

Nittany Mineralogical Society Bulletin

Nittany Mineralogical Society, Inc.
P.O. Box 10664

State College PA 16805

Editor (see page 8):

David C. Glick

April, 2013

Visit our web site: www.nittanymineral.org

April 17th meeting:

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

by

William E. Kochanov, P.G.
Pennsylvania Geological Survey

Our April meeting will be held Wednesday the 17th in room 114 auditorium of Earth & Engineering Sciences Building on the west side of the Penn State campus in State College, PA. Maps are available through our web site.

6:30 to 7:30 p.m.: Social hour, refreshments in the lobby

7:30 to 8:00 p.m.: announcements, questions, answers; door prize drawings

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.

The synclinal Lackawanna Valley of northeastern Pennsylvania exhibits a broad range of interbedded fluvial and alluvial sequences 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 mapping 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. 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).

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Bill shows a specimen of tosudite in quartz-pebble conglomerate from the Pottsville Formation, Glen Maura area, Lackawanna County PA. Close-up is about 1 inch across. D. Glick photos.

No Junior Rockhounds News

We regret that we still don't have a schedule for Juniors meetings. Please watch for news. - Editor

Minerals Junior Education Day brings kids and smiles

by David Glick,

NMS President and Junior Ed. Day Coordinator

On April 6th, we held our 17th annual Minerals Junior Education Day. This was the first time away from the Penn State campus; the Boalsburg Fire Hall worked well for the event. We had seven stations (plus sales tables), with souvenirs from each to remind the students about what they learned at each station. The stations were:
Sphere grinding and polishing
Minerals versus rocks
Cleavage of minerals
Gold panning
Fluorescence
Fossils
Iron ore minerals and ironmaking

Attendance was about 117 students (plus lots of family members). We didn't get much advertising done, so thank those who helped us spread the word. NMS is grateful

to all of our member volunteers, as well as many other organizations and individuals, including the following: Co-sponsorship and assistance was provided by the Bald Eagle Chapter of GPAA; Penn State Geosciences Club; Penn State Earth & Mineral Sciences Museum; and Greenwood Furnace State Park. Subways of State College provided lunch for some of the volunteers. Samples for handouts, sales and door prizes were provided by long-time major supporters Michael and Barbara Sincak of Treasures of the Earth; John 'Pen' Ambler and Trish Ambler; the collecting group of Skip Colflesh, Scott Snavelly, Ryan O'Neal and Bob Buckmoyer; Willard Truckenmiller; and others.



Fluorescence station by Stu Bingham (shown) and John Passaneau.

J. Passaneau photo.

See more photos on pages 2 & 3, and Geode Night on page 2

Tosudite

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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 mineral sphalerite drops a tantalizing worm in front of the collector with the possibility of more extensive sulfide mineralized localities along this trend.



Anthracite/quartz breccia, Pottsville Formation, Dunmore area, Lackawanna County PA. D. Glick photo

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. ❄



An antique fire hose carriage provided an interesting backdrop for Junior Ed. Day registration with Dave Glick (center left) and Duff Gold(bottom left). R. Altamura photo

March Meeting Geode Night



The kids help crack open their geodes. R. Altamura photo.



One of the geodes opened at the event. Actual size is 3" tall. D. Glick photo.

Minerals Junior Education Day

continued from page 1



The fossils station with Paul Zell (above) and Charles Miller (below).
J. Passaneau photo.



The Sicree family showed how minerals exhibit cleavage and how it relates to the atomic arrangement in crystals.
J. Passaneau photo.



Ellen Bingham (below) and Mike Smith (above) ran the sales table.
J. Passaneau photo.



Bob Altamura discusses historical ironmaking.
L. Funderburk photo.



Nate Stevens (bottom right), Angela Bertagni (top right) and Nina Bingham of the Penn State Geosciences Club discussed the definitions and relationships of rocks versus minerals.
R. Altamura photo.



Gary Mitchell (shown) and Mike Sheasley also staffed the ironmaking station.
R. Altamura photo.



