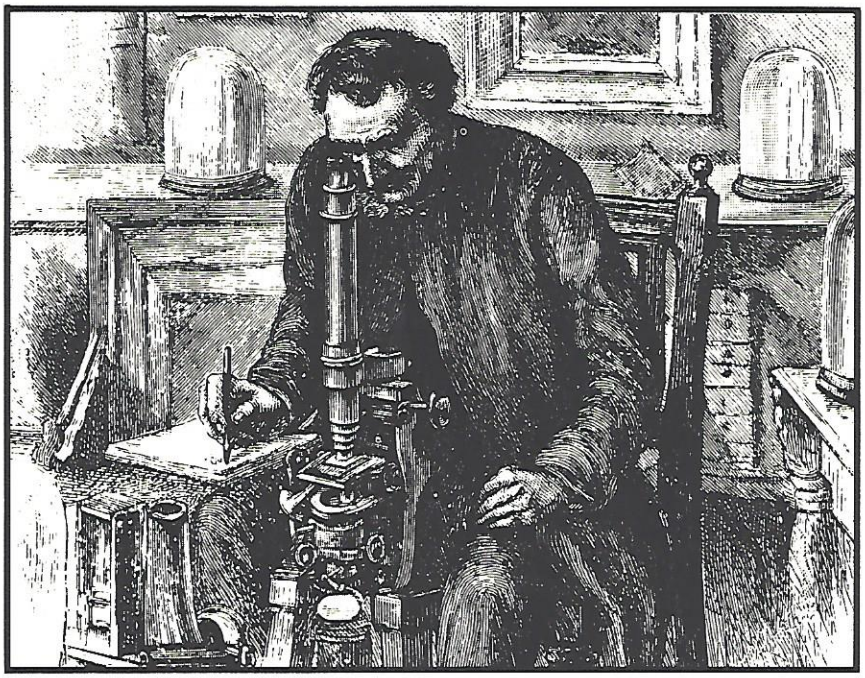
1996 FRIENDS OF MINERALOGY
PENNSYLVANIA CHAPTER

Symposium for the Mineral Collecting Community
on
Native Elements



November 15–17, 1996
West Chester University

Friends of Mineralogy Pennsylvania Chapter
1996 Symposium

NATIVE ELEMENTS

Schedule of Events

November 15, 1996	Geology Department, West Chester University	
Friday Evening:	7:00 PM	Advance Registration/Social Hour
	8:00 PM	What's New in Minerals
	9:00 PM-End	Socializing/Specimen Give-Away Table
November 16, 1996	Geology Department, West Chester University	
Saturday (all day)	8:00 AM	Registration/coffee & doughnuts
	9:00 AM	Symposium Welcome by Chapter President, Mr. Roland Bounds
	9:05 AM	Welcome by West Chester Univ. Representative, Dr. LeeAnn Srogi
	9:10 AM	WCU Mineral Museum Update Mr. Bill Yocum
	9:15 AM	First talk of the day Dr. LeeAnn Srogi-WCU
	9:55 AM	Second talk of the day Dr. Gene C. Ulmer-Temple Univ.
	10:35 AM	Break
	10:50 AM	Third Talk of the day Dr. David Ellis-DuPont Co.
	11:30 AM	PA Chapter Update and Information
	12:00 PM	Buffet Luncheon: Sykes Hall
	1:00 PM	Keynote Speaker Dr. Robert Jenkins-DuPont Co.
	2:10 PM	Move back to Geology Building
	2:20 PM	Fifth talk of the day Mr. Jay Lininger-MATRIX Magazine
	3:10 PM	Break
	3:30 Pm	FM General Membership Meeting/Auction

November 17, 1996
Sunday

Field Trip: Glen Mills Quarry-Milestone Materials Inc.
Leave-K Parking Lot at 9:00 AM
Meet at West Chester University for directions/guidance to the quarry. We are usually in a quarry for approximately 4 hours. As you know from previous entrances into quarries, hard shoes (steel toe preferred), hard hats, safety glasses, and gloves are required. Safety is of the utmost importance.

List of Speakers

Name	*Affiliation*
Dr. Gene Ulmer	Temple University
Dr. LeeAnn Srogi	West Chester University
Mr. Jay Lininger	MATRIX Magazine
Dr. Robert Jenkins	DuPont Company
Dr. David Ellis	DuPont Company

NATIVE ELEMENTS: A TEACHER'S PERSPECTIVE

LeeAnn Srogi

The Native Elements are a teacher's joy because they can be used as concrete examples of many of the important concepts in a mineralogy course. For example, diamond and graphite are both made of pure carbon, but diamond is the hardest natural substance (10 on the Mohs scale) while graphite is one of the softest (hardness of 1–2)! Graphite also conducts electricity—but only in one direction through the mineral! Students are naturally curious about these different properties. In helping them discover the answers, we can teach them about atomic bonding and atomic arrangements which influence the physical properties of minerals. The Native Elements illustrate three of the types of atomic bonding in minerals. The Native Elements are also excellent examples of different ways of putting atoms together to make crystalline solids. Some of these minerals, such as gold and copper, have simple arrangements in which atoms are packed close together. Others have more complex arrangements: Sulfur's structure consists of puckered rings of eight sulfur atoms. Finally, the Native Elements can be used to illustrate the different ways in which minerals can form. Of the native metals, the Platinum Group elements crystallize from magna, while gold, silver, and copper precipitate from hydrothermal fluids. Graphite forms during metamorphism, while sulfur is a common sedimentary mineral. Diamonds come from deep within the earth's mantle, while the native iron minerals, Kamacite and Taenite, most commonly come from meteorites. This talk will present some of the fun facts and the deeper significance of the Native Elements.

