THE NORTHERN VIRGINIA MINERAL CLUB INC

The Mineral Newsletter

Next meeting: November 4 Time: 7:30 p.m.

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



Duftite on calcite

Tsumeb Mine, Tsumeb, Namibia

Source: Mindat. Photo: Jean-Marie Claude.

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November 2024
Explore our website!

November Meeting Program:

2024 Club Show

details on page 9

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Mineral of the Month
Duftite

by Sue Marcus

Frequent readers of these columns know that I try to choose minerals that are attractive and might appeal to collectors. In choosing duftite, I realize that I've selected another copper mineral after October's cuprite. An unintended consequence is that cuprite and duftite occur at some of the same localities. Writing these columns is a learning experience for me too.

Duftite occurs in the weathered upper parts of some copper deposits. Although copper deposits are relatively common, duftite is neither common nor rare. However, macroscopic crystals are very rare; micromounts are found more frequently, and coatings are the most common way that duftite occurs. Many collectors have duftite coating whatever the primary specimen is in their collections.

This mineral was identified slightly more than a century ago when Otto Pufahl described it. Pufahl, a German professor of metallurgy, named the new mineral duftite for Gustav Bernhard Duft. Duft, a prominent mining engineer, was general manager of the Tsumeb Mine in what was then German South-West Africa (now Namibia).

In 1956, Claude Guillemin evaluated several groups of copper minerals, including arsenates. He subdivided duftite into duftite-α and duftite-β, neither of which is a mineral species name approved by the International Mineralogical Association (IMA). Just because the IMA hasn't made the distinction doesn't mean it isn't important. Apparently, at the Tsumeb Mine, the relative amount of lead in the mineral affected ore processing.

Later work on duftite and chemically similar minerals led to the current understanding that duftite, conichalcite, and austinite form a solid solution series, meaning that intermediate minerals form between the chemical end members of the spectrum. The intermediates are neither all one species (such as duftite) or another (such as conichalcite). This complicates cataloging and labeling for mineral collectors like us. Malcolm Southwood, writing on Mindat, states that it is safer to call unanalyzed specimens "duftite/conichalcite series." In this column, I'll use duftite for any materials that's called duftite by others.



Northern Virginia Mineral Club members,

Please join our November speaker, Kathy Hrechka, for dinner at the Olive Garden on November 4 at 5:45 p.m.

Olive Garden, Tysons Corner (across from the shopping center), 8133 Leesburg Pike, Vienna, VA
Phone: 703-893-3175

Reservations are under Craig Moore, Vice President, NVMC. Please RSVP to Craig at vicepresident@novamineral.club by 1 p.m. on the day of the meeting.



Duftite on cerussite, Tsumeb Mine, Tsumeb, Oshikoto Region, Namibia. Source: Mindat; photo: Rob Lavinsky.

Duftite is a lead-copper arsenide mineral that occurs fairly frequently around the world, though mostly as microcrystals. Micromounters, you have many localities to choose from! Duftite colors and crystal habits can be distinctive for a location. Bright apple green crystals occur in some places, whereas others are noted

for deep forest-green, satiny crystals. Crystal habits or forms are diverse too. I've looked through all 607 duftite images posted on Mindat, plus a few more on other websites. I'll mention only a few of the many duftite occurrences because many localities produced a micromount of two but were not prolific.

Localities

United States. The United States is not noted for duftite. It occurs here, though most reports indicate that a few beautiful micromounts were collected at each of at least half a dozen locations. Collectors may identify additional occurrences since small crystals may be overlooked or maybe a rock needs to be overturned to find them.

In Granite County, MT, the Black Pine Mine produced some lovely, gemmy olive-colored microcrystals of duftite. The mine site has been reclaimed, meaning that the dumps have been covered and are no longer accessible. The area is also private property (with patented claims).

Similarly, the Jim Crow Mine in Grant County, NM, produced a few duftite micromounts. It, too, is on patented land, with mine workings probably reclaimed.

The Centennial Eureka Mine in Juab County, UT, produced sprays of bright apple-green duftite microcrystals. The sprays consist of small bundles of well-separated rodlike crystals. Crystal faces from this location appear to be slightly rough for an unknown reason. The mine operated until 1955.

Arizona calls itself the Copper State, although I'd guess Michigan and maybe other states would dispute that title. Like for other U.S. duftite localities, only a few specimens are reported on Mindat, the most comprehensive source of mineral localities. Microcrystals forming small spheres of duftite, no more than 1 millimeter (0.04 in) in size, came from the Moon Anchor Mine in Maricopa County. Rolf Luetcke found a few microscopic spheres of duftite at an unnamed polymetallic prospect in Tres Alamos Wash in Cochise County.

In southwestern Nevada, the 3 Metals Mine has been a source of several unusual minerals, such as cornwallite. The sole duftite image posted on Mindat is a colorful, attractive micromount with orbs of bright-green duftite, granular chrysocolla, and elongated crystals of colorless hemimorphite.



Duftite from the United States. ***Top:*** *Jim Crow Mine, Steeple Rock Mining District, Grant County, NM.* ***Bottom:*** *3 Metals Mine, Weepah Mining District, Esmeralda County, NV. Source: Mindat; photos: Douglas Merson.*

At least two southern California mines were sources of duftite micromounts pictured on Mindat. Interested collectors may have to use the silver pick (money) to acquire specimens since all the mines are closed and some are posted against trespassing. At the Reward Mine in Inyo County, dark-green botryoidal duftite



Duftite, Ojuela Mine, Mapimi, Mexico. Source: Mindat; photo: Michael Roarke.

formed on an opaque mineral that was unidentified on Mindat images. The Mohawk Mine in the Clark Mountains of San Bernardino County also produced a few duftite specimens.

Mexico. The Ojuela Mine in Mapimí, Durango, is well known to mineral collectors. It is perhaps the best source of legrandite specimens and is noted for wulfenite and hemimorphite, among many other mineral species. Most recently, "sandwich" wulfenite crystals appeared on the mineral market, exhibiting two layers of light-colored wulfenite with a middle layer of darker material.

Fine duftite specimens have also come from the Ojuela Mine. Ojuela Mine duftite takes various forms. Thick dark-green botryoidal coatings of duftite on wulfenite are attractive, especially when the duftite is, in turn, partly covered by later calcite crystals.

These would be called duftite epimorphs if duftite did not replace wulfenite. If duftite replaced wulfenite, we'd say it was a duftite pseudomorph after wulfenite. There are long discussions among collectors and professionals about when to use the terms pseudomorph, epimorph, perimorph, or—replacement!

I use the term pesudomorph for mineral A replacing mineral B while retaining mineral B's crystal shape; and the term epimorph for a coating of mineral A over mineral B when crystals of mineral B are dissolved away, leaving a hollow shell composed of mineral A.