Many volunteers from GPAA demonstrated gold panning at their very popular station.
R. Altamura photo.



Jim Garthe and Pat Garthe demonstrated a machine to grind and polish spheres of rock.
R. Altamura photo.

One of the greatest stories in geology (that never happened)

by
Dr. Charles E. Miller, Jr.
Retired geologist

The Paluxy River near Glen Rose, Texas is world famous for its dinosaur tracks in the Cretaceous (145-66 million years ago, Ma) Glen Rose Formation. Dinosaur tracks were first discovered in the riverbed in 1908 but later discoveries in 1938 brought worldwide attention to the locality. In that year, Roland T. Bird of the American Museum of Natural History (AMNH) in New York City began discovering some of the finest dinosaur trackways in what is now Dinosaur Valley State Park. His discoveries were the first sauropod footprints scientifically documented, and were designated a National Natural Landmark in 1969.

Bird was an assistant to Barnum Brown of the AMNH, and traveled the country looking for dinosaur tracks. Before going to the Paluxy River, Bird visited the Purgatoire River near LaJunta, Colorado where sauropod and carnosaur tracks had been found in the Jurassic (201-145 Ma) Morrison Formation. He was unimpressed and went to Texas following a report of dinosaur tracks there. In the 1980s Martin Lockley of the University of Colorado re-examined what Bird had overlooked at the Purgatoire River and identified over 1200 Jurassic carnosaur and sauropod tracks. This is now the largest tracksite in North America. Later, Lockley reexamined Bird's discoveries of the Paluxy River.

At the Paluxy River, Bird's original discovery was an impressive footprint. "Hind footprints were 38 inches long and 26 inches wide, and showed four claw impressions. Forefeet were smaller, more rounded, and the toes terminated in fleshy pads lacking the single claw known to have been carried by other sauropods whose skeletons have been found (Bird, 1941, p. 2)." The river excavations became part of a Work Projects Administration (WPA) project that The University of Texas at Austin and the AMNH jointly supervised. Some of the dinosaur tracks were under water of the river. Others, discovered later, were parallel to the river and periodically flooded. As additional footprints were found, a cofferdam of sandbags was built so the area could be drained and tracks accessed (Figs. 1 and 2). However, repeated river flooding hampered excavations. Bird writes: "One of the major vicissitudes associated with collecting fossils from a river bed. When the river



Figure 1. Image by Roland T. Bird. From *Natural History*, February 1941, copyright © Natural History Magazine, Inc., 1941. Used by permission.



Figure 2. Image by Roland T. Bird. From *Natural History*, February 1941, copyright © Natural History Magazine, Inc., 1941. Used by permission.

rose, dikes broke, and the quarry filled with mud. Most exasperating were repeat performances, just after the quarry had been cleaned. This [Fig. 3] shows the river receding from a typical five-foot rise, of which there were half a dozen during the summer (1941, p. 5)."

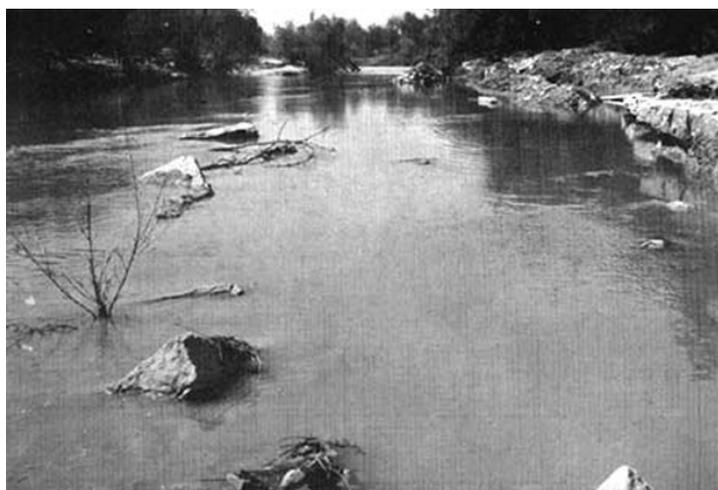


Figure 3. Image by Roland T. Bird. From *Natural History*, February 1941, copyright © Natural History Magazine, Inc., 1941. Used by permission.

