Nittany Mineralogical Society Bulletin

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

Editor (see back page):
September, 2018 **Visit our web site: www.nittanymineral.org** *David C. Glick*

September 19th meeting:

The 1974 Penn State Cross-Country Geology Field Trip

by
Dr. Charles E. Miller, Jr.

Our September meeting will be held Wednesday the 19th in room 114 (the large auditorium) Earth & Engineering Sciences Building on the west side of the Penn State campus in State College, PA. Maps are available on our web site.

6:45 to 7:45 p.m.: Social hour, refreshments in the lobby
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!*

In May-June, 1974, The Pennsylvania State University Department of Geosciences ran a cross-country geology field trip to the west coast and back. Approximately 6000 miles were traveled in 21 days. Trip leaders were Drs. Roger J. Cuffey and the late Charles P. Thornton. This trip was the writer's introduction to Penn State courses and to geology west of the Mississippi River.

Such trips offer regional geology by experiencing it. Many stops were national monuments, parks, or memorials... In addition, there were a number of other geological stops that were interesting – even spectacular – in their own regard.

See the complete article on page 4, and please attend the well-illustrated presentation!

Dr. Miller has arranged for Dr. Cuffey and several of the students from the trip to attend and to have the opportunity to speak briefly. We'll celebrate, and attempt to satisfy our sweet tooth, by including a photo cake with our refreshments during the social hour. Please join us!
-Editor

ATTENDING THE SEPTEMBER MEETING?
Donations of **a few high quality, labeled door prize specimens** are invited.
Your donated snacks will be welcomed.
Bring a friend!

OFFICIAL NOTICE: Annual Meeting and Elections in October

by David Glick, NMS President

The October 17th meeting will be the **Annual Meeting of the Corporation**, and will include election of officers. In accordance with our bylaws (available on the web site), the Board of Directors, acting as the Nominating Committee, has met and has provided its recommended slate of officers. Volunteers and nominations were invited, but none were received, so the slate is the incumbent officers, who have all agreed to stand for election again:

President - David Glick
Vice President - Robert Altamura
Secretary - John Dziak
Treasurer - Stuart Bingham

The Board truly needs **additional volunteer**s to get involved with running the Society, providing **new energy and fresh thinking** and some new names on the ballot. 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!**

MEMBERSHIP RENEWAL TIME!

Members, if you have not already renewed, a dues form has been mailed with this printed Bulletin or linked (on our web site) with your e-mailed Bulletin announcement. Your renewal will be welcomed! Mail it or bring it to the meeting; doing it this month will help reduce our work load next month. Thank you!

October Meeting Program

For our October 17th regular meeting, we are looking forward to a presentation on Serpentinites and Associated Minerals on the Eastern Flank of the Berkshire Massif near Westfield, Massachusetts, by Dr. Robert Altamura.

November, December Date Changes

Our November regular meeting will be on the second Wednesday, Nov. 14 Our usual date would have been the day before Thanksgiving. We are also planning to move our holiday dinner up one week, to Wednesday, December 12.

Minerals Junior Education Day set for Saturday, March 30, 2019

Please keep the date open and plan to help the Society present our annual event for children in grades 1-8 and their parents.

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** . 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**. The September issue announced that fellow Pennsylvanian Alice "Joy" Bourne of the Che-Hanna Rock & Mineral Club passed away on June 29. Joy was well known and respected for her energetic service to EFMLS in many offices, including two consecutive terms as president. President Barbara Ringhiser tells a story which could come from many of us - she heard about Wildacres workshops for 19 years before finally attending, and finding the experience very rewarding. The Fall session has just concluded, so watch for the Spring session announcement for your chance to attend. Juniors Chair Betsy Oberheim recommends the facebook group *The Rockhound Connection.*

The **AFMS Newsletter** is available by the same methods. In the September issue, Historian Jennifer Haley begins the story of mineral collecting in the U.S., starting in the late 1700s. President Sandy Fuller writes about her visits to clubs around the country, saying, "Our clubs are really about people, working together around a common passion." The Juniors programs including Future Rockhounds Badges and Rock Pals box exchanges are active and information is available. Donations to the AFMS Scholarship Foundation are encouraged. Keeping collecting on public lands open through the comment process on Public Lands Travel Management Plans is described. Club Rockhounds of the Year are introduced and honored. *-Editor*

Geo-Sudoku

by David Glick

This puzzle contains the letters CEINOPRSV; one row or column spells the physiographic divisions of the continent. 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.

