Nittany Mineralogical Society Bulletin

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

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

November 18th Zoom meeting ONLINE:

Making the Case for Celestine as the Pennsylvania State Mineral

Peter J. Heaney, PhD
Department of Geosciences
The Pennsylvania State University

Celestine was first described from Pennsylvania, and has been under consideration multiple times for Pennsylvania's State Mineral. Dr. Heaney will speak about the early history of celestine, and his experiences concerning the State Mineral. **See the article on page 2.**

Please join us online for this presentation! The Zoom link will be e-mailed to all paid members who receive our e-mails; others can receive it by e-mailing <xidg@verizon.net>. We'll plan to start at 7:30 p.m.; we can have informal discussions, then we can do any questions & answers and announcements, and plan to start the presentation at 8:00 p.m. We will have some information on the main page of the web site as well.

SOCIETY NEWS

Zero dues: Those who were paid members in the membership year just ended (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. The rates for new members 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.

Elections: At the Annual meeting of the membership as part of the October meeting, the incumbent officers were re-elected: President - David Glick; Vice President - Robert Altamura; Secretary - John Dziak; Treasurer - Stuart Bingham.

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. Their second video, about the Penn State Obelisk of Pennsylvania building stones, is now on their YouTube channel. There's a link to it on our web site. *-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 November **EFMLS News** notes that their convention took place virtually via Zoom October 23-24, 2020; elections and budget votes were postponed until a mid-November meeting. Recipients of the Federations many annual awards are introduced. The Catawba Valley show went on as planned, and is described. Some regional VPs, and the AFMS VP from EFMLS (Matt Charsky) are announced.

The **AFMS Newsletter** November issue presents results of the 2020 Bulletin Editors' Contest. The American Lands Access Association is described. The new edition of the AFMS/Future Rockhounds of America Badge Manual is announced. There's a long section on lapidary Shop Tips from 1975. *-Editor*

Geo-Sudoku

by David Glick

This puzzle contains the letters ABCENORSW; one row or column describes the competition among museums for fossils. 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.

E		O		R				C
		C	O	W	A		B	S
A	S					O	W	
	N		E	S		C		
R				N		B		E
		E		B		S		
S				E	N			
C				A		R		O
W				O	B			

Making the Case for Celestine as the Pennsylvania State Mineral

Peter J. Heaney, PhD
Department of Geosciences
The Pennsylvania State University

Since the 1990s, efforts to promote the mineral celestine ($SrSO_4$) as Pennsylvania's State Mineral have resulted in at least three bills introduced in the state capital, but none have successfully cleared the hurdles for confirmation. At the urging of the Che-Hanna Rock and Mineral Club, Rep. Tina Pickett spearheaded House Bill (HB) 278 in 2017, but it never received even a committee vote. A competitive attempt in 2017 to name quartz as Pennsylvania State Mineral was offered as Senate Bill 610 by Sen. Tom Killion, but it too never came up for a vote. In the summer of 2019, Rep. Pickett added the celestine proposal as an amendment to HB 1282, which advocates for the selection of amethyst as State Gem.

I became involved in this process in 2012 at the behest of Royce Black, who at the time was a sixth grade student at Commonwealth Connections Academy. Royce announced that he was "on a journey to get celestine named as the Pennsylvania State Mineral," and wondered whether I would assist him with "the 'lobbying' step." That ultimately led to a hearing before a legislative subcommittee and a continuing push to discover both the historical and geological background of Pennsylvania's celestine deposits. In April 2019, I met with Dr. Klaus Thalheim, curator of mineralogy in the Senckenberg Natural History Collections of Dresden, to explore the archives regarding Andreas Gotthelf Schütz, the German natural philosopher who discovered celestine in ~1790 near Bellwood, PA and who returned with samples that were analyzed by the premier chemist of the age, Martin Klaproth. With the assistance of Drs. RT Schmitt and A. Massanek, Dr. Thalheim has located the original samples in the natural history museums of Dresden, Berlin, and Freiberg (Figs. 1 and 2). For this talk, I will describe what we have learned about the early identification of celestine, and I will contend that this historical context merits celestine's designation as State Mineral.

