

# Nittany Mineralogical Society Bulletin

Nittany Mineralogical Society, Inc.

P.O. Box 10664

State College PA 16805

Editor (see page 8):

David C. Glick

October, 2013

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

October 16th meeting:

## Fossils of the Green River Formation

by Dr. Charles E. Miller, Jr.  
Geologist

Our October meeting will be held Wednesday the 16th in the 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;

Annual Meeting of the Corporation  
including elections; 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 Green River Formation of lake sediments in Colorado, Utah and Wyoming contains a great variety of attractive and detailed fish fossils, as well as plants, insects, birds, reptiles, and even some mammals. These fossils are the most complete record of the Eocene (58-33 million years ago) ever discovered. **See Dr. Miller's article starting on page 4.**



*Diplomystus* (left) and *Knightia* (right), two fossil fish from one of the lake beds in the Green River Formation (Wikipedia, Green River Formation). Photo by Photolitherland, used under the Creative Commons Attribution 3.0 Unported license.

### ATTENDING THE OCTOBER MEETING?

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

Your donated snacks and drinks will be welcomed.

Bring a friend!

**Junior Rockhounds Meetings** are on hold until January. We do have a reasonable expectation that we could start them then. We thank everyone for their patience.

### Dues are Due!

by David Glick, NMS President

Our membership year ends on October 31, so it's time to pay dues. For current members whose payments have not been received, a **form is enclosed** with this printed Bulletin; the form and payment can be mailed in or brought to our October meeting. Your **prompt payment helps a lot** in reducing work for our volunteer staff. The rate remains at \$20 for an individual member, with other options available. Forms may also be downloaded from our web site.

The dues form includes a line for "don't send a printed Bulletin." If you read the Bulletin on the web site anyway, you can help reduce our printing and mailing expenses by checking this line. You can go back to the printed version, or request individual printed issues, at any time.

### Annual Meeting and Elections in October

by David Glick, NMS President

The October 16<sup>th</sup> meeting will include a brief **Annual Meeting of the Corporation**, with election of officers. In accordance with our bylaws, the Board of Directors, acting as the Nominating Committee, announced the following slate of candidates in September. No other volunteers or nominations have been received, and these incumbents have agreed to serve again:

President: David Glick

Vice-President: Robert Altamura

Treasurer: John Passaneau

Secretary: Ellen Bingham

The Board requests additional volunteers to get involved with running the Society, providing **new energy and fresh thinking**. In many cases it would be useful to have newcomers spend some time on committees and attending Board meetings before stepping into elected office. All members: please consider volunteering! We could use help in organizing door prizes, refreshments, publicity, the Bulletin, and more. Members are invited to attend Board meetings (generally held on the first Wednesday of the month at 7:30 p.m. - check with the President), to see how we operate.

## Volunteer NMS Organizer Needed for Bellefonte Science Event

Penn State's Eberly College of Science is organizing another Exploration-U Family Science Night event, this one on Thursday, November 14, 2013 from 6:00 - 8:00 p.m. at Bellefonte Area High School. It will include exhibits and hands-on demonstrations in science, technology, engineering, and mathematics; a notable feature this time will be Starlab planetarium shows. NMS already participates in their similar State College event; **if you would like to organize** a booth for NMS at the Bellefonte event, please contact Dave Glick (see p. 8) by October 18. All exhibitors and volunteers will receive a pizza dinner; set-up and dinner is from 4:30 - 5:30 p.m. *- Editor*

## NMS Demonstrates Lapidary Crafts to Families at Harvest Festival

On October 6, the parent - teacher organization held their annual Harvest Festival for families involved with the Houserville and Lemont elementary schools in the State College Area School District. One of the featured categories was crafts, and NMS members Bob Altamura, Stuart Bingham and Greg McGruer demonstrated lapidary craft including diamond sawing, cabochon grinding and polishing, tumble grinding and polishing, and faceting. Finished jewelry resulting from these techniques was displayed, and giveaways of tumble-polished stone were provided to the visitors. Bob reports that the attendance seemed about the same as last year, which was 300, and that the demonstrations were well received. *- Editor*

## Minerals from Pennsylvania in Online Museum

The web site of John Betts Fine Minerals includes an online mineral museum <http://www.johnbetts-fineminerals.com/museum.htm> which can be accessed in a variety of categories, including mineral species, group, or locality. To see Pennsylvania specimens in the collection, click on locality, then on the US on the globe, then on Pennsylvania (or directly at [www.johnbetts-fineminerals.com/jhbnyc/mineralmuseum/gallery2.php?init=&loc=Pennsylvania](http://www.johnbetts-fineminerals.com/jhbnyc/mineralmuseum/gallery2.php?init=&loc=Pennsylvania)). Clicking on a specimen brings up a large photo and details on the specimen. A few have additional photos and notations. As of this writing there are 849 Pennsylvania specimens illustrated in the museum. *- Editor*

