



Arizona Geological Society Newsletter

ARIZONA GEOLOGICAL SOCIETY, INC., TUCSON, AZ

FEBRUARY 2011

February 1, 2011 DINNER MEETING

George Davis, Professor Emeritus, University of Arizona will be our featured speaker. See 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 January 28, 2011.

Please indicate low-salt, vegetarian, or vegan meal preferences. A coffee/salad/roll/dessert option is also available for \$18.

Please cancel if you are unable to attend. The hotel cannot guarantee that meals will be available without a timely reservation.

Geoarchaeology of the Sanctuary of Zeus, Mt. Lykaion, Greece

by George Davis, Ph.D.

Pausanias reports in his *Guide To Greece* (2nd century AD) that the Mt. Lykaion Sanctuary of Zeus was sacred to ancient Greeks. His descriptions hold: an upper sanctuary with ash altar and temenos; a lower sanctuary with hippodrome, stadium, and fountain. The Mt. Lykaion Excavation and Survey Project team has determined that Zeus-cult activities continued uninterrupted from Late Helladic (from ~1400 BCE) through Hellenistic times (2nd century BCE). The upper sanctuary resides on a tectonic klippe emplaced during Early Tertiary. A ten degree dipping thrust (Lykaion thrust) is the basal fault for the upper plate. Its trace precisely separates the lower and upper sanctuaries. Springs 'dot' the fault trace because groundwater descent through the klippe is halted by impermeable fault rocks.

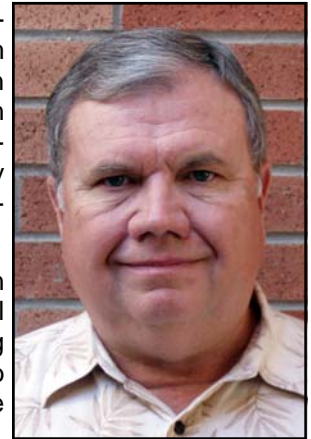
Detailed mapping of bedrock and structures within the Sanctuary of Zeus on Mt. Lykaion in the Peloponnese (Greece) reveals intimate ties between the archaeological and geological elements. The physiographic setting of this Pan Hellenic mountaintop sanctuary is dramatic visually. The upper part of the sanctuary is situated on top of a high dome-like summit (approximately 1400 m) known as Agios Elias (St. Elijah). The east margin of the upper sanctuary is a precipitous landslide-strewn escarpment actively being shaped by normal faulting related to regional extension. Active normal faults criss-cross the very summit of the sanctuary. The abrupt change in geomorphology from the lower to upper sanctuary areas coincides with the trace of the ten degree easterly dipping thrust fault, which was active in the early Tertiary and accommodated kilometers of east-to-west tectonic transport. Major folds developed during the thrusting event, and the core of one is occupied by a rock shelter thought by some to be the mythical birth cave of Zeus. This cave is a dilational saddle reef in the very core of an anticline!

The bedrock of Mt. Lykaion comprises five rock formations of the Pindos Group, each having a distinctive stratigraphic and landscape signature. The oldest sediments of the Pindos Group were deposited in a deep narrow part of the Neotethyan ocean. Pindos Group deposition began in the Jurassic with a restricted-basin phase in which the Pindos basin was deep, far from shore, and sediment starved. The pre-orogenic history continued through late Cretaceous time, producing overall a sedimentary section approximately 1000 m thick. The preorogenic history ended in latest Cretaceous when the Pindos basin began to be inverted and closed through formation of thrust faults and associated macrofolds. Uplifted blocks shed clastic sediments of latest Cretaceous through Oligocene age. Regionally the synorogenic sequence is about 300 m thick and represented primarily by Flysch Transition Beds, which in the Mt. Lykaion area is approximately 100 m in thickness.

