

Nittany Mineralogical Society Bulletin

Nittany Mineralogical Society, Inc.

P.O. Box 10664

State College PA 16805

Editor (see page 8):

David C. Glick

January, 2010

Visit our web site: www.ems.psu.edu/nms/

January 20th meeting:

LiDAR Imagery and the PAMAP Program

by Arnold G. Doden
GMRE, Inc.

Our January meeting will be held Wednesday the 20th 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; 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 – please come, bring your family and guests, and share an enjoyable evening! -Editor

LiDAR (**l**ight **d**etection **a**nd **r**anging) is a remote sensing technique in which laser pulses measure properties of scattered light to find range and other information of a distant target. LiDAR determines the range to an object by measuring the time delay between transmission of a pulse and detection of the reflected signal, analogous to the principle of RADAR. Aircraft-based LiDAR technology has application in many fields and one of the principal data products useful in geology is laser altimetry (contour mapping). The resulting topographic models provide contour intervals of 2 feet, in contrast to traditional U.S.G.S. quadrangle maps that typically use 20 foot intervals. Other products, such as digital elevation models (DEM's), are also developed using LiDAR data.

The Pennsylvania Department of Natural Resources' PAMAP Program began in 2006 and involves the collection and processing of high-resolution LiDAR elevation data for the entire state. The data sets are easily accessed through the internet and consist of State Planar Coordinate tiles that cover 10,000 feet by 10,000 feet on the ground. The tiles are downloaded (for free!) as georegistered shape files, which are then incorporated into a geographic information system (GIS) for immediate display or additional processing. Several examples of LiDAR contour models and other related data are presented for two different areas in Pennsylvania. The accompanying image is a DEM for the State College Quadrangle, showing Nittany Mountain and other prominent features.



DEM of State College and Nittany Mountain; article at left.

Junior Rockhounds:

Thursday, Jan. 28th

by Dr. Andrew Sicree

Junior Rockhounds meetings are scheduled for 7:00 p.m. on the fourth Thursday of the month, January through May. The location is room 117 of Earth & Engineering Sciences Building, Penn State's University Park "West Campus." This is the same location as the last couple of years, and the same building as our regular meetings. See the winter weather policy below.

Each month's meeting has a new topic or topics with fun, hands-on learning. Youngsters who have not yet received their collection storage boxes courtesy of NMS should come to the meetings and pick one up. Those who already have them should bring them to the meetings to hold the specimens which will be given out. For this season the topics we're planning on are:

Jan. 28: Microscopic Minerals

Feb. 25: Meteorites

Mar. 25: Lapidary (gem cutting)

Apr. 22 & May 27: to be determined.

We encourage those who attend to become NMS members, but it's not required. Just \$7.00 covers a whole year (through October 2010) of student membership. Parents may get a lot out of the meetings, too! Check the web site for news, or contact Dr. Andrew Sicree (see page 8).



Weather Cancellation Policy

In case we experience active winter weather on a meeting date, our policy is to cancel the meeting (regular or Juniors) only if evening classes at Penn State have been cancelled. That cancellation is publicized in the usual radio and TV service announcements.

Penn State reports that WPSU-FM and Penn State Live <<http://live.psu.edu/>> are "the official sources for weather-related delay or cancellation advisories at Penn State's University Park campus." - Editor

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.ems.psu.edu/nms/ or remind Dave Glick to bring a printed copy to a meeting for you to see.

The January issue begins with a detailed description of the Federation's **Wildacres Workshops**, reprinted on page 3 of this Bulletin. The base fee is \$350. for the week, and the list and descriptions of classes for 2010 are on pages 9 and 10 of that Newsletter. A registration form for both the Spring (April 23-29, 2010) and Fall (September 6-12) sessions is included on page 14 of that Newsletter. The speakers will be Bob Jones, writer/editor and tour leader, in spring and Lisa Carp, speaking on tourmalines and jewelry, in fall.

