Nittany Mineralogical Society Bulletin

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

October, 2020 **Visit our web site: www.nittanymineral.org** *Editor (see back page): David C. Glick*

October 21st Zoom meeting ONLINE:

Earth Science can be fun

Dr. Charles E. Miller, Jr.

Earth science is interdisciplinary, integrating geology, meteorology, climatology, oceanography, and astronomy. A continuing challenge for earth science educators is to make subject material appealing to students. This is especially true today because of competition from cellular telephones, video games, television, and the Internet. This talk attempts to address this issue. Audience participation is encouraged. Selected topics from the talk are discussed in the **article on pages 4 - 7**.

APOLOGIES FOR PROBLEMS WITH **PRINTED** BULLETIN

from David Glick, Bulletin Editor

For about the last ten of the 13 years in which we've been distributing color printed NMS Bulletins, I've been printing them with a big old wide-format color laser printer (HP 8550N), built like a battleship and bought for a minuscule fraction of its original cost at Penn State Salvage & Surplus. Well, apparently even battleships only go so long before either undergoing a major refit or being scrapped. That time may have come for this printer and the two parts machines that I purchased later. This problem came up at a time when I haven't been able to do much to address it. At the moment I'm optimistic that I can print this issue, but it's far from certain.

If you receive an issue with poor color, or a black and white issue, or only a digital PDF issue, I apologize. We will do our best to get things back on an evenly colored track.

All of us at NMS sincerely hope that everyone is in good health and will continue to be well. We look forward to being together again.

BIG NEWS - ZERO DUES

Those who were paid members in the membership year now ending (11/2019-10/2020) will have their **membership extended for the coming year at no cost. No payment or form is needed**, but cash DONATIONS ARE WELCOMED.

NEW MEMBERS: The rates for those joining from now until October 31, 2021, will be half of our normal rates. The dues form on the web site has been updated to reflect this, and PayPal arrangements will be updated soon.

The Board of Directors made this decision at a meeting on October 12. We have been unable to provide as many services as we'd like during the COVID pandemic, and everyone could use a little help. Retaining members seems more important than cash right now. The Eastern Federation has waived its dues to member clubs such as ours for the coming year, and the Federation's insurance carrier is giving a rebate of 25% for the past year. We appreciate the financial help that this provides.

While We Can't Travel: **Virtual Geo-Resources**

We continue to add to the interesting resources on the main page of our web site, www.nittanymineral.org. Penn State's Earth and Mineral Sciences Museum has been adding many posts to their Facebook page, and now has their first video up on their YouTube channel. It's about "Trilobites, Tree Stumps and Trackways," in support of International and National Fossil Day, October 14, 2020. There's a link to it on our web site

At this time, videos of the 2020 Dallas Mineral Collecting Symposium (with presentations and tours by some very well-known names in mineral collecting) are still available by following the links at <https://www.dallassymposium.org/ >. *-Editor*

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 **Federation leaders 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 October **EFMLS News** is not yet available. Notice has been received that the EFMLS Convention planned for October 23-26 has been canceled. It appears that virtual meetings of Board members will continue.

The **AFMS Newsletter** October issue announces that their Annual Meeting will be virtual via Zoom on October 17 (the October convention in Tennessee has been cancelled). Suggestions are sought for revisions to the Future Rockhounds manual. *-Editor*

Geo-Sudoku

by David Glick

This puzzle contains the letters ABEILMSTU; one row or column describes how snowflakes form. As usual, if you've read this issue, you've seen it or a version of 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.