Bird's most significant discovery was of 12 sauropod and four carnosaur trackways following the same general direction (Figure 4a and 4b). He describes two of the trackways: "Most interesting feature uncovered during the season's work was the trail of a flesh-eating dinosaur following that of a sauropod. This is seen at the left of Trail Two [Fig. 4b] as a row of three-toed footprints. Made at a time when the mud was of the same consistency, these prints suggest that a fourteen-foot flesh-eater was actually stalking the big quadruped. At any rate, when the sauropod swung to the left, the carnivorous dinosaur did likewise. Along this ancient waterfront, the territory of these two distinctively different types of dinosaurs overlapped (1941, p. 4)." Bird inferred the carnivore attacked the brontosaurus. Barnum and Bird decided to excavate a portion of the two trackways (Fig. 5) for an AMNH exhibit, which, eventually, led to much debate. Forty tons of track-bearing rock were excavated from these trackways and sent to The Texas Memorial Museum, the AMNH (Fig. 6), and the Smithsonian. The slab for the AMNH originally was 17 feet long and had to be excavated in three sections.



Figure 6. The trackways as they are exhibited today at the American Museum of Natural History, New York. AMNH photo.

Bird writes: "Visitors to the new Jurassic Hall in the American Museum will in time see the original footprints mounted in the base of the gigantic skeleton of the 'Thunder Lizard.' As if this 120-million-year-old monster had just strolled into his present position in the hall, you will see the tracks as he would have left them, six front and six hind footprints, under glass resembling the water in which he waded" (1941, p 75). Figure 6 shows the exhibit as it appears today – an anachronistic setting: Cretaceous dinosaur footprints in the Jurassic Hall. Mounted above the Cretaceous trackways in the AMNH are Jurassic dinosaur skeletons from the Morrison Formation because, at that time, Cretaceous sauropod skeletons were unavailable. "Few if any scientists would endorse an exhibit with two or more dinosaurs of different ages side by side in the same scene, but the spectacle of 150-million-year-old dinosaurs making 100-million-year-old tracks has survived for decades." (Lockley, 1991, p. 172)

Bird's "attack" interpretation of the converging dinosaur trackways is one of the greatest stories in geology. A brochure for Dinosaur Valley State Park at Glen Rose, Texas gives the following description: "Among the many tracks he [Roland T. Bird] found were a remarkable double set of tracks left by a giant sauropod (brontosaurus-like) dinosaur followed by a



Figure 4a, b. Images by Roland T. Bird. From *Natural History*, February 1941, copyright © Natural History Magazine, Inc., 1941. Used by permission.

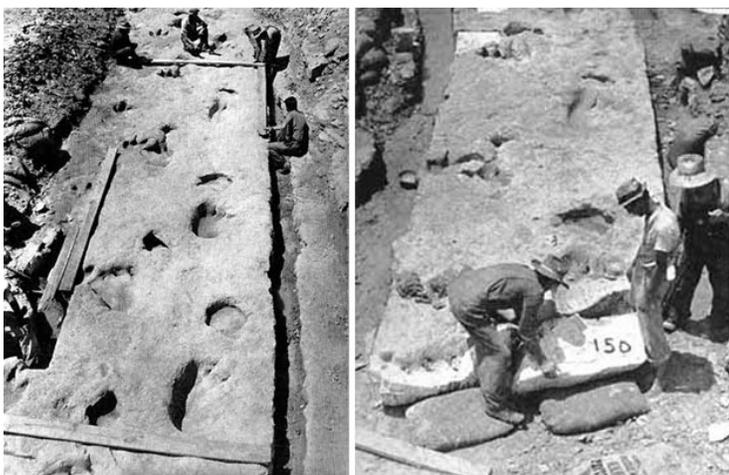


Figure 5a, b. Image by Roland T. Bird. From *Natural History*, February 1941, copyright © Natural History Magazine, Inc., 1941. Used by permission.

