THE NORTHERN VIRGINIA MINERAL CLUB INC

The Mineral Newsletter

Next meeting: June 5 Time: 7:30 p.m.

Dunn Loring Fire Station, 2148 Gallows Road, Dunn Loring, VA

Volume 63, No. 5
June 2023
Explore our website!

June Meeting Program:

Musings of a Museum Curator

Details on page 8

Atacamite

Naltagua Copper Project, Santiago Province, Chile.

Source: Mindat. Photo: Rob Lavinsky.

In this issue …

Mineral of the Month
Atacamite

by Sue Marcus

For our June Mineral of the Month, let's see what we can learn about atacamite. This lovely mineral is named for its type locality, the Atacama Desert in northern Chile and southern Peru. It was named in 1797 by J.F. Blumenbach, though some sources incorrectly credit it to Prince Dimitri Augustus Gallitzin (or Demetrius Gallitzin). Even the miscredit is inaccurate because it was Dimitri's father, Prince Dmitri Alexeievich Gallitzin, who was the mineralogist and collector, not his son.

Blumenbach's original description is printed in German in a Gothic font (called *Fraktur* in German). With assistance from my daughter, Genny Haskins, Hutch Brown, and Herwig Pelckmans, we've deduced that Blumenbach did indeed use the word atacamite (*Atacamit*) in his 1797 handbook, describing it as emerald-green sand (*smaragdgrüner Sand*). In his 1803 work, in French, he credits a Mr. Dombey with giving him the original material, sourced from Dombey's travels in South America.

The emerald-green to dioptase-green hues are (unsurprisingly) caused by copper. Atacamite is a hydrated secondary copper chloride that is usually found in arid environments. It is not soluble in water, though it can dissolve in acids. The most noted atacamite localities are in desert regions; however, since it is a secondary copper mineral, it also occurs in other regions—sometimes ones that surprised me until I thought more about the geological and mining environments.

Atacamite occurs in slag (waste from processed ore, often containing a lot of silica). Atacamite-bearing slag occurs in incompletely melted metal scrap near Dyke Park in Stamford, CT, and on the Greek island of Serifos. Slag and the minerals found in it are caused by human actions, so they are not natural minerals. Atacamite found in slag is likely to be identical to naturally formed atacamite—it is just unintentionally synthetic. In Tuscany, Italy, ore mined during the Etruscan and Roman eras produced slag that was processed near Baratti Beach and then reprocessed for several decades prior to the 1960s. Beautiful but anthropogenic (unnatural) atacamite crystals have come from this Italian locality.

Summer break ahead!

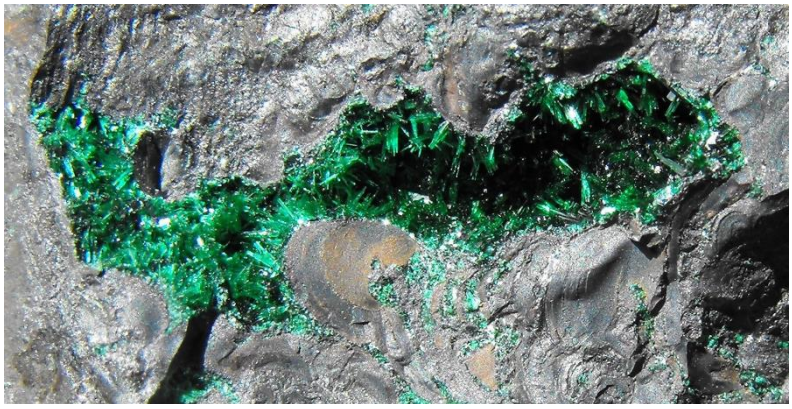
Northern Virginia Mineral Club members,

The June club meeting will be in person at the Dunn Loring Fire Station at 2148 Gallows Road in Dunn Loring, VA, on **June 5, 7:30 p.m.** For meeting details, see page 8.

Atacamite, chrysocolla, and gypsum. La Farola Mine, Cerro Pintada, Atacama, Chile. Source: Mindat; photo: Alberto Calderon.

An Atacamite Group comprises atacamite and 16 related minerals. Clinoatcamite, paratacamite, paratacamite-(Mg), and paratacamite-(Ni) share the root name of atacamite. All members of the Atacamite Group have (OH) and Cl in their chemical formulas. Clinoatacamite and atacamite are polymorphs sharing the same chemical composition but having different structures.

Arizona has the right conditions for atacamite formation: rich copper deposits, including secondary mineralization. Mindat presents a puzzle concerning



Atacamite, Southwest Mine, Bisbee, Arizona.
Source: Mindat; photo: Rolf Luetcke.

atacamite in its page on the Santa Cruz deposit in the Casa Grande Mining District. Along with only one image of an atacamite micromount, the property description states, "May be the largest atacamite deposit in the world." No documentation is given for that claim, and no other mineral images are shown. In 2023, feasibility studies (to determine the economic viability of mining) were being conducted and investors sought. A company website specifically mentions atacamite as an ore mineral.

Microcrystals are the norm for atacamite occurring at several localities, though the Mammoth-Saint Anthony Mine produced a few specimens with macrocrystals reaching at least 6.3 centimeters (2.5 in) in size. Some specimens show two phases of atacamite growth. The Rowley Mine is most famous for wulfenite crystals. At that mine, atacamite is uncommon and associated with cerussite. Lovely microcrystals of atacamite have come from the Southwest Mine, near Bisbee.

At least two localities in Nevada have atacamite reported on Mindat. At the 3 Metals Mine in Esmeralda County, one image shows a 10.6-centimeter (4.1-in) specimen with small, gemmy atacamite crystals. The only image shows a micromount specimen collected in 2012. Also in Esmeralda County, the interestingly named Broken Toe Mine produced a microspecimen described as atacamite replacing connellite.

