18,000 sq miles by 2012. Its a really big canyon you know.

How about your greatest achievement EVER? Having a wonderful and exciting life staying alive all those years in Grand Canyon and other canyons of the Colorado Plateau when on hikes and river trips with Susan and our children. Couldn't ask for anything better. Perhaps, though, I could use some new body joints here and there.

Continued Page 3

Member Spotlight—George Billingsley (continued)

What are your hobbies? Geologic studies and the thrill of discovery that comes with every new canyon or place to explore on the Colorado Plateau.

Water, Whiskey or Wine? WATER! Nothing like going a day or two without it to develop a sincere taste for it.

Thanks, George!

Do you know someone who would be an interesting subject for a "Member Spotlight" column? Email his/her name and contact information to ajones@clearcreekassociates.com.

Fall 2010 Field Trip

AGS is planning a field trip, tentatively in mid-October, to a southern Arizona mining district. Steel-toe boots, hard hats, safety vests and safety glasses will be required.

Stay tuned for more details.

GRAND CANYON 2011 GEOLOGIC RAFT TRIP

We have set the dates for the 8-day raft trip—July 10-17, 2011 and are currently accepting \$500 deposits. The total trip cost is \$2750, which includes flights back to the starting point, all meals and gear, etc. Stan Beus will be our geology guide and Hatch River Expeditions is our outfitter. Details are provided in the June newsletter. There is strong interest, but we anticipate that not everyone who indicated a preliminary interest will be able to go. If you wish to be part of this wonderful trip, please call Alison Jones at 520-622-3222 or email her at [ajones@clearcreekassociates](mailto:ajones@clearcreekassociates.com) for more information.

AGS NEWSLETTER DEVELOPMENTS

AGS is seeking to reduce the number of hard copies of the newsletter that are sent by U.S. Mail. If you receive a hard copy newsletter by mail and are able to receive an email copy instead, please notify AGS on the website or by leaving a voicemail message at 520.663.5295. Please be aware that you might receive an email and a hard copy newsletter for a short period of time while we do the switch.

2010 MEMBERSHIP DIRECTORY SPONSORSHIP

AGS is now accepting advertisements for the 2010 AGS Membership Directory. Our sponsors help offset the directory preparation and production expenses. Thanks to their generous support, the cost of membership continues to be very reasonable. The rates for advertising are listed below:

SIZE	RATE	APPROX. DIMENSIONS
Business Card	\$25	Standard Business Card
½ Page	\$100	4.7" w x 4" h
Full Page	\$200	4.7" w x 7.9" h

AGS can work with a variety of formats for your company ads: camera-ready, a business card, or an electronic file (.bmp, .doc, .jpg, tif, .pdf, etc.). The artwork will fit in the size limitations listed above. Feel free to submit a digital or hard copy sized to 8.5" x 11" and we will size it to fit. AGS retains digital copies of all ads published in 2005, so can place those ads again without a hard copy or digital file.

Date needed: Aug. 20 deadline - directory will be published in late August. Advertisers will receive a copy of the directory.

Please contact VP Marketing Cori Hoag at choag@srk.com or mail a hard copy to: AGS, P.O. Box 40952, Tucson, AZ 85717. If you have questions, call Cori at (520) 400-4135. Remit payment by check with the copy of the advertisement. AGS will send you an invoice (if needed) and a receipt. **Thanks for your support.**

Proposed Slate of 2011 Officers & Councilors

Don't miss the **AGS Annual Meeting** on September 7 when the proposed slate of Officers and Councilors for 2011 will be presented for your vote. As you can see, we are still working to fill some vacancies. Are you interested in serving on the AGS Board? Contact AGS President Mark Cocker at 520-670-5505.

President	TBD
VP Programs	Robert J. Kamilli, U.S. Geological Survey
VP Field Trips	Doug Shakel, Retired
VP Marketing	Ann D. Pattison, Independent
Treasurer	Coleen Brown, Retired
Vice Treasurer	Mike Conway, Arizona Geological Survey
Secretary	Alison Jones, Clear Creek Associates
Vice Secretary	Greta Orris, U.S. Geological Survey
Past President	Mark Cocker, U.S. Geological Survey
Councilor 1 (11-13)	Anthony Williams, Investor
Councilor 1 (11-13)	TBD
Councilor 2 (10-12)	Jeffrey Cornoyer, Rosemont Copper
Councilor 2 (10-12)	Claudia Stone, SRK Consulting
Councilor 3 (09-11)	M. Lee Allison, Arizona Geological Survey
Councilor 3 (09-11)	Diana C. Kamilli, Retired



Tetrapod
footprints in the
Coconino
Sandstone (late
Permian), Grand
Canyon, Arizona.

