

# Nittany Mineralogical Society Bulletin

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

Editor (see back page):

David C. Glick

December, 2019

Visit our web site: [www.nittanymineral.org](http://www.nittanymineral.org)

## December 18<sup>th</sup>: Annual Holiday Dinner at Quaker Steak & Lube Restaurant Please join us!

On Wednesday, Dec. 18, 6:00 p.m., rather than our usual meeting and program, we'll have our **Holiday Dinner** at Quaker Steak & Lube Restaurant, 501 Benner Pike (across Benner Pike from the Nittany Mall), State College PA 16801 in their "Corvette Room."



There is actually a real Corvette suspended from the ceiling above part of the Corvette room (photo at right). The entire restaurant is decorated in automotive memorabilia making the place and our event a lot of fun.

NMS will pay for appetizer plates to be shared by all those present, then attendees can order and pay for their own dinners. We'll have some door prizes also.

We will continue our past tradition where members can have a table at the dinner to sell minerals / fossils/ gems / jewelry / rock crafts, so bring some cash. Sellers need to collect PA sales tax. NMS will charge a commission fee at 10% of the vendor's pre-tax sales. If you are interested in selling, please contact Bob Altamura ([raltamura@comcast.net](mailto:raltamura@comcast.net) or 814-234-5011) as soon as possible to secure table openings. \*

## Weather Cancellation Policy

In case we experience active winter weather on a meeting date, our policy is to cancel the meeting only if Penn State evening classes at University Park 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



## Minerals Junior Education Day Hits the Quarter-Century Mark SAVE THE DATE Saturday, March 28, 2020

Frank Kowalczyk will be coordinating NMS's 25th Annual Minerals Junior Education Day. It is set for Saturday, March 28, at Central Pennsylvania Institute of Science & Technology at Pleasant Gap, the same location as the last few years. Please save the date and think about how you might help present this great event.

We will be 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. Batches of 200+ similar specimens, around which a station topic could be planned, would be great! \*

## 3D Digital Fossil Images Online

The University of Michigan Online Repository of Fossils (UMORF) is a project of the University of Michigan Museum of Paleontology to increase the accessibility of fossil specimens through “onscreen manipulation of 3D digital models.” Rotate, pan and zoom can be done on a regular monitor within the web browser. There is an anaglyph mode for use with red/cyan glasses, and a stereoscopic 3D mode for 3D TVs and monitors. Try it at <https://umorf.ummp.lsa.umich.edu/wp/>

## 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. The **Federations and our Society strongly encourage all members to read the monthly Federation Newsletters, available on their web sites**, which are linked from our web site, [www.nittanymineral.org](http://www.nittanymineral.org). We present brief summaries here in order to encourage readers to see the entire newsletters. There’s a lot there!

The EFMLS Newsletter is now being distributed electronically; a link is available on our web site [www.nittanymineral.org](http://www.nittanymineral.org). In the December issue, Wildacres registration is announced to start January 1; sessions will be May 18-24 and August 24-30. President David Nock discusses starting his second year and moving the Federation ahead. The safety article discusses maintaining our collecting and workshop tools in the interest of safety, up to and including vehicles -“Cars are a really big tool.” Donations are invited for the annual auction to be held March 28 at the convention in North Carolina.

EFMLS leaders want **you** - the club member - to see the **Newsletter**. Please see it at <https://efmls.org/newsletter> (linked from the NMS home page).

The **AFMS Newsletter** December column on Juniors Activities invites suggestions for the Future Rockhounds of America Badge Manual and for the kids column in *Rock & Gem* magazine. President David Wayment discusses jewelry classes, Federation conventions and the AFMS slide/video loan programs. Certified display case judges are needed, and training classes are being planned. Recreational Rockhounding as defined in the US Code of Federal Regulations is reviewed. Cheryl Neary will be taking over as AFMS Central Office Administrator; among many other responsibilities, any mailing list changes should be sent to her. Endowment Fund Drawing tickets are available for \$5 or 5 for \$20; donations for the drawing are invited, and will be illustrated in upcoming issues and on the web site. Rockhounds of the Year are introduced. *-Editor*

## Geo-Sudoku

by David Glick

This puzzle contains the letters ACEHIMOPT; one row or column spells a pyroxene group mineral. As usual, if you’ve read this issue, you’ve seen it. 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.