George Davis is Regents Professor Emeritus in the Department of Geosciences at The University of Arizona. He came to teach structural geology at UA in 1970 as successor to Evans B. Mayo, and he has served as research advisor to about 50 MS and PhD students, and on the research committees of many others. His professional interests include metamorphic core complexes (he co-authored the first paper on them with Peter Coney), Laramide deformation in southeastern Arizona, the structural geology of the Colorado Plateau, and active tectonics, particularly as related to how geologic structures form in real time. Since 2004, George's main research activities have been in Greece, where his major efforts are directed toward geoarchaeological connections of bedrock geology to human activities and built structures in the ancient Greek world. George has served at UA in a variety of administrative roles, but he has continued to publish extensively. Currently he is wrapping up the third edition of *Structural Geology of Rocks and Regions* with co-authors Steve Reynolds and Chuck Kluth. George recently completed a three-year term as Chair of the Advisory Committee to the Geosciences Directorate of the National Science Foundation. He has received numerous awards including the Lindgren Citation Award for Excellence in Research, awarded by the Society of Economic Geologists; and the Geological Society of America's Career Contributions Award in Structural Geology and Tectonics.

February Member Spotlight—Robert Kamilli

Robert Kamilli (Bob) was born in Philadelphia, PA. After receiving a B.A. degree in Geology from Rutgers in 1969, he received his Masters (1971) and Ph.D. (1976) degrees from Harvard. After graduate school, he worked at the Henderson mine in Colorado and as an adjunct professor in the Department of Geological Sciences at the University of Colorado in Boulder. Teaching continues to be a source of enjoyment for Bob. He has worked with students of all ages, and has developed earth science curricula for primary and secondary schools in Saudi Arabia and Arizona. He is currently an adjunct professor in the Geosciences Department at the University of Arizona.



Bob joined the U.S. Geological Survey in 1983 as a geologist in their Saudi Arabian Mission where he studied deposits of tin and tungsten and advised the Saudi government on mineral exploration. From 1987 to 1989, he served as Chief Geologist of the Mission, developing and leading a minerals exploration program for the Mission and the Saudi government. Bob developed a taste for hot climates while in Saudi, so his move to Tucson in 1989, where he has continued his career with the USGS, was welcomed.

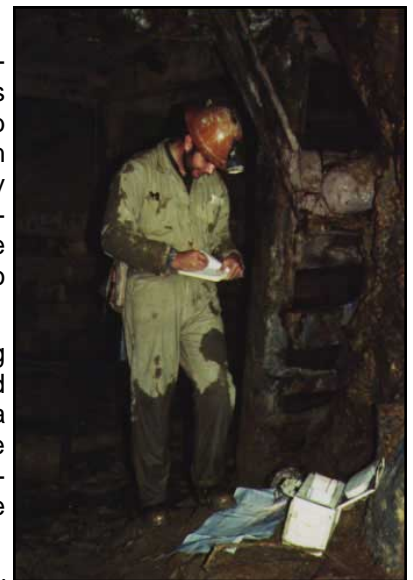
Bob is an active AGS member, having served as AGS president in 1999 and as VP for programs from 1995-1998 and 2004-present. He lives in Tucson with his wife, Diana, who is also a geologist and active AGS member.

How did you first become interested in geology? When I was five years old, I sold quartz pebbles collected near my home in southern New Jersey. I would paint them bright colors, and sell them to the neighbors. Little ones cost a penny; big ones cost a nickel; two-tone rocks were a dime. I also loved maps. From about the age of eight, I was the official navigator on family vacations. Fortunately, my parents did not object to my planning routes that passed near quarries and mine dumps. My father bought me my first rock hammer when I was twelve. By then, he was probably tired of my ruining his claw hammers. I did not know that maps had anything to do with rocks until I took a geology course at the Colorado School of Mines between my junior and senior years of high school, courtesy of the National Science Foundation.

What was your first job? I worked as an electrician in a factory that made drive-through car-wash machines. It was a good job because I got to wire up machines from blueprints; each machine was a little different. It certainly was a lot better job than flipping burgers. As a kid, I learned electrical work from my Dad, who was an electrician. At one point, when I was having a hard time academically during my freshman year at college, I seriously considered dropping out and joining the International Brotherhood of Electrical Workers like my Dad. I often wonder what my life would have been like if I had taken that path. I do know that I would not have seen so much of the world if I had.

What was your first job as a geologist? My first job in geology was as a teaching fellow while a graduate student. Then, as a part of my dissertation research, I had the opportunity to work as a consulting geologist for the Huampar and Buenaventura mining companies in Peru where I learned how to breathe at elevations above 15,000 feet. After graduate school, my first full-time job was with the Climax Molybdenum Company as a geologist at the Henderson Mine in Colorado. I always have loved working underground.