I've visited the American Girl mineral deposit (not the doll) in the Cargo Muchacho Mountains of Imperial County, California. Unlike Michael and Phillip Feldman, I did not find any lovely microcrystals of atacamite. The Feldman specimen was verified by analyses.

Most collectors think of South American localities, particularly Chile and Peru, when we picture fine atacamite in our minds.

Perhaps the most prolific producer of atacamite was the La Farola Mine in Chile's part of the Atacama Desert. Copper and gold were extracted from ores mined by underground methods. Contrasting atacamite, sometimes with olive-colored libethenite and/or pseudomalachite, occurred on whitish halloysite (a clay mineral). Other lovely specimens have deep green atacamite with chrysocolla. The atacamite crystals can be macros or micros in diverse formations, including attractive radiating sprays. The atacamite forms a coating on a breccia matrix. Specimens up to 18.5 centimeters (7.3 in) in size are portrayed on Mindat, with crystals up to 2 centimeters (0.8 in) in size on other specimens.

Most specimens seem to have been extracted in the 1980s and 1990s. Some sources claim that La Farola is the type locality for atacamite.

Famous collector Rock Currier visited the mine to acquire specimens for his business. He reported blocks as large as refrigerators from which atacamite could only be extracted by bashing off chunks.

Atacamite on white fibers of plancheite, La Farola Mine, Cerro Pintada, Atacama, Chile.
Source: Mindat; photo: Remy Philippe.

Atacamite, La Farola Mine, Cerro Pintado, Atacama, Chile.
Source: Mindat; photo: Roger Sedgwick.

Currier reported that he found a beautiful atacamite floater here. He wrapped it in a handkerchief to protect it and tucked it safely into a pocket. He got sweaty in the hot mine, pulled out his handkerchief, and flung the precious specimen against a metal rail. Most of us have a "one that got away" story, though few of us have found and lost a relatively rare crystalized mineral specimen overseas and underground.

Another claimant for the "type locality" designation is the Collahuasi Mining District in Chile's Tamarugal Province. The only specimen identified as atacamite from this cluster of mines (top right) is a mass of dark, somewhat dinged crystal blades 6.4 centimeters (2.5 in) in the largest dimension.

The Carmen Mine, in Copiapó Province, has also been reported as the type locality, but I could find no confirming information or any images of atacamite from this locality. The report comes from Bottrill and Currier (2010), who note that 1-centimeter (0.4-in) crystals were sent to Prince Golytzin (Gallitzin) in about 1820. By that time, Prince Dmitri Alekseyevich Gallitzin, the mineral collector, had died; his son, Prince Demetrius Augustine Gallitzin, was a priest, likely acting as a missionary in America at the time.

Atacamite, Collahuasi Mining District, Tamarugal Province, Chile.
Source: Mindat; photo: Rob Lavinsky.

Still in Chile, the Chuquicamata Mine is famous for many species of beautiful mineral specimens, including atacamite. Chuquicamata is a vast ore system composed of several related orebodies. Mining is primarily for copper, though the gold found there probably pays the mining costs. Although gold is much less prevalent in many metal mines, its value is so high that even minor amounts are valuable enough to extract. Molybdenum is also produced. In modern times, the mine has been operating since the 1910s, although Indigenous people probably worked the deposit centuries earlier.

The Chuquicamata open pit can be seen in satellite imagery. It is reportedly the world's largest open-pit copper mine. It contains almost 2 billion tons of ore. Underground mining commenced in 2019. A north-northeast-trending fault zone controls the location of the mineralization. Chuquicamata is a porphyry copper deposit, meaning that it was formed by hydrothermal fluids moving upwards from a cooling magma of granitic or dioritic composition.

Atacamite has not been abundant at this mine; predominantly microcrystals were found. Future atacamite discoveries are possible here, but since mining has gone underground, the zone of secondary mineralizing that contains atacamite might be mined out. Collectors can hope for specimens from nearby deposits.

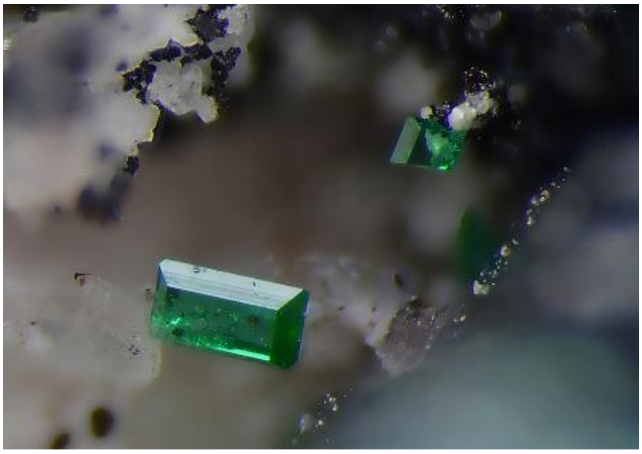
Atacamite, La Farola Mine, Cerro Pintado, Atacama, Chile. Source: Mindat; photo: Rock Currier.

Other Chilean mines have produced minor amounts of crystalized atacamite.

The Lily Mine in Pisco Province, Peru, produced lovely, lustrous atacamite crystals on matrix. Some specimens display attractive combinations of deep green atacamite and aqua chrysocolla. Individual atacamite crystals reached at least 1.2 centimeters (0.5 in) in size. Plates of these specimens probably exceeded the 14.9 centimeters (5.9 in) of one shown on Mindat. Even more unusual ones, up to 9 centimeters (3.5 in) in size, had atacamite crystals included in water-clear gypsum. Specimens (gypsum with atacamite inclusions) were extracted from the late 1990s through at least 2015, with a major find of the matrix specimens in 2014. Rob Lavinsky (of irocks.com) visited the mine in 2016. He is featured in an episode of *Mineral Explorers* (video), along with some gorgeous atacamite specimens. The mine is a small, intermittently worked underground operation, with atacamite found sporadically.