In his President's column, Loren Patterson talks about New Year's resolutions; "This year we need to get serious concerning our access to Federal (BLM) lands and any rights that affect collecting on public lands." He recommends reading the article by John Martin in the Dec.-Jan. AFMS Newsletter at www.amfed.org/news/news2009.htm and contacting our representatives.

The 60th annual **EFMLS Convention** will be held March 5-7 in conjunction with the Delaware Mineralogical Society's 47th annual Delaware Gem, Mineral and Fossil Show in Stanton. An article on page 4 describes the area and some of its attractions for our hobby, such as the Univ. of Delaware Mineralogical Museum, Delaware Geological Survey displays, Iron Hill Museum, Delaware Natural History Museum, and The Academy of Natural Sciences in Philadelphia. Other attractions include scenic features, architectural tours, historic sites, and the indoor conservatory gardens at Longwood Gardens. The Show takes place at Delaware Technical & Community College, just off of I-95, Stanton exit, on the SW side of Wilmington. Show hours are Saturday 10-6 and Sunday 11-5. For more, see www.delminsociety.net/marchshow2010.htm.

The **AFMS Newsletter** is available by the same methods. The December-January issue was covered here last month.

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

Planning for Minerals Junior Education Day and Nittany Gem and Mineral Show

By David Glick

We are planning for our 14th annual **Minerals Junior Education Day** on Saturday, April 10, 2010. We plan to have eight stations on a variety of topics including minerals, their properties and uses, fossils, geology and its applications, gems, gold, etc. Each station is staffed by people who can discuss the topic; some sort of hands-on activity for the students is very desirable, as is a pertinent specimen for each student to take home. If you have an idea for a station or for approximately 275 specimens, please let me know. Donations of items for the sales table are also invited. We are seeking volunteers for all aspects including publicity and telephone registration personnel, as well as a coordinator for the entire project.

For the Show, we need displays for our display cases, donations for the silent auction, and volunteers for a variety of activities including table set-up on Friday morning, June 25. Please plan to enter the Best of PA specimen contest; details will be coming soon.

Please contact Dave Glick to volunteer or to get more information. - Editor

Philadelphia Mineral Treasures and Fossil Fair

from their press release

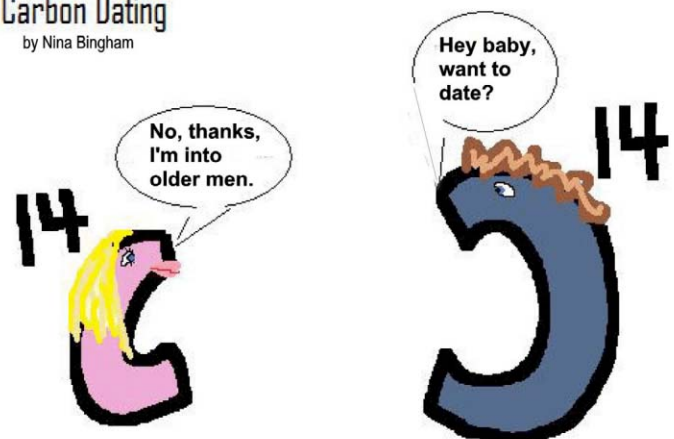
Saturday, March 27, 10 am to 5 pm

Sunday, March 28, 10 am to 4 pm.

The 2010 Show will be held at the Lulu Temple, 5140 Butler Pike, Plymouth Meeting, PA (PA Turnpike, exit 333; or I-476, exit 20). Free Parking. Three presentations on Saturday (two by Bob Jones) and one on Sunday. There will be a special display of southeastern Pennsylvania minerals presented by the Academy of Natural Sciences of Philadelphia. Admission \$5.00. Children under 12 \$1.00; Uniformed scouts free.