	M			B	U		L	
B	E	I						A
S	L	U		T	A			
		T			I			
	S			E	M		B	
	I		L	A				T
		B	U	L				S
E						T	U	L
		S			T	E	I	B

Friends of Mineralogy - Pennsylvania Chapter Plans

Nov. 7 Virtual Symposium and Nov. 8 Field Trip

Friends of Mineralogy-Pennsylvania Chapter will hold its annual Symposium for Pennsylvania Mineral Collectors on Saturday, November 7, 2020, as a live virtual event from 9:00 a.m. to 3:30 p.m., subject to change. An in-person field collecting trip is planned for Sunday, November 8. The online symposium is planned to include six virtual live presentations of interest to Pennsylvania mineral collectors, with audience questions and answers. The tentative list of presentations is:

Jeri Jones, Jones Geological Services
Update of Some Historic and New Mineral Finds in York County, Pennsylvania

Ryan Mathur, PhD, Juniata College
Mineral and mining histories of Fort Roberdeau, Blair County, Pennsylvania

Joseph Marchesani, PG
Brief discussion of North Carolina Crabtree Emerald Mine pegmatite and comparison to Unionville, Pennsylvania, pegmatite

Chris Haefner
Pequea Silver Mine (Argentiferous Galena), Lancaster County, Pennsylvania

Peter Heaney, PhD, Penn State
New Insights into the Growth of Hematite and Goethite

Bill Stephens, PG, Stephens Environmental
Field Camp, SUNY at Selkirk, 1982

The Symposium will be available to FM-PA Chapter 2020 members who **register in advance**. Non-members may pay for 2021 membership by October 26 and receive membership for the remainder of 2020, including the Symposium and Field Trip, as a bonus. **See <http://www.rasloto.com/FM/>** for membership application, symposium details, and registration form as they become available.

Collected in Pennsylvania

NMS member Mike Dunton found this crinoid last month. He reports: I found three different crinoids on two separate rocks; only one is shown here. It's small (2-3/4" from stalk to top of the "flower", which is ½" wide) but my first including the flowery arms of the animal. This was at a small local contractor's shale pit near Stroudsburg. I never knew it was there - even after passing the place on I-80 hundreds of times.

Celestine, Meckley's quarry, Mandata, Northumberland County, PA. *D. Glick photo.*

Strontianite in ice, Dec. 9, 2006, at National Limestone Quarry, Mount Pleasant Mills, PA. *D. Glick photo.*

Malachite, Berks County, PA. Delaware Cty. Institute of Science specimen, Media, PA. *D. Glick photo.*

Microcline var. Amazonite, Mineral Hill, Delaware County, PA. Delaware County Institute of Science specimen, Media, PA. *D. Glick photo.*

Earth Science can be fun

Dr. Charles E. Miller, Jr.
Nittany Mineralogical Society

Earth science is interdisciplinary, integrating geology, meteorology, climatology, oceanography, and astronomy. A continuing challenge for earth science educators is to make subject material appealing to students. This is especially true today because of competition from cellular telephones, video games, television, and the Internet. This talk attempts to address this issue. Audience participation is encouraged. Selected topics from the talk are discussed in this article.

From 1893-1896, the Nansen Polar Expedition (Figure 1) garnered worldwide attention. The book "Farthest North" chronicles this adventure. The expedition attempted to reach the North Pole in a way not previously tried. A specially designed boat sailed into Arctic waters to be frozen in sea ice during the long winter. It was hoped that Arctic Ocean currents would carry the ice-locked boat to the North Pole. Experts had said such a ship could not be built and the journey was tantamount to suicide.

The expedition combined exploration and science. Exploration challenges included temperatures dipping to -57 degrees F, polar bears, pressure ridges in sea ice, fierce winds, and more. At the same time, it was truly a scientific expedition with regular observations made in geology, meteorology, oceanography, and astronomy. The Nansen bottle - for sampling water at a specific depth - was developed by the expedition. Astronomical observations were crucial in determining daily positions. They needed to know if they were stationary, moving