Back to the Ojuela Mine and duftite. Duftite from Ojuela ranges in color from bright olive-green to dark forest-green. Duftite pseudomorphs of wulfenite also form nice specimens. Much rarer are duftite pseudomorphs after hemimorphite. Microcrystals of duftite are usually bright olive-green, occurring in botryoidal form on specimens up to 13.7 centimeters (5.4 in) or more in size. Colorless, sparkling calcite crystals are sprinkled on many pieces.

Ojuela Mine duftite and other minerals are usually found on an earthy reddish-orange limonitic matrix that can be friable. The specimens may leave orange dust on a display shelf or box.

The Ojuela deposit is named for a Jesuit priest who recognized its mineral wealth in 1598 or 1599. Bursts of extraction alternated with periods of dormancy; the mine is currently flooded and dormant. Specimen production occurred intermittently between 1940 and 2012, with nice specimens still occasionally found (presumably on the dumps). More than 100 minerals have been found there.

England. The Pemberly Croft Mine in Cornwall, England, may be the best source of duftite in the United



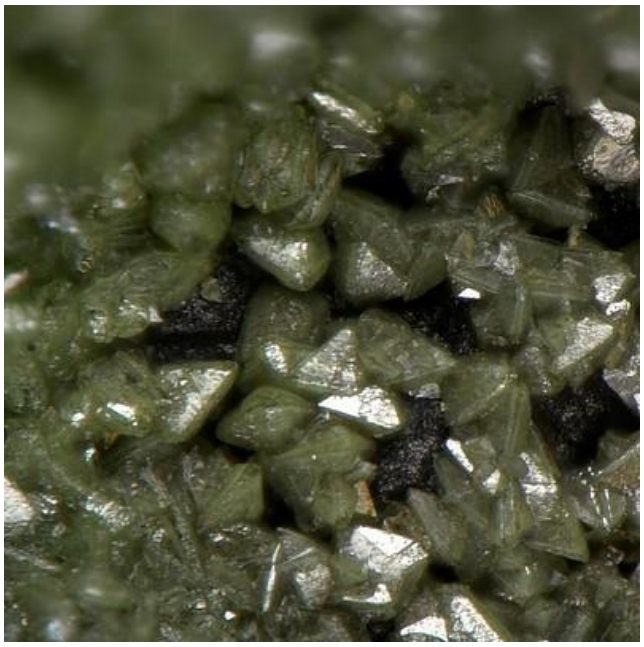
Duftite on quartz, Penberthy Croft Mine, Cornwall, England. Source: Mindat; photo: Steve Rust.

Kingdom. Mining was most active from the late 18th century to the early 20th century but was probably intermittent. Duftite formed in the upper, weathered part of the deposit.

Photos on Mindat show several specimens that look like tiny seed-like crystals scattered on matrix. All duftite crystals are micros. Unusual yellow-gold, sparkling gemmy microcrystals of vanadium-rich duftite were found there. Mimetite, bayldonite, plumbogummite, and quartz are among the minerals associated with duftite from this locality.

France. As in the United States, several localities in France have produced a few specimens of duftite. The crystals are usually microscopic, although at the Cap Garonne Mine near Toulon, duftite forms crusts on specimens up to at least 9.5 centimeters (3.7 in). Some attractive duftite crystals form clusters of doubly terminated crystals that are visible under magnification. Another unusual form from this mine consists of opaque, hexagonal rod-shaped crystals capped by and possibly filled with mimetite.

The French area of Villefranche-de-Rouergue, part of Occitanie, yielded two occurrences of duftite, although neither has been prolific. Yellow to green microcrystals of duftite were found at the Falgayrolles prospect. Crystals form small clusters, although an image of a single 1-millimeter (0.04-in) crystal posted on Mindat shows a translucent gemmy green hexagon. The



Duftite, Cap Garonne Mine, Toulon, France. Source: Mindat; photo: Stephan Wolfsried.



Duftite, Clara Mine, Baden-Württemberg, Germany. Source: Mindat; photo: Stephan Wolfsried.

dumps of the small long-dormant mine were the source of the specimens. Microscopic duftite crystals were reported near Najac, where they occurred with rare species like agardite-(La).

Germany. The Clara Mine, in Germany's Black Forest, produced more than 414 mineral species, including 13 for which it is the type locality (as of January 2015), so perhaps there are more in the past 10 years. The mine still produces barite and fluorspar, and limited collecting was allowed on some of the dumps for a fee.

Clara Mine duftite gives collectors reasons to collect micromounts. Under magnification, duftite appears as sparkling bursts, like fireworks, of distinguishable individual crystals. Other euhedral microcrystals are transparent or translucent forest-green jewels in varied crystal habits. Yet another microcrystalline form looks like tiny opaque and furry brachiopods; the texture of the crystals is hard to describe. Not all duftite crystals from the Clara Mine are furry or scaly, although this appearance seems to be distinctive of duftite from this mine. I have not seen it in images of duftite from elsewhere.

It is difficult to determine the "real" colors from images on a computer screen. Images posted on Mindat



Duftite, Clara Mine, Baden-Württemberg, Germany. Source: Mindat; photo: Matteo Chinellato.

include duftite crystals that appear to be reddish-brown or apple-green, although darker green is most common. My favorite image, by Matteo Chinellato, shows pale green balls, like cotton balls, studded with dark-green translucent duftite crystals. Are these later single duftites on earlier massive duftite? The caption doesn't explain the pale material.

Beautiful microcrystals of duftite have been found in an exposed barite vein at an abandoned quarry at Borstein, a mountain near Reichenbach, Germany. Some specimens are gemmy and apple-green. Others are separate opaque, doubly terminated, and elongated crystals. Another specimen exhibits opaque duftite that forms sprays of terminated crystals. Quartz, sometimes reddish, is a common accessory mineral.

Slovakia. Lead was mined from an open pit near Drienok peak in Slovakia's Carpathian Mountains. The lovely transparent to translucent duftite microcrystals from there form clusters of crystals or tiny botryoidal shapes, attractively contrasting with white mimetite, dolomite, and cerussite. Intermittent mining began in the 14th century, with underground exploration in the middle of the 20th century.

Austria. Fuchsloch, literally "foxhole," is a cavelike but manmade excavation near Brixlegg in Austria's



Duftite, Point 5.0, Borstein, Reichenbach, Hesse, Germany. Source: Mindat; photo: Stephan Wolfsried.

Tyrol region. All duftite from this locality forms microcrystals, though specimens vary in appearance and crystal habit.

The most interesting of these duftite microcrystals are hollow. I don't know whether these formed when duftite coated a now dissolved mineral. Rough-surfaced duftite spheres are contrasted with smooth spheres of rosasite on the image of one specimen posted on Mindat. Sprays of distinctly separate, elongated duftite are also attractive.