	A		M					
					P	E	T	
T					E	M		O
M		H					P	I
	E					O	H	C
	I				A	T		M
A	M	I				H	O	
H	P		A	O				
C				H		P	I	

### The 2020 Philadelphia Mineralogical Society Swap and Sell

Saturday, Jan. 11, 2020, 9 am to 12:00 pm, at Cathedral Village Center, 600 E. Cathedral Rd., Philadelphia (Andorra), 19128. Free Admission, open to the public. [www.phillyrocks.org/swap-and-sell/](http://www.phillyrocks.org/swap-and-sell/)

### 2020 Philadelphia Mineral Treasures and Fossil Fair

Saturday March 28, 10 am to 5 pm;  
 Sunday, March 29, 10 am to 4 pm.  
 Lulu Temple, 5140 Butler Pike, Plymouth Meeting, PA., (PA Turnpike, exit 333; or I-476, exit 20)  
 Free Parking.  
 Adults: \$6.00. Children under 12: \$1.00;  
 Uniformed scouts and troop leaders free.  
[www.phillyrocks.org/mineral-show/](http://www.phillyrocks.org/mineral-show/)

Special Features: On both days a line-up of distinguished professional speakers will be presented. The Academy of Natural Sciences of Philadelphia will present a display of minerals from its collection. In addition, there will be fossil and mineral displays, educational materials, door prizes and a food concession. Thirty dealers will offer fossils, minerals, crystals, and jewelry from all over the world, as well as books, decorative items, and other merchandise. Young visitors can enjoy the annual fossil dig for children, and the kid's corner with free mineral gifts.

## Fluorite Exhibit

NMS is preparing a new exhibit for our spot at Penn State's Earth and Mineral Sciences Museum and Art Gallery in Deike Building. This exhibit will feature fluorite, including several specimens bequeathed to NMS by our late member John Passaneau. Fluorite was one of several areas of specialization in John's collection.

Clockwise from top right: Crystal zoning shown in sawn slice, R. Altamura specimen; next three crystal groups from Cave-in-Rock, Illinois, ex-J. Passaneau specimens; green crystal cluster from Rogerly Mine, Frosterly, Durham, England, D. Glick specimen. Photos by D. Glick.



## The World of Minerals

The World of Minerals is a monthly column written by Dr. Vivien Gornitz on timely and interesting topics related to geology, gemology, mineralogy, mineral history, etc.

### Swiss Mystery Rock from the Depths

by Dr. Vivien Gornitz  
from

Bulletin of the New York Mineralogical Club, Inc.  
March 2018, Volume 132, No. 3

Second Place Winner,  
Original Adult Article Advanced,  
AFMS 2019 Bulletin Editors' Contest

Rocks are like the pages of a mystery book that unlocks hidden secrets for those that can read the language. A pretty green and red rock from an unlikely place tells one such story.

While on vacation southern Switzerland, the writer spotted several colorful rocks in a jeweler-craftsman's shop in the old part of Locarno on a rainy day. The craftsman was busy at work fashioning attractive, one-of-a-kind (and rather pricy) rings and necklaces, using fairly common semi-precious gemstones from around the world, such as lapis lazuli, amethyst, garnet, topaz, opal, turquoise, as well as this unusual red and green stone. When asked, he claimed that the rock was eclogite, collected by a local rockhound from a nearby



locality—Gorduno, near the town of Bellinzona, Ticino (Tessin), Switzerland. By coincidence, the writer had visited this town the day before to explore its world-famous medieval castles. (Bellinzona is a UNESCO World Heritage site).