THE PLATINUM GROUP MINERALS AND ELEMENTS

Gene C. Ulmer

In keeping with the Native Element theme of this Symposium, one might be tempted to think that the well known noble metal behaviour of the Platinum Group Elements (PGEs) might make them 'eligible' to frequently occur in nature as native elements. However, the platinum group elements are largely chalcophile and therefore form sulfides, arsenides and tellurides, *i.e.*, the platinum group minerals (PGMs). In many PGMs, the major cation is a PGE. In other deposits, the PGEs are accounted for as cations present only in trace amounts in solid solution within the more common base metals sulfides [L. Cabri, Univ. Toronto, Canada]. Besides these two types of PGE-sulfides, fire assay of rocks and ores has substantiated that the PGEs are also present within oxide minerals like chromite; apparently these PGEs are also in solid solution as no discrete PGE phases are found despite much examination even at 20,000 × with the electron microphobe [I. Kinloch, Johannesburg Consolidated Investment Co., South Africa]. Despite these chalcophile and lithophile characteristics of the PGEs, they do occassionally occur as native elements, but as alloys usually with iron (***electrum,*** for example). In recent years it has been discovered that PGE-rich zones of mafic plutons are often associated with another native element, carbon, in the form of poorly- to well-crystallized graphite [G. Ulmer, Temple Univ, Pennsylvania]. This association of graphite and PGEs is so 'reliable' that the carbon is also now used as a 'target' in prospecting mafic igneous rocks for PGE. This association raises some very interesting questions about how the PGMs form.

The mineralogy, economic geology, petrogenesis, and field geology of some of the world's important PGE/PGM depostis will be discussed with slides. Some PGE ore samples will be on display from the Bushveld (South Africa), and the Stillwater (Montana) Complexes.

THE NATIVE SILVER MINES OF PORT RADIUM, NWT, CANADA

Dave Ellis

The mineralized veins at Port Radium in the Canadian Arctic were discovered by Gilbert LaBine in the late 1920's. Two families of intersecting veins occur at Port Radium. For years one set of veins at the mine were mined primarily exclusively for pitchblende needed to produce radium. After World War II silver became the dominant product of the mine. Native silver was found in nearly vertical veins, up to six feet wide, near the contact between pyritized amphibolites and hematized silicic volcanic rocks. The silver occurred with acanthite, cobaltite, and niccolite in a matrix of calcite. Wall rocks near the veins were usually silicified and hematitized during ore deposition. The silver-bearing veins were usually less than one foot in width. However, they were frequently very rich, up to 75% native silver by volume. Port Radium is now mined out and abandoned.

THE HOMESTAKE GOLD MINE: AN AMERICAN INSTITUTION

Robert E. Jenkins II

The Homestake Mine in the Black Hills of South Dakota is the oldest and most productive gold mine in the western hemisphere. The talk will be a survey of the history of gold production at Homestake: its mining and metallurgy, present and past concepts of the geology and mineral distribution of the orebodies. In that ties between community and the "big mine" are intimate, the talk will also include some of the history of the towns of Lead and Deadwood, which the operation has supported for so long.

NATIVE COPPER IN PENNSYLVANIA

Jay Lininger

The known assemblage of copper minerals from around the world amounts to nearly 300 species. The relative abundance of copper worldwide, coupled with its predisposition to readily combine with other elements provides the environment to produce such a large number of species. Paradoxically, the property of copper to readily bond with other elements, results in a scarcity of the native metal in nature. The well known deposit in the Upper Peninsula of Michigan, remains the only large occurrence of the native metal.

Native copper is an uncommon mineral in Pennsylvania, with one minor exception. The known Pennsylvania occurrences appear in the Precambrian metavolcanic rocks of the South Mountain Range, or in relation to igneous intrusions in the Triassic redbeds of Southeastern Pennsylvania. Gordon (1922) reports the following primary occurrences of native copper; Berks County (Jones Mine); Lebanon County (Cornwall Mines); Chester County (Wheatley Mine). Gordon also reports native copper as a secondary mineral in Montgomery County (Ecton-Perkiomen Mines). In all cases the mineral was uncommon to rare, occurring as small hackly masses, dendritic forms, metallic grains or very rarely, crystals.

Stose, Wherry and Bevier reported about 20 occurrences of native copper in the Catoctin metabasalt unit (South Mountain Metavolcanics) of Adams, Franklin and Cumberland Counties. At these locations, native copper was prospected for its economic potential and was therefore more abundant than in other locations. Stose, in noting the similarity to the Keweenaw metavolcanics, suggested that the native copper resulted from the natural reduction of a sulphide deposit.

The author has noted occurrence of metallic grains of native copper at Hunterstown Mine, Adams County and the Fox Run Prospect, York County. Both occurrences resulted from the effects of diabase intrusions into Triassic sandstones.