Carbon Dating

by Nina Bingham



Welcome to Wildacres 2010

by Jane Kuehn, WA Workshop Committee Member

from the January 2010 EFMLS Newsletter

Coming to Wildacres is like a warm embrace by an old friend. After the windy, scenic climb up the Blue Ridge Parkway, the gravel and dirt road twists its way to the pinnacle of the Wildacres Retreat at 3300 feet. When you step from your car, the fresh aroma of deep woods welcomes you into this majestic silence and the beautiful lodge beckons entrance. Crisp wooden porches are clothed in welcoming rocking chairs and a flagstone patio unfolds below you with yet more rockers and a breathtaking



panorama of the Smokies.

The registration area is in the great room of the north lodge, a glass-enclosed lounge worthy of the finest ski lodge. Leather sofas and huge armchairs are arranged in three conversation areas with a gigantic fireplace dominating one wall. Handcrafted artwork is skillfully displayed and oriental carpets soften the polished hardwood floors.

Guest rooms are clean and spacious, lacking only a TV and telephone. The dining hall is a large, simple room that serves large, simple meals three times a day. There's a library, auditorium, and meeting room, as well as a canteen. Hiking trails crisscross the mountaintop and are rated on difficulty and duration. Workshops are all in outlying buildings, well equipped and expertly staffed.

The Eastern Federation has volunteers available 'round the clock to ensure smooth function and maximum enjoyment both in the classroom sessions and after hours. Class sizes are kept small so each student receives personal instruction every step of the way, and teachers are fully equipped with all the materials necessary to complete your project. The keynote speaker gives six general interest talks during the week to the full assembly, but is available on campus for informal discussions. Mealtimes make excellent opportunities for in depth conversations and personal queries, but the evening porch sessions bring out the lively best of all participants.

Classes range from beadwork to bezels, from judging to geology, from photography to pewter work, depending

upon the needs of the Federation and the availability of instructors. Metalworking classes often employ the use of torches and metal forming tools, while cabbing and faceting delve into perfecting a single stone. Intricate designs are produced in a never-ending variety and students are given an opportunity to show off their work at the end of the week. Other classes offered include wirewrapping, geology, photographing minerals and gems, beading, chain making, mineral ID and scrimshaw.

Mid-week, there's a free day where students are encouraged to explore local attractions. Perennial favorites include gold mining, collecting trips to near-by quarries, road trips to Biltmore Mansion or Grandfather Mountain, hiking, and leisurely relaxation in the wonderful rockers. An afternoon tailgate session encourages participants to exchange, sell, or barter goods and there's an opportunity for some of the participants to give short programs which spotlight other interests the presenters enjoy.

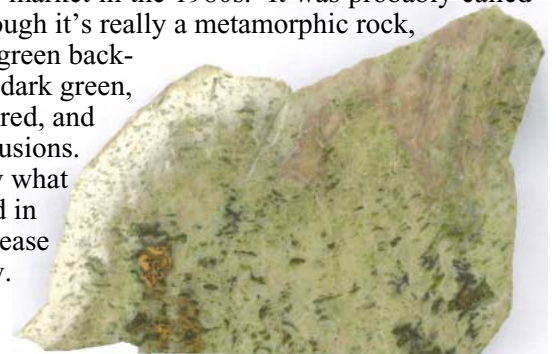
As the week winds down and projects near completion, an evening session is dedicated to a 'good stuff' fundraising auction. This is an opportunity to invest in the future of Wildacres since proceeds are often used to purchase items used in future workshops while you acquire lovely items in the process. Many of the instructors donate finished pieces, fabricated specifically for the auction. Individuals donate rough, specimens, memorabilia, books, or craft supplies relating to gem and lapidary work, and often, items purchased on free-day excursions.

The week culminates the following evening with a talent show. By this time, you've all become friends, so talent is optional. Songs, skits, jokes and recitations bring many to tears of delight while peals of laughter rock the room. Corny or clever, every act is applauded, every offering is appreciated. The spirit of mirth carries over to the canteen where everyone congregates to polish off the last of our snacks and drinks. Rocking chairs grind far into the night as folks realize our week is at an end. Memories are molded and friendships are solidified. ✨

Do you know me?