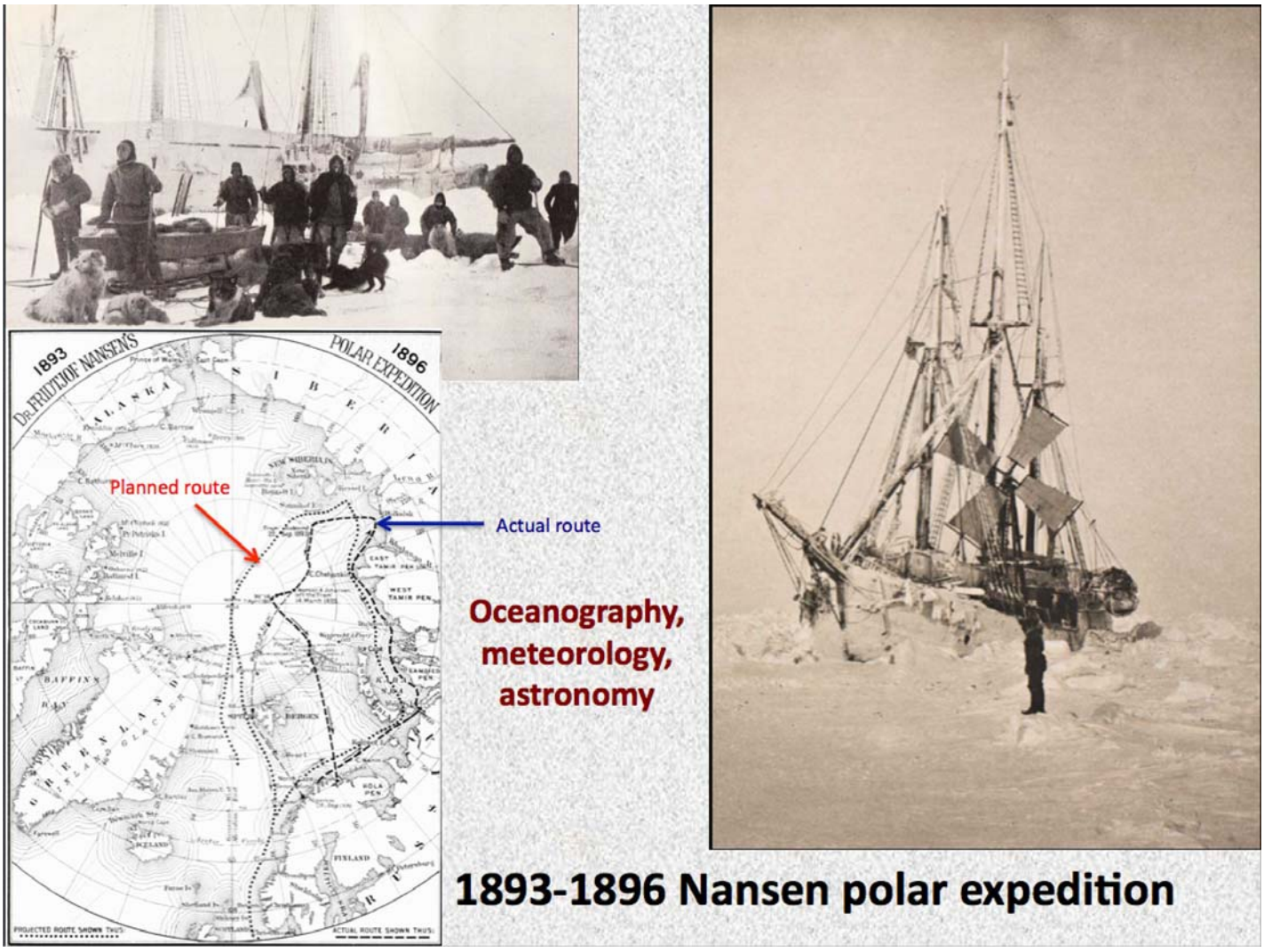

Figure 1: The Nansen polar expedition. (Public domain)

north, or moving south. To assist in this, star sightings were routinely done. One sighting was: "An observation of Capella [Auriga]….would seem to show that we are in any case not farther north than 80º." How did they know this? The technique is simple and was taught to the writer's high school earth science and college astronomy students. It involves a sextant, an ephemeris, and a few simple basic principles. The sextant measures Capellla's altitude above the horizon. The star's celestial coordinates (declination, right ascension) are from the ephemeris. Declination is equivalent to latitude, measured above or below the celestial equator - an extension of Earth's equator out into space. Subtracting declination from its altitude gives the elevation of the celestial equator (C.E.) above the horizon. The C.E. is 90 degrees from the North Celestial Pole (Polaris, the North Star). In the northern hemisphere, the altitude of Polaris above your northern horizon equals your latitude.