Biography

Peter Heaney has been a professor of mineral sciences at Penn State University since 1998. He received his Ph.D. from Johns Hopkins in 1989. In 2008 he served as President of the Mineralogical Society of America (MSA), and for the past four years he has helped organize the celebration of MSA's centennial in 2019.

Fig. 1 - Sample of fibrous Celestine from the Martin Heinrich Klaproth collection purchased by the Berlin Museum of Natural History in 1817. (Courtesy of Ralf Thomas Schmitt, BMNH).

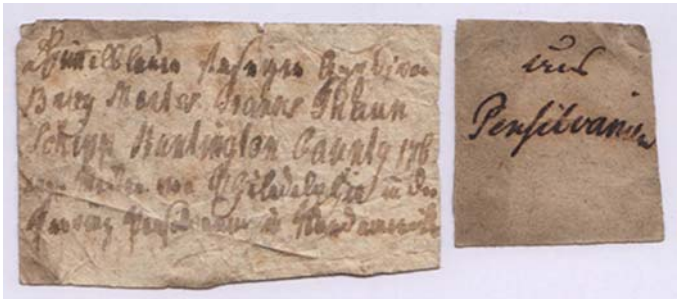

Fig. 2 - Label accompanying celestine from "Baley Moutains" in "Franks Township", likely penned by Andreas Gotthelf Schütz. (Courtesy of Ralf Thomas Schmitt, BMNH).

From the collections

Dr. Charles E. Miller, Jr.

This is Part 4 in a series of articles showcasing images and specimens in the writer's collection.

(Note: the author collected and photographed the specimens in this article.)

Part 4: White River Fossils

The White River Group contains the world's best suite of Eocene-Oligocene (56-23 million years ago) vertebrate fossils. These include tortoises, rhinos, birds, saber-toothed cats, early dogs, large pig-like animals, oreodonts (sheep-like mammals), tusked deer, horses, camels, brontotheres (titanotheres), and more. The areal extent of these terrestrial sediments across the northern Great Plains is shown in Figure 1. This area is mostly grassland, much of which is eroded into badland topography. Characterizing the area are the Pawnee National Grasslands (Figure 2) in northeastern Colorado, the Oglala Grasslands in northwestern Nebraska, and Badlands National Park in South Dakota (Figure 1).

The abundance and diversity of mostly vertebrate fossils in the White River fostered a long history of paleontology that continues today. So common are vertebrates that early work in the group referred to "Titanotherium (rhino-like mammals) beds," "turtle and oreodon (sheep-like animals) beds," and "Metamynodon (extinct rhino) beds." It was primarily work of Joseph Leidy, Nathaniel Marsh, and Edward Cope that made the White River Badlands a focus for vertebrate paleontologists. The infamous "Bone Wars" (1872-1892) involved intense competition between Cope and Marsh that included White River fossils. Many expeditions sent fossils from these formations to museums, including the Smithsonian and Carnegie Museum of Natural History. Today, two exceptional sites - Badlands National Park, South Dakota (Figure 1) and Toadstool Park, Nebraska (Figure 1) - preserve White River fossils for continued professional studies.

Figure 2: Cliffs of the White River; Pawnee National Grasslands, Colorado. 1986.