NMS has acquired several slabs of the material pictured (shown at actual size), which may have been on the lapidary market in the 1980s. It was probably called jasper, although it's really a metamorphic rock, with a pale green background and dark green, copper-colored, and pinkish inclusions. If you know what it was called in the trade, please let me know.

- Editor



Popular Mineralogy

Fascinating mineralogy and earth science for the amateur mineralogist and serious collector - #30

Who Was Mohs and What Is His Scale?

by Andrew A. Sicree

What every schoolkid knows

Every schoolchild and every mineral collector should know the Mohs' Scale of Hardness. Among the first aspects of science taught in grade school, it was created nearly two hundred years ago, it has persisted in use precisely because it is simple to learn and quite useful.

Who was Mohs?

Carl Friedrich Christian Mohs (1773-1839), born in Gernrode, Germany, was a mineralogist and a geologist. After studying at the famous Mining Academy of Freiberg in Saxony under Abraham Gottlob Werner (for whom the wernerite variety of scapolite is named), and a stint as a pit foreman at the Neudorf/Harz mine, Mohs was hired by a wealthy banker, J. F. van der Nüll, to whip his mineralogical collection into shape.

Faced with identifying and organizing a large mineral collection, Mohs employed an unusual strategy. Unlike his mineralogical colleagues, Mohs did not use chemical composition to classify minerals. Rather, he emphasized the physical attributes of the minerals he studied. In particular, he used crystal morphology, cleavage, density, and hardness to classify the minerals. Mohs method had the virtue of using characteristics of minerals that could be readily determined through easy (and inexpensive) observations or simple tests.

In 1812, Mohs moved to the Joanneum in Graz, Austria, and became Professor of Mineralogy. He published a text with the lengthy name of *Versuch einer Elementar-Methode zur Naturhistorischen Bestimmung und Erkennung der Fossilien* (which translates to *A Primary Method to Determine Natural History and Identification of Fossils*) in 1812. In that same year, he developed his scale of hardness.

Mohs' Scale of Hardness

Based on the work of Werner and his own experience identifying minerals, Mohs assembled a list of common

minerals to be used as hardness standards. This is how Mohs described the list of minerals he chose for use in his scale of hardness:

The number

1. denotes the degree of hardness of a variety of PRISMATIC TALC MICA, known by the name of common talc.
2. of a variety of PRISMATOIDAL GYPSUM-HALOIDE, of imperfect cleavage, and not perfectly transparent. Varieties perfectly transparent and crystallised, are commonly too soft.
3. of a cleavable variety of RHOMBOHEDRAL CALC-HALOIDE;
4. of OCTAHEDRAL FLUOR-HALOIDE;
5. of RHOMBOHEDRAL FLUOR-HALOIDE;
6. of PRISMATIC FELD-SPAR;
7. of RHOMBOHEDRAL QUARZ;
8. of PRISMATIC TOPAZ;
9. of RHOMBOHEDRAL CORUNDUM;
10. of OCTAHEDRAL DIAMOND.

Note the unusual spelling of quartz. Some of the mineral names are obsolete, such as "gypsum-haloide" for gypsum, "octahedral fluor-haloide" for fluorite, and "rhombohedral fluor-haloide" for apatite. Apart from nomenclature differences, Mohs' original scale is the same as used today:

- | | |
|-------------|------------------------|
| 1. TALC | 6. ORTHOCLASE FELDSPAR |
| 2. GYPSUM | 7. QUARTZ |
| 3. CALCITE | 8. TOPAZ |
| 4. FLUORITE | 9. CORUNDUM |
| 5. APATITE | 10. DIAMOND |

Mohs did not contend that his one-to-ten scale meant that the difference in hardness between, for instance corundum and diamond was the same as the difference in hardness between talc and gypsum. He recognized that many minerals would fall between any two numbers on the scale, but he selected the minerals on his list because they were common minerals, easily obtainable

in large pure specimens (except for diamond, of course) that one could use for scratch tests. Mohs was aware that there is a degree of art in conducting a scratch test and that practice was necessary to achieve consistent results.