A specimen of the “eclogite” purchased at the shop measures roughly 6.3 cm by 5.5 cm across. Small raspberry-red garnet crystals (2-3 mm across) are scattered across the greenish rock. The largest garnet crystal measures around 1 cm across. On closer inspection, the rock appears to consist of two different types of pyroxene, one a darker forest green (enstatite?); the other, a brighter green (diopside?) scattered and in clusters surrounding the large garnet. Smaller, granular grains of very pale yellow olivine occur throughout. One or two small emerald-green crystals are also present (Cr-diopside?), as are a number of opaque grains. Based on sight identification, literature survey, and comparison with photographs of specimens from this locality, the

rock was tentatively identified as a garnet lherzolite, rather than eclogite.



**G a r n e t** lherzolite is an ultramafic igneous mantle rock — a type of garnet peridotite, which consists of olivine, ortho- and clino-pyroxene, pyrope garnet, with lesser chromite, sulfides, and

accessory hornblende. According to mineral lists in Mindat, the German Mineralienatlas Lexicon, and several technical articles, minerals from Alpe Arami, Gorduno include: forsterite, enstatite, diopside, chromian diopside, pyrope, amphiboles, such as edenite-pargasite, chromite, ilmenite, geikielite, humite, omphacite, and spinel. One study (Ernst, 1981) reports an average mineral assemblage consisting of around 47% olivine, 13% orthopyroxene, 16% clinopyroxene, 5.6% pyrope, 2.3% spinel, and 6.9% amphibole (Ernst, 1981). The garnet is 71% pyrope (other components not given).

Both garnet lherzolite and eclogite occur in close proximity at Alpe Arami, and also look somewhat similar; hence a plausible misidentification by the collector. The Alpe Arami eclogite contains predominantly garnet and omphacite (a Ca, Na, Mg, Al pyroxene), with lesser amounts of rutile. These primary mineral have been partially replaced by later-stage hornblende, kyanite, clinozoisite, plagioclase, and occasionally, biotite and chlorite. In contrast to the garnet from the lherzolite, the eclogitic garnet from this locality is composed of 39% almandine, 37% pyrope, 23% grossular, and 1% spessartine. Omphacite averages 43% jadeite, 49% diopside, and 8% hedenbergite.

At Alpe Arami, outcrops of garnet lherzolite are surrounded by narrow lenses of eclogite within a gneissic complex that also includes amphibolites and granitic rocks. In contrast to most other outcrops of lherzolites from the western Alps, these lherzolites contain pyrope instead of the more widespread occurrences of spinel. The presence of pyrope suggests a much greater depth of origin that does spinel, as will be shown below.

Alpe Arami lies within the Pennine Alps, and its history is closely linked to that of the Alps. By the mid-to-late Cretaceous period, shifting plate motions began to close a narrow seaway—Tethys—that had once separated the European plate in the north from the Southern Alpine plate. During ensuing stages of plate collision, oceanic crust was subducted deep beneath the European plate, while slivers of continental sedimentary and metamorphic rocks were crumpled and thrust over the downgoing slab, ultimately forming the Alps. As plate collision continued, the rocks that had been dragged down to great depths were subsequently uplifted, exhumed, and returned to the surface. Outcrops of mafic and ultramafic rocks (such as lherzolite) delineate the zone where subducted oceanic and upper

mantle rocks had collided with continental crust, and were subsequently upthrust.

Attempts by geologists to sample mantle minerals and rock types firsthand have proved unsuccessful to date. However, nature has provided earth scientists with free mantle samples, thanks to plate collisions that formed mountain belts like the Alps (and also thanks to kimberlite pipe eruptions<sup>1</sup>). The garnet lherzolite from Alpe Arami furnishes one such sample. Based on pressure-temperature stability relations between co-existing minerals, the Alpe Arami garnet lherzolite formed at depths in excess of 60-80 kilometers and temperatures around 950°C.