large carnivorous dinosaur. This impressive record of an ancient hunt was collected and placed on exhibit at the American Museum of Natural History in New York.” (Lockley, 1991, p. 172) Indeed, this “attack” or “hunt” scenario is spectacular. Imagine, actual geologic evidence of an attack that took place 100 Ma. Unfortunately, it never happened. Both the sauropod and carnosaur trackways show little or no deviation or obvious change of pace. A small pack of carnosaur may have been stalking a herd of large brontosaurus, but there is no evidence for a one-on-one attack. A modern-day analogue is a lion attacking an African bull elephant. The elephant stands 13 feet tall and weighs six tons. In comparison, the lion weighs 550 pounds. Despite the huge height and weight differential, an African bull elephant changes posture, position, and gait when a lion is attacking it. A similar response would have been expected from a brontosaurus that a 14-foot carnosaur attacked. The carnosaur was capable of severely injuring or killing the brontosaurus.

An archival video of Bird’s excavations at the Paluxy River is on *YouTube* at: <http://blogs.smithsonianmag.com/dinosaur/2012/03/excavating-the-river-of-giants/>). Archival images that Bird took of the excavations can be found at: www.naturalhistorymag.com/picks-from-the-past/081795/a-dinosaur-walks-into-the-museum

References

- Bird, R., 1939, Thunder in his footsteps: Natural History, v. 43, pp. 254-261.
- Bird, R., 1941, A dinosaur walks into the Museum: Natural History, v. 47, pp. 74-81.
- Lockley, M., 1991, Tracking Dinosaurs: A New Look at an Ancient World. New York: Cambridge University Press, pp. 169 and following.

Monongahela Rockhounds Show in the Pittsburgh Area

Saturday, April 20, 10:00 am - 6:00 pm
Sunday, April 21, 10:00 am - 4:00 pm

West Mifflin Volunteer Fire Co., #4
Skyview Hall, (air-conditioned)
640 Noble Drive, West Mifflin, PA 15122
(Near Century III Mall and the Allegheny Co. Airport)

<http://www.monongahelarockhounds.org/events.php>

Free show admission Free grand prize drawing
Dealers of minerals, fossils, rough and cut gems, jewelry,
beads, and lapidary items
Faceting demonstration and displays Door prizes
Free mineral identification Children's activities
Food and beverages
Free Grand Prize Drawing, choice of mineral or jewelry

EFMLS Annual Convention - Long Island 2013

Theme: Long Island Lighthouses & Geology
Friday, May 31st through Monday June 3rd 2013
Long Island Sheraton - 631.231.1100
Jointly Hosted by the Island RockHounds & Suffolk Gem & Mineral Club
www.islandrockhounds.org / www.suffolkgem.com

You are cordially invited to join the Island RockHounds and the Suffolk Gem & Mineral Club in our first joint show and the first EFMLS Convention being held on Long Island! Our show is on Saturday, June 1st and Sunday, June 2nd from 10:00am – 5:00pm (both days). We presently have 28 vendors, children activities, seminars, demonstrations and the EFMLS Annual Auction. A busy weekend that offers something for everyone!

Long Island is renowned for its beautiful beaches, from the rocky North Shore to the sandy South Shore. With our coastline there are many lighthouses! We have arranged a lighthouse tour on Friday for those of you who are interested! The island has also seen its share of geological activity, especially that of coastal erosion, which has changed our coastline a multitude of times, some of these events are ancient, but some even within the current inhabitants life times.

The Convention’s host hotel, Sheraton Long Island, is centrally located at 110 Vanderbilt Motor Parkway, Hauppauge, New York. It is easily accessible by road, rail and plane.

By Highway: Located off Exit 53 of the Long Island Expressway (LIE 495) or Exit 46 of the Northern State Hwy.

By Airplane: The hotel is approximately 12 miles from the Islip Macarthur Airport (LIMA) in Ronkonkoma.

By Rail: The Long Island Rail Road (LIRR), Ronkonkoma line, Brentwood station is minutes away.

