

**Friends Of Mineralogy  
Pennsylvania Chapter**

**Fall Symposium  
Nov 3 & 4 , 2012**

**Presented at Franklin and Marshall College  
Lancaster Pennsylvania**



**Selected Topics  
on  
Pennsylvania Mineralogy and Geology**

## ***SCHEDULE of EVENTS***

**8:30 AM to 9 AM**

**Registration**

**9 AM to 9:15 Opening Remarks**

**9:15 to 9:55 AM**

**Ron Sloto**

*The Marcellus and Utica Gas Plays in  
Pennsylvania*

**9:55 to 10:30 BREAK**

**Check out the silent auction & visit the dealers**

**10:30 AM to 11:10 AM**

**Dr. LeeAnn Sorgi**

*The Morgantown Sheet: tectonics, mineralogy,  
and geology of a rock resource*

**11:10 AM to 11:40 AM**

**William Kochanov**

*Occurrence of tosudite and associated  
sulfide minerals in the Anthracite Fields of  
Pennsylvania*

**11:45 AM to 1:30 PM**

**Lunch on your own -RM 119 will be open**

**Silent Auction Ends 12PM**

## ***Schedule of Events***

1:30 PM to 2:10 PM

Charles Boyer and Robert Donley

“Images of America Cornwall”

2:10 to 2:30

Break

Room 119 will be open

2:30 PM to 3:10 PM

**Dr. Howell Bosbyshell**

The age of detrital zircon from the Wissahickon Schist and Gneiss, south-east Pennsylvania and northern Delaware: implications for regional tectonic history

3:15 2nd Silent auction ends



# Ronald A. Sloto

Ron Sloto is a senior hydrogeologist with the U.S. Geological Survey in Exton, Pennsylvania. During the past 38 years, he has worked on a wide variety of water-resource issues in Pennsylvania and the surrounding states. His experience includes groundwater and surface-water modeling, characterization of contaminant transport at Superfund sites, application of borehole geophysics to hydrogeologic investigations, radionuclides in ground water, and development of computer programs for hydrologic analysis. He is the project chief of the Washington County, Pennsylvania, Marcellus Shale study that is part of the larger U.S. Environmental Protection Agency national study on hydraulic fracturing and its potential impact on drinking water resources. He has also worked at Marcellus Shale sites in Blair, Cambria, Fayette, Lycoming, Monroe, Pike, Somerset, Sullivan, Tioga, and Wayne Counties. Ron has published over 80 reports, papers, abstracts, and journal articles on water resources, geophysics, geology, and mineralogy. He has been a mineral collector since the age of 5 and has a keen interest in the mining and mineral history of southeastern Pennsylvania.

## ABSTRACT

### **The Marcellus and Utica Gas Plays in Pennsylvania**

A primary and controversial target for unconventional natural-gas production is the Marcellus Shale, a black, organic-rich bedrock formation of Devonian age that is currently being exploited in Pennsylvania, West Virginia, and Ohio. The Utica Shale is a calcareous, organic-rich shale Middle Ordovician age below the Marcellus where natural-gas development is just beginning. The first Marcellus Shale gas well was drilled in Pennsylvania in 2003 and since then about 12,000 permits have been issued over 1,500 gas wells have completed. This talk will discuss the extent of the plays and their history, geology, and methods of development and gas extraction, including horizontal drilling and hydraulic fracturing.

## **Dr. LeeAnn Srogi**

Dr. LeeAnn Srogi is professor and chair of the Department of Geology & Astronomy at West Chester University. She grew up in suburban Detroit, and her earliest memories include picking out interesting stones and fossils. She came east for college and received her B.S. in Geology from Yale University (1977) and Ph.D. in Geology from the University of Pennsylvania (1988). She taught at Penn, Smith College, and Ohio Wesleyan University before joining the WCU faculty in 1991. Her Ph.D. dissertation was on the petrology of igneous and metamorphic rocks of the Wilmington Complex, Delaware, and she continues to do research in the region. She is currently engaged in three research collaborations with faculty and students on the geology and tectonics of the Morgantown Sheet; the metamorphic and tectonic history of the Wissahickon Formation; and how values, emotions, and attitudes shape student learning. She teaches upper-level courses in mineralogy, igneous and metamorphic petrology, as well as introductory courses in geology and geological disasters. She is always interested in stimulating new ways of teaching about minerals and rocks: beyond "rock-in-a-box!" Her non-rock interests include music (mostly classical and jazz), reading, cooking, films, hiking, birding, and gardening with native plants to provide habitat for birds and insects.

