

Nittany Mineralogical Society Bulletin

Nittany Mineralogical Society, Inc., meeting in State College, Pennsylvania
Contact information on back page

January, 2017

Visit our web site: www.nittanymineral.org

Editor (see back page):
David C. Glick

January 18th meeting - **NEW LOCATION:**

Establishing the Foundation for Rhyolite Sourcing of Native American Artifacts

by

Barry E. Scheetz, Tim Murtha and Gregory H. Bondar

Our January meeting will be held Wednesday the 18th in **A NEW LOCATION: Room 113 Information Sciences & Technology Building** (which bridges North Atherton St.) on the west side of the Penn State campus in State College, PA. From our usual parking lot, it is the building to the left of Earth & Engineering Sciences Building (EESB). The room is on the ground floor, accessible from either the end door facing EESB or the main door at the corner of the parking lot near Atherton St. *Maps are available on our web site.*

6:45 to 7:45 p.m.: Social hour, refreshments in the hallway
[if a site is available]

7:45 to 8:00 p.m.: announcements, questions, answers
about 8:00 p.m.: featured program

The event has free admission, free parking, and free refreshments, and is open to all; **parents/guardians must provide supervision of minors.** Bring your friends and share an interesting evening!
-Editor

Of the nearly dozen lithic materials that were utilized by Native American peoples in what is now Pennsylvania, metarhyolite is the 7th most abundant lithic material reported in the State PASS files that form the registration of archaeological sites. Metarhyolite occurs in the Catoctin Formation in Franklin and Adams County as part of the extreme northern Blue Ridge Mountains, locally known as South Mountain. An analysis of the time frame for the exploitation of metarhyolite shows that during the Transitional Era [7000 to 8000 BC] the material usage exploded along the Juniata and Susquehanna River Valleys throughout Pennsylvania and into New York and westward into Ohio. We will explore the distribution of rhyolite along the Eastern Seaboard and examine its physical and chemical characteristics with the goal of identifying components that can be utilized to unequivocally define the origins of a rhyolite sample to its source location.

Minerals Junior Education Day Saturday, April 1, 2017

Frank Kowalczyk will be coordinating NMS's 22nd Annual Minerals Junior Education Day. It is set for Saturday, April 1, at Central Pennsylvania Institute of Science & Technology at Pleasant Gap, the same location as the last two years. Please save the date and think about how you might help bring this great event to families in our community.

At this event, kids get an empty egg carton when they check in, then go to a series of stations, each concerning a different aspect of mineral properties, rocks, fossils, etc. They learn about the topic from a demonstration or discussion, and receive a properly labeled specimen or educational item related to the topic, so they gather a whole collection in their egg carton. There is also a sales table with kid-friendly prices.

We are starting early to prepare for the 2017 event, seeking **volunteers** to help to present the stations, and ideas for stations which we (or you) might present. We also welcome advance donations of identified minerals, tumble-polished material, fossils, books, etc. which can be sold at child-friendly prices. To volunteer or get more details, **please contact Frank J. Kowalczyk:**

frank.j.kowalczyk@gmail.com
or 814-238-8874



Weather Cancellation Policy

In case we experience active winter weather on a meeting date, our policy is to cancel the meeting only if evening classes at Penn State have been cancelled. That cancellation is publicized in the usual radio and TV service announcements.



Penn State notes that weather-related cancellation / closing information can be found at WPSU-FM, the news site <http://news.psu.edu/>, and <http://www.facebook.com/pennstate>



- Editor

ATTENDING THE JANUARY MEETING?

Donations of **a few high quality, labeled door prize specimens** are invited.

Bring a friend!

NOTE THE NEW LOCATION

When Geologists Make Beer...

NMS member, earth science teacher and Penn State alum Dan Leppold authored an article entitled “Stein Beer: Last Call” in the December 2016 issue of Brew Your Own magazine. The full article can be found at <https://byo.com/stories/issue/item/3499-stein-beer-last-call>

As Dan reports, “Stein brewing is a method brewers used before they could direct-fire brew pots, mostly because they were made of wood. In lieu of heating the pot, brewers used hot stones to heat the wort. One serious problem brewers faced was the dangerous potential for the stones to explode or fall apart during the heating/cooling process if the correct type of rocks are not used.”