Namibia. The Tsumeb Mine is famous among mineral collectors for its great variety of mineral species and for some of the world's finest examples of some species. More than 489 mineral species have been identified from the Tsumeb deposit. Duftite was one of the 72 minerals originally found and described from this mine, named for the mine manager.

Although duftite specimens can be relatively large, up to at least 14.5 centimeters (5.7 in) in size, individual duftite crystals are rarely visible. Distinct crystals of duftite are best seen through a microscope.

Duftite from Tsumeb is usually olive-green, providing an aesthetic color contrast with associated minerals like calcite (white), cerussite (colorless to white), azurite (blue), and malachite (a different shade of green), among others. One image of duftite posted on Mindat



Duftite with calcite, Tsumeb Mine, Tsumeb, Oshikoto Region, Namibia. Source: Mindat; photos: Nadia Georgieva (top); Neal Luppescu (bottom).

shows bright-green duftite covered by clear sparkling quartz.

Duftite occurs in many forms, including as microcrystals in vugs and as coatings of other minerals with botryoidal mounds of duftite. The mineral commonly coats calcite crystals, sometimes preferentially grown on certain calcite faces while not growing on other faces of the same crystal or set of crystals. A unique specimen of iridescent duftite with calcite is posted on Mindat. The poster notes that analyses proved the iridescent mineral to be duftite.

The caption for another photo deserves quoting since I can't think of any way to paraphrase it: "Electric green epimorph of duftite after mimetite and pseudomorph of duftite replacing crystals of azurite." This beautiful specimen evidently had a complicated paragenesis (sequence of mineral species formation). Pseudomorph means one mineral replacing ("after") another. Epimorphs occur when one mineral grows over (rather than replacing) an original mineral, which then dissolves.

Other specimens are pseudomorphs of wulfenite replaced by duftite. Chemical zonation within some analyzed specimens varies from duftite to conichalcite.

A pipelike structure bought mineralized fluids towards the surface, forming the Tsumeb deposit. The pipe was emplaced about 530 ± 11 million years ago. Slightly acidic waters percolated downwards in the hosting dolomite, dissolving the carbonate rock and facilitating pathways for later upward-bound mineralized fluids. Tsumeb is now a World Geoheritage Site.

Australia. The world's finest macroscopic duftite crystals probably come from the Mount Bonnie Mine in Australia's Northern Territory. Duftite specimens from Mount Bonnie, covered with clusters of crystals, form specimens up to 7.6 centimeters (3 in) in size. That might not seem large, but these are visible original duftite crystals up to 0.5 centimeters (0.2 in) in size, not duftite coatings or pseudomorphs after another mineral. The duftite clusters can appear to be botryoidal when viewed casually, without magnifications.

Micromounters can glean lovely specimens from this locality too. Many samples, both macro and micro, have small white to yellow mimetite crystals on them. An attractive piece with duftite and yellow-green mimetite is described by Demetrius Pohl on Mindat as, "Collected with Rock Currier in the cockroach, coral snake and bat infested lower adit of the mine in December, 1973."

The Mount Bonnie deposit was hosted in the Mount Bonnie Formation, composed of shale, siltstone, graywacke, and dolomite, with minor breccia. The rocks of the units including Mount Bonnie are about 2 billion years old.



Duftite, Mount Bonnie Mine, Grove Hill, Northern Territory, Australia. Source: Mindat; photo: Rob Lavinsky.

Mining occurred intermittently since the early 1900s, although there has been no known extraction in the 21st century. The property continues to interest mining companies, but a larger quantity of economically extractable ore would likely need to be identified for mining to resume.

Duftite was found on or near the surface of the deposit in an oxidized zone, along with hematite, cerussite, malachite, and other secondary minerals. This cap of weathered oxidized rock, known as gossan, formed above lenses of sulfide ore. Gold and silver are found in the gossan, encouraging mining and exploration.

Greece. Beautiful crystals of duftite in diverse crystal forms were collected at the Christiana Mine near Lavrion. They include star bursts of tiny individual crystals, glassy botryoidal forms, and coatings on quartz and calcite. Colors of Lavrion duftite range from pale green through neon to dark olive-green.

Additional Occurrences

Other occurrences of lovely duftite microcrystals include in Zimbabwe (Sanyati Mine); England (LDNPA Amber Zone/Brandy Gill Mine in Cumbria); Germany (Clemenslust Mine); Spain (La Cruz Mines); and Italy (Rio Ricet Mines (three small officially unnamed mines near Ricet creek)). What about large countries like China and Russia? Copper is mined in both as well as in other countries where no duftite has been reported.

Duftite probably occurs in additional countries, large and small. It is easily confused with mottramite, possibly balydonite, and other minerals, especially without crystallographic analysis. We can hope for additional localities to be identified—and I'm hoping for macroscopic crystals in quantities that make them affordable.

Economic Uses

Although the chemical formula of duftite includes lead, copper, and arsenic, this mineral is not sufficiently abundant to be an ore mineral.

Moreover, duftite gemstones are a rarity. I could find no cut or faceted duftite. Crystals are almost always microscopic, and coatings are too thin and fragile to use for lapidary purposes. Mineral collectors are the main economic outlet for this mineral.

Prices

I looked up prices online on October 11, 2024. Starting at the high end of the price spectrum, The Arkenstone offered a gorgeous calcite, duftite, and hematite specimen from Tsumeb for $6,000. The 8.9-centimeter (3.5-in) piece exhibits rhombohedral translucent white calcite with preferentially deposited light green duftite, overgrown by another phase of calcite, sealing in the duftite. This specimen had a complex history because



Duftite, Christiana Mine, Lavrion Mining District, Greece. Source: Mindat; photo: Steve Rust.

there are some scalenohedral calcite phantoms within some of the later calcite rhombs. The specimen was owned by Rock Currier, who was probably the most famous mineral collector and dealer of the late 20th and early 21st century.

At the other end of the price spectrum, a duftite micromount from Falgayrolles, France, was for sale on eBay for $9.

There were many options in the middle of the price range. A lovely 3.3-centimeter (1.3-in) specimen of botryoidal duftite from Tsumeb with minor dioptase on white calcite was recently sold by Wenrich Minerals for about $40.