### **Abstract**

#### **The Morgantown Sheet: tectonics, mineralogy, and geology of a rock resource**

The Mesozoic basins that trend across eastern Pennsylvania from the Maryland border to the Delaware River are failed rift valleys related to continental extension and opening of the Atlantic Ocean. They are a small component of continental rift systems that spanned at least five continents. Basaltic magmas erupted and intruded into the rift basins during Jurassic time are informally known as the Central Atlantic Magmatic Province (CAMP). Marzoli et al. (Science, v. 284, p. 616-618, 1999) and other workers have estimated that lava flows covered as much as seven million square kilometers (not counting the intrusives), with ages that cluster around  $200 \pm 4$  million years. This tremendous production of basaltic magma within a geologically short period of time may be linked to mass extinctions or global-scale environmental disruptions. This talk concerns the geology of a local part of the CAMP, the Morgantown Sheet.

The Morgantown Sheet is an intrusion of basaltic magma that crystallized to form predominantly fine-grained gabbro or diabase. These rocks, and related intrusions and one lava flow to the east, have been important sources of aggregate, dimension stone, and interesting mineral specimens. The Morgantown Sheet is the westernmost intrusion within the Newark Basin, which extends into New Jersey



# William E. Kochanov

William (Bill) Kochanov (pronounced KO-CHAN'-OFF) is a geologist with the Pennsylvania Department of Conservation and Natural Resources, Bureau of Topographic and Geologic Survey, Geologic Mapping Division. Throughout his tenure at the Survey, he has been involved with bedrock mapping projects covering areas within the northern anthracite coal field, the northern tier Endless Mountains region, and in the Chester Valley of southeastern Pennsylvania. He has also authored 14 county reports specific to subsidence features within the karst regions of Pennsylvania as well as numerous articles pertaining to the general geology of Pennsylvania.

## Abstract

The synclinal Lackawanna Valley of northeastern Pennsylvania exhibits a broad range of interconnecting fluvial and alluvial lithofacies of coal- and non-coal bearing Carboniferous strata. The geology is also complicated by regional unconformities and intraformational folding and faulting.

As part of a cooperative mapping program with the U.S. Geological Survey, bedrock mapping was conducted on selected quadrangles within the Northern Anthracite Field. During work in the Avoca quadrangle near Scranton, clear to smoky quartz crystals were observed covering the joint surfaces of sandstone beds in the Glen Maura area near Scranton. Further searching revealed a blue to blue-green coating associated with the crystals. Samples were analyzed showing that the blue coating was the clay mineral tosudite.

Tosudite is defined as a regularly interlayered chlorite-smectite clay mineral (Bailey, 1982). Generally formed as a result of hydrothermal alteration, tosudite has been associated with metallic ore zones in Japan (Shimoda, 1969).

Where observed along the eastern flank of the Northern Field, it occurs as an interstitial filling between quartz pebbles of the Pennsylvanian-age Pottsville Sharp Mountain conglomerate and along fractures within basal sandstones of the overlying Llewellyn Formation. Similar local occurrences have been recorded by Harrison and others (2003) and more regionally by Daniels and others (1990). The zinc mineral sphalerite is also associated with tosudite and occurs as euhedral microcrystals in quartz veins of the lower Llewellyn.

The lithologic dichotomy and the occurrence of tosudite being restricted to the Pottsville/Llewellyn stratigraphic interval, is suggestive that mineralization occurred along a timeline coincident with Alleghanian-age uplift. The presence of tosudite along with the sulfide minerals sphalerite drops a tantalizing worm in front of the collector with the possibility of more extensive sulfide mineralized localities along this trend.

# Dr. Howell Bosbyshell

Dr. Howell Bosbyshell received his B.Sc. from West Chester University in 1992 and his Ph.D. from Bryn Mawr College in 2001. He currently serves as an Assistant Professor in the Department of Geology and Astronomy at West Chester University where he teaches Field Geology, Structural Geology and Geophysics. His research focuses on in-situ monazite geochronology and its application in unraveling complex, poly-deformed and metamorphosed terranes such as the central Appalachian piedmont.

## Abstract

In recent years, the Wissahickon Formation has been provisionally subdivided into three units based on differences in lithology, metamorphic and deformation histories, contact relationships, and the tectonic affinity of interlayered amphibolite. From NW to SE these units have been known as the Glenarm Wissahickon, the Mt. Cuba Wissahickon, and the type-Wissahickon, which occurs to the east of the other units across the steeply dipping Rosemont Shear Zone. This talk describes the results of LA-ICPMS U-Pb detrital zircon age analyses which demonstrate marked differences in zircon provenance between the type-Wissahickon, which occurs mainly in Philadelphia and Delaware counties, and the units to the west. We recommend abandoning the use of the name "Wissahickon" for the "Glenarm" and "Mt. Cuba" rocks and propose a new lithodemic unit, the West Gove Metamorphic Suite, consisting of the Mt Cuba Gneiss and the Doe Run Schist, as well as the Laurels Schist and White Clay Creek and Kennett Square Amphibolites.