A hot chunk of Pennsylvania Triassic diorite hits the wort. *D. Leppold photo*

When the very hot rocks are dropped into the wort, the sugars in the wort caramelize on the surface of the rocks, producing a flavor that is distinctive in stein beer. The illustrated article details the process, and rocks, used by Dan and his friends, and some additional flavoring experiments. The results were good!

In case you were wondering about stein beer and beer stein, “beer stein” is an English usage; Wikipedia’s “beer stein” article states, “In German, the word stein means stone and is not used to refer to a beverage container.” The usage probably originated from the fact that beer steins were made of stoneware pottery before they were made of glass.

FEDERATION NEWS

Nittany Mineralogical Society, Inc., is a member of EFMLS, the Eastern Federation of Mineralogical and Lapidary Societies, and therefore an affiliate of AFMS, the American Federation of Mineralogical Societies. We present brief summaries here in order to encourage readers to see the entire newsletters.

The **EFMLS Newsletter** is available through the link on our web site www.nittanymineral.org, or remind Dave Glick to bring a printed copy to a meeting for you to see. The January issue kicks off publicity and registration for the week-long workshops at Wildacres in the mountains of North Carolina. The Spring session will be held May 22-28, with Bob Jones as Speaker-in-Residence. A description, list of classes and a registration form are in that issue. President Dave Korzendorfer revisits a series of articles from ten years ago about assessing the health of a club and reviving its membership numbers. An internet safety article is provided.

The **AFMS Newsletter** is available by the same methods; the December-January issue was summarized in our last issue.

Please see the web sites for the complete Newsletters. There’s a lot there! *-Editor*

Geo-Sudoku

by David Glick

This puzzle contains the letters ACFGHIKNR. One row or column includes a high-pressure topic in Pennsylvania. As usual, if you’ve read this issue, you’ve seen the word. Each block of 9 squares, each row, and each column must contain each of the nine letters exactly once. The solution is on page 8.

C	G		F	N			A	
	K				G		N	
	N	F		H			K	
			G				F	
		G	A			H		C
A	H	I						
N	A		H			F		
G		H		F			R	
F	R	C		A		K		

Door Prizes at January Meeting

NMS is supplying two “grand door prizes” for the January meeting, illustrated below. In addition, there is a cluster of calcite crystals from Corydon, Indiana, 2.1", with interesting overgrowth of aligned smaller crystals.



A sawn slab of red banded jasper, 4.9" It is thoroughly lithified, should behave well if carved. *R. Altamura photo.*



Pyrite crystal cluster from the Leonard Mine, Butte, Montana; 3.5". Ex- John Passaneau collection. *D. Glick photo.*

Mineral Specimens for sale

I am preparing to sell a large percentage of my worldwide collection and thousands of Pennsylvania specimens, many self collected and old classics. There's plenty of variety, and plenty for different levels of collector interest. Anyone interested should call to set up an appointment. Thanks,

Skip Colflesh, Hershey, PA
phone 717-805-2027

60 Years Ago in Rocks & Minerals

The January-February 1957 issue of *Rocks & Minerals* magazine included several Pennsylvania items. The first was by Dr Richmond E. Myers of Moravian College, reprinted from his column in the *Bethlehem Globe Times* newspaper. A reader asked about typical Pennsylvania minerals to include in a collection. The author felt that the criteria would be hard to agree upon, and instead mentioned ten minerals with Pennsylvania connections. The first five have Pennsylvania names [some no longer recognized]: nesquehonite, lansfordite, lancasterite, eastonite, and sauconite.

Sphalerite from the Uberroth mine had an unusual appearance for the species and was worth mentioning. Genthite was named for the Pennsylvania mineralogist Frederick A. Genth. Radioactive thorianite from the Williams quarry at Easton was listed “in keeping with today's developments” in nuclear research.