Technical Details

Chemical formula ..... $PbCuAsO_4(OH)$

Crystal form ..... Orthorhombic

Hardness 4.5

Specific gravity ..... 6.1 to 6.6 (sources vary)

Color ..... Varying shades of green, from almost black to bright apple-green

Streak ..... White to pale green

Cleavage ..... Poor

Fracture ..... Uneven to conchoidal

Luster ..... Vitreous to earthy

Acknowledgments Plus

When I write these columns, I contact people I know who might have specimens and photographs of the month's mineral. Some are local friends and some are people who post images on Mindat. For duftite, I humbly thank the following for permission to use their images (and for Demetrius, also his words): Matteo Chinellato, Jean-Marie Claude, Michael Cline, Nadia Georgieva, Rob Lavinsky, Neal Lippescu, Douglas Merson, Demetrius Pohl, Michael Roarke. Steve Rust, and Stephan Wolfsried. As always, many thanks to Hutch Brown, our supreme editor, for improving my scribblings.

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GeoWord of the Day

(from the American Geoscience Institute)

mantle plume

(a) A rising pipe-shaped volume of mantle that is abnormally hot or wet or both, such that during decompression it partially melts. The geochemically distinct basalt that segregates from the plume is called oceanic island basalt and forms oceanic island chains like the Hawaiian Islands. (b) A vertical cylindrical part of the Earth's mantle, hotter than its surroundings, within which larger-than-normal amounts of heat are conducted upward to form a "hot spot" at the Earth's surface.

(from the *Glossary of Geology*, 5th edition, revised)



Kathy Hrechka

Collecting at Crater of Diamonds

November 4 Program

Club member Kathy Hrechka will share her adventures while searching for naturally occurring diamonds at the Crater of Diamonds State Park in Murfreesboro, AR. She will display specimens from the site, which is the eroded surface of an ancient crater. More than 100 million years ago, a diamond-bearing lamproite eruption occurred in what is now southwestern Arkansas, forming today's Crater of Diamonds.

Kathy's talk will include the history of diamond prospecting in Murfreesboro, which began in 1906. Various companies mined diamonds there in the years that followed. The largest diamond, found in 1924, was a



40.23-carat stone called the Uncle Sam Diamond, since faceted into a 12.42-carat emerald-cut gemstone on display in the Smithsonian's gem gallery. In 1972, Crater of Diamonds became an Arkansas state park, welcoming visitors to sift through soils in search of diamonds.

Kathy, who lives in Alexandria, VA, has collected microminerals for the past 40 years, specializing in naturally occurring diamonds. She is a retired flight attendant and the editor of *The Mineral Mite*, newsletter of the Micromineralogists of the National Capital Area (MNCA). She is also the MNCA's webmaster and the club historian for the NVMC. In addition, she volunteers for the Smithsonian National Museum of Natural History's Geology, Gems, and Mineral Gallery.

In addition to hearing Kathy's presentation, we will discuss the upcoming club show on November 23-24. Show Chair Tom Taaffe will lead the discussion; see his article on page 18. We will need volunteers to play various roles required for a successful show. You can sign up here.

Our November meeting will be in person at the Dunn Loring Fire Station, 2148 Gallows Road, Dunn Loring, VA. You can also join us on Zoom at https://tinyurl.com/ycx7tf8j.

Bench Tip

Sanding Disks

Brad Smith

One of the flexshaft tools that saves so much time is the snap-on sanding disk. I mainly use the medium and fine grits, but I sometimes like the very fine ones that are sold for working with platinum.

Ordinarily, you'd think of placing the disk on the mandrel with the grit side facing away from your hand, but notice that you end up with your elbow up in the air. Instead, try flipping the disk so that the grit side is towards your hand. It's a much more comfortable position because the elbow is down near your side, and it lets you hold the work up close where you have a better view of what you're sanding.

I use these snap-on disks so frequently that I keep multiple mandrels with different grits already mounted in the bur stand. Some mandrels have the grit facing out and some facing in.



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





President's Message

by Jason Zeibel

Happy November to all NVMC members and friends! It is a time to give thanks for all our blessings. For our club members, that includes being thankful for all our rocks and minerals, for enough space to keep them all (mostly) indoors, and for a community of friends and family that support us in our hobby. I am certainly thankful for the opportunity to be your president and for the support you show me in my role.

The most important month of the year as a club has arrived—the month of our annual show. We take great pride in putting this on as a club, and the community has become used to it, with many visitors coming back year after year.

This year marks the 32nd annual show and the silver anniversary of our collaboration with George Mason University's Department of Atmospheric, Oceanic and Earth Sciences. It has been a wonderful experience for all involved. I want to give a big shoutout to our show chairman, Tom Taaffe. With his strong attention to detail, Tom has been a driving force in making our show a success.

With that said, the show would never be possible without our club volunteers. A lot of hard work is required to put a show of this size and complexity together (see Tom's article on page 18): the dealers need help unloading on Friday and loading again on Sunday; the admissions table needs volunteers; and, of course, the Kids' Room needs a lot of support.

To be honest, the Kids' Room is actually my favorite part of the show—not just because I have a couple of curious kids, but also because we are chartered to be an educational organization. It is our job as a club to help educate and share our hobby with the next generation of geologists and paleontologists. Although the Kids' Room can be loud and crazy at times, it is where the learning happens (fig. 1).



Figure 1—*A lively Kids' Room is one of the main features at our annual club show. Photo: Jason Zeibel.*

To help the show succeed, I am making a personal appeal to our members to volunteer at least 1 hour of your time. I sent a Sign-Up Genius to our members by email (if you're not getting club emails, reach out to me at president@novamineral.club). Consider signing up for a time slot here. Even if the slots are full for your preferred activity, please consider showing up at either the admissions table or the Kids' Room and offering to help. You are the one who will make our show a success and keep visitors coming back year after year. As a special incentive, all members who volunteer for at least 1 hour get free admission to the show!

One other request for the show: if you have a pile of rocks, minerals, or fossils that you no longer enjoy or that take up space for new treasures, please consider donating them for the show. We can give some away in the Kids' Room or auction them off in the club's silent auction. Either way, they will find homes with excited new owners who can enjoy them. Please bring them on the Friday of the show or to the November club meeting and we'll take care of them. Thank you from your president!

Last month, we enjoyed one of my favorite club activities, the biannual club auction (fig. 2). I have



Figure 2—*Club members examining specimens during the silent part of the fall club auction. Photo: Jason Zeibel.*

always harbored a secret desire to be an auctioneer, and as club president I took the opportunity to make it happen! We auctioned for over an hour, and many treasures went home with new owners.

There was a liveliness to this fall's auction that I hadn't seen in a while! I attribute that to several new members who came. It is amazing to see new faces and new excitement in the club!

At this month's club meeting, we will get to hear about diamonds! (My wife may actually come then!) I am quite excited to hear our own Kathy Hrechka tell us stories about prospecting for diamonds in Arkansas (see the program on page 10).