In 2017 and 2019, Penn State Professor Christopher House spoke to the Nittany Mineralogical Society on the Mars Curiosity Rover. Complementing his presentations, this talk makes a case for surface water previously on the planet. Putative evidence includes mudcracks, mudstone, cross bedding in mudstone, pebbles (Figure 2), deltas, drainage channels, relict stream meanders replete with point bars and cutoffs, and gypsum deposition. Prolific pebbles are interpreted as having been deposited by a stream that flowed at walking pace and was ankle- to hip-deep.

Figure 2: Mars pebbles from stream flow. NASA reports the stream was flowing equivalent to a walking pace and was ankle-deep to hip-deep. (NASA)

Two major features - Olympus Mons and Valles Marineris - will be discussed. The former is the tallest mountain in the solar system, attaining a height of 72,000 feet! Mt. Everest, at 29,000 feet, pales in comparison. The latter is a canyon six miles deep and 2500 miles long. In comparison, the Grand Canyon is one mile deep and 227 miles long. Geological origins of the Mars features are discussed.

Other than Earth, Mars is the most studied planet in the Solar System. At least 50 probes have been sent there. The planet is appealing to scientists because it is within the Habitable Zone in which environmental conditions may have allowed life to occur. Because of that, some people think of Mars as a future refuge from a ravaged Earth. However, Mars is a cold, dry, barren, hostile planet. Its average temperature is -81º F. In comparison, Earth's is 57º F. At Mars' poles, temperatures reach -195ºF. There is essentially no surface water, making it a desert. Its thin atmosphere is only 0.13 percent oxygen compared to 21 percent for Earth. The atmosphere is poisonous, consisting of 95 percent carbon dioxide. There is basically no ozone layer to protect life from harmful ultraviolet radiation. If life exists on Mars, it most likely is underground. The largest dust storms in the Solar System are on the planet, at times enveloping all of it and lasting for months. Thin clouds consist mostly of carbon dioxide crystals and when it snows, the flakes are carbon dioxide. Air pressure on Mars is so low (equivalent to 22 miles above the Earth) astronauts would require pressurized spacesuits if they ventured out.

Since 2003, Mars has been the subject of an annual Internet hoax. Headlines proclaim: "Mars big as the moon on August 27? See Mars as large as the full moon. Should be spectacular! Truly a once in a lifetime experience." It's never been true and never will be true. It is amazing how many people are taken in by this fake news. One valid observation of Mars is that it goes through retrograde motion. "Last night I saw Mars move westward through the sky in its apparent retrograde motion." Any comments? On a daily basis, followers of astrology faithfully read about Mars: "Your passion, determination, drive, and energy are some aspects of your life that Mars controls. This planet commands you to stand up and get things done. It rules your confidence and power." NONSENSE. Consider that all objects with mass have gravity, such as the Sun, cars, or a book. Gravity diminishes with distance. At its closest approach to Earth, Mars' gravity is 50 million

times weaker than that of a book two meters away. Yet, you never hear about the gravitational effect of a book on people.

In 1972, uranium ore from Gabon (Africa) was found to be slightly depleted. Even though the percentage was very small, concern over fissionable materials getting into terrorist hands forced an investigation. It was determined that about 1.7 billion years ago, 17 sites had become naturally occurring nuclear reactors. Groundwater acted as a neutron moderator, turning the reactors on and off over a hundred thousand years. A total of about 100 kilowatts of energy was produced - i.e., enough to light 1000 light bulbs or a few toaster ovens. The Gabon reactors are unique.