The Long Island Sheraton has a courtesy shuttle available. The shuttle runs from 7:00am – 10:00pm and is available upon request. Call the hotel if you plan in utilizing the shuttle from either the airport or LIRR Brentwood station.

If you are from the mountain areas, please consider visiting our beaches. If you are from the coastal states, please consider strolling along our North Shore. There are many quaint villages that had flourished during the maritime days. Some of our favorites are Port Jefferson, East Northport, Huntington, Centerport on the North Shore and BayShore and Sayville on the South Shore. There is so much to see and do on the Island, the twin forks, the wineries, museums, shopping and more! And how could we forget New York City, the city that never sleeps is only a stone’s throw away.....

Convention and Show Hotel Information & Reservation Rates:

The Long Island Sheraton, a full service hotel, has placed a number of rooms aside for participants of the EFMLS Convention. The EFMLS group rate is \$139.00/ night plus taxes. When making reservations please mention the EFMLS to receive the convention rate. Reservations must be made by APRIL 30th to receive the discounted rate. The hotel has free parking: a coffee shop open at 6:30am – 1:00pm; a restaurant open daily from 7:00am- 10:00pm, and the Spritz Lounge. There is also an indoor pool located on the first floor, and an exercise room. The hotel is pet friendly, allowing dogs, for a small pet cleaning fee.

Questions may be directed to Cheryl Neary; ciervo.neary@gmail.com or via cell # -516.449.5341

Collecting at Franklin / Sterling Hill Events?

Events for collecting fluorescent minerals are coming up at Franklin and Sterling Hill, New Jersey. The Sterling Hill Super Dig, with special extras this year, is April 27; see page 5 and

<http://sterlinghillminingmuseum.org/superdig/index.php>

<http://sterlinghillminingmuseum.org/superdig/schedule.php>

The Super Dig will be an official event of Nittany Mineralogical Society, so paid NMS members will be covered by NMS insurance, and can take advantage of early registration at 8:00 a.m. The Buckwheat Dump Night Dig at Franklin is on June 2 <http://www.franklinmineralmuseum.com/activities.htm>.

If you are going or are interested in going, please contact NMS member Steve Grazier at <triviasteve@yahoo.com>, who will check on possibilities for coordinating travel to the events. Do you want to get a ride? Give a ride? Leave central Pennsylvania early in the morning? Get there the previous evening? Let Steve know.

- Editor

Geo-Sudoku

by David Glick

Our area has a history of iron ore mining and ironmaking. This puzzle contains the letters ACEFNPRSU, and one row or column includes the name of the structures built to make the pig iron. 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	S						R
			N					P
	N	P	S			A		C
R					N		A	S
				S	F		E	
	S		A		R			F
			R				C	
C		F				S	N	
S	P		C					E

NEWS FROM THE FEDERATIONS

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 April issue starts with Ellery Borow's safety article, pointing out that although being safe in our hobby involved spending some money on safety equipment, it's worth it, and spending a little can save a lot in hospital bills. President Cheryl Neary provides some updates on the EFMLS Convention schedule on Long Island (May 31 - June 3) in the aftermath of Superstorm Sandy and the big winter snowstorm. Come see where all the weather news took place! There will be plenty to see and do at this first-ever EFMLS convention to be held on Long Island, New York. ALAA encourages us to provide input to US Forest Service and other agency Travel Management Plans (which roads will be open or closed to motor vehicles). Donations are encouraged for the AFMS Scholarship Fund and the Eastern Foundation Fund, and the Each One Teach One and Club Rockhound of the Year programs are reviewed. The useful historical record provided by photographs at conventions and meetings is noted. Darryl Powell provides a number of suggestions for publicizing activities for and by junior members. The Wildacres workshop schedule and classes are reviewed, and registration forms are included in the issue.

The **AFMS Newsletter** is available by the same methods. The April issue opens with updates on the Endowment Fund drawing, with some photos of new prizes, and more to come next month. Tickets are \$5 or 5 for \$25. President Don Monroe encourages us to teach someone our skills, or be the student receiving that valuable skill in order to pass it along to the next generation. Jim Brace-Thompson recommends a new book for children, *A Rock is Lively*, by author Dianna Hutts Aston and illustrator Sylvia Long, with "colorfully detailed paintings of rocks and minerals." Club Rockhounds of the Year are introduced, and ALAA asks you to get involved with cleanups on public lands,

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

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.