Since we have a speaker, we will do our best to facilitate a hybrid meeting. Look for an email Zoom link for those of you who are unable to make it in person to the meeting. Since "NVMC Zoom A/V coordinator" is not an actual position, your president and his daughter will do their best to make sure everyone in cyberland can hear, see, and speak with those of us there in person. However, I ask for your patience and feedback regarding what goes well and what still needs work.

Please continue to keep an eye out for good speakers and send a note to our club vice president,



Figure 3—*Some of the specimens offered at the fall club auction. Photo: Jason Zeibel.*

Craig Moore, who has the difficult job of coordinating all speaker schedules. If you have a topic that you are excited about and feel motivated to present on it, then let Craig know!

We will go out to dinner before the November club meeting, so consider joining us. Please RSVP to Craig to make sure we have the right number in our reservation.

Jason

Message From EFLMS President Bill Stephens: Presentations Available

As always, EFMLS clubs can ask Bill Stephens to be a speaker, and he can provide PowerPoint presentations on any number of collecting sites. Topics of new programs in preparation include fluorite from the Blanchard Mine, NM; Willis Mountain kyanite ("geology, mineralogy, mining, and collecting at an active nonmetallic ore mine"); exceptional green diopside crystals from northern New York; and the Red Cloud Mine ("modern collecting and specimen mining at a classic wulfenite locale"). PowerPoint presentations are also available on the Hogg Mine; the Diamond Hill Mine; wavellite from Mount Pleasant Mills, PA; pyromorphite from Phoenixville, PA; and more.

Bill would also like to invite everyone to join him for the upcoming Friends of Mineralogy (PA Chapter) annual symposium and field trip in November (see the sidebar). Held in Heritage Hall at the University of Pittsburgh's Johnstown campus, the symposium will include a small show with dealers. The symposium also includes my talk on wavellite occurrence at the National Limestone Quarry at Mount Pleasant Mills, PA, updated to include the machine dig this spring. It will also include my own updated talk on pyromorphite from Phoenixville, PA, delivered by Ross Elliott. The field trip will be to the Mount Pleasant Mills wavellite location and will be led by me. If you've never been, now's the time to give it a go.

Don't forget the Tucson Mineral Symposium this year! I'll be giving an abbreviated version of my Mount Pleasant Mills presentation, with seven other speakers also lined up. The symposium will be broadcast live on Saturday, February 15, 2025.

Register for both events online. Both are worth 6 continuing education units for professional geologists and are cheap credits if you need them.

October 31 ends my second and final term as president of EFMLS. I will remain your Region IV regional vice president and primary point of contact for EFMLS business. I have also appointed myself as Region V regional vice president to help western clubs that have had no material support and no regional vice president for the time I've been involved in the EFMLS (since 2019).

I am also staying on with EFML as webmaster; please send event ads, profile adjustments for membership, or club officer changes to webmaster@efmls.org. Remember that the annual EFMLS convention for 2025 is in Hickory, NC, hosted by the Catawba society. I will be there representing the EFMLS and maybe selling too.

Rockin' in the Alleghenies

Friends of Mineralogy—Pennsylvania Chapter presents:
Symposium, Show, and Field Trip

JOHNSTOWN SECOND ANNUAL MINERAL, FOSSIL & GEM SHOW

Nonmembers $15, members $10, students free
30+ tables of selected vendors

SYMPOSIUM FOR MINERAL ENTHUSIASTS

Friday evening, Nov. 8: meet & greet (bring your mineral specimens to talk about)
Saturday, Nov. 9: Hybrid symposium (online or in person), 8 a.m. to 5 p.m.
Where: Heritage Hall, University of Pittsburgh-Johnstown
Talks focus on green Pennsylvania minerals, including:

- Beryls of Pennsylvania - by Ronald A. Sloto, PG, West Chester University
- Pyromorphite in Pennsylvania - by Ross Elliott, PG, Delaware DNREC
- Wavellite at Mt. Pleasant Mills, PA - by Bill Stephens, PG, Stephens Environmental
- Serpentine Minerals of the East Coast & Pennsylvania - by Dr. Robert Altamura, PG
- Green Diopside in New York - by Tomer Shapira
- Green Rocks of Northwest Portugal—Ultramafics - by Dr. Ryan Kerrigan, UP-J

Silent Auction – Giveaway Table – Meet Fellow Collectors
Professional Geologists: Six professional development hour credits available for full lecture attendance

FIELD TRIP

Sunday, Nov. 10: Mt. Pleasant Mills Quarry
Open only to symposium registrants.

Visit our website for details, registration form, changes and updates: www.rasloto.com/FM



Meeting Overview: Club Fall Auction

October 7

by Almas Eftekhari, Secretary

President Jason Zeibel kicked off our October meeting with a short business discussion before we got to the main event—our fall club auction of rocks, minerals, and fossils.

After introducing several new people in attendance (Michelle and Jim Keeley, along with Chris Wilson), Jason reminded us of our annual club show coming up in November (see the article on page 18). Please sign up to volunteer—Show Chair Tom Taaffe will be circulating the Sign Up Genius for the show by email. Please consider donating at least 1 hour of your time—if you do, your admission to the show is free!

Vice President Craig Moore announced that November's speaker will be Kathy Hrechka, who will relate her experiences while collecting at Crater of Diamonds State Park in Murfreesboro, AR (see the program description on page 10). Kathy will have specimens on display, including volcanic rock and minerals.

Jason expected teacher Jackie Lake and some of her students to come to the meeting to speak about the NVMC's partnership with Braddock Elementary School in furnishing mineral specimens and other educational materials, but they didn't show up.

Jason asked club members to donate gems, minerals, and fossils for the silent auction at our annual club show. Sue Marcus brought two specimens for us to preview for major door prizes at our club show. Germaine Broussard has been working on displays for the show for several months and brought some for us to preview.

Club members were asked to bring buckets of specimens for the Kids' Room at the show, where they will be given away. The Kids' Room is a lot of fun, so please consider volunteering there for at least an hour.

Jason invited anyone still having problems with club emails going into spam folders to let him know by email (see his email address on the back page).

The auction took up the rest of the meeting—the photos on the right will give you some idea of what there was to see.



September Field Trip
Willis Mountain

by Katy Johnson, Field Trip Co-Chair

On September 21, NVMC members joined EFMLS President and Professional Geologist Bill Stephens and others in the rockhounding community for our annual multiclub trip to Willis Mountain in Dillwynn, VA. The event was hosted by the Kyanite Mining Corporation and coordinated by the Gem and Mineral Society of Lynchburg. Special thanks to James Tomlin, president of the Lynchburg club, for including the NVMC!

According to its website, Kyanite Mining Corporation "is the world's largest and oldest producer and supplier of the industrial mineral kyanite and its calcined derivative, mullite." Due to its ability to resist heat, kyanite has a wide variety of uses, including in spark plugs, brake pads, and kiln features. Kyanite has excellent binding properties, and it is also used in cutting tools and grinding wheels. (See the article on kyanite in the May 2021 issue of this newsletter.)