Puzzler: Consider the poor guy (Figure 3) standing on ice skates in the middle of a frozen lake in a frictionless, no-wind setting. Disregard the snow - THERE IS NO SNOW. The ice is very smooth. No one can assist him. He cannot break the ice, throw a rope to a nearby tree, or float up in the air, as in a balloon lifting him. He can't skate off the ice because that requires friction. How can he get off the ice? The answer will lead to further discussions. Send your answers on the back of a gold plated envelope to Puzzler c/o NMS.

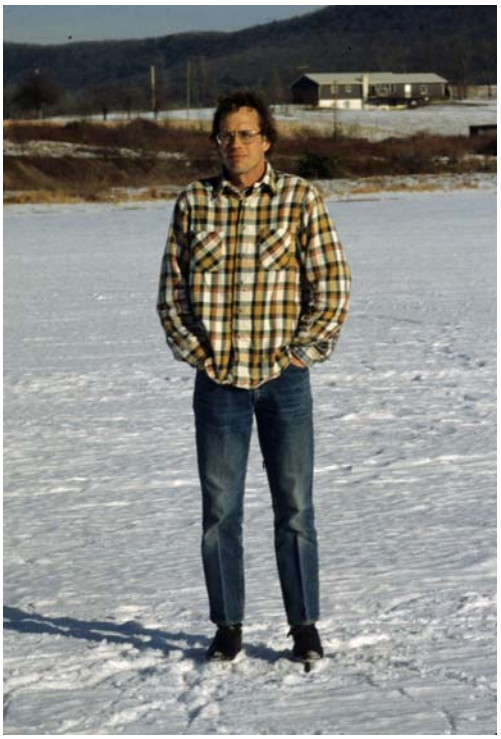

Figure 3: Poor guy on a frozen lake. (ASSUME THERE IS NO SNOW!)

Exercise: Hold an arm out in front of you with the thumb pointing up. Close one eye and line the thumb up with some background object. Don't move your arm. Now, close that eye and open the other one, looking at your thumb. Your thumb appears to shift relative to the same background object. The apparent shift is parallax. It is parallax (stellar parallax, trigonometric parallax) that allows us to calculate distances to many celestial objects. An object (such as a nearby star) is viewed at opposite ends of Earth's orbit (a 186,000,000 mile separation). An angle is measured and simple calculations give the distance to the star.

Meteorology is replete with interesting phenomena. Lightning (Figure 4), for example, is both dangerous and exciting. It can travel cloud-to-cloud, cloud to ground, and ground to cloud. Recently, a lightning bolt in Argentina was documented to be 440 miles long. Another phenomenon interesting to all is the rainbow (Figure 5). It should be noted that distance to a specific rainbow is elusive. As the viewer proceeds to that location, the rainbow keeps advancing its position.

Figure 4: Lightning; Aurora, CO. 6-21-84. Image by the author.

Figure 5: 180° rainbow at Yellowstone National Park, WY-MT. Image by the author.

We all know the common forms of precipitation: rain, snow, sleet, and hail. However, identification and/or origin of the latter three is sometimes confused. For example, one day my neighbor said: "It's hailing outside." I said: "No, there is no thunderstorm so that is sleet." Formation of sleet involves temperature inversions (Figure 6). Normally, air temperature decreases with increased elevation. Sometimes that progression is altered with warmer air covering a colder layer. Rain formed in the warmer air freezes as it falls to earth. Temperature inversions trap air pollution (Figure 6). Snow is familiar to everyone. However, some misunderstand its origin. They say it is frozen rain. Once again, frozen rain is sleet.

Figure 6: Smog associated with a temperature inversion; Denver, CO. Image by the author.

Snow is formed from deposition - a synonym for sublimation in the atmosphere. Sublimation is a phase change - the change of a solid to a gas, or vice versa, without a liquid phase. Water vapor changes directly to a solid (snow).