Overruling previous heated debate on the subject, more recent findings demonstrate an even deeper mantle source for these rocks. One line of evidence comes from tiny, oriented rods of ilmenite (and spinel) within olivine. The crystallographic orientations of the inclusions relative to their host strongly implies exsolution of ilmenite and spinel from an older generation of slightly impure Cr, Fe, Al, and Ti-bearing olivine. These foreign elements had once been dissolved in olivine at pressures corresponding to mantle depths over 300 kilometers. As pressures lowered during ascent to the surface, the solubility of these impurities dropped and ilmenite and spinel precipitated out. The presence of clinopyroxene lamellae within diopside inclusions in garnet or surrounding garnet may point to a similar breakdown of majorite garnet,  $Mg_3(Fe^{+2}, Al, Si)_2(SiO_4)_3$ , which is stable only at depths exceeding 300 kilometers. Silica rods and needles in omphacite from accompanying eclogites reinforce this viewpoint. The needles in omphacite could also represent exsolution from a silica-rich clinopyroxene that is only stable at much higher pressures, but this line of evidence is not as firmly nailed as that of the ilmenite.

Both Alpe Arami garnet lherzolites and eclogites show signs of having been transported upward from great depths within the mantle during the main phase of Alpine deformation. While garnet lherzolite is an

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<sup>1</sup> The two rock types present at Alpe Arami—garnet lherzolite and eclogite—also happen to be the primary host rocks of diamond in kimberlite pipes. Kimberlite merely acts as a kind of elevator that carries these gems to the Earth's surface. Needless to say, the geologic environment of Alpine peridotites and eclogites and that of these two diamond host rocks in kimberlitic xenoliths is totally different. No occurrences of gem diamonds have been reported to date from the Alps.

important mantle rock type, eclogite generally forms during high-pressure metamorphism of oceanic basalt and gabbro, as oceanic crust descends deeper into the mantle and enters high pressure-temperature regimes. Eclogite, being denser than average mantle rock, sinks and drags down associated continental crust. Exactly how these rocks make the return trip back to the surface is not that well-understood. The conveyor system is "...a very different geological elevator from the one that carried up the only other rocks known to have arrived from the deep mantle, the bits of mantle rock that bear diamonds<sup>2</sup>."

A leisurely walk through a rain-drenched southern Swiss town yielded an unexpected treasure—an exotic rock that tells a fascinating tale of survival after an arduous journey from the base of the upper mantle, near the transition zone some 300 to 400 km deep, and back up to the surface, transported by the tectonic forces that built the Alps.

### Further Reading

Alpe Arami:

[https://www.mineralienatlas.de/lexikon/index.php/Schweiz/Tessin/Bellinzona/Bezirk/Ticino/Kres/Gorduno/Alpe\\_Arami](https://www.mineralienatlas.de/lexikon/index.php/Schweiz/Tessin/Bellinzona/Bezirk/Ticino/Kres/Gorduno/Alpe_Arami)

Arami Alp, Gorduno, Bellinzona, Riviera, Ticino (Tessin), Switzerland. <https://www.mindat.org/loc-72012.html> (accessed 9/12/2017).

Bocchio, R., De Capitani, L. and Ottolini, L., 2004. New chemical data on the clinopyroxene-garnet pair in the Alpe Arami eclogite, Central Alps, Switzerland. *The Canadian Mineralogist*. 42:1204-1219.

Ernst, W.G., 1981. Petrogenesis of eclogites and peridotites from the Western and Ligurian Alps. *American Mineralogist* 66:443-472.

Garnet peridotite (partly serpentinitized):

[https://commons.wikimedia.org/wiki/File:Garnet\\_peridotite.jpg](https://commons.wikimedia.org/wiki/File:Garnet_peridotite.jpg) (accessed 2/8/18).