The Rudna Mine is a deep copper mine near Polkowice, Poland, where copper and silver are extracted from several orebodies. This underground mine is currently 1,244 meters (4,081 ft) deep. Here, atacamite colors halite crystals pale green. Some dots of included atacamite can be seen in some specimens, although most appear to have copper diffused in them. I don't know how atacamite was identified.

Atacamite occurs infrequently in Spain, though some fine micromount-size crystals were found in the Andalusia region. The best are deep emerald green, and translucent, absolutely gemmy. Several mines, including the Sol, Estrella, Casualidad, and Santa Barbara, produced a few, very choice microspecimens. Mindat shows lovely opaque tufts of radiating microcrystals from the San Miguel Mine in Catalonia.



Atacamite, Mina Santa Barbara, San José, Andalusia, Spain. Source: Mindat; photo: Jean Claude Dol.

The Qaleh-Zari Mine in Iran's South Khorasan Province is a source of atacamite, including an unusual rosette shown on a Mindat image. The specimen appears to be microcrystals of atacamite coating another mineral, possibly barite or calcite, that forms the "petals" or blades of the rosette.

A few atacamite specimens are reported on Mindat from the Tieshan and Tonglushan Mines in China.

Australian copper deposits also hosted atacamite. The world's largest atacamite crystals came from the New Cornwall Mine near Kadina on the Yorke Peninsula of South Australia; large means up to 23 centimeters (9 in).

Specimens of atacamite from the New Cornwall Mine occur on limonitic or siltstone matrix in small vugs, together with quartz. Two phases of atacamite formation may have occurred, as evidenced by distinct, well-formed crystals juxtaposed with massive atacamite.

Production of copper began in the 1860s but did not last long. The mine was dewatered in the 1930s, but production was again limited. The long-abandoned property was mostly reclaimed in the 1990s, then purchased by a church.

Atacamite, Wallaroo Mine, Kadina, South Australia. Source: Mindat; photo: Rock Currier.

Atacamite, Mt. Gunson copper mines, Pernatty Lagoon, South Australia. Source: Mindat; photo: Keith F. Compton.

Large atacamite crystals were extracted during the active phase in the 1860s. The author of the Mindat description of the mine postulates that most of the large crystals came from one pocket. These crystals became parts of major museum collections.

Atacamite, with crystals to 1 centimeters (0.4in) was also found on dumps, probably in the 1970s and 1980s. Most of the dump-collected specimens exhibit microcrystals. Specimens from this locality have been mislabeled as coming from other South Australia copper mines, such as the Moonta, Mount Gunson, and Burra Mines.

Mount Gunson includes several geologically zoned copper orebodies that were mined sporadically, usually using open-pit methods. After a copper discovery in the 1870s, mining began in 1899. The Cattlegrid deposit was discovered in 1971.

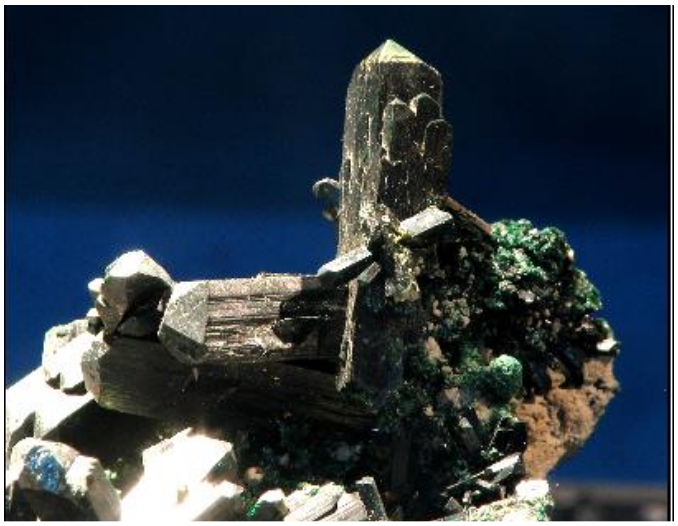
It and other deposits in the Mount Gunson complex have produced atacamite specimens, some different from others I've seen. Specimens exhibit a wide range of features. Nodules, stalagtitic mounds, massive specimens, and microcrystals came from these deposits.

Balls of tiny atacamite blades form attractive dark green rosettes. Larger crystals up to at least 1.6 centimeters (0.6 in) in size are usually not lustrous and associated with gossan, although more genny crystals were also found. In some specimens, atacamite is being pseudomorphed by malachite.

The group of Mount Gunson deposits probably formed near the waterline (at the time of mineralization), with an additional, later phase of atacamite crystallization that was related to surficial geological processes.

All of the Mount Gunson deposits were inactive in 2013, although nearby copper deposits were being explored in 2022. Maybe new collectible specimens of copper minerals will come from this area in the future.

Intermittent mining in the Moonta or Moonta-Wallaroo area occurred in two major phases. The longest phase took place between the discovery of



Atacamite, Wallaroo Mine, Kadina, South Australia. Source: Mindat.

copper in 1861 and the close of mining in 1923. A short later phase in the 1990s yielded a small amount of high-grade ore. Crystals up to at least 2.2 centimeters (0.9 in) were extracted. Lustrous micromounts were also found.

Atacamite was found infrequently at the Burra Mine. An odd atacamite occurrence was noted at the Jingemia Cave in Western Australia. Apparently, guano altered copper minerals into atacamite crusts. The cave is a traditional use area by the Yued people.

Historically, atacamite has been used in cosmetics, ceramics, and glass. It was used in pigments, including to illustrate medieval manuscripts. It can be a copper ore, though it is usually not abundant enough; and because it is found only in surface- and near-surface environments, it is normally quickly mined out. The Santa Cruz deposit in Arizona might be exceptionally rich in minable atacamite.