Before the trip, James Tomlin introduced Bill Stephens to Mike Morris, our corporate host at the mine. Bill was able to get permission to fly his drones, and he got some great aerial photos (fig. 1).

The morning began with us gathering in the parking lot to sign waivers and receive the official safety briefing (fig. 2, top). Afterwards, we caravaned up towards the top of iconic Willis Mountain (fig. 2, bottom). We were blessed with perfect weather and even better company as we enjoyed exploring and digging through the freshly blasted piles of rock stockpiled by the mining corporation as it prepared for the winter months.

According to Bill, the collecting this year was extraordinary, with the mine open to collectors from end to end for the first time in the four times he's been there. Because the crusher had been down for months, piles of kyanite ore were everywhere; moreover, the orebody was exposed in the floor of the mine in several places. Bill had never seen fresh ore in the floor, and he was able to photograph some of the structure and fabric of the orebody while also scavenging for high-quality specimens.

We found high-quality blue kyanite, pyrite in kyanite, and iridescent turgite. Lovely fresh pale-bluish to white kyanite with tiny pyrite crystals abounded in piles and on the floor across much of the mine. Bill



Figure 1—*Drone photo of field trip participants inside the Willis Mountain kyanite mine. Note the exposed kyanite in the wall (center right). Photo: Bill Stephens.*



Figure 2—***Top:*** *Safety briefing for field trip participants from multiple clubs.* ***Bottom:*** *Rockhounds on the mine floor, with the top of Willis Mountain looming in the background. Photos: Katy Johnson (top); Jerry Nissley (bottom).*

alone found at least 150 pounds of blue kyanite, some in large blades, some with pyrite, and some with striking weathering rinds that accented the blue blades (fig. 3). Bill found so much that he started handing out pieces to folks who were wandering about nearby.

Overall, it was an amazing day, and we left with full hearts and full carloads of new specimens. To give you some idea of what we found, here are sample photos of specimens collected by Bill (fig. 3) and me (below). Bill plans to prepare a PowerPoint presentation on the trip featuring his drone footage and the exceptional specimens he collected.





Figure 3—*Specimens collected by Bill Stephens.* ***Top:*** *Nice hand sample of blue kyanite ore with a touch of weathering rind for accent.* ***Middle:*** *Light-blue kyanite with profuse pyrite crystals; note that the surface exemplifies the fabric of crystal growth.* ***Bottom:*** *Another striking blue kyanite specimen with pyrite and a bold brownish weathering rind. Note the seemingly contorted fabric defined by interlocking crystals. Photos: Bill Stephens.*



Field Trip Coming Up

Geology of Upper Accotink Creek

November 9, 2024

Our next field trip will focus on the uppermost part of a major watershed in Fairfax County, VA. Originally scheduled for last May, the field trip was rained out, so we hope to make it up in November.

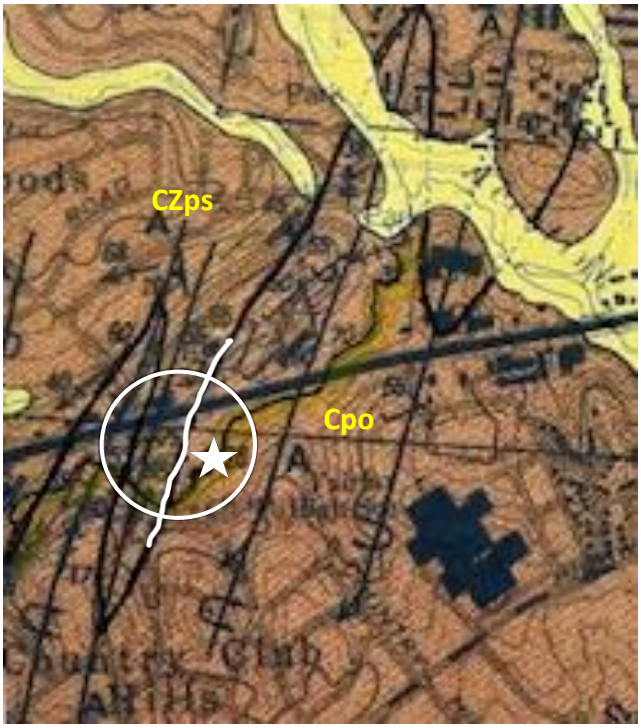
Accotink Creek, 25 miles long, straddles two geologic provinces in our area, the Piedmont and the Coastal Plain. The stream originates just north of the city of Fairfax and crosses onto the Coastal Plain near Lorton, then joins the Potomac estuary near Gunston Hall (home of Founding Father George Mason).

Upper Accotink Creek traverses Piedmont bedrock roughly half a billion years old. We will meet at a small park near Fairfax city and walk to Accotink Creek, where we will see outcrops of upturned, finely bedded metamorphic bedrock. We will also examine gravel bars along the creek for quartz in various hues and for fine-grained, greenish-gray to reddish-brown pieces of bedrock, some with a micaceous sheen, such as phyllite and possibly schist. Bring a rock hammer and a loupe or magnifying glass, if you have them.

Club members will lead the trip, explaining the origins of the bedrock, its context within the geology of our area, and the general history of the creek itself. To help you prepare, the map at upper right—a detail from the 1986 USGS geologic map for the Fairfax Quadrangle—is marked up so you can more easily see key features, such as Accotink Creek (traced in yellow); the field trip location in the park (circled in white); and the bedrock exposure we will see on the creek (white star).

The map shows two geologic units, but they are hard to tell apart because (inexplicably) they were mapped in nearly identical shades of brown. To help you see the difference, the jagged boundary line between them is traced in black. At upper left is Peters Creek schist (**CZps**); at lower right is Old Mill Branch metasiltstone (**Cpo**).

(***Note:*** Peters Creek schist in Fairfax has been reclassified by geologists as Mather Gorge schist (**CZms**), but older maps like the one shown here for the Fairfax Quadrangle still label it as Peters Creek schist. The components, of course, remain the same.)



The boundary line between the two units (**CZps** and **Cpo**) cuts through the field trip site (circled, white line). The bedrock exposure we will see (white star) is in the metasiltstone (not the schist), according to the map. However, geologic mapping is imprecise, especially near boundary lines, so the bedrock could be either schist (and possibly gneiss, a lesser component of the Peters Creek unit) or metasiltstone (plus phyllite and metatuff, lesser components of the Old Mill Branch unit). We might see all of these rocks on gravel bars because the creek washes material downstream.

When: Saturday, November 9, 10 a.m. (rain date: November 10).