What is your most memorable field experience? When I was doing the early fieldwork in Peru for my dissertation I did not know much Spanish. One day the mine foreman said to me (approximately) "Vamos a explosionar temprano hoy día, así que asegúrese de salir de la mina antes del mediodía." ("We are going to blast early today, so be sure to leave the mine by noon.") I just smiled and said something like "Buenos días" and went on my way. I was alone in a stope when I felt the blast through the rock, then the sound of the dynamite exploding, then the air blast. Big rocks started falling around me out of the back of the stope. I was OK, but decided that maybe I had better leave. It was about a 200 meter ladder climb and then a 500 meter walk to leave the mine. When I exited the mine, the mine managers were waiting for me. They were both very mad and very relieved to see me. That was the day I decided to learn Spanish. I took many crazy chances in this little mine, which would never have passed an MSHA inspection, but I was young and immortal back then.



Bob mapping underground in Peru, 1972.

Bob Kamilli—Member Spotlight (continued from page 2)

What do you consider your greatest professional achievement? My dissertation proved the role of boiling in epithermal ore deposits. Boiling of hydrothermal fluids in ore deposits was little known at the time. The paper had a major impact and is still cited. It has been a stimulus for much additional field, laboratory, and theoretical research by many others over the past thirty-five years.

How about your greatest achievement EVER? I did well in high school, but I had no real study skills and was unprepared for the academic rigors of college. By the end of the first six weeks of my freshman year at Rensselaer Polytechnic Institute, I was well on my way to flunking out. Unlike today at most universities, there was no office or short course to help students improve their study skills. I slowly taught myself by trial and error to study, budget my time and take tests. By the end of my second semester, I made the dean's list. I am much more proud of this fact than I am of my Ph.D., for which I had plenty of help and encouragement from my dissertation committee.

What are your hobbies? I have always loved music of all sorts. I played the flute and piccolo in high school and now play the guitar and banjo. In order to communicate with my relatives in Germany and Austria (whom I have only recently discovered through the Internet), I have taken up the study of German forty years after I took it in college. Diana, my wife, who is also a geologist, and I take dog agility classes with our very smart Australian Shepherd. It's great fun, and the dog loves it.

Water, Whiskey or Wine? My preference for milk is so strong that my family and friends kid me about it.

Thanks, Bob!

Do you know an AGS member who would be an interesting subject for the Member Spotlight column? Please contact Alison Jones at ajones@clearcreekassociates.com with your suggestion.

Announcements

Arizona Water Resources Tour—February 16-18, 2011

The Water Education Foundation and the Bureau of Reclamation, Lower Colorado Region are offering a three-day, two-night tour February 16-18, 2011. The tour is designed to educate public policy decision makers, attorneys, consultants, and state and federal government staff members about the challenges facing Arizona's water management. For more information: <http://www.watereducation.org/toursdoc.asp?id=823>.

Arizona Department of Mines and Mineral Resources—Status

The Arizona Dept. of Mines & Mineral Resources ([ADMMR](#)) ran out of funds and was closed on Friday, January 21. On that same day, Arizona Geological Survey (AZGS) finalized an agreement that turns over custody to AZGS of the ADMMR's extensive files and reports on mines and mineral resources. The ADMMR offices in Phoenix opened on Monday, January 24 under management of AZGS. According to Arizona State Geologist Lee Allison's blog (<http://arizonageology.blogspot.com/>), "AZGS is committed to keeping the ADMMR files open to the public through the end of the state fiscal year (June 30) or until the Legislature takes action on Gov. Brewer's proposal to consolidate ADMMR into AZGS."



STATE OF ARIZONA
DEPARTMENT OF MINES AND
MINERAL RESOURCES

The University of Arizona J. DAVID LOWELL PROFESSIONAL PROGRAM IN MINERAL RESOURCES has a variety of courses available for credit or non-credit in 2011. For more information contact the Lowell Institute for Mineral Resources at 520-621-5292, or refer to the website at www.IMR.arizona.edu.

In Memoriam

Condolences to the family and friends of AGS Member **Dr. Barry N. Watson** who died January 19, 2011 from complications related to cancer. Barry received his B.S. degree from Pomona College in Southern California and his M.S. and Ph.D. from the University of Arizona. He worked for a number of mineral exploration companies including ASARCO and US Borax.