Atacamite has been found in the patina of the Statue of Liberty and growing on ancient bronze objects. Though natural, such deposits come from materials created by humans.

According to Wikipedia, atacamite has also been found in the jaws of bloodworms!

Regular readers have learned the lapidary mantra: "If a mineral can be cut or faceted, someone will do so." That's the case with atacamite, even though it is soft, delicate, and impractical.

I found an opaque faceted stone labeled as atacamite from Australia for sale online for £58 (about $27). The cut stone also contains an unidentified blue mineral. Other faceted opaque stones from Chile (none blue) were being sold on Etsy.

Atacamite is neither common nor truly rare. Specimens can be purchased for less than $20, although quality and crystal sizes improve with increasing prices. Beautiful, well-crystalized specimens of green halite, purportedly with atacamite inclusions, are offered for sale for about $27 and up.

I debated buying one, which I would enjoy. My concern about being able to keep the specimen sufficiently protected from humidity, which would destroy it, made me decide that one of these lovelies would not be mine.

Those with more spending money than me can find a beautiful clear gypsum specimen with atacamite inclusions from the Lily Mine priced at $1,800. Atacamite specimens from Australian localities are being offered for $1,200 to $1,800. The upper-end atacamites are gorgeous but not enough orders of magnitude better than, say, a $300 specimen for the costs to be justified, in my opinion.

Technical Details

Chemical formula .....$Cu_2(OH)_3Cl$

Crystal form .....Orthorhombic

Hardness 3-3.5

Specific gravity .....3.745-3.776 g/cm^3 (measured)

Color .....Shades of green, usually bright greens in darker shades

Streak .....Green

Cleavage .....1 perfect, 1 fair

Fracture .....Conchoidal

Luster .....Vitreous, adamantine

Sources

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KGHM. N.d. Rudna.
Mindat. N.d. Atacamite Group.
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June 5 Program

Musings of a Mineral Museum Curator

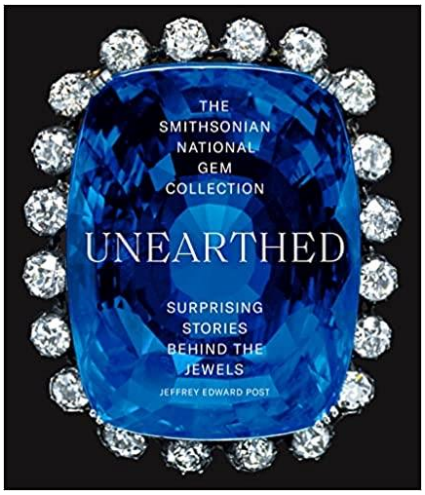
Dr. Jeffrey Post

Editor's note: *Dr. Post gave the same presentation at the April meeting of the Mineralogical Society of the District of Columbia. This introduction is based on the introduction to his presentation by the MSDC vice president, Cindy Schmidtlein, in the MSDC newsletter.*

Our speaker for June is Dr. Jeffrey Post, mineralogist and curator-in-charge of gems and minerals at the Smithsonian National Museum of Natural History (NMNH). Dr. Post has been a research mineralogist in the NMNH's Mineral Sciences Department since 1984 and curator-in-charge of gems and minerals for over 30 years. He has made frequent presentations to clubs in our area, keeping us informed of happenings at the NMNH, a wonderful mineralogic resource.

Dr. Post's research interests include environmental mineralogy, single-crystal and powder X-ray diffraction, manganese oxide minerals, clay minerals, and gemology. He is the recipient of the Carnegie Mineralogical Award for his outstanding contributions in mineralogical preservation, conservation, and education. He is currently the president of the Mineralogical Society of America.

This spring, Dr. Post will be transitioning into retirement. In his presentation, he will discuss highlights of his time at the NMNH; he will also review his 2023 Tucson experience and other news over the past year related to the NMNH collection and the Department of Mineral Sciences.



Be sure to check out Dr. Post's latest book: *The Smithsonian National Gem Collection—Unearthed: Surprising Stories Behind the Jewels*. The book brings to life the scandals, mysteries, and human stories behind some of the world's greatest gems. The book is available on Amazon here.

President's Collected Thoughts

by Jason Zeibel

This spring, I spent two weeks in southern England for work. It was a fun chance to get away and see a different part of the world.

On my Saturday off, I took the short train ride down to Dover in Kent to hike on the majestic white cliffs overlooking Normandy. The UK government purchased the land around the white cliffs for the National Trust in 2016 and now maintains a network of lovely hiking trails. It was an atypically sunny day, and I recommend the stop if you find yourself on the other side of "the pond."

Two things really struck me, geologically speaking.

First was the sheer volume of marine creatures (mostly coccoliths) that went into creating these towering calcium carbonate formations. The cliffs were formed from the seabed some 60 to 100 million years ago during the late Cretaceous Period. The chalk is very soft and crumbly. I even saw the negative impression of a giant clam in the ceiling of one of the tunnels excavated for World War II.

The other thing that struck me was the flint that makes an almost perfectly horizontal line through the chalk. The flint formed not from coccoliths but from the remains of sea sponges and other siliceous plankton that hardened into microscopic quartz crystals. Using flint from the cliffs, Stone Age humans did everything from cutting down trees to starting fires. Without that flint layer, the history of the English Isles might have been very different.

In May, we had an absolutely wonderful presentation by Dr. Caitlin Ahrens of NASA about rockhounding on Mars. She showed us detailed geologic maps of Mars, which I found to be quite amazing because no one has ever been to Mars to do the mapping. Dr. Ahrens described imaging spectroscopy ("squiggly-line fingerprints") as a tool for identifying and ultimately mapping mineral species. Her enthusiasm for astrogeology is contagious. We hope to have her back again to talk about even farther out things … like Pluto!