“To round out the list to ten, we add jasper and piedmontite. Jasper, so common in the Reading Hills, was the first mineral mined by man in Pennsylvania. The Indians used it for arrowheads. Piedmontite, notably from the South Mountain area in Adams and Cumberland counties, has always been of interest to collectors as a Pennsylvania mineral.

Another article (from the *Wilkes-Barre Record*) covered the October 21, 1956, dedication of a “coal altar” of anthracite in the chapel of King's College, Wilkes-Barre. It was made from a single 4200-pound block of anthracite from Wanamie, Luzerne County, cut by the French Creek Granite Company in St. Peter's, and carved by Edgar Patience.

Finally, a special exhibition of the Maxwell Sommerville collection of engraved gems at the University of Pennsylvania Museum was reported. The collection, which had been in storage for many years, “...is mentioned in Dake's *Quartz Family Minerals*, because most of the two thousand or more gems are made from many varieties of quartz. ...Dr. Dake says [it] is without doubt the finest private collection ever assembled.” There was a 36-page catalog of items in the collection. Many other gems on display at the Museum were mentioned.

-Editor

THOUGHTS ON MARCELLUS SHALE DRILLING IN PENNSYLVANIA

Dr. Charles E. Miller, Jr.
State College, PA

Introduction

Marcellus Shale drilling began in Pennsylvania in 2003. Despite a plethora of information about it, there are still misconceptions, misinformation, and lack of understanding. For example, some think of oil and gas fields as underground pools, like big lakes. Oil and gas fields or reservoirs are in solid rock. Hydrocarbons exist within pore spaces or fractures in those rocks. Misinformation on Pennsylvania's Marcellus drilling was epitomized in one local news story characterizing hydraulic fracking as being new. It is not. Its first use was in 1947. We used it in Texas when the writer was a petroleum geologist from 1981-1985. This means hydraulic fracking has been used for 69 years – hardly new.

In 2012, State College voted in a Community Bill of Rights, part of which prohibited gas drilling and fracking. This was in response to “the dangers of shale-gas drilling--the poisoned water supplies, the pollution, the destruction of the natural landscape, the ruination of whole communities.” Prior to the 2012 vote, this writer spoke with two local residents regarding Marcellus drilling. While their intentions were admirable, neither understood the issues. Like some others, they joined the cause after hearing pollution claims and various buzzwords such as fracking, harmful chemicals, and horizontal (directional) drilling. One of the two stated: “The idea of horizontal drilling just sounds awful.” It was evident there was no understanding of this technological breakthrough. Horizontal drilling significantly reduces surface land disturbance because drilling in multiple directions is from a single drill site. A separate drill site for each direction is no longer needed. Twenty or more wells can be drilled from one horizontal drill pad. In comparison, if those 20 wells were conventional, each requires clearing land for access roads and site development. Horizontal drilling also increases productivity over conventional drilling. Despite these explanations, this person's viewpoint remained unchanged. The other person admitted not understanding the issues. None-the-less, that person wanted to prevent impacts similar to what coal mining did to her erstwhile community.

Fracking

One issue involving Marcellus drilling that is frequently cited is fracking. What is usually implied is hydraulic fracking as opposed to non-hydraulic or explosive fracking. The former involves fracturing rock at depth using high-pressure fluids. The latter uses explosives to fracture rock at depth and is known as “shooting” a well. Explosive fracking is linked to John Wilkes Booth, the assassin of President Abraham Lincoln, who in 1864 destroyed a well using gunpowder in an attempt to stimulate production. However, that led to the Roberts Petroleum Torpedo, encasing gunpowder in an iron case and detonating it at depth. This proved successful. Eventually, hydraulic fracking replaced “shooting” wells.

The word “fracking” is sometimes misused. Fracking is a specific procedure. Some people misuse the term to collectively reference procedures associated with fracking. For example, someone might say “all the water contamination due to fracking” when, in fact, related procedures such as spills are the cause. Citing these examples may be a matter of semantics. None-the-less, the examples highlight misconceptions. Mentioning them is not an attempt to minimize potential and real environmental impact but rather to clarify. The problems still exist, just by other names.