Hardness scale controversies

Some minor controversies surround Mohs' Scale. Some authors report 1812 as the year in which Mohs developed his scale. Others report the year as 1820 or 1822. It is probable that Mohs developed his scale over the years preceding 1812. The discrepancy in reported dates may be due to the fact that Mohs' scale did not gain much acceptance until his publication of *Die Charaktere der Klassen, Ordnungen, Geschlechter und Arten; oder, Die Charakteristik des Naturhistorischen Mineralsystemes (The Characteristics of the Classes, Orders, Gender and Species, or, The Characteristics of the Natural History Mineral-Systems)* in 1821. Mohs published his *Grund-riss der Mineralogie (Treatise on Mineralogy)* in 1822.

More serious is the charge is that Mohs "borrowed" his scale from Abraham Werner, his teacher. Before Mohs, Werner had developed a scale of hardness that used methods of scratching to compare relative hardness. Late in life, Werner complained that his former students were publishing his ideas without crediting him. Certainly there are similarities between Mohs' and Werner's scales – they share many of the same minerals – but there are important differences as well. Mohs' scale is simpler than Werner's scale (Werner used more minerals) and is inverted. Mohs' scale runs from soft (talc = 1) to hard (diamond = 10) while Werner's scale started with the hardest mineral (diamond = 1) and numerical values increased as the minerals got softer.

The idea of comparing hardness of one mineral with another was not, however, originated by Werner. For instance, both the Greek philosopher Theophrastus (ca. 371-287 BC) and the Roman naturalist Pliny the Elder (AD 23-79) reported observations of relative hardnesses of minerals.

Other authors proposed hardness scales both before and after Mohs. For instance, Jameson used a scale with diamond = 1 and chalk = 21, with talc = 20. Other scientists, such as La Métherie, had even more complicated scales. For instance, La Métherie listed

diamond at 2500 and gypsum at 500 with many minerals in between.

The popular success of Mohs' Scale is due to his selection of a small number of common minerals. It is easily memorized (just ask any schoolchild studying rocks!). Also, Mohs hardness numbers rise with increasing hardness – a fact that makes it intuitively more pleasing than scales with descending hardness numbers.

How hard is hard?

Mohs' Scale is an ordinal scale: minerals are arranged in an ascending scale according to their hardnesses, but the scale says nothing about exactly how much harder one mineral is than the next.

If we make a rigorous study of the hardnesses of minerals, we discover that what appears to be simple is in fact complicated. There is more than one type of hardness. For instance, there is a difference between "scratch hardness" and "indentation hardness." Scratch hardness is resistance to deformation due to shearing friction with another object, while indentation hardness is the resistance to deformation due to a constant perpendicular load from a pointed object. Scratch hardness involves two forces (shear and perpendicular) while indentation hardness involves only a perpendicular force. Indentation hardness gives us a truer measure of the hardness of a mineral, but scratch hardness is easier to observe when done by hand. It is more difficult (takes more force) to scratch or indent a harder mineral than a softer one. Mohs' hardnesses are scratch hardnesses but, as mentioned above, they are only ordinal and cannot be used to determine the amount of force necessary to make a scratch.

To make a more rigorous, quantifiable measure of hardness, some type of sclerometer is employed. A variety of hardness testers have been used over the past two hundred years. Some methods work best with metals while others work best with brittle materials such as glasses and ceramics. (Minerals that fall in each group – there are malleable native metals such as native copper and more brittle minerals such as chalcopyrite.) You may see values reported for Vickers, Brinell, Rockwell, Rosiwal, and/or Knoop hardnesses. Different gadgets and different methods are employed to measure hardness. For instance, Rosiwal hardnesses are grinding hardnesses, while Knoop hardnesses are measured by

making a small indentation in the mineral. Both the Knoop and the Rosiwal methods give huge increases in their values between corundum and diamond.