## Gem Hunt Program Starts October 15 on The Travel Channel

The newly arrived October issue of Rock & Gem notes that The Travel Channel will debut a new series, Gem Hunt, on October 15<sup>th</sup> at 10:00 p.m. It's described as a "behind-the-scenes look at the high-stakes industry of gemstones..." There are video clips and more on the Travel Channel web site <http://www.travelchannel.com/tv-shows/gem-hunt>. It appears that the "hunt" will be mostly for gems to be bought, but there will be a visit to a ruby mine in Vietnam, and perhaps other collecting experiences.

## 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](http://www.nittanymineral.org), or remind Dave Glick to bring a printed copy to a meeting for you to see. The October issue is not available yet, but we know a few of the things that might be included. The Fall session of Wildacres Workshops was held last month; it's time to think about attending the spring 2014 session. General information about these week-long retreats with lapidary and mineral classes and good times can be found at <http://efmls-wildacres.org/>. **The 2014 EFMLS Convention will be March 29-30 in Plymouth Meeting, PA.** It's in conjunction with the Annual Mineral Treasures + Fossil Fair show and sale presented by The Philadelphia Mineralogical Society and The Delaware Valley Paleontological Society at LuLu Temple, 5140 Butler Pike, Plymouth Meeting, PA.

The **AFMS Newsletter** is available by the same methods. The October issue starts with A Couple of Points on Driving Safety by Owen Martin, AFMS Safety Chair. Diamond Dan Publications is celebrating 20 years in business with a sale on kids' activity books; see [www.diamonddanpublications.net](http://www.diamonddanpublications.net).

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

**Mineral Collecting Enthusiasts  
Meet and Learn at  
Friends of Mineralogy - PA Chapter  
Symposium and Field Trip**

**November 2-3, 2013  
Franklin & Marshall College,  
Lancaster, PA**

The Friends of Mineralogy – Pennsylvania Chapter will hold its 2013 symposium and field trip on the first weekend in November. Mineral collectors in attendance on Saturday, November 2, will hear talks by experts on Pennsylvania minerals, geology and mining. There will be sales by selected dealers, a silent auction, give-away table, and opportunities to meet and talk with fellow collectors. On Sunday, those registered for the symposium may participate in a mineral collecting field trip (location and details to be announced). Safety equipment is required.

The program of presentations planned for the symposium includes:

**Ron Sloto**, US Geological Survey:  
The Jones Mine, Berks County, Pennsylvania

**William Kochanov**, Pennsylvania Geological Survey:  
A revised interpretation of the Fairfield Quarry debris flow deposits, Adams County, Pennsylvania

**Robert Beard**, Geologist and author:  
Iron Mines in Pennsylvania, New Jersey and New York  
- Geology, History, and Minerals

**Stan Mertzman**, Franklin & Marshall College:  
Slag, Ceiling Tile, and Industrial Mineralogy

All interested mineral collectors are invited to register and attend. As usual, select mineral dealers will be present, and there will be a silent auction, give-away table, and refreshments. The location is the Hackman Physical Sciences Building; the parking lot off Harrisburg Pike is nearby and the door at the corner of the building facing that lot should be open at 8:30 a.m. Lunch is available at restaurants within walking distance. Please see the web site <http://www.rasloto.com/FM/> for details, updates, and the **registration form**. Registration fees are \$25.00 for non-members, \$15.00 for current FM-Pa members. **Please Register in advance.**

*-FM-Pa press release*

**ULTRAVIOLATION 2013  
FLUORESCENT MINERALS ONLY**  
*If Your Rock Don't Glow You're at the Wrong Show*  
**SHOW – SWAP – SELL**  
by **The Rock and Mineral Club of Lower Bucks County**  
**Saturday October 26, 2013**  
**9:00 AM to 4:00 PM**  
**First United Methodist Church**  
**840 Trenton Road**  
**Fairless Hills, PA**  
**\$2 donation - Kids 12 & under free**  
**Food and Beverages available**  
**Raffles & other exciting give-a-ways**