A major concern of Marcellus drilling is freshwater degradation. Drilling and fracking fluids, brine, and natural gas migration are issues. Fracking, however, does not usually cause water degradation to freshwater zones. This is because of the basic tenets of Marcellus drilling in Pennsylvania (Figure 1): solid steel surface casing extends from the surface to 50 feet below freshwater zones; between casing and strata is air into which cement is pressure injected; usually several thousand feet of strata separate freshwater zones from the Marcellus; and water quality below freshwater zones is undrinkable. Groundwater at depths where this fracking occurs is old salt water from when sediments were deposited in a marine setting. Fracking occurs far below fresh-water zones. Surface casing plus cementing are intended to contain drilling and fracking fluids as well as natural gas to the well bore.

There are, however, infrequent occasions when fracking and/or drilling fluids leak from casing and cement. In addition, there may be infrequent upward migration of fracking fluids just as natural gas sometimes does, due to high pressure. This can lead to

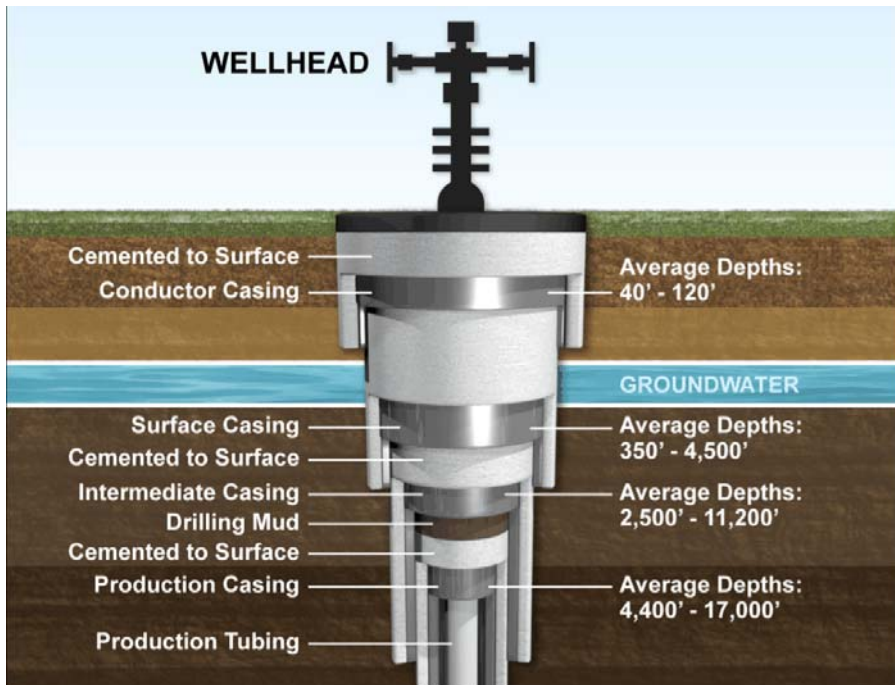


Figure 1: Typical Marcellus Shale well construction. (energyindepth.org)

freshwater degradation at shallower levels. If it occurs at all, freshwater degradation is mostly associated with related scenarios such as leaking cement, spills, corrosion of steel casing, and poor well completions. **The important point is these latter four examples are not unique to Marcellus drilling. They also occur in conventional oil and gas drilling that does not use fracking or horizontal drilling.** If leaking cement, spills, corrosion of steel casing, and poor well completions are a basis for wanting to ban Marcellus drilling (unconventional drilling), then the same consideration should be applied to conventional drilling. If both conventional and unconventional drilling are banned, our country will have to reconsider its energy plan.

A perception of earthquakes and fracking is inculcated in some people's thinking. Distinction is made between earthquakes from waste-water injections and those from hydraulic fracking. Again, this may be semantics. **Fracking does not usually cause earthquakes.** Rather, it is high-volume wastewater injections that are the cause. Such man-induced earthquakes were first realized in the 1960s at the Rocky Mountain Arsenal outside Denver, Colorado. Wastewater injections, there, correlated with over 700 earthquakes. **An important point is that the Denver earthquakes had nothing to do with fracking.** However, in 2014 earthquakes were attributed to hydraulic fracking in Ohio. That fracking activated a

hidden fault beneath the well. The actual number of fracking-induced earthquakes is minor compared to the number from waste-water injections. Because hydraulic fracking involves large volumes of water, there is more wastewater for disposal. This is an issue that demands more attention, such as increased recycling of fracking fluids.