Green, H.W., Dobrzhinetskaya, and Bozhilov, K.N., 2010. The Alpe Arami story: triumph of data over prejudice. *Journal of Earth Science* 21(5):731-743.

Kerr, R.A., 1996. Minerals in rock mass hold clues to 400-kilometer ascent. *Science* 271:1811.

<sup>2</sup> Kerr, 1996.

### Other specimens from Canton Ticino, Switzerland



#### Kyanite

Locality: Central St Gotthard Massif, Leventina, Ticino (Tessin), Switzerland. Size: 7.8 x 5.2 x 2.7 cm.

"This specimen features a 6 cm-long, doubly-terminated kyanite in contrasting silvery mica matrix, from the classic old locality in Switzerland..."

Rob Lavinsky, iRocks.com – CC-BY-SA-3.0

(<https://commons.wikimedia.org/wiki/File:Kyanite-154995.jpg>), „Kyanite-154995“, <https://creativecommons.org/licenses/by-sa/3.0/legalcode>



#### Hematite

Locality: Fibbia Mt., Fontana, Central St Gotthard Massif, Leventina, Ticino (Tessin), Switzerland (Locality at [mindat.org](https://www.mindat.org)). Size: miniature, 4.6 x 3.0 x 2.6 cm

"A very sharp miniature with robust, fat hematite crystals clustered tightly together in the classic style often called a "Fibbia rose." The cluster is nearly an inch across, with individual crystals to 1.4 cm or so..."

Rob Lavinsky, iRocks.com – CC-BY-SA-3.0

(<https://commons.wikimedia.org/wiki/File:Hematite-tuc1052a.jpg>), „Hematite-tuc1052a“, <https://creativecommons.org/licenses/by-sa/3.0/legalcode>



# Rutgers Geology Museum




## 52<sup>nd</sup> Annual Open House



SATURDAY, JANUARY 25, 2020

JOIN US FOR A DAY OF NATURAL DISASTER-THEMED LECTURES & ACTIVITIES!

### Presentations in Scott Hall Room 123\*

10:00 am to 11:00 am	<p><b>"How the 1849 Gold Rush and the 1906 San Francisco Earthquake Enabled us to Divine our Seismic Future"</b>  <i>Presented with demonstrations by Dr. Ross Stein</i>                      Temblor Inc.</p> 
11:30 am to 12:30 pm	<p><b>"Science in the Public Eye – How a Study of Physical Properties in the Earth becomes a Threat of Volcanic Catastrophe"</b>  <i>Presented by Dr. Vadim Levin</i>                      Rutgers University, Department of Earth and Planetary Sciences</p> 
2:00 pm to 3:00 pm	<p><b>"After Disaster Strikes - Economic Impacts from Natural Disasters and How Modeling Technology Helps Institutions Prepare"</b>  <i>Presented by Megan Arnold</i>                      Risk Management Solutions</p> 

\*Lectures can be viewed online. See our website for details.

### Mineral Sale - Scott Hall Room 135, 9:00 am\*\* to 3:00 pm

\*\*Early access to mineral sale available with Emerald & Diamond Level Museum Memberships

Credit cards, cash and checks accepted. Sales tax applied to all purchases unless tax-exempt status is provided.

- Rock and mineral identification – Scott Hall Room 116, 11:00 am to 2:00 pm
- Crafts and educational activities for kids (all ages) – Geology Museum, 11:00 am to 2:30 pm

### Hands-on activity sessions for kids (ages 8+) in Scott Hall

10:30 am – 11:30 am	Room 103	Hurricanes & their Aftermath
	Room 104	Volcanoes
	Room 105	Earthquakes
12:30 pm – 1:30 pm	Room 103	Hurricanes & their Aftermath
	Room 104	Volcanoes
	Room 105	Earthquakes
1:30 pm – 2:30 pm	Room 103	Hurricanes & their Aftermath
	Room 104	Volcanoes
	Room 105	Earthquakes



CART Captioning Services will be available for all lectures.