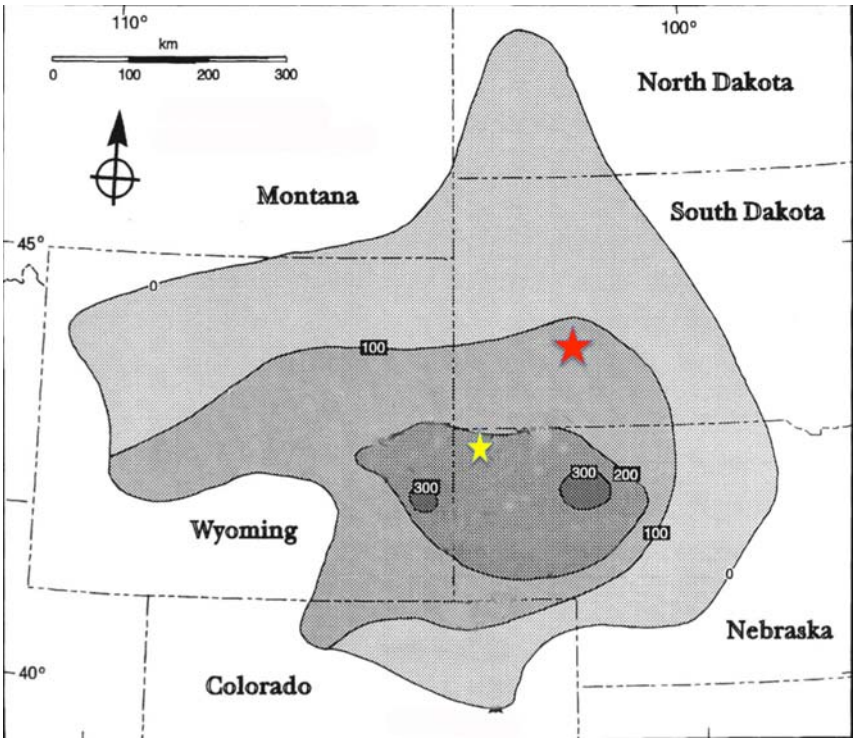

Figure 1: Distribution of the White River Group. (Modified from Larson & Evanoff, Tephrostratigraphy and source of the tuffs of the White River sequence, 1998.) Badlands National Park (red star) and Toadstool Park (yellow arrow).

Sediments of the White River rocks are from two source areas: the Black Hills of South Dakota and volcanic ash from Nevada and Utah. The Laramide Orogeny that formed the Rocky Mountains also elevated the Black Hills. As land rose, erosion removed sediment that became the White River Group. Mixed with the sediments was the referenced volcanic ash, falling out from eruptions much farther west.

The long geological history of the White River (approximately 15 million years) reflects transitioning depositional environments and changing climate. In late Eocene, these sediments largely associated with meandering rivers on broad, low, flat-lying floodplains. Streams meandered across a forested landscape set in a humid subtropical climate. By mid-Oligocene, the climate was drier and cooler, comparable to a savannah or steppe environment. At the end of the Oligocene, there was transition into semi-arid desert-like conditions still present today. Clues regarding

the paleoclimate come from changes in the sediments and environments they represent, paleosols (ancient soils), and fossils.

Figure 3: Sandstones and conglomerates, representing channel deposits in the White River Formation; Pawnee National Grasslands, CO. 1986. Note well-developed cross bedding (center) indicating stream flow.

The meandering stream/floodplain scenario is reflected in the sediments. Conglomerates and sandstones represent channel deposits (Figure 3) while siltstones and mudstones are overbank (flood) deposits (Figure 2). The fine-grained muds contain large amounts of smectite, a clay derived from weathering of volcanic ash. Some ash was consolidated into tuff layers, interspersed within the White River. It is the combination of fine-grained sediment mixed with volcanic ash that preserved fossils (Figures 2, 4-10).

The lower part of the White River contains abundant kaolinite. This clay began as smectite chemically weathered from volcanic ash. Most of that weathering was under more humid conditions in early White River time. As climate turned colder and drier at the end of the Eocene, the proportion of clay to ash decreases. This relationship is a proxy to climate change during White River time.

Of the White River vertebrates, extinction of brontotheres (titanotheres) at the end of the Eocene marks a dramatic change. They were browsers, standing 8 feet high, probably inhabiting forests in the late Eocene. They may not have been able to adapt to a changing climate in the mid-Oligocene that was drier and cooler, replacing forest with savanna or steppe vegetation. The large size of brontotheres is an example of mammals proliferating after demise of dinosaurs about 29 million years earlier. White River time was part of the "Age of Mammals," with these animals moving into ecological niches that dinosaurs previously occupied.