Several states have either banned fracking or imposed a moratorium on it. Water degradation is cited as one reason. Some examples given are creditable and some are not. Complaints alleging water degradation from Marcellus drilling do not automatically make them valid. A number of studies have been done on potential degradation to water wells from Marcellus drilling. Although the blogosphere culture disputes the findings, the general conclusion is that Marcellus drilling activities have not caused widespread, systematic damage to water resources. Instead, there are isolated examples and there are problems associated with water withdrawals from limited water sources; groundwater contamination; inadequate well cementing and casings that allowed migration of gas and liquids into drinking water aquifers; releases of inadequately treated wastewater; and surface spills of chemical fracking fluids and wastewater.

One sensational effect of leaking natural gas is that of people lighting their water. This occurs when methane leaks to the surface and is dissolved in water. Each example garners lots of attention. However, these examples may not always be attributable to Marcellus drilling. In some cases, migrating methane preceded Marcellus drilling. This writer knows of at least one example in Pennsylvania where methane leaking into a stream was ignited. This leaking methane predated Marcellus drilling by at least 15 years. Some leaking methane is naturally occurring and some is from old wells. There is also a study of water wells in northeastern Pennsylvania that detected naturally occurring methane in 24 percent of the wells. Another study in Pennsylvania determined that methane detected in water wells is different in origin than natural gas from the Marcellus. This study used "fingerprinting" of the methane. **The point is that methane in water supplies may not necessarily be due to Marcellus drilling.**

Comparisons

The concern to protect freshwater is paramount. However, that concern seems narrowly focused on Marcellus drilling. Consider the following four scenarios, all of which contribute more water degradation than does Marcellus drilling but none of which have been banned.

Pennsylvania's Department of Environmental Protection manages a LUST (Leaking Underground Storage Tank) Program. As of October 2012, the state has 23,339 underground storage tanks. Of these, 15,499 have had confirmed releases. Most have been cleaned up. The majority of these tanks are at gas stations. Underground gasoline storage tanks have a long history of leaking. Lost gasoline can infiltrate to the water table, degrade water quality, and yield explosive vapors. In 1970 an underground gasoline storage tank at Spring Mills, PA leaked 200 to 250 gallons, some of which migrated to a private water well. An explosion in the well created a crater 25 feet in diameter and 12 feet deep (Figure 2).

During winter, PennDOT applies road salt to melt snow and ice. Salt applications have significant environmental impacts. Road salt impacts the water

table, streams, water supplies, and wildlife. In addition to sodium and chloride, components in road salt may include: ferrocyanide, chromium, cadmium, lead, and more. Ferrocyanide is on the Environmental Protection Agency's list of toxic pollutants. From 1983 to 2003, at a cost of \$3.2 million, one New England state replaced more than 424 private wells that road salt contaminated. Several public water-supply wells have also been abandoned due to this contamination. Canada categorized road salt as a toxin. Also, as everyone who lives in our northern states knows, road salt is extremely corrosive to cars. It is estimated that road salt has caused billions of dollars worth of damage to vehicles.

Pennsylvania has 46 active sanitary landfills. These replace old-style dumps. Both produce leachate and methane. Leachate is any liquid produced at such sites. Considering the wide range of materials disposed at sanitary landfills, leachate has great potential for degrading freshwater if it leaks. There is a long history of leachate leaking from sanitary landfills, mostly from older ones that do not incorporate newer technologies.