	I	N	C	P			S	
						I		
	O	V	E		I		P	C
			O					I
	V		I	E	C		N	
		P						R
V		I	P		E	R	O	
			V		N		E	
	N					P		

25 Years Ago in State College

In October 1993, the Friends of Mineralogy - Pennsylvania Chapter Symposium was held at Penn State. It brought mineral collectors together and helped stimulate interest in a local club with a mineral collecting emphasis. Nittany Mineralogical Society was founded in January, 1994.

NMS Picnic

On Sunday, August 26th, NMS once again held its leisurely annual picnic and cookout at the home and shady deck and back yard of Ellen and Stuart Bingham. The weather was better than usual for this summer, and we had a good time. Thanks go to Ellen and Stu for providing a great location and great food.

-Editor

D. Glick photos; please excuse the digital panorama distortion.

Earth Science Week
October 14 - 20, 2018

from
https://www.earthsciweek.org

"Earth Science Week isn't just for students and teachers. If you're curious about Earth science, you're invited to participate in events nationwide and plunder a treasure trove of online resources." This year's theme is "Earth as Inspiration."

National Fossil Day
October 17, 2018

from
https://www.nps.gov/subjects/fossilday

"Join paleontologists, educators, and students in fossil-related events and activities across the country in parks, classrooms, and online during National Fossil Day. National Fossil Day is an annual celebration held to highlight the scientific and educational value of paleontology and the importance of preserving fossils for future generations."

The 1974 Penn State Cross-Country Geology Field Trip

by Dr. Charles E. Miller, Jr.