April 18-21, 2013: Rochester Mineralogical Symposium <http://www.rasny.org/MinSymposium/MineralSymp.htm>

April 20-21, 2013: Monongahela Rockhounds Gem, Mineral and Fossil Show. West Mifflin Volunteer Fire Co #4, Skyview Hall, (air-conditioned), 640 Noble Drive, West Mifflin, PA 15122. (Near Century III Mall and the Allegheny Co. Airport). Free admission. **See p. 6.** <http://www.monongahelarockhounds.org/events.php>

May 11, 2013: South Penn Spring Rock Swap, by Central PA and Franklin County R&M Clubs; South Mountain Fairgrounds, 1.5 miles West of Arendtsville, PA on Rte. 234.

May 18-19, 2013: World of Gems and Minerals - Jewelry, Bead, Mineral and Fossil Show, by Berks Mineralogical Society. Leesport Farmer's Market, Route 61, Leesport, PA. <http://www.berksmineralsociety.org/>

June 1, 2013: Spring Mineralfest by Pennsylvania Earth Sciences Association. Macungie Mem. Park, Macungie, PA. Saturday only 8:30 - 3:00. www.mineralfest.com

June 1-2, 2013, Eastern Federation of Mineralogical & Lapidary Societies Convention, and Suffolk Gem and Mineral Club Ann. Show, Smithtown, New York. EFMLS Meeting May 31. See page 7.

Sept 14-15, 2013: CPRMC Show, Harrisburg

Sept. 20-22, 2013: American Federation and Southeast Federation Conventions, Jacksonville, Florida.

Oct. 26, 2013: South Penn Fall Rock Swap, by Central PA & Franklin County R&M Clubs; South Mountain Fairgrounds, 1.5 miles West of Arendtsville, PA on Rte. 234.

Geo-Sudoku Solution

A	C	S	F	P	E	N	U	R
F	U	R	N	A	C	E	S	P
E	N	P	S	R	U	A	F	C
R	F	E	P	C	N	U	A	S
P	A	C	U	S	F	R	E	N
U	S	N	A	E	R	C	P	F
N	E	A	R	F	S	P	C	U
C	R	F	E	U	P	S	N	A
S	P	U	C	N	A	F	R	E

ATTENDING THE APRIL MEETING?

Donations of labeled **door prize specimens** are invited.

Your donated snacks and drinks will be welcomed.

Bring a friend!

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 prorated 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 to

Nittany Mineralogical Society, Inc.

P.O. Box 10664

State College, PA 16805

or bring your dues to the next meeting.

We want to welcome you!

SOCIETY OFFICERS

David Glick (President) 814-237-1094 (h)

e-mail: xidg@verizon.net

Dr. Bob Altamura (Vice-President) 814-234-5011 (h)

e-mail: raltamura@comcast.net

John Passaneau (Treasurer) 814-231-0969 (h),

e-mail: jxp16@psu.edu

Ellen Bingham (Secretary) e-mail: emb22@psu.edu

OTHER CONTACTS

Field Trips: Ed Echler 814-222-2642

e-mail preferred: eechler@comcast.net

Junior Rockhounds: Dr. Andrew Sicree

814-867-6263 (h) e-mail: sicree@verizon.net

Membership Chair: David Glick (see above)

Programs: Dr. Duff Gold 865-7261(o), 238-3377(h)

e-mail: gold@ems.psu.edu

Door Prizes: *volunteer needed!*

Facebook: Mike Zelazny e-mail: maz166@psu.edu

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:

David Glick E-mail: xidg@verizon.net

209 Spring Lea Dr. phone: (814) 237-1094 (h)

State College, PA 16801-7226

Newsletter submissions are appreciated by the first Wednesday of the month. If you include photographs or graphics, 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.

Visit us at www.nittanymineral.org