The much drier conditions toward the end of the Oligocene made surface water scarce. As a result, animals congregated around water holes, last refuges during drought. The concentration of animals depleted food supplies, causing mass starvation. Today, these ancient water holes yield large numbers of bones from that time period. One of these is the "Bones Galore" White River dig site in the Pawnee National Grasslands. In 2001, Russ Graham - former curator of the Denver Museum of Nature and Science and, later, of the Earth and Mineral Science Museum at Penn State - led an expedition to this site, interpreted as a former water hole.

During the first half of White River deposition, erosion rates were low because vegetation proliferated in a humid climate. Sedimentation exceeded erosion, allowing for accumulation of the White River. Toward end of the Oligocene, as climate became drier, erosion exceeded deposition. This dominance of erosion over deposition is reflected in badland topography of Badlands National Park and Toadstool Park, for examples. One consequence of that erosion is exposure of fossils. However, while erosion exposes fossils, it also destroys them. On one trip to Toadstool Park, 26 tortoise shells were found - all disarticulated due to erosion.

Abundance and variety of mostly vertebrate fossils makes the White River appealing to collectors. One of the most common and familiar fossils there is the land tortoise. Typically, these range in size from a few inches to two feet in length. Non-burrowing tortoises provide insights into the paleoclimate during White River time by serving as proxies to temperature. These large tortoises are abundant in the White River and could not have withstood average winter temperatures below 13o C. Burrowing tortoises (think of the present-day gopher tortoise), also abundant, dug dens in which many other animals inhabited. These acted as sanctuaries and their abundance may explain preservation of articulated skeletons of medium-sized predators. Figures 4-8 show tortoises the author collected in the White River of Colorado and Nebraska. These usually appear as hemispherical shapes in the sediment (Figure 4a). The raised portion of the skeleton is the carapace, or upper shell. The hemispherical shape is due to erosion removing part of the shell in a transverse direction. In comparison, the plastron is the lower, flatter part of the shell. General descriptions for Figures 4-8 are given without species identifications. More specific identifications for Figures 9-11 and 13-14 are the courtesy of Russ Graham.