ULTRAVIOLATION is the **ultimate** show for the fluorescent mineral enthusiast, whether a novice or serious collector. The show features many of the world's premier fluorescent mineral dealers who strive each year to bring the biggest, brightest and best fluorescent minerals to satisfy the insatiable cravings of the fluorescent collector. ULTRAVIOLATION highlights fluorescent minerals exclusively and is the next best thing to night collecting. **You will not find a bigger or better fluorescent mineral show anywhere in the country.** Alternating periods of darkness and room light provides the perfect environment to experience these beautiful and colorful minerals. Free admission and a fluorescent mineral specimen for each junior mineralogist 12 years and younger when accompanied by an adult. See flyer at <http://www.mineralfest.com/flyers/2013ultraviolation.pdf>  
*-press release flyer*

**GEMARAMA 2013: "SHADES OF RED"**  
**NOVEMBER 2-3 AT EXTON, PA**

2013 will be the 44th year that Tuscarora Lapidary Society has hosted its annual fine gem, jewelry and mineral show, Gemarama. In addition to vendors you would expect at any gem show, a third of the show houses over 30 instructional and competitive cases and a large lapidary arts demonstration area where visitors can see live the cutting of stones, jewelry making, beading, chain making, wire wrapping, and other arts and sciences associated with lapidary. Hours are Saturday November 2, 2013, 10 a. m - 6 p.m. and Sunday November 3, 2013, 10 a.m. - 5 p.m. The location is Founders Pavilion at CFS, the School at Church Farm, 1001 E. Lincoln Highway, Exton, PA 19341. It is located ½ mile west of the Frazer - Rte. 30 exit off of Route 202. (Set your GPS unit to 1001 E. Lincoln Hwy, Exton, PA.) Admission is \$6 for adults, \$1 for children under 12 years of age; two-day adult tickets are \$9. See more at <http://www.lapidary.org/GEMARAMA/Gemarama.html>  
*- web site*



# Fossils of the Green River Formation

by Dr. Charles E. Miller, Jr.  
Geologist

The Green River Formation consists of intermontane lacustrine sediments mostly deposited during the Eocene (58-33 million years ago, ma) in three lakes in Colorado, Wyoming, and Utah. This formation is best known for its well-preserved fossils and its oil shale. Green River fossils (Figures 1 and 2) are displayed in private collections, museums, art galleries, businesses, and



Fig. 1: *Diplomyustus dentatus* caught in the act of swallowing a small *D. dentatus*.



Fig. 2: Fat-tail stingray *Asterotrygon maloneyi*. This is a pregnant female with a small baby ray coiled inside her; herring-like *Knightia eocaena* at top (Grande, 2013). Both specimens are from Fossil Lake.



Fig. 3: A six-foot palm frond excavated at the Ulrich Quarries in Kemmerer, Wyoming in 2013. The individual posing did most of the excavating, taking five months to complete. (Image by the author.)

traveling exhibits worldwide. One six-foot palm frond recently sold to a private collector for more than \$100,000 (Figure 3). President Eisenhower purchased a large fish from one commercial quarry that he gave to the Japanese emperor in 1960. These fossils are the most complete record of the Eocene ever discovered. The largest oil shale deposit in the world is in the Green River, equal to 3 trillion barrels of oil! This formation is also known for the world's largest deposit of trona and nahcolite, both sodium bicarbonates. The former is used in making glass, chemicals, paper, detergents, textiles, food, and conditioning water and the latter is baking soda.

Green River sediments accumulated in former Lake Uinta, Lake Gosiute, and Fossil Lake. These were truly great lakes, with one of the longest durations of any known lake. Lake Uinta lasted over 10 million years. In comparison, the five great lakes of the United States are about 10,000 years old. Green River lakes existed in

a sub-tropical climate, similar to present-day Gulf Coast and southern Atlantic regions, with essentially frostless winters. Certain fossil flora, such as palms and balloon vine, and certain fauna, such as crocodiles, alligator, and boa constrictors, and specific fish, establish low-temperature limits.

Green River lakes fluctuated in size through time. Mud cracks far out in lake basins reveal regressions. Stromatolite distributions also show fluctuating shorelines. At some locations, crystal molds of saline minerals, flat-pebble conglomerates, and ripples with flattened crests indicate desiccation. Similarly, thick evaporite deposits, such as trona and nahcolite, attest to extreme desiccation.

One significant feature of the Green River is its organic-rich sedimentary deposits. There is nothing comparable to it elsewhere. While organic-rich sediments exist elsewhere, those in the Green River make up a much larger percentage of total sediment. One drill hole showed 2100 feet of continuous oil shale. The oil originates from blue-green algae (cyanobacteria).