In June, we will be back in person again at the Dunn Loring Fire Station on Monday, June 5. We will have a true treat of a program because Dr. Jeffrey Post has

The White Cliffs of Dover. **Top:** *Jason on the National Trust trails.* **Center:** *Trace fossil of a giant clam in the chalk.* **Bottom:** *WWII gun battery (note the line of flint). Photos: Jason Zeibel.*

agreed to talk about his work with the Smithsonian's mineral collection. He is another enthusiastic speaker, and I highly encourage participation.

In May, we did our meeting in a hybrid format, with some folks joining via Zoom and others in person. That seemed to work fairly well—except for a game of pass-the-microphone during the Q&A session. We will try to keep that option going for those who are not able to make it in person.

We also had a quick discussion about mineral-collecting locations. We agreed to keep exploring the issue but definitely want to look into the possibility of the club getting access to the Morefield mine in Amelia, VA. Apparently, some clubs have been able to arrange access and we want to see if a date can be set for the NVMC as well. We will continue the discussion about other collecting localities via email and at the June meeting.

Finally, here are some upcoming planning dates to be aware of:

- Tentatively plan for Sunday afternoon on August 6 for our ***summer picnic*** at the Zeibel house in Clifton, VA. We will have grilled proteins of various types, and we ask participants to bring sides, desserts, and—of course—rocks and fossils for swapping. Details to follow.
- Our ***fall auction*** will be at the Dunn Loring Fire Department. Due to Labor Day falling on the first Monday of the month, we are still trying to nail down a September meeting date, so the auction might shift to October if our September meeting winds up being fully virtual.
- And, of course, don't forget the annual show on November 17-19.

Jason

Upcoming EFMLS Convention

by Cheryl Brown, Show Chair, Gem and Mineral Society of Syracuse

Editor's note: *Adapted from* EFMLS News *(May 2023).*

The Eastern Federation Convention is drawing near, and the Gem and Mineral Society of Syracuse is looking forward to hosting everyone during our July show.

No Wildacres in Fall 2023

Per the EFMLS Wildacres website, no session was scheduled for fall 2023. Registration for next spring will probably become available in late winter 2024.

Atlantic Micromounter's Conference

June 3, 10:30 a.m.-3:30 p.m.
(see website for more info)

Location: James Madison University, Harrisonburg, VA

Presentation: Dr. Elizabeth Johnson, professor and curator, will talk about the Phil Cosminsky and Fred Keidel micromount collections

Activities: Visiting the James Madison Mineral Museum; micromount trading and giveaways

Attendance: Limited to 50 people; no conference fee

Signing up: Michael Pabst at michaeljpabst@yahoo.co

We are excited to have a field trip planned for Monday, July 10, to the Mohawk Valley Mineral Mining location to look for Herkimer diamonds. This is a great opportunity because an annual membership is included in the registration fee. This means you can go back to the mine and just pay the day rate fee anytime for the next year. We will have experienced miners with us as guides.

Please take note of the deadlines (for forms and information, click here). The convention advance registration form must be submitted by June 7, 2023. The deadline for making reservations in the block of rooms we have reserved at a discounted rate at the convention hotel is June 9, 2023. (When you call the Holiday Inn Hotel to make a reservation, don't select the reservation option. Instead, stay on the line to reach the front desk at the hotel. We have a block of rooms reserved under Eastern Federation. If you have any questions or problems, please call me at 315-708-9122.)

All meetings and the banquet will be held in the hotel—no traveling! The auction will be held at the show. See you in July!

Rockville Quarry Open House on May 6, 2023

by Sue Marcus

The Rockville Quarry (formerly the Hunting Hill Quarry) in Maryland is currently owned by Holcim US. I drove into the Hunting Hill Quarry on my learner's permit more than 50 years ago, and I recall many fun times collecting with my parents as part of the Gem, Lapidary and Mineral Society of Montgomery County.

On one Mother's Day, we went to the quarry, with my mom and Mrs. (Charlotte) Morrison having a great time finding garnets. We even collected in the rain, which shows the true colors of the rock and is perfectly fine if it isn't too cool or windy. The quarry has been closed to collectors for many years, so this was my best chance to venture back.

Saturday was a perfect day—sunny and not too hot in the morning. I arrived at about 10:30 for the event, which started at 10.

There were tours into the pit. They used fancy shuttle buses, the types used to transport groups to airports. We piled into one with cushy (clean) seats. Not my usual geology ride!

Our tour guide worked for the company as a concrete marketer. He acknowledged that he knew nothing about geology. He even asked whether anyone could explain what "metamorphic rocks" meant!

The dad and teen in the seats in front of me thought the rock looked like limestone, so I told them it was serpentine. I answered some of their other questions as well, and they later told me how nice it was to have their own tour guide.

Initially opened in mid-1950s, the pit is now about 500 feet deep, with another 35 years of production left. Suburbia surrounds what used to be a hole in the countryside.

We were driven down to about the 300-foot level but never allowed out of the shuttle. No rock collecting—which is what I'd expected but not what I'd hoped.

Back up at the top, there were exhibits and demonstrations and lots of kids' activities, like huge bouncy castles and face-painting. Some of the related industries had displays, showing geophysical equipment

and concrete products. The quarry had a tent with displays showing the uses of minerals, some of the rocks found there, and—for some odd reason—a small pile of gold-painted rocks.

For the next open house, I suggested that the quarry invite mineral clubs (certainly the GLMSMC) to feature a display. I asked whether the quarry geologist was present, but he's based in Pennsylvania.

It was good fun and I'm glad I went. Just wish there'd been more geology. The company is trying to be a good neighbor.

Fakes, Forgeries, and Misrepresentations

by The-Vug.com

Editor's note: *The Vug is an online source of information about minerals. Thanks to Sue Marcus for the reference!*

This webpage is a list of 40 scams, fakes, forgeries, and misrepresentations that appear on the mineral-collecting market, from aluminum to zircon. Some of these fakes are well-known classics and some are very recent. Every purchaser of minerals, from the collector to the dealer, runs the risk of falling for a fake at some point in time. It could be an emerald crystal glued into a calcite matrix and covered with mica at the base—or a green glauberite/calcite that is colored that way from a dip in a vat of copper solution.