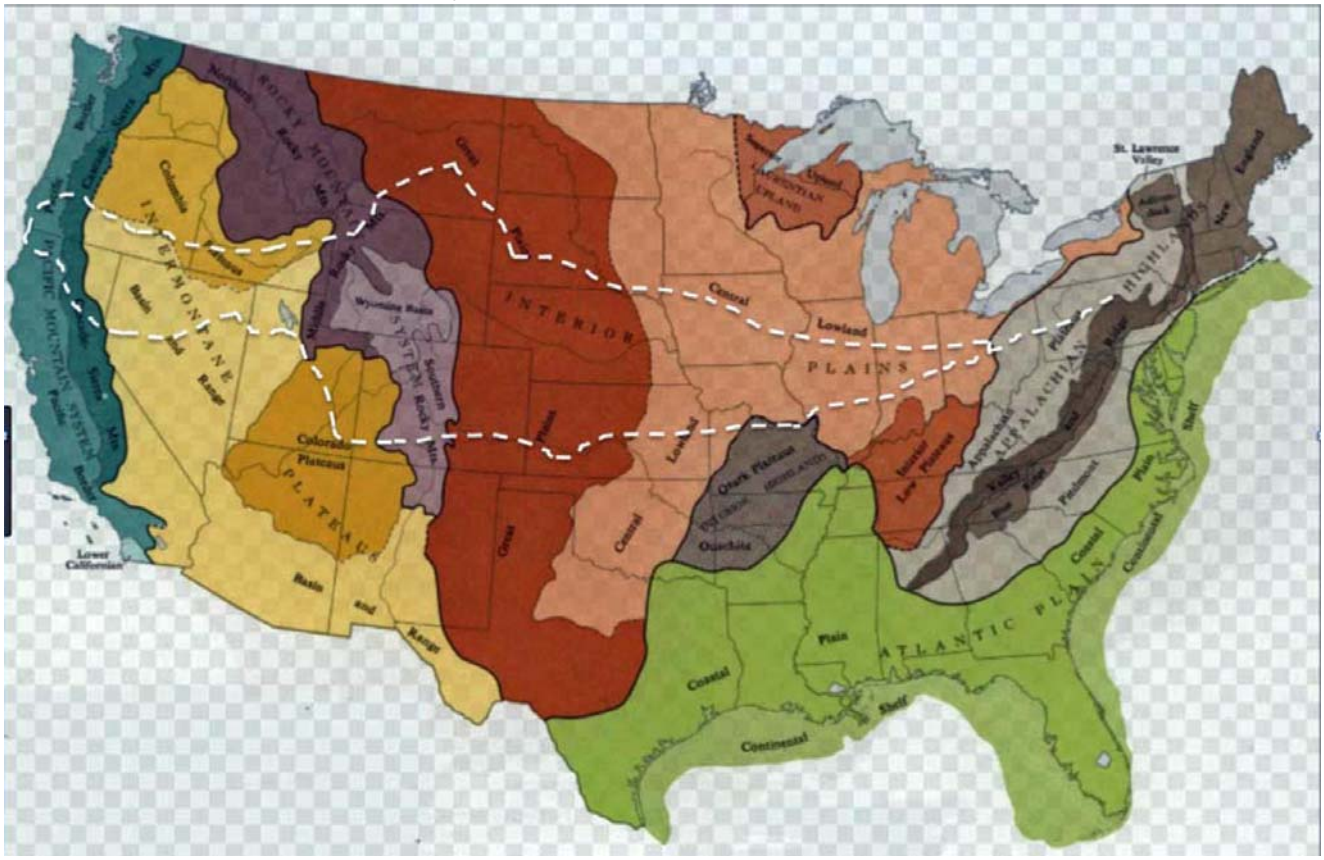

Figure1: Physiographic map of the contiguous U.S. with the approximate route of the 1974 cross-country geology field trip. (The National Atlas of the USA)

In May-June, 1974, The Pennsylvania State University Department of Geosciences ran a cross-country geology field trip to the west coast and back. Approximately 6000 miles (Figure 1) were traveled in 21 days. Trip leaders were Drs. Roger J. Cuffey and the late Charles P. Thornton. This trip was the writer's introduction to Penn State courses and to geology west of the Mississippi River.

Such trips offer regional geology by experiencing it. Many stops were national monuments, parks, or memorials. National monuments included Craters of the Moon. National parks included Arches, Crater Lake, Badlands, Mt. Lassen, Mesa Verde, Great Sand Dunes, and Yellowstone. National memorials included Mt. Rushmore. In addition, there were a number of other geological stops that were interesting – even spectacular – in their own regard. This articles highlights only a few of these national treasures. The others are discussed in the public presentation.

Although mostly geological, the trip was also interdisciplinary, with elements of geography, climatology, meteorology, and astronomy. One cannot drive cross-country without noting geography, especially in vegetation and physiography (landforms) changes. Grasslands and/or xerophytic (drought resistant) vegetation of drier climates replace Pennsylvania's lush vegetation as one travels to central and western states. This trip crossed physiographic provinces (Figure 1), each having landforms distinctive enough to distinguish one from another. In Pennsylvania, it is easy to distinguish the Appalachian Ridge and Valley Physiographic Province from the Coastal Plain. Similarly, physiography of the Great Plains Province is significantly different from the Basin and Range. Remote areas provided opportunities for nighttime astronomical observations. Professors Cuffey and Thornton fostered this, having side interests in astronomy. The former's father was a professor of astronomy. For several of us with astronomy training, this led to night observations of stars and constellations. The educational value of such observations will be discussed. Meteorological observations include discussions on wave clouds, dust devils, and mirages.

In Kansas, one field stop (Figure 2) was the Late Cretaceous (87-82 million years ago, mya) Niobrara Chalk. Chalk is limestone composed of microscopic tests (shells) of coccoliths. The White Cliffs of Dover are another example. This formation was deposited in the Western Interior Seaway that connected the Arctic Ocean and Gulf of Mexico, bisecting North America. It is replete with fossils, including mosasaurs and other marine organisms. Its regional significance is discussed in a later section.