Where: Country Club Hills Common Park, 10050 Spring Lake Terrace, Fairfax, VA (from Route 29, take Blenheim Boulevard towards Fairfax city, then right on Brookwood Drive and left on Spring Lake Terrace; park on the street).

The walk to the creek is short, but the vegetation is dense and the weather might be cool, so wear appropriate clothing. The creek is small but has no bridge and we will cross it, so ***wear rubber boots*** or other foot gear that you don't mind getting wet. Bear in mind that your clothes might get a little wet or dirty. We won't be there long, but consider bringing water to drink.

See you there!



Club Show Coming Up!

November 23-24, 2024

by Tom Taaffe, Show Chair

The NVMC is holding our 32nd Annual Gem, Mineral, and Fossil Show this fall at George Mason University (GMU) in Fairfax, VA.

The show will be on November 23-24 in Dewberry Hall, Johnson Center Building, on GMU's Fairfax campus. Show hours will be from 10 a.m. to 6 p.m. on Saturday, November 23, and from 10 a.m. to 4 p.m. on Sunday, November 24. Admission will be $6 for adults, $4 for seniors (65-plus years old), and $3 for teens (13-17 years old). Admission is free for Scouts in uniform, children 12 and under who are accompanied by a parent, and GMU students and faculty with ID.

Here are various ways that NVMC members can help with this year's show. Please sign up here.

Show volunteers needed!!

Volunteers Staff the Show

You can volunteer to help during show hours on Saturday and Sunday. For example, we always need volunteers for the **Kids' Activity Room**. This job entails administering quizzes, helping with puzzles, and awarding free specimens to kids who earn them. It also includes fielding any questions the kids have as well as helping with mineral and fossil identification. The Kids' Activity Room can get a little crazy at times, but it's lots of fun and very worthwhile.

We also need volunteers to help with **setting things up** on Friday night, November 22, from 4 to 9 p.m. The work begins at 4 p.m. with three to four volunteers bringing essential items from the club's storage unit to GMU. It's especially helpful if one or more volunteers can offer use of a vehicle. Additional Friday chores include building showcases and assembling the club's banner. Volunteers might be needed to help set up the Kids' Activity Room according to our floor plan.

Finally, incoming dealers (starting shortly after 5 p.m. until about 7:30 p.m. on Friday night) will greatly appreciate **help from volunteers at the loading dock**. It is very important for the process to go smoothly because we have only 4 loading bays for up to 20 incoming vehicles. We will assign arrival times for dealers to help make the process as efficient as possible.



Display tables at the annual club show in November 2023, with Dr. Julia Nord (left). Photo: Tom Taaffe.

This year, we are celebrating a remarkable **25 years of sponsorship** by Dr. Julia Nord and the Department of Atmospheric, Oceanic and Earth Sciences at GMU.

On Saturday and Sunday, during show hours, we will need volunteer help at the **admissions table**. The need is greatest on Saturday from 9:45 a.m. until about 2 p.m. and again on Sunday morning until about 2 p.m. More volunteers will make the admissions process smooth and efficient; we don't want to make people wait very long to enter the show.

When the show ends at 4 p.m. on Sunday, we will need numerous volunteers to help **take down the show**. Every task that went into setting up the show will go in reverse. Volunteers will need to carefully disassemble all club equipment and gather it up, then load everything into vehicles, transport it back to the club's storage unit, and put it away for next year.

Last year, we had success recruiting volunteers using "Signup Genius," and we are doing it again.

Silent Auction and Door Prizes

Our club holds a Silent Auction on Sunday afternoon, usually between 1 and 2 p.m. On Saturday, we typically award hourly door prizes for both kids and adults. We invite club members to donate hobby-related items such as fossils and minerals for both the Silent Auction and as door prizes. Proceeds from the auction go to the club to help defray show expenses.

Donating Specimens for Kids

You can further contribute to the success of the show by donating mineral and fossil specimens for our Kids' Mines in the Kids' Activity Room. These should be specimens suitable for children, not too big or small (about 1-3 inches in size and weighing about 1-4 ounces). The specimens should be somewhat interesting and attractive, and they should hopefully have some educational value. Donated specimens should not be toxic, sharp, splintery, or otherwise dangerous. They would also be best in their natural unpolished state. Specimens from nearby localities are great choices, such as prehnite, amazonite, amethyst, and garnet.

Devising New Quizzes for Kids

You can help by designing or creating a new mineral challenge, puzzle, or identification quiz for the Kids' Activity Room. Your new mineral quiz should not be too easy or too difficult; we want children to get some of the answers right while still feeling challenged, and we want them to have learned something. If you have an idea and want feedback, please email me at rockcllctr@gmail.com.

For your newly designed quiz, you might want to use photos, line art, or even actual specimens. All of these ideas can work. Just remember that we want your quiz to be relatively uncomplicated and straightforward so that it is easy enough to take and easy to grade. It's been a long time since anyone other than me and John Weidner designed a new quiz for the Kids' Activity Room, so please give it a try!