Exploration drilling in the coal industry determines economic feasibility of mining specific coals. It is common to find old, abandoned drill holes that are still open. Other drill holes may have been filled with drill

cuttings. Unless grouted (almost never done), drill holes provide direct pathways for vertical migration of groundwater from one stratum to another. This is called commingling of water. The result is that acid mine drainage produced during mining can easily drain via ungrouted drill holes to deeper aquifers, degrading water quality at those lower depths. Thousands of drill holes that have not been grouted exist in Pennsylvania's coal regions.



Figure 2: A 25-foot-diameter crater from an exploding water well at Spring Mills, PA.

(Image courtesy of Richard R. Parizek)

A Crossroads

America remains at a crossroads in its energy use. It consumes more energy than any other country. Our economy is based on cheap energy. The Marcellus Shale is a huge, world-class natural-gas reservoir that will continue for decades to provide a significant percentage of America's energy. Below the Marcellus is the Utica Shale. However, it is economical to produce gas from shale only if hydraulic fracking and horizontal drilling are used. Americans are fickle when it comes to energy. They enjoy driving low-gas-mileage vehicles but do not want to pay high gas prices. Similarly, they are willing to use oil and gas but do not want it produced in their backyard. This is an example of the NIMBY (Not In My Back Yard) concept.

Conclusion

Oil and gas drilling are extractive activities, as are mining of coal, limestone, sandstone, copper, and many other rocks and minerals. All extractive mining activities have potential deleterious environmental impacts. It sometimes seems anti-drilling advocates have zero tolerance for water degradation involving Pennsylvania's Marcellus drilling. If so, that may be a somewhat unrealistic approach. It is also unrealistic in the other mentioned extractive activities.

Pennsylvania might have done a better job in anticipating environmental issues relating to Marcellus drilling. Gas drilling could be as regulated as the coal industry. Conversations with Marcellus drilling foremen indicate they have always expected additional regulations as well as a tax on gas production. That tax would support costs of monitoring the industry.

Perhaps moratoriums are a better alternative than bans on Marcellus drilling. Moratoriums suspend drilling until additional data are collected. Hopefully, decisions are based on those data.

One wonders what is the goal of advocates wanting to ban Marcellus Shale drilling. Is it to increase regulations on the industry? If so, that is commendable. However, if misconceptions, misinformation, and lack of understanding guide those who want to ban this valuable resource, it is unfortunate. We need to be smart about extracting this resource, not reacting in a knee-jerk manner. Water resources need to be protected and other concerns minimized. However, America

keeps using more and more energy. Extraction of that energy is not 100 percent failsafe. It should be kept in mind that all of our country benefits from the Trans-Alaska Pipeline. However, it, too, has had its share of leaks.

While considering banning fracking, why not also consider banning coal mining, nuclear power plants, hydroelectric dams, and wind turbines? There is some opposition to these energy sources, similar to that of Marcellus drilling. Obviously, this is not realistic. It seems that Americans easily forget the 1970's when Saudi Arabia refused to sell oil to us. Gasoline was rationed and it was predicted the country would run out of natural gas. We were importing a very large percentage of our oil. Horizontal drilling and fracking have opened up a huge potential in oil and gas from shale. This would not have been economical without hydraulic fracking and horizontal drilling. Surely Americans will be rational enough so that a balance can be obtained between developing shale hydrocarbons and maintaining environmental quality.

Disclaimer

The writer has no connection with any Marcellus Shale drilling companies working in Pennsylvania, or elsewhere, other than having visited two drilling sites in the State.

Mineralogical Record's Axis Online Journal

Mineralogical Record occasionally publishes *Axis*, a free journal, at <http://www.minrec.org/journal.asp>. We have not previously mentioned the compilation of "Legal Nuggets" columns, posted earlier this year. There are seven essays published in the Mineralogical Record magazine by the late Judge Francis Allegra between 2008 and 2012:

Fragile Minerals and the TSA
The Taxman Cometh
Collectors, Investors and Dealers
"My Word is My Bond"
Specimen Defamation
Warranties
Estate Planning for Your Collection

Some Upcoming Shows and Meetings

Our web site <http://www.nittanymineral.org> has links to more complete lists and details on mineral shows and meetings around the country. See www.mineralevents.com for more.