This chart shows typical Knoop and Rosiwal hardnesses obtained for the Mohs minerals:

Mineral	Mohs	Knoop	Rosiwal
talca	1	1	0.03
gypsum	2	32	1.25
calcite	3	135	4.5
fluorite	4	163	5
apatite	5	430	6.5
orthoclase	6	560	37
quartz	7	820	120
topaz	8	1340	175
corundum	9	1800	1000
diamond	10	7000	140000

This illustrates the fact that the hardness gap between diamond and corundum really is much greater than the step between corundum and topaz.

In 2012, we'll celebrate the two-hundredth anniversary of Mohs' Scale – a tribute to an eminently practical tool of mineralogy!

Refs.: Broz, M. E., Cook, R. F., and Whitney, D. L., 2006, "Microhardness, toughness, and modulus of Mohs scale minerals," American Mineralogist, v. 91, no. 1, p. 135-142. and Newcomb, S., 2009, The World in a Crucible: Laboratory Practice and Geological Theory at the Beginning of Geology, Geological Soc. Amer. Special Paper 449, 186 p.

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Tough-Guy Minerals

Hardness should not be confused with toughness. For instance, topaz is harder than quartz, but it is not tougher. In fact, a topaz crystal can be decidedly untough. If struck in the proper direction, topaz will display perfect cleavage and split quite nicely – an unpleasant occurrence if the specimen happens to be in *your nice robin's-egg blue topaz ring!*

Toughness is the resistance a mineral shows to *cracking* when it is *stressed*. Hardness, on the other hand, is the resistance to shape changes (i.e., deformations) when a *force* is applied. A diamond has extremely strong resistance to shape changes (such as scratches) when rubbed with another material, but diamond crystals can quite readily crack (i.e. cleave) when struck sharply.

Among the tougher minerals are the jade minerals nephrite and jadeite. Nephrite is an amphibole, a calcium- and magnesium-rich variety of actinolite, usually expressed with the chemical formula $\text{Ca}_2(\text{Mg,Fe})_5\text{Si}_8\text{O}_{22}(\text{OH})_2$. On the other hand, jadeite is a pyroxene mineral ($\text{NaAlSi}_2\text{O}_6$, monoclinic). Both minerals are typically a pleasant green color, although nephrite can be white, yellow, brown, or black, and jadeite can be white, or (rare) blue or purple. Nephrite has a Mohs hardness of between 6 and 6.5 while jadeite can be a slightly harder 6 to 7.

The exceptional toughness of jade allows the carving of jade sculptures with thin, delicate features. In nephrite, this toughness results from its fibrous texture on a microscopic scale. This structure is not unexpected – nephrite is an amphibole, and other amphiboles are among those minerals that can occur as "asbestos" (i.e., asbestiform or fibrous minerals). Interconnected matts of fibers are significantly more difficult to break through than a single crystal would be.

Jadeite is more granular than fibrous in its microstructure. A crack that begins in one microscopic grain must switch directions as it crosses into the neighboring grain. This increases the path length of the crack and thus also increases the amount of energy needed to make a crack grow. Even more importantly, cracks in jadeite tend to branch. Each branch or secondary crack consumes additional energy. This crack-branching tendency makes jadeite one of the toughest of all minerals.

Ref.: Bradt, R. C., Newham, R. E., and Biggers, J.V., 1973, "The toughness of jade," Am Mineralogist, v. 58, p. 727-732.

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Weird Geology: Gnowing Geognosy

Although "geognosy" sounds vaguely like the name of an obscure 5th Century heresy, the term really means the study of rocks and minerals and their origin and distribution throughout the Earth's crust. The word arises from *geo-* for Earth and the Greek *gnôsis* meaning "knowledge, or seeking to know." Geognosy is a somewhat archaic term, generally superseded by the term geology.