When comparing hail and sleet, the major difference in appearance is that concentric layering (like an onion) in the former is due to updrafts and downdrafts in cumulonimbus (thunderstorm) clouds, causing freezing, partial melting, and freezing of additional moisture layers. The largest hailstone recorded in the U.S. was from South Dakota. It measured 8 inches in diameter and weighed almost two pounds. Updrafts in excess of 100 mph were necessary to form this hailstone. This, now, brings us to William Rankin, "the man who rode the thunder." In 1959, his jet fighter stalled over a thunderstorm at 47,000 feet. He was forced to bail out at 629 mph in -58° F temperature - into a thunderstorm. His parachute opened prematurely and it took him 40 minutes to descend. He suffered frostbite. Decompression caused bleeding from his eyes, nose, ears, and mouth.

National parks are a great source of interesting features, especially to those of us in geology. One of the most scenic is Yosemite National Park in California. Figure 7 shows one view in the park. At center is the Merced River Valley. If you look closely, you can see light-colored point bars on the river. On the right is one of the most popular features - Half Dome. It is a granitic dome (actually a half dome) rising more than 4,737 feet above the valley floor. During the Pleistocene Ice Age (1-2 million to 12,000 years ago), glaciers virtually filled - and shaped - the Merced River Valley. That ice was about a mile thick, extending up almost to the top of Half Dome. The valley floor is covered with glacial deposits. Hanging water falls high up on valley sides and other evidence attest to the glacier thickness. To some, the name "Half Dome" implies valley glaciers truncated the dome, giving it the appearance it has today. What evidence do you see that glaciers carved Half Dome in half? What evidence do you see that glaciers did not carve Half Dome in half?

Figure 7: View of Yosemite National Park showing the Merced River Valley and Half Dome. Image by the author.

At New Paris, Pennsylvania, is one of many "Gravity Hills." Stopped vehicles at designated locations seem to defy gravity, coasting uphill. Balls placed on the road do the same. Most states and many countries have their own gravity hills (aka "mystery hill," "gravity road," or anti-gravity road). What is going on at these locations? Does earth's gravity work differently at these unique sites? Readers, what do you think? The answer appears in the next paragraph.

All "gravity hills" are optical illusions. If surveying equipment is used at the sight, it is shown that objects coast downhill, not uphill. ❄

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.

Most upcoming events have been canceled.
Verify show schedule before traveling!

Oct 23-25, 2020: EFMLS Convention has been CANCELED. Catawba Valley G&M Club Show, Hickory, NC, goes on.

Oct 31, 2020: Ultraviolation show CANCELED

Oct 31, 2020: South Penn Rock & Mineral Swap & Sale, by CPRMC & Franklin County RMC. South Mountain Fairgrounds, Biglerville PA. Sat. only, 8-3. https://www.facebook.com/events/2813772025379750/

Nov. 7-8, 2020: Friends of Mineralogy - Pennsylvania Chapter Annual Symposium - Live Virtual Event Saturday Nov. 7 - and Field Trip Sunday Nov. 8. https://rasloto.com/FM/

Nov. 14-15, 2020: Monongahela Rockhounds Show CANCELED
See http://www.monongahelarockhounds.org/events.php

Geo-Sudoku Solution

T	M	A	E	B	U	**S**	L	I
B	E	I	M	S	L	**U**	T	A
S	L	U	I	T	A	**B**	E	M
M	B	T	S	U	I	**L**	A	E
A	S	L	T	E	M	**I**	B	U
U	I	E	L	A	B	**M**	S	T
I	T	B	U	L	E	**A**	M	S
E	A	M	B	I	S	**T**	U	L
L	U	S	A	M	T	**E**	I	B

INVITE A FRIEND TO JOIN THE SOCIETY

The Nittany Mineralogical Society prides itself on having ng the finest line-up of speakers of any earth sciences ub in the nation. Everyone is welcome at our meetings. f ou'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.

Visit us at www.nittanymineral.org