Photo Credit:
Fred Beck

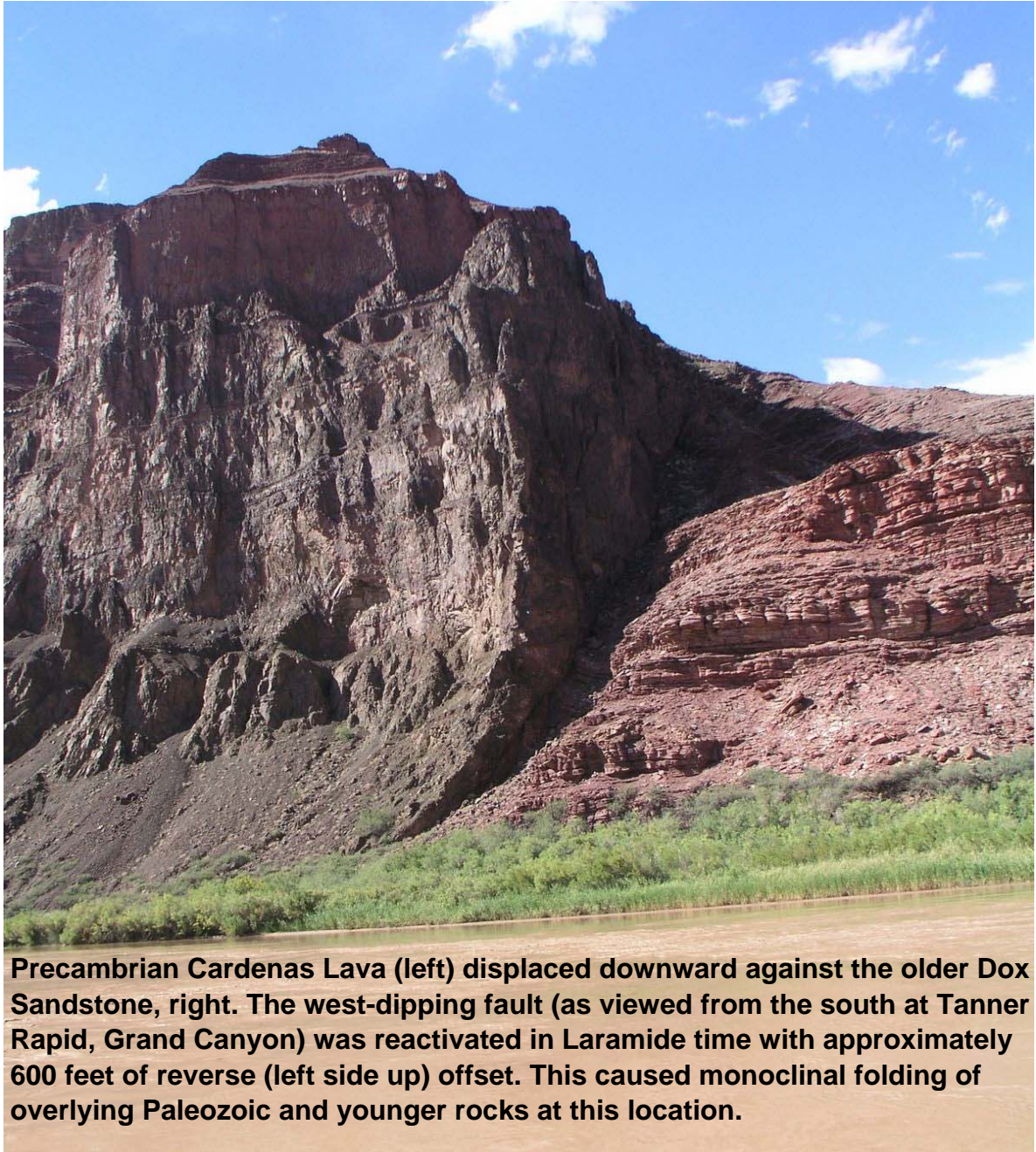


Photo Credit: Fred Beck

Precambrian Cardenas Lava (left) displaced downward against the older Dox Sandstone, right. The west-dipping fault (as viewed from the south at Tanner Rapid, Grand Canyon) was reactivated in Laramide time with approximately 600 feet of reverse (left side up) offset. This caused monoclinial folding of overlying Paleozoic and younger rocks at this location.

Do you have photos showing particularly interesting geological features?

Would you like to share them with your fellow AGS members?

If so, please email your digital format photo to ajones@clearcreekassociates.com with a detailed caption. Please let us know who took the photo so we can give proper credit.

We will use the photos as space allows in the monthly newsletter.

Thank you!

Alison Jones, AGS Secretary and newsletter editor



ARIZONA GEOLOGICAL SOCIETY

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 monthly dinner meeting and by the
 Arizona Geological Survey. Visit the
 AZGS website
 www.azgs.state.az.us
 and click on
 Non-AZGS Publications

2010 AGS MEMBERSHIP APPLICATION OR RENEWAL FORM

Please mail check with membership form to: Arizona Geological Society, PO Box 40952, Tucson, AZ 85717

Dues (check box) 1 year: \$20; 2 years, \$35; 3 years: \$50; full-time student (membership is free)

NEW MEMBER or RENEWAL? (circle one)

Name: _____ Position: _____

Company: _____

Mailing Address: _____

Street: _____ City: _____ State: _____ Zip Code: _____

Work Phone: _____

Home Phone: _____

Fax Number: _____

Cellular Phone: _____

E-mail: _____

I wish to receive newsletter by E-mail Regular mail only E-mail AND Regular mail

If registered geologist/engineer, indicate registration number and State: _____

Enclosed is a _____ tax-deductible contribution to the J. Harold Courtright Scholarship Fund.