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*Dr. Andrew A. Sicree is a professional mineralogist and geochemist residing in Boalsburg, PA. This **Popular Mineralogy** newsletter supplement may not be copied in part or full without express permission of Andrew Sicree. **Popular Mineralogy** newsletter supplements are available on a subscription basis to help mineral clubs produce better newsletters. Write to Andrew A. Sicree, Ph.D., P. O. Box 10664, State College PA 16805, or call (814) 867-6263 or email sicree@verizon.net for more info.*

Crystal Matrix Crossword

Mineral Places

ACROSS

- 1 element named for France
- 3 a sodium niobate mineral
- 12 used to display minerals
- 14 two double-u
- 15 big rocks = rip- ____
- 16 ____ - deucey backgammon
- 17 city for a spring mineral show
- 18 state where Ruggles Mine is
- 19 the guys with black helicopters
- 20 information technology
- 21 an iron sulfide mineral that isn't pyrite
- 27 where the mother of all gold mines is
- 29 the tantalizing element
- 30 what localities are
- 31 drop a guy's brazilianite and face his ____
- 32 what Adam los
- 34 named after Gadolin
- 36 a mineralogist's messiest place
- 37 state famous for smithsonite
- 38 where the old things are
- 40 __ Regne Mineral magazine
- 41 niobite comes from N_ _ _ _
- 43 Eastman Kodak stock symbol
- 44 a geological time
- 45 where mineralogists work
- 46 town in Mexico
- 48 where Cave-In-Rock is
- 50 meaning "middle"
- 51 well-concealed lithium silicate
- 53 Anno Domini
- 54 found with the last dinosaur
- 55 opposite of not on
- 56 pretty orange-red gems
- 60 found on a crucifix
- 62 on screen display (ab)
- 63 found in old mine adit
- 64 _____ Ridge, Ohio
- 65 where they sell off the minerals
- 66 electrical engineering

DOWN

- 1 iron-zinc spinel from NJ
- 2 what native gold makes you
- 3 lead mineral from Nye Co. NV
- 4 a noble gas
- 5 typical collecting weather
- 6 small country with 2 big oceans
- 7 three for the Romans
- 8 that's my ____ greenockite
- 9 named for Shah's country
- 10 tit for ____
- 11 prefix for minerals near surface
- 13 not found in selenite

- 17 copper oxide mineral
- 20 ending for halides
- 22 not the root (ab)
- 23 smelly, hard to melt element
- 24 what mineralogist's desk isn't
- 25 magnetic flux density units
- 26 Eskeborn Adit, Harz, mineral in series with chalcopyrite
- 28 alloy that looks like gold
- 32 radioactive gas
- 33 Bikita, Zimbabwe, lithium mineral
- 35 what opal miners are
- 38 Asian Econ Policy Review (ab)
- 39 combines with gold
- 42 rum makers
- 45 light emitting diode
- 47 what Pop-Eye says
- 49 metal from Sudbury Ontario
- 50 city where folders come from
- 52 rhymes with pinup
- 55 river in Normandy
- 56 patrols quarries
- 57 comes out of volcano
- 58 geological time
- 59 young boy

- 61 found in nickeline
- 64 faithful

December Puzzle Solution: Not -ites

C	R	Y	S	T	A	L	L	I	N	E		B	B	S
E	A	R	N		L	O	A	D			E	R	T	E
R	R	S		A	L		S	E	L	E	N	I	U	M
I	E		F	R	O		A				T		I	
O		O	R		P	H	O	S	P	H	A	T	I	C
P	K	W	Y		H	A	L				A	L	A	R
Y	I	N		W	A	D	I		C	O	R	E		Y
R	A		D	I	N		V		O	O	P		S	S
O		O	R	N	E		I	N	F	O		D	O	T
C	A	S	E					N	S	F		H	U	L
H	E	M	I	S	P	H	E	R	E		E	G		L
L	O								R	E	X		I	L
O	B	S	I	D	I	A	N		D	R		F	R	I
R	E	I	N				R	O	M	A		I	R	O
E	D	S				U	L	T	R	A	M	A	R	I

Some Upcoming Shows and Meetings

Our web site <http://www.ems.psu.edu/nms/> has links to more complete lists and details on mineral shows and meetings around the country.