Figure 2: Cretaceous Niobrara Chalk; Elkader, KS. Image by the author.

A stop in south-central Colorado was at the Spanish Peaks - two granitic stocks 13,600 and 12,700 feet high, respectively, that were important markers along the Santa Fe Trail. These peaks are world famous for over 500 radiating igneous dikes. Geology textbooks commonly include photographs of these intrusions. Because the dikes are usually more resistant than surrounding country rock, they commonly form linear walls 50+ feet high crossing the area for up to 25 miles (Figure 3). An array of other igneous features is also present, making this an area of spectacular scenery and geology. In addition to igneous-rocks, glaciers eroded the Spanish Peaks during the Pleistocene Ice Age, creating examples of alpine glacial features.

Figure 3: Devil's Stairway - a granite porphyry dike at La Veta, CO. This is one of the radial dikes associated with the Spanish Peaks. The arrow points to a PSU geology student standing on one stairstep. This dike is more resistant, with sections rising 125 feet above the country rock. The dike can be traced across the landscape. Image by the author.

Mesa Verde National Park, in southwestern Colorado, is famous for ancestral Pueblo archaeological sites dating from AD 600 to 1300 (Figure 4). There are over 5000 sites, including 600 cliff dwellings. These archaeological sites are found in the Mesa Verde Sandstone that was deposited in the Cretaceous Western Interior Seaway. The regional significance of this sandstone is discussed in a later section.

In central Utah is a large roadcut of Castlegate Sandstone (Figure 5), consisting of coal, shale, and sandstone. These strata are collectively known as cyclothems – i.e., cyclic repetition of coal and associated layers. The Castlegate represents coastal swamps and meandering streams along the Cretaceous Western Interior Seaway. Cyclicity is due to shifting shorelines associated with the seaway. The regional significance of this formation is discussed in a later section.