Phone: 848-932-7243

Email: [geologymuseum@sas.rutgers.edu](mailto:geologymuseum@sas.rutgers.edu)

Website: [geologymuseum.rutgers.edu](http://geologymuseum.rutgers.edu)

### 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](http://www.mineralevents.com) for more.

**Jan. 11, 2020:** Swap & Sell, by Phila. Mineral. Soc. See p.2

**Jan. 25, 2020:** Rutgers Geology Museum Open House. See p. 7

**Mar. 7-8, 2020:** Earth Science and Mineral Show, by Delaware Mineralogical Society. Doubletree by Hilton, 4727 Concord Pike (Route 202), Wilmington DE 19803 <http://www.delminisociety.net/marchshow/marchshow.htm>

**Mar. 27-30, 2020:** EFMLS Convention and Catawba Valley Gem & Mineral Club Show, Hickory, NC. <https://efmls.org/annual-convention>

**Mar. 28-29, 2020:** 51st Annual Gem & Mineral Show, by Che-Hanna Rock and Mineral Club. Wysox Volunteer Fire Company Social Hall, 111 Lake Rd., Wysox PA 18854 <http://www.chehannarocks.com/show.html>

**Mar. 28-29, 2020:** Philadelphia Mineral Treasures and Fossil Fair, by Phila. Mineral. Soc. & Delaware Valley Paleontological Soc. See p. 2

**Apr. 18-19, 2020:** Gem, Mineral & Fossil Show, by Monongahela Rockhounds. Skyview Hall, West Mifflin Volunteer Fire Co. #4, 660 Noble Dr., West Mifflin PA 15122. Sat 10-6, Sun. 10-4. <http://www.monongahelarockhounds.org/events.php>

**Apr. 23-26, 2020:** Rochester Mineralogical Symposium <http://www.rasny.org/MinSymp/>

**Apr. 25-26, 2020:** Gem & Mineral Show, by New Jersey Earth Science Association. Littel Community Center, 12 Munsonhurst Rd., Franklin NJ 07416. Sat 9-5:30, Sun. 10-5. <http://njesa.org/index.html>

### NMS BOARD MEETING NOTICE

NMS members are invited to attend Board of Directors meetings, which are generally held at 7:00 p.m. about two weeks prior to the general monthly meeting, although we do not meet every month. **The next date is Thursday, January 9, 2020.** Members who would like to attend should contact president David Glick to verify time and place; those who would like to have their discussion item placed on the agenda should contact him at least one week in advance of the meeting.

### Geo-Sudoku Solution

E	A	O	M	T	H	I	C	P
I	C	M	O	A	P	E	T	H
T	H	P	C	I	E	M	A	O
M	T	H	E	C	O	A	P	I
P	E	A	I	M	T	O	H	C
O	I	C	H	P	A	T	E	M
A	M	I	P	E	C	H	O	T
H	P	T	A	O	I	C	M	E
C	O	E	T	H	M	P	I	A

### 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](http://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!**

### CONTACT INFORMATION

#### mailing address:

Nittany Mineralogical Society, Inc.  
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145 Goddard Cir.  
Penna. Furnace PA 16865

#### SOCIETY OFFICERS

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#### OTHER CONTACTS

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814-867-6263 (h) e-mail: [aas132@psu.edu](mailto:aas132@psu.edu)  
Membership Chair: David Glick (see above)  
Programs: Dr. Duff Gold 865-7261(o), 238-3377(h)  
e-mail: [gold@ems.psu.edu](mailto:gold@ems.psu.edu)  
Door Prizes: Dr. Bob Altamura (see above)  
Facebook & Publicity: John Dziak: [jjd264@psu.edu](mailto:jjd264@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](mailto: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. 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.

**Visit us at [www.nittanymineral.org](http://www.nittanymineral.org)**