Many of these are not fakes but rather misrepesentations of items to make them sell better, mainly to the metaphysical crowd. Not to deny anyone's spiritual beliefs, but a mineral is a mineral. Sometimes, the renaming of a mineral does not really help to pass it off to the metaphysical crowd; but then again, how can someone feel good about selling plain old milky quartz as the obscene "Azeztulite" or making up a name for quartz with multiple inclusions, such as "Melody's Stone." … *Read more*.

Why Do Geometric Patterns in Salt Flats Worldwide Look So Similar?

by Matthew R. Francis

Editor's note: *The article is adapted from ScienceNews, 5 April 2023. Thanks to Tom Burke for the reference!*

From Death Valley to Chile to Iran, similarly sized polygons of salt form in playas all over the world—and subterranean fluid flows might be the key to solving the longstanding puzzle of why.

Geometric shapes such as pentagons and hexagons spontaneously form in a wide range of geologic settings. Dried mud, ice, and rock often crack into polygons, but these patterns tend to vary dramatically in size. So why are all playas so persistently similar?

The answer lies underground, physicist Jana Lasser and colleagues proposed on February 24 in *Physical Review X*. With sophisticated mathematical models, computer simulations, and experiments performed at Owens Lake in California, the team connected what they saw on the surface with what is going on beneath. … *Read more*.

When Pyrite Goes Bad

by Darrell Powell

Editor's note: *The article is adapted from* AFMS Newsletter *(March 2023), p. 5.*

Pyrite decay is one of the biggest problems for mineral collectors. Minerals made of iron and sulfur, such as pyrite and marcasite, can have this problem. For reasons that scientists have not been able to fully understand, the sulfur and iron in these minerals combine with oxygen and hydrogen. The sulfur reacts to become sulfuric acid and the gas called hydrogen sulfide, which smells like rotten eggs.

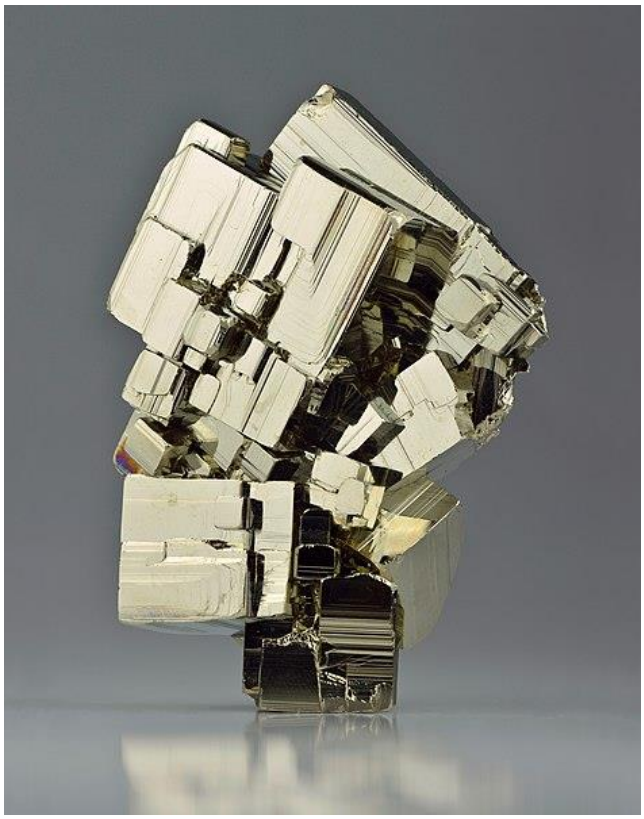
If you have pyrite or marcasite in your collection and it is decaying, you will be able to smell the sulfur. First, the pyrite and marcasite specimens will turn dark and lose their shiny metallic luster. Over time, you will begin to see yellow and white crusts form. The crusts will be crumbly and will rub off very easily. In the worst case, the specimen will actually fall apart! As the specimens deteriorate, the acids created will attack your specimen labels, too. The paper will turn brown and very brittle.

Scientists don't know how to stop or even control pyrite decay. There are two things that are known that can help you:

1. When one pyrite or marcasite specimen deteriorates, it can cause other specimens nearby to deteriorate, too. If you have a number of pyrite and marcasite pieces, keep them separated from one another. If you have a specimen that is beginning to deteriorate, remove it from the collection immediately.
2. Remember that one of the chemicals created by pyrite decay is the gas called hydrogen sulfide. Keep your specimens in a place where the fumes can't build up. On an open shelf is a good option. In other words, good air circulation helps.

Many mineral collectors report that pyrite specimens that are darker greenish in color are more likely to change and fall apart from pyrite disease. Avoid acquiring pyrite specimens that are dark in color. Bright, brassy, metallic pyrite crystals are much less likely to have pyrite disease.

Some pyrite specimens, like the great cubes and groups of cubes from Spain, don't seem to get pyrite disease. The bright, shiny, metallic pyrite specimens from Peru also seem immune to this disease.



Top: *Pyrite crystals, Huanzala Mine, Ancash, Peru.*
Bottom: *Pyrite specimens with decay.*
Sources: Wikipedia (top); Researchgate (bottom).

Rare Chalcopyrite Balls From Daye, China

by The Arkenstone

Editor's note: *The article is adapted from The Arkenstone (iRocks.com). Thanks to Sue Marcus for the reference!*

These "balls" started coming out in January 2019, according to a reliable source who works directly with miners at Tonglushan (literally "Green Copper Mountain" in Mandarin), which is also the world's oldest continuously worked copper mines. It has been active since the Chinese Bronze Age 3,500 years ago, and there is a historic museum atop the old ruins.