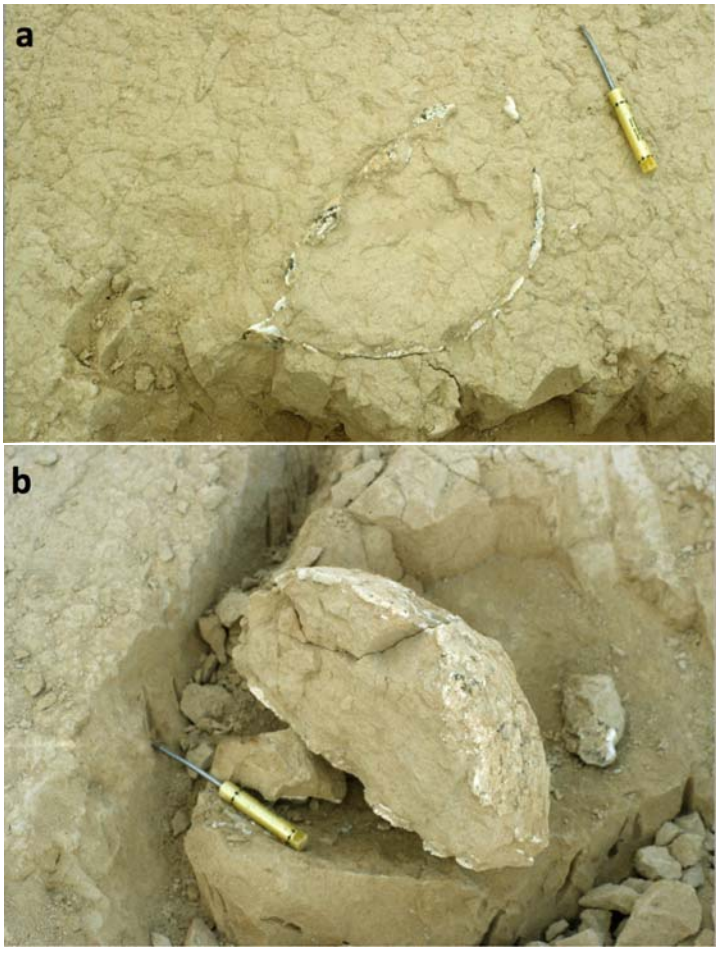

Figure 4: (a) Tortoise shell; White River Group Pawnee National Grasslands, CO.; 1986. (a) Before excavation. (b) After excavation. Specimen is 11" wide and 5.4" tall. Note mudstone matrix.

Figure 5: Tortoise shell from the Oligocene White River Group. Pawnee National Grasslands, CO; 1986. Length: 5.7"; width: 5.1". Note mudstone matrix. View of partial carapace.

Figure 6: Partial tortoise shell showing the carapace; White River Group; Nebraska. 1986. 11.5" (W), 7.3" (H). Estimated length for intact shell: 16-24". Individual scutes are well shown.

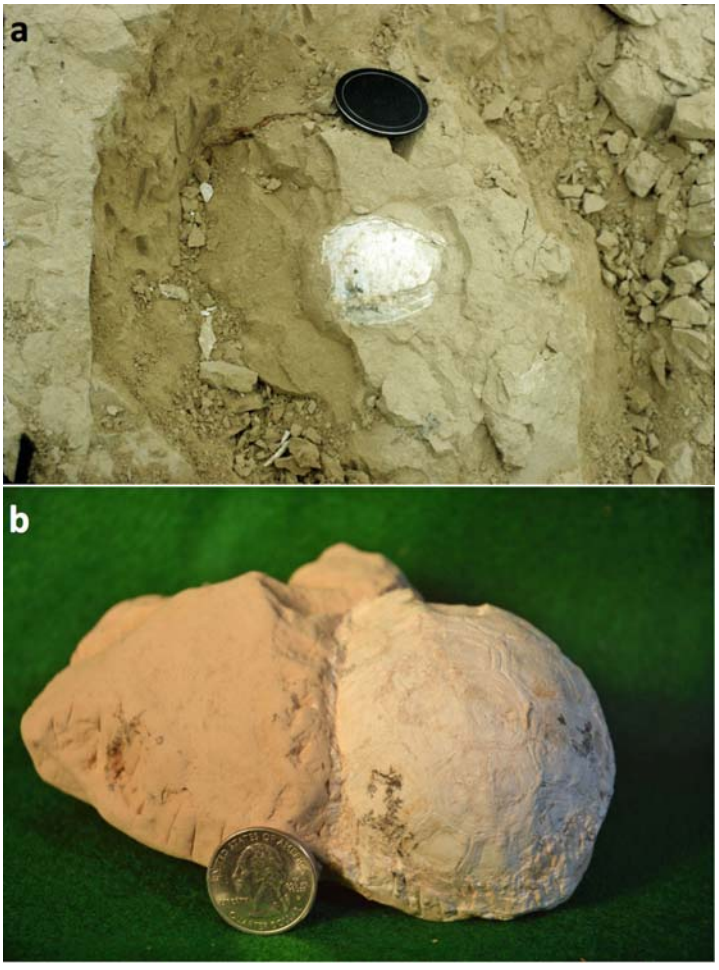

Figure 7: Tortoise shell showing the carapace; White River Group; Pawnee National Grasslands, CO., 1986. Before (a) and after (b) excavation. Shell measures 3.5" x 3" x 1.7". Note mudstone matrix. Individual scutes are well shown.