March 6 - 7, 2010: EFMLS Convention & Delaware Mineralogical Society Show, Stanton, DE. See p. 2.

March 27-28, 2010: 41st Annual Che-Hanna Rock & Mineral Club Show sponsored by the Che-Hanna Rock & Mineral Club. Athens Twp. Volunteer Fire Hall, Sayre, PA

March 27- 28, 2010: Philadelphia Mineral Treasures and Fossil Fair sponsored by the Philadelphia Mineralogical Society. Lulu Temple, Plymouth Meeting, PA.

March 27-28, 2010: 32nd Annual Gem-Mineral & Jewelry Show sponsored by the Franklin County Rock & Mineral Club. Shalom Christian Academy, Chambersburg, PA.

April 24-25, 2010: 38th Annual NJ Earth Science Gem & Mineral Show (with Outdoor Swap) Co-sponsored by the Franklin-Ogdensburg Mineralogical Society, New Jersey Earth Science Association and Sterling Hill Mining Museum. Franklin School, Franklin, NJ

June: 5, 2010: Spring Mineralfest sponsored by the Pennsylvania Earth Sciences Association. Macungie Memorial Park Building, Macungie, PA.

June 26 - 27, 2010: Nittany Gem & Mineral Show, State College, PA. <www.ems.psu.edu/nms/> *

For sale / trade: Equipment & Materials

For sale by NMS: 27 issues of Mineralogical Record from 1977-1983. Includes special issues: Tsumeb, Europe, California, Colorado-II, Arizona I through V, Ontario, Gold. \$260 plus tax for the lot. Dave Glick, 814-237-1094.

For sale or trade for non-PA minerals: Alaska Gold Survey book, the 18th Annual Report of Dept. of Interior Vol. 3 1897, with 390 pages including illustrations on Alaska gold prospecting, mining & geology, plus more. E-mail Tim at <stamprockcoin314@hotmail.com>

For sale: Large mineral collection; will sell all or part. Tumble polisher with three 12-lb. and one 6-lb. drum plus grits, polishes and pellets. My phone number is (570) 672-2325. Leave a message if I'm not in.

For sale: Jade in various types & colors; mostly rough, plus some slabs; some fine Coober Pedy opal. Also equipment and jewelry making supplies from jewelry studio and production shop. Contact Daniel G. Reinhold in Mill Hall, PA; phone 570 726-8091 after lunch every day, or e-mail: dreinhold1@comcast.net *

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). Your dues are used for programs and speakers, refreshments, educational activities, Bulletins, and mailing expenses. Please fill out a membership form (available on the web site), 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

David Glick (President) 814-237-1094 (h)

e-mail: xidg@verizon.net

Dr. Bob Altamura (Vice-President) 814-234-5011 (h)

e-mail: raltamur@fccj.edu

John Passaneau (Treasurer) 814-231-0969 (h),

e-mail: jxp16@psu.edu

Ellen Bingham (Secretary)

e-mail: emb22@psu.edu

OTHER CONTACTS

Field Trips: Ed Echler 814-222-2642

e-mail preferred: eechler@comcast.net

Junior Rockhounds: Dr. Andrew Sicree

867-6263 (h) e-mail: sicree@verizon.net

Membership Chair: David Glick (see above)

Programs: Dr. Duff Gold 865-7261(o), 238-3377(h)

e-mail: gold@ems.psu.edu

Door Prizes: Tim Holtz

e-mail: stamprockcoin314@hotmail.com

Publicity: Volunteer Needed!

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

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.