Nowadays, they mine deep underground with huge trucks and modern mining. Tonglushan is the recently productive source of many modern copper minerals from China, including malachite in stalactites and sheets; the strange chalcocite "balls" in matrix that came out a few years ago; sparkly pyrite on calcite; calcites of different colors; gypsum; and many other species. The modern entry is just down the road from the museum and the archeological grounds of the old smelters and kilns of ancient times.

When the balls first came out, we thought they might be some new way to fake copper minerals. However, the source said the miners were truthful and forthright. We had the first specimens looked at in several ways, including cross-sectioning one of the larger yellow chalcopyrite balls to look at the internal structure (which was normal and radial, so these are not carved).

We also had an analysis done at the University of Arizona via EDS. The results came back conclusively chalcopyrite, with no bornite (as I had guessed the multicolored coating on top might be). Both internally and externally, these are pure chalcopyrite that matches the known standards.

We then asked the miners to provide matrix specimens. Apparently, the easy pickings were the floater clusters on the bottom of the pocket, and few matrix pieces had been collected from above. In the fourth and final lot (obtained in May and collected in April), we were finally able to get the matrix specimens by paying extra. The floaters had been simply picked up in the bottom of the open pockets, and the matrix specimens took more work (and time and tools) to acquire from the roof of that last pocket. The matrix

Chalcopyrite balls from the Tonglushan Mine near Daye, China, cemented together by sulfides in the formation pocket.

is mudstone, an extremely fine-grained sedimentary rock consisting of a mixture of clay and silt.

Additionally, Dr. Stuart Mills (senior curator of geosciences at Museum Victoria) has been extensively studying these chalcopyrite balls for a future paper. Some of his initial findings are available here.

Courtesy of Dr. Peter Megaw, who examined pieces in China with us:

As you can see in the accompanying images, the matrix pieces show a rim or zone between the balls and the mudstone matrix. My guess is that fluids of some sort dissolved whatever cement was holding the mudstone together, liberating the sulfide balls and allowing them to pop free and accumulate in the bottom of the void in a nest of loose sand.

Originally, each ball would have been completely surrounded by this zone; but in some cases, it was incompletely dissolved (perhaps because it was more completely sulfidized?), leaving the balls stuck to the matrix.

I think simple weathering is very unlikely to be the culprit as the leaching the agent. The oxidation you can see is not very pervasive and the balls generally look fresh; since chalcopyrite weathers easily and quickly, if this was a weathering effect, you'd see more oxidation and chalcopyrite destruction than you're seeing here.

More likely is that late ore fluids dissolved the matrix around the balls and may even have contributed a little sulfide to "glue" the loose balls together. Closer examination of those rims and their transition to-

wards the matrix will tell you whether this scenario is plausible. I am also intrigued by the complex lumpiness on the back of the largest matrix piece. That may reveal some aspects of the overall environment they formed in.

These matrix specimens show that the chalcopyrite forms much in the same was as "blister copper" from Connecticut or Cornwall formed, but in a different matrix. Instead of forming in, and being bonded to, solid sulfide ores as at those classic localities, these balls formed in a hard sandstone rock matrix with lots of cavities. The chalcopyrite filled veins and cracks and also bubbled up into these shapes where open space allowed it.

Some specimens show two balls fused together—or clusters of smaller balls merged with larger ones—naturally in the matrix. Later, the structure of mudstone holding these heavy objects was degraded; and because the sulfides are heavy, they simply fell out and settled to the bottom of the pocket (except for some pieces stuck in matrix on the top).

This is similar to some gem species' pockets in kaolinized clay, where everything settles to the bottom in a mess of floater kunzite or tourmalines. It's also what you'd expect to happen if clusters of Spanish pyrites had been exposed to such effects and ended up in open pockets instead of frozen in a mountain.

When found, the miners scooped these up and took them out, and we have only cleaned them with water and a quick bath in SimpleGreen. When you look at the matrix specimens, you can see incipient floaters coming out of the strange mix of sulfide-infused mudstone, and you can easily imagine how these would have formed according to the above logic.

Bench Tip: Small Parts Containers

Brad Smith

I'm always on the lookout for small containers to use for holding all those little parts and tools we deal with in making jewelry, especially since I'm always traveling to classes and workshops.

My latest find is some plastic vials about 15 mm in diameter and 75 mm long. Best part is they are free. The vials are used in the doctor's office to draw blood samples. They cannot be used after their expiration date and are thrown out. On my last doctor's visit, I asked the nurse if they had any expired vials. She tried to give me 400 of them (we settled on 200).

The ones shown below are called "Vacutainers," but there are probably many other names. They're clear plastic with a rubber stopper and a paper label all ready to write on. I find them really handy for small parts like jump rings, prong settings, small drills, nuts/bolts, faceted stones, and precious metal filings.

Smart Solutions for Your Jewelry Making Problems
amazon.com/author/bradfordsmith

Massive Rare Earth Deposit Found

by Brendan Rodenberg

Editor's note: *The article is adapted from KX News in North Dakota. Thanks to Sue Marcus for the reference!*

The North Dakota Department of Mineral Resources (DMR), in conjunction with State Geologist Ed Murphy, has announced that North Dakota's Geological Survey has discovered a nearly 30-foot-thick interval of rocks containing untapped critical minerals.

Critical minerals are defined by the U.S. government as minerals that are essential to the economic or national security of the states. Typically, these are minerals that make up vital components of modern technologies, especially energy infrastructures and those used in defense applications. However, as important as these minerals are, there is little to no production of them in the United States—and U.S. manufacturers must often rely on supplies from foreign countries, some of which are U.S. adversaries. Much of the global supply of the more valuable rare minerals currently comes from South China.