One estimate is the Green River contains three trillion barrels of oil. However, it is not presently economical in this country to extract that oil. Furthermore, oil-shale mining and processing raise a number of environmental concerns, such as land use, waste disposal, water use, waste-water management, greenhouse-gas emissions, and air pollution (Oil Shale, 2013).

Fish are probably the best-known fossils in the Green River. A herring-type fish, *Knightsia*, is the most common. These lived in schools numbering in the millions. Other vertebrates include: bats, birds, turtles, lizards, crocodiles, alligators, snakes, frogs, a three-toed horse, and stingrays. Some vertebrate fossils are unique. Examples include mass mortality layers, fish in stomachs of bigger fish, crocodile puncture holes in a turtle, fish with other fish in their mouths, and coprolites. Coprolites are preserved excrement. They interest geologists because they may yield paleoecologic information. Fish coprolites, in particular, are common in the Green River. Coprolites thought to be crocodilian in origin have also been found in these sediments. That identification is based on the large size of the coprolites – up to 7.5 inches in length. Fossilization of these coprolites, especially delicate ones from fish, are rare in the fossil record and attest to the unusual nature of the depositional environment and fossil preservation in the Green River.



Fig. 4: Poplar; Douglas Pass, CO. (Collected and photographed by the author.)



Fig. 5: Maple; Douglas Pass, CO. (Collected and photographed by the author.)

Fossil plants reflect those that surrounded the lakes, but also include algae (stromatolites) within the lakes, themselves. The more common plants were: sycamore, poplars (Fig. 4), maples (Fig. 5), willows, sumac, cattails, fern, palms, and horsetail. Plant fossils provide clues about the paleoclimate, including as paleoprecipitation indicators. At least 300 insect species are described from the Green River. A few of





Fig. 6 (left): Weevil. Fig. 7 (above): Nematoceran fly, maybe a March fly. Specimens collected and photographed by the author. PSU Entomology Department identifications.

those include: dragonfly, scarab beetle, cockroach, cricket, water strider, crane fly, mosquito, horsefly, bot fly, butterfly, moth, and ant. Exquisite preservation enables identification in most instances, even those delicate in nature such as the *Culex* mosquito. Delicate features like antennae, wings, ears, and eyes are found. Some insect larvae are found, but most are adults. Fossilized insects and larvae provide clues to seasonal timing, depositional characteristics, and climatic conditions at the time of deposition. For example,

Soldier Fly larvae are found in the Green River. This insect family is still living today. Their eggs are deposited in spring to early summer, in ponds and lakes, where water flow is minimal. Preservation of these larvae in the Green River provides a relatively exact time line for deposition of the sediments in which they are found. These sediments were deposited in early to mid-summer, under warm conditions, in low-energy, probably in a bay or lagoon.

Another application of Green River insects is in insect herbivory. Peter Wilf of The Pennsylvania State University conducted such research. Extant plant-insect associations predict how ancient herbivory may relate to past temperature and rainfall and to characteristics of



Fig. 8 (left): a fly; probably a black fly; Fig. 9 (above): a fly; Douglas Pass, CO. All specimens collected and photographed by the author. PSU Entomology Department identifications.

host plants. Green River fossils offer an opportunity to examine interplay of insect herbivory, plant defense, and climate.

Most of the Green River Formation is found on Bureau of Land Management land. Collecting is not allowed except with special permits. However, there are private holdings or legal agreements by which collecting is permitted. Three well-known collecting localities in this formation are at Douglas Pass, Colorado; the Ulrich Quarry at Kemmerer, Wyoming; and at Fossil Butte National Monument, also at Kemmerer.

Douglas Pass is a Lake Uinta locality in northwestern Colorado. It is best known for vast numbers of some of the best-preserved insect and plant fossils from the Green River. Vertebrates are very scarce but include lizards, small crocodylians, bats, birds, and small fish. This site is also known as the “radar dome” location.

Carl and Shirley Ulrich have operated the world-famous Ulrich Quarry and Gallery since 1947. The quarry is in Fossil Lake deposits. Fossils from here are displayed worldwide. Fee collecting is offered.

Fossil Butte National Monument protects approximately 8200 acres of Fossil Lake sediments. At least 19 different fossil species have been found here. Collecting is reserved for research projects, only. Establishment of Fossil Butte to protect fossils is somewhat ironic in that it was the site of a brazen theft. In 1993 two fossil collectors broke into the monument visitor center to steal fossils exhibited there. A few days previous, they had cased the center, even signing the guest book. They caused considerable damage. Two years later they were convicted in federal court.