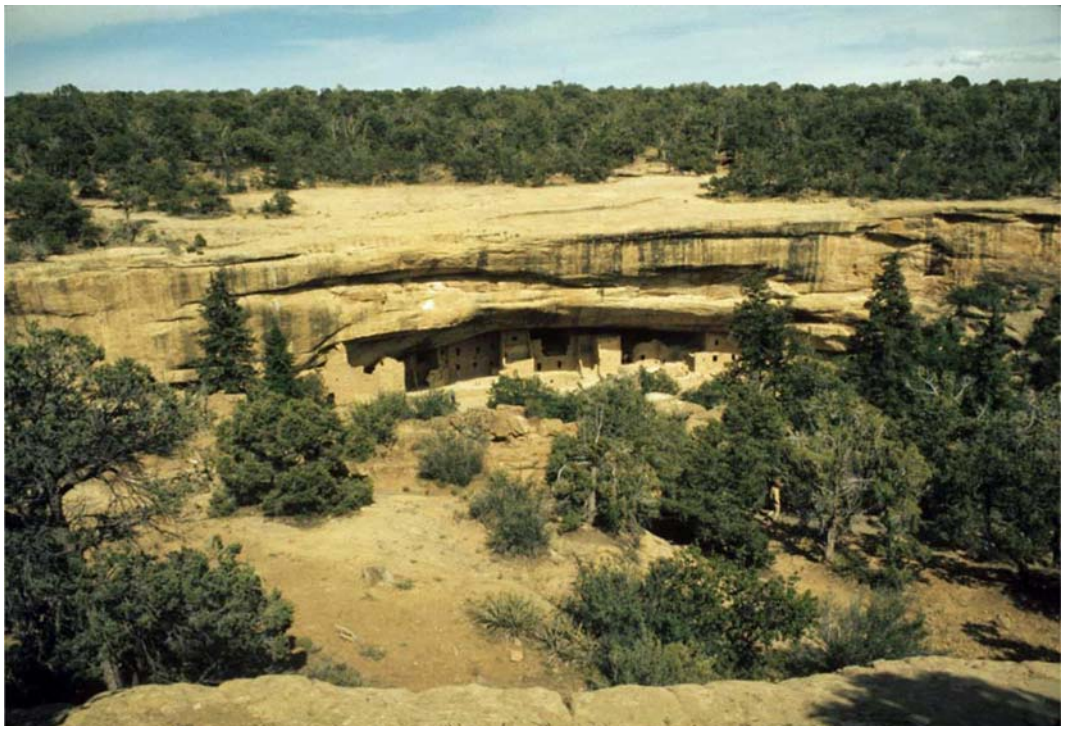

Figure 4: Spruce Tree House, a Pueblo cliff dwelling in the Cretaceous Mesa Verde Sandstone; Mesa Verde National Park, CO. Image by the author.

Approximately 40 miles west of the Castlegate stop are exposures of the North Horn Formation consisting of large-sized gravels and boulders (Figure 6). In places, it is over 3000 feet thick. This formation represents a terrestrial, high-energy, depositional environment. Ancient streams draining eastward into Colorado and eastern Utah brought in boulders and gravels eroded from the nascent Rocky Mountains. This deposit provides clues to the timing of the Laramide Orogeny that produced the Rockies. Much of this formation is Cretaceous. In that regard, it relates to several other Cretaceous stops previously discussed in this article.

Figure 5: Penn State geology students inspecting coal cyclothems in the Cretaceous Castlegate Formation in central Utah. Note cut-and-fill features of former stream channels (yellow arrows) and thickness variability of the sandstone unit (center), varying from 12 to 5 feet in the roadcut. Image by the author.

A cross-country geology trip lends itself to regional concepts such as sedimentary stratigraphic facies changes. Subdivisions are lithostratigraphic and biostratigraphic facies changes. In this article, only the former are considered. These technical terms can easily be understood, even by non-geologists. Facies are physical (litho) and/or fossil (bio) characteristics of a rock formation distinguishing it from adjacent formations or from parts of itself. For example, locally the Reedsville Shale consists of siltstone, shale, and

sandstone. That contrasts with the underlying Coburn Formation, a limestone. Fossil content (biofacies) also distinguishes the two. Because depositional settings keep changing and shifting, a formation may have a predominantly shale facies in one area but a predominantly sandstone facies in another.

Another application of this concept is regional. Many formations in the mid-continent are related to the Western Interior Seaway (Figure 7). At any one time, parts of the seaway had deeper water (shales) while other parts were shorelines (sandstones), reflecting different depositional settings. Our cross-country trip observed litho- and bio-stratigraphic facies changes of Late Cretaceous rocks from Kansas to Utah (SE-NW black line of Figure 7). This time slice showed an east-west stratigraphic progression of: chalk (limestone), shale, sand, coal/shale/sandstone, and conglomerate – all late Cretaceous.

The Niobrara Chalk (chalk lithofacies) represents limestone deposition far enough from most clastic sedimentation entering the seaway. This is intuitive because high influx of clastic sediments shuts down carbonate production. More westward is the Pierre (Mancos) Shale representing a deeper-water facies of the seaway. Shales consist of very small clay particles deposited as mud. Because of small size, clay is the last to settle out in a gravel/sand/clay sequence of clastic particles. Compare this sequence to the beaker of water in Figure 7. Heavier particles (gravels) settle out first, sand secondly, etc. This same depositional sequence occurs laterally, as in our line-of-section in Figure 7. The next westward lithofacies in the seaway is sand of the Mesa Verde Formation (Figure 7). Predominance of sand over shale indicates a shallowing, higher-energy, near-shore depositional setting, such as beach deposits. More westward in this line-of-section is the Castlegate Sandstone, consisting of alternating coal, shale, and sandstone (Figure 7). Coal (plant material) indicates coastal swamps replete with meandering streams. Termination of our section exposes gravels in Utah. These represent proximity to the sediment source – the Rocky Mountains. The current Rocky Mountains were uplifted during the Laramide Orogeny at the end of the Cretaceous. Erosion of these high mountains provided the sequence of sediments described. ❄

Figure 6: Gravels of the Cretaceous North Horn Formation at Thistle, UT. Note geology hammer for scale. Image by the author.