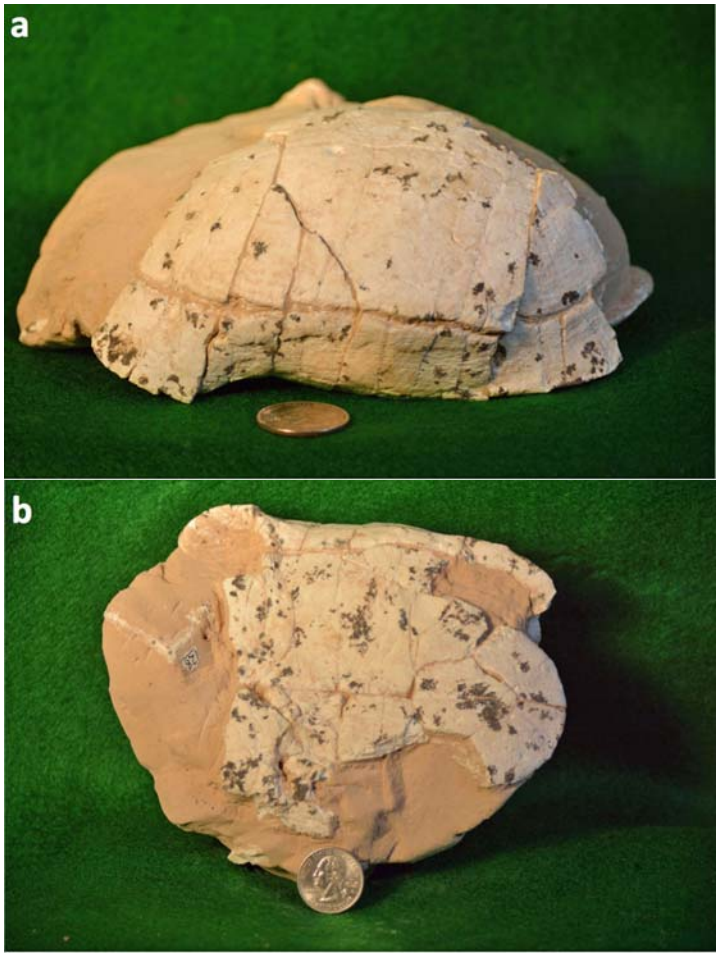

Figure 8: Tortoise shell; White River Group; 1986. 6.5" x 5.3" x 2.4". (a) Carapace. (b) Plastron.

Figure 10: Partial jaw of Archaeotherium. White River Group, NE. 1986. Note mud matrix.

Figure 11: Partial Stenomylus jaw. White River Group, NE. 1986.

Figure 9: Lateral view of (probably) upper oreodont jaw. White River Group, NE. 1986. Note mud matrix enveloping the fossil.

Figure 12: Suite of vertebrate bones from the White River Group; Nebraska. 1986.

Figure 13: Oreodont jaw; White River Group, NE. 1986. Note mud matrix.

Figure 14: Probably an Archaeotherium premolar; White River Group, NE. 1986.

Acknowledgments

Dr. Roger J. Cuffey, Emeritus Professor of Paleontology at Penn State is acknowledged for reviewing the manuscript. Any errors are those of the author. The author is grateful to Dr. Russell Graham for tentative identifications. Long-distance viewing without seeing actual specimens results in the tentative identifications. ❄

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!

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

Geo-Sudoku Solution

E	W	O	**B**	R	S	N	A	C
N	R	C	**O**	W	A	E	B	S
A	S	B	**N**	C	E	O	W	R
B	N	W	**E**	S	O	C	R	A
R	A	S	**W**	N	C	B	O	E
O	C	E	**A**	B	R	S	N	W
S	O	A	**R**	E	N	W	C	B
C	B	N	**S**	A	W	R	E	O
W	E	R	C	O	B	A	S	N

INVITE A FRIEND TO JOIN THE SOCIETY

The Nittany Mineralogical Society prides itself on having 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 reduced for this year only (see the web site). 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.

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