**References**

Grande, L., 1984, Paleontology of the Green River Formation, with a review of the fish fauna, 2<sup>nd</sup> ed.: WY Geol. Surv., Bull. 63, 333 p.

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Labandeira, C.C., Wilf, P., Johnson, K.R., and Marsh, F. 2007. Guide to Insect (and Other) Damage Types on Compressed Plant Fossils. Version 3.0. Smithsonian Institution, Washington, D.C., 25 p.

Oil Shale (n.d.). In *Wikipedia*. Retrieved October 10, 2013, from [http://en.wikipedia.org/wiki/Oil\\_shale](http://en.wikipedia.org/wiki/Oil_shale)

Wilf, P., Labandeira, C., Johnson, K., Coley, P., and Cutter, A., 2001, Insect herbivory, plant defense, and early Cenozoic climate change: Proc. Nat’l. Sci. USA, May 22; 98 (11), pp. 6221-6226. \*

**Geo-Sudoku**

by David Glick

This puzzle contains the letters ACEHILNOT, and one row or column spells one of the evaporite minerals in the Green River Formation. 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	O		T			E	
				C	A			
C		T	E				I	L
E			A			T	H	O
	H					C		E
			H		L	I	A	
	O	H		L		E	N	A
	E		O					H
	C	A			E	O		I

**Twenty Years Ago  
Pre-NMS**

In October 1993, Nittany Mineralogical Society had not yet been formed. Friends of Mineralogy - Pennsylvania Chapter, including some future NMS organizers, held their symposium at Penn State. The symposium demonstrated the support for mineral collectors’ activities in the State College area, and helped lead to the founding of NMS a few months later.

**Ten Years Ago in NMS**

In October 2003, our meeting program was “An Introduction to Inclusions in Minerals and Gems,” by Dr. Andrew Sicree. Photographs from the talk were the first color illustrations in the NMS Bulletin. We had a field trip to Hanson Company’s Salona Quarry.

## 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.

**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.

**Oct. 26, 2013:** Ultraviolet All-Fluorescent Mineral show, by Rock & Mineral Club of Lower Bucks County. First United Methodist Church, 840 Trenton Rd, Fairless Hills PA. See p. 3.

**Nov. 2-3, 2013:** Friends of Mineralogy - PA Chapter Symposium (Nov. 2, Lancaster, PA) and Field Trip (Nov. 3). See page 3 and [www.rasloto.com/FM/](http://www.rasloto.com/FM/)

**Nov. 2-3, 2013:** Gemarama, "Shades of Red," by Tuscarora Lapidary Society. The School at Church Farm, Exton, PA. Sat 10-6, Sun. 10-5. See page 3 and <http://www.lapidary.org/GEMARAMA/Gemarama.html>

**Nov. 23-24, 2013:** Gem, Mineral and Fossil Show by Northern Virginia Mineral Club and GMU Dept. of Atmospheric, Oceanic and Earth Sciences. The Hub Ballroom (Student Union II Building) on George Mason University Campus, Braddock Rd & Route 123, Fairfax, Virginia. Use Parking Lot A, enter from Nottaway River lane, look for courtesy shuttle to mineral show. Sat 10-6, Sun. 10-4.

**March 29-30, 2014:** EFMLS Convention, Plymouth Meeting, PA

**April 18-19, 2014:** First Gem, Mineral & Fossil Show for the non-profit **North Museum of Natural History and Science**. At Farm & Home Center, 1383 Arcadia Rd (off Manheim Pike), Lancaster, PA. Friday 10-6, Saturday 10-5. **VENDORS**

**WANTED:** \$50.00 per table. Contact Alison Mallin, 717-358-7188 <[amallin@northmuseum.org](mailto:amallin@northmuseum.org)> for more information and to reserve a space

### Geo-Sudoku Solution

I	A	O	L	T	N	H	E	C
H	L	E	I	C	A	N	O	T
C	N	T	E	O	H	A	I	L
E	I	L	A	N	C	T	H	O
A	H	N	T	I	O	C	L	E
O	T	C	H	E	L	I	A	N
T	O	H	C	L	I	E	N	A
N	E	I	O	A	T	L	C	H
L	C	A	N	H	E	O	T	I

### 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 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

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Membership Chair: David Glick (see above)  
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e-mail: [gold@ems.psu.edu](mailto:gold@ems.psu.edu)  
Door Prizes: *volunteer needed!*  
Refreshments: *volunteer needed!*  
Facebook: Mike Zelazny e-mail: [maz166@psu.edu](mailto: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](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. 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](http://www.nittanymineral.org)