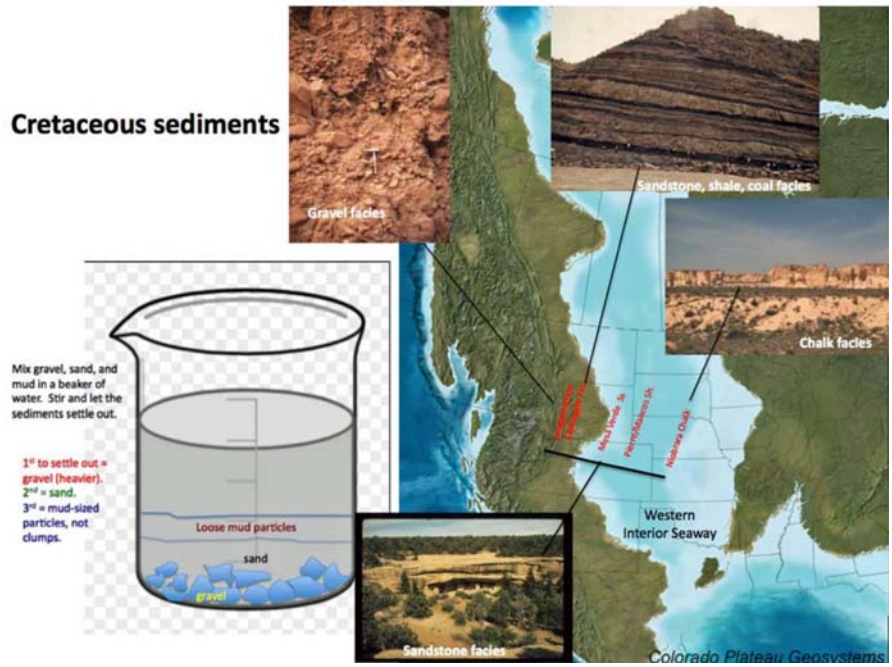

Figure 7: Paleogeographic map of the Late Cretaceous Western Interior Seaway. Litho- and bio-stratigraphic facies observations were made along the SE-NW line-of-section (black). Thumbnail images correspond to formations along the line-of-section. See article for additional details. (Thumbnails by the author.)

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.

Sept. 15-16, 2018: Annual Gem, Mineral & Jewelry Show by: Central Pennsylvania Rock and Mineral Club. New location: Harrisburg Consistory (2701 North 3rd Street) Harrisburg PA 17110 Sat 10-6, Sun 10-5 http://www.rockandmineral.org/annual%20show.htm

Sept. 29-30: Franklin-Sterling Hill Gem & Mineral Show. NEW LOCATION: Littell Community Center (formerly the 'Armory'), 10 Munsonhurst Road #12, Franklin NJ 07416 The Pond outdoor swap has the same hours (show admission required) , Sat. 9-5, Sun. 10-4. http://www.fomsnj.org/Events.aspx http://spmom3.wixsite.com/franklin-gem-mineral

October 6, 2018: Autumn Mineralfest, by PA Earth Sci. Ass'n. Macungie Mem. Park, Poplar St., Macungie, PA. One hundred tables overloaded with minerals, fossils, gems, jewelry, crystals and geodes from six continents - and possibly from outer space. Sat. only, 8:30-3. http://www.mineralfest.com

Nov. 3-4, 2018: Friends of Mineralogy - PA Chapter Symposium. Franklin & Marshall College, Lancaster PA. See page 2. http://www.rasloto.com/FM/

Geo-Sudoku Solution

E	I	N	C	P	R	V	S	O
S	P	C	N	V	O	I	R	E
R	O	V	E	S	I	N	P	C
N	C	S	O	R	P	E	V	I
O	V	R	I	E	C	S	N	P
I	E	P	S	N	V	O	C	R
V	S	I	P	C	E	R	O	N
P	**R**	**O**	**V**	**I**	**N**	**C**	**E**	**S**
C	N	E	R	O	S	P	I	V

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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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.