Jan. 28, 2017: Rutgers Geology Museum Open House. See page 7 of Dec. issue and geologymuseum.rutgers.edu/

March 4-5, 2017: Earth Science, Gem and Mineral Show by Delaware Mineralogical Society. **NEW LOCATION:** U. Del. Wilmington campus, Arshat Conference Center, 2800 Pennsylvania Ave (Rt. 52), Wilmington DE 19806. Sat 10-5, Sun. 11-5. Info and coupons at www.delminsociety.org
 --- **AND A Symposium** with a variety of topics and more than 10 speakers; watch for details.

March 25-26, 2017: Che-Hanna Rock & Mineral Club Annual Show, **NEW LOCATION:** Wysox Volunteer Fire Company, 111 Lake Rd., Wysox, PA; Sat. 9-5, Sun. 10-4; \$3.00, \$1.00, under 8 free; 48th Annual Show. Club members exhibits, museum exhibits, lapidary demonstrations, door prizes. Kids' scavenger hunt & mini mine. Fluorescent show. Dealers. www.chehannarocks.com

March 25 -26, 2017: Gem- Mineral & Jewelry Show by The Franklin County Rock and Mineral Club, Hamilton Heights Elementary School, 1589 Johnson Road, Chambersburg, PA. Jewelry - Gemstones - Minerals - Fossils - Displays - Demonstrations - Door Prizes. Saturday 10 a.m.- 5 p.m. Sunday 10 a.m.- 4 p.m.

March 25 -26, 2017: Show and sale by Philadelphia Mineralogical Society & Delaware Valley Paleontological Society, Lu Lu Temple; 5140 Butler Pike; Sat. 10-5, Sun. 10-4; www.philamineralsociety.org

May 6, 2017: South Penn Rock Swap, by Central Penn & Franklin County R&M Clubs. South Mountain Fairgrounds, west of Arendtsville PA on Rt 234. For GPS use 615 Narrows Rd, Biglerville PA 17307. Contact: tsmith1012@comcast.net

June 3, 2017: Spring Mineralfest by PESA, Macungie, PA. Sat. only 8:30 -3:00. <http://www.mineralfest.com/>

June 16-17: Annual Show by Lancaster County Fossil and Mineral Club, Solanco Fairgrounds, Hoffman Building; 172 South Lime St.; Fri. 12-8, Sat. 10-5.

October 21-22, 2017: EFMLS Convention & Show, Bristol, Connecticut.

Geo-Sudoku Solution

C	G	R	F	N	K	I	A	H
H	K	A	I	R	G	C	N	F
I	N	F	C	H	A	G	K	R
K	C	N	G	I	H	R	F	A
R	F	G	A	K	N	H	I	C
A	H	I	R	C	F	N	G	K
N	A	K	H	G	R	F	C	I
G	I	H	K	F	C	A	R	N
F	R	C	N	A	I	K	H	G

Visit us at www.nittanymineral.org

INVITE A FRIEND TO JOIN THE SOCIETY

The Nittany Mineralogical Society prides itself on having among the finest line-up of speakers of any earth sciences club in the nation. Everyone is welcome at our meetings. If you'd like to be part of our Society, dues are \$20 (regular member), \$7 (student rate), \$15 (seniors), \$30 (family of two or more members, names listed). Those joining in March or later may request pro-rated dues. Your dues are used for programs and speakers, refreshments, educational activities, Bulletins, and mailing expenses. Please fill out a membership form (available at www.nittanymineral.org), make checks payable to "Nittany Mineralogical Society, Inc." and send them in as directed, or bring your dues to the next meeting.

We want to welcome you!

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The **Bulletin Editor** will welcome your submissions of articles, photos, drawings, cartoons, etc., on minerals, fossils, collecting, lapidary, and club activity topics of interest to the members. Please contact:

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 State College, PA 16801-7226

Newsletter submissions are appreciated by the first Wednesday of the month. Photographs or graphics are encouraged, but please do not embed them in word processor files; send them as separate graphics files (TIF, or good to highest quality JPEG files, about 1050 pixels wide, are preferred). Please provide captions and name of photographer or artist.