Although their name suggests that rare minerals are difficult to find, they are relatively common in some types of rocks; however, they do not always concentrate into ores that can be mined. Currently, the United States has only one such deposit (the Mountain Pass Mine in California), which is not enough to meet domestic demand. Fortunately, samplings taken since 2015 by the North Dakota Geological Survey have identified a tremendous concentration of critical minerals throughout the Williston Basin.

The sampling project has produced one of the most detailed data sets of enriched coal deposits in North America through the analysis of more than 300 sites and 1,700 samples from western and south-central North Dakota. These formations represent only a small part of the estimated lignite reserves in the state, and testing has already suggested that North Dakota has many deposits of critical earth elements that have not yet been tapped into. The largest of these, a brightly-colored area containing many enriched minerals, is known as the Bear Den Member of the Golden Valley Formation—which can often be seen in upland areas covering 340 square miles over west-central North Dakota.

Top: *Coals in the lower half of the bright beds in western North Dakota contain critical minerals.*
Bottom: *Geologists taking samples.*
Source: North Dakota Geological Survey.

Samples of lignite coal and mudstones from the lower parts of the Bear Den Member contain up to 2,570 parts per million of rare earth elements; it is believed to be the highest spot concentration ever reported from North American coal deposits (far exceeding the threshold of 300 per million usually considered "economic"). Enriched concentrations of critical minerals, including cobalt, gallium, germanium, and lithium, were also present in these samples.

The Geological Survey has already identified a handful of other weathering zones in the Williston Basin, to be discussed in future reports by the DMR. Another of these deposits, located 1,000 feet stratigraphically below the Bear Den Member, has also been confirmed to contain high concentrations of rare minerals. It has been used to supply enriched lignite for research at the University of North Dakota.

For full details, click here.

June 2023—Upcoming Events in Our Area/Region (see details below)

Sun	Mon	Tue	Wed	Thu	Fri	Sat
				1	2	3 Shows, MD, NC, PA
4 Show: W. Friendship, MD	5 **NVMC mtg**	6	7 MSDC mtg	8	9	10 Shows, Gastonia, NC; Raleigh, NC
11 Shows, Gastonia, NC; Raleigh, NC	12 GLMSMC mtg	13	14 **Flag Day**	15	16 Show, Swannanoa, NC	17 Show, Swannanoa, NC
18 **Father's Day**; Show, Swannanoa, NC	19 **Juneteenth**	20	21 **Summer begins**	22	23	24
25	26	27	28 MNCA mtg	29	30	

Event Details

3: Kernersville, NC—Annual show; Greensboro Gem and Mineral Club; Piedmont Triad Farmers Market, 2914 Sandy Ridge Rd; Sat 9-5; admission free; info: Kathie Montgomery, 336-706-0061, www.ggmc-rockhounds.com.

3: Macungie, PA—Show and sale; Pennsylvania Earth Sciences Association; Macungie Memorial Park, 50 Poplar St; Sat 8:30-3; admission free; info: Dane Transue, danetransue@rcn.com.**5: Arlington, VA**—Northern Virginia Mineral Club; info: https://www.novamineralclub.org/.

3-4: West Friendship, MD—Annual show; Mid-Atlantic Gem and Mineral Association, LLC; Howard County Fairgrounds, 2210 Fairgrounds Rd; Sat 10-5, Sun 11-4; $6; info: Teresa Soltis Schwab, 301-807-9745, beadware@rcn.com.

7: Washington, DC—Mineralogical Society of the District of Columbia; info: http://www.mineralogicalsocietyofdc.org/.

10-11: Raleigh, NC—Raleigh Rocks, Minerals, Fossil and Jewelry Show; Raleigh Fairground, Kerr Scott Bldg, 4285 Trinity Rd; Sat 10-6, Sun 10-6; admission free; info: Ashu Kumar, 919-257-8915, Jewelpassageshows@gmail.com.

10-11: Gastonia, NC—Annual show; Gaston Gem and Mineral Club; Johan Newcombe Event Center/Habitat for Humanity, 1840 E Franklin Blvd; Sat 10-6, Sun 10-4; admission free; info: Mary Fisher, GastonGemAndMineral@gmail.com.

12: Rockville, MD—Gem, Lapidary, and Mineral Society of Montgomery County; info: https://www.glmsmc.com/.

16-18: Swannanoa, NC—Annual show; MAGMA, Jacquot & Son Mining; Land of the Sky Shrine Club, 39 Spring Cove Rd; Fri 9-6, Sat 9-6, Sun 10-5; admission free; info: Richard Jacquot, 828-779-4501, rickjacquot@gmail.com.

28: Arlington, VA—Micromineralogists of the National Capital Area; info: http://www.dcmicrominerals.org/.

THE NORTHERN VIRGINIA MINERAL CLUB INC

Crystals are the flowers of the Mineral Kingdom

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The Northern Virginia Mineral Club

Visitors are always welcome at our club meetings!

PLEASE VISIT OUR WEBSITE AT:
http://www.novamineralclub

Please send your newsletter articles to:
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hutchbrown41@gmail.com

RENEW YOUR MEMBERSHIP!

SEND YOUR DUES TO:
Roger Haskins, Treasurer, NVMC
4411 Marsala Glen Way, Fairfax, VA 22033-3136

OR

Bring your dues to the next meeting.

Dues: Due by January 1 of each year;
$20 individual, $25 family, $6 junior (under 16, sponsored by an adult member).

Club purpose: To encourage interest in and learning about geology, mineralogy, lapidary arts, and related sciences. The club is a member of the Eastern Federation of Mineralogical and Lapidary Societies (EFMLS—at http://www.amfed.org/efmls) and the American Federation of Mineralogical Societies (AFMS—at http://www.amfed.org).

Meetings: At 7:30 p.m. on the first Monday of each month (except January and September) at the Dunn Loring Fire Station, 2148 Gallows Road, Dunn Loring, VA.* (No meeting in July or August.)

**Changes are announced in the newsletter; we follow the snow schedule of Arlington County schools.*