Getting the Word Out

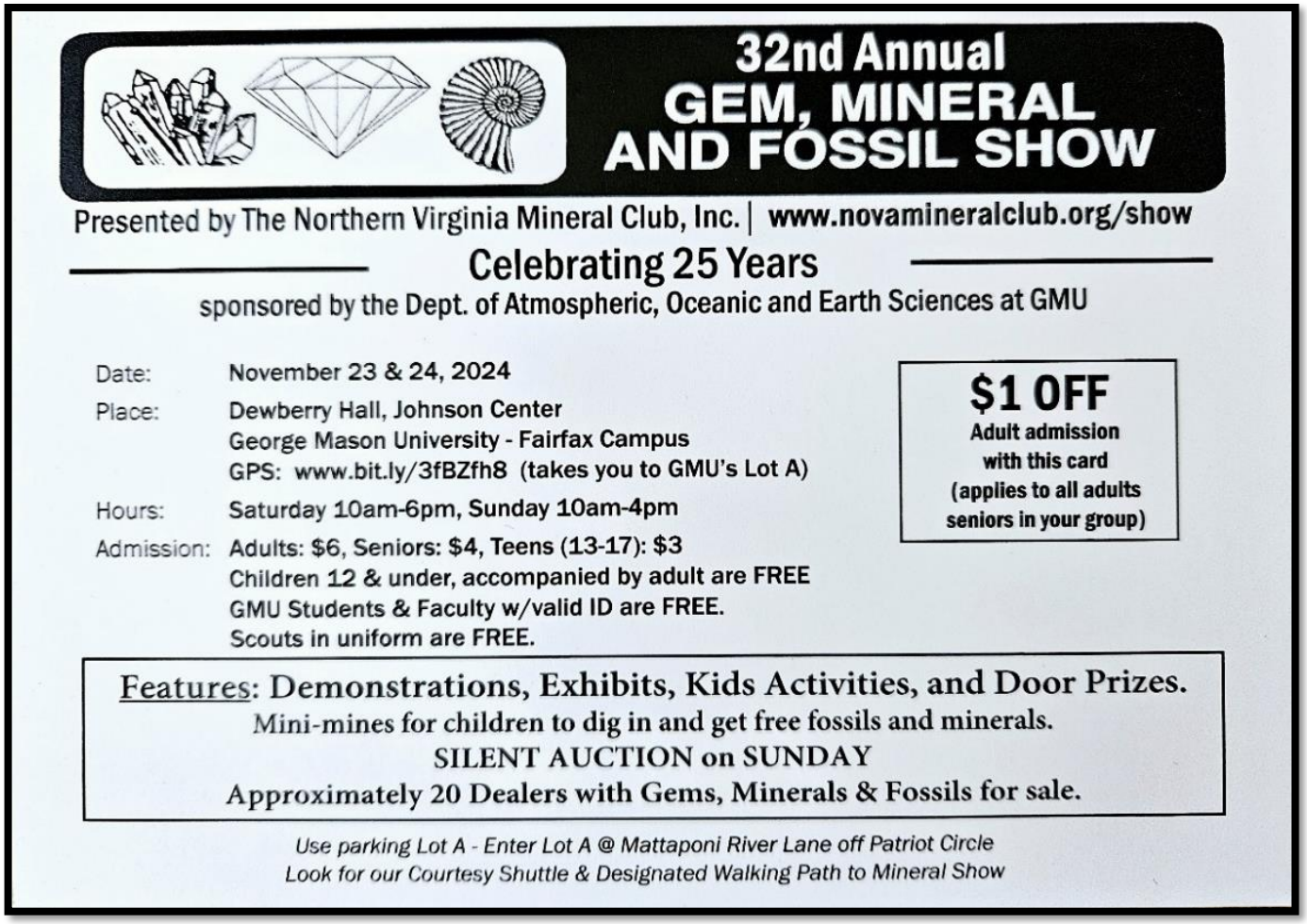
You can volunteer to help promote our annual show and really get the word out. We always need help with show advertising and promotion. We will, of course, mail postcards to previous attendees, and we do post our show on some rockhound show calendars; but we really could use much more help.

2024 Gem, Mineral, and Fossil Show: Participating Dealers

- R and L Minerals, Ron & Linda Tonucci, Waldorf, MD
- Jon Feigin, Glassboro, NJ
- Crystal Luxe Lighting, Aldeane Josephs, Bethesda, MD
- Arrowwood Minerals, Dick & Mary Ertel, Lexington, VA
- Bob Farrar, Bowie, MD
- Alan's Quality Minerals, Mount Laurel, NJ
- The Garnet Group, Casper Voogt, Sterling, VA
- Geosol Imports, Rob Evans, Hawley, PA
- Hartstein Fossils, Gene Hartstein, Newark, DE
- Dave Hennessey, Woodbridge, VA
- Ken Reynolds, Herndon, VA
- KBT Minerals & Fossils, Tom Taaffe, Vienna, VA
- The Mineral House, Tom & Pam Kottyan, Bucyrus, OH
- Broken Back Minerals, Eric Meier, Wilmington, DE
- Andy Dietz, Ashland, VA
- The Prospector Shop, Marianne Cannon, Gibsonia, PA
- Stone Soul Crystals and Gems, Jere Myers, Queenstown, MD

As you might know, myriad social media options and opportunities exist, including Facebook, neighborhood websites, the Patch, websites of regional mineral clubs, and so on. I am sure that several club members are much more fluent in and comfortable with navigating and posting on the web than I am. So please volunteer to help with show promotion.

When the show date is closer and you are ready, please send me an email at rockcllctr@gmail.com, and I will give you all the specifics you will need to post our show on your selected spots on the web (show dates, place, hours of operation, admission fees, and so on).



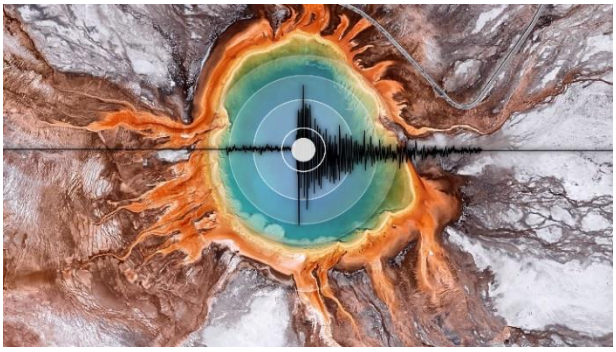
Yellowstone Explosion Explained: A Dive Into National Park's Recent Thermal Activity

by Janet Loehrke

Editor's note: *The article is from* USA Today, *11 August 2024. Thanks to Sue Marcus for the reference!*

Yellowstone National Park visitors were startled last month by an unexpectedly fierce hydrothermal explosion—an eruption of underground hot water that spewed steam, boiling water, mud, and grapefruit-sized rocks hundreds of feet into the air.

No one was injured, but the July 23 explosion in the Biscuit Basin area, just 2 miles north of the famous Old Faithful geyser, damaged a boardwalk and nearby thermal pools. The park service has closed Biscuit Basin as it assesses the area.



While tourists flock to Yellowstone for its natural beauty, the park is also known for its geysers, earthquakes, and hydrothermal explosions, which show the power below the surface—a supervolcano.

What caused Yellowstone's hydrothermal explosion?

Part of the active volcanic area that spans northern Nevada, Idaho, and Wyoming is the Yellowstone Plateau Volcanic Field, which includes the caldera. This Yellowstone caldera is what is causing geysers to erupt. … *Read more*.

Club History

The Annual NVMC Show: A Legacy of George Mason University and Dr. Julia Nord

by George Loud

Editor's note: *George Loud served as NVMC officer in various capacities, including as president in 1991-92 and as show chair in 1993-98, then together with current show chair Tom Taaffe in 1999. Tom submitted the article.*

Dr. Julia Nord, a professor of geology at George Mason University (GMU), has announced that she is retiring in 2025 at the end of the current school year. The NVMC is greatly indebted to Julia and to GMU for hosting our show for the last 25 years. Julia's pending retirement warrants a look back to see how it all began.

When, as club president, I proposed a club show in 1992, I was met with a good deal of skepticism based, perhaps, on previous failed attempts to host a club show. This time, however, a lot of good and talented people stepped forward. Given the difficulty we've had in recent years in filling club offices, it might be hard to believe that in 1992—and for many years thereafter—volunteers were so plentiful.

Our first two club shows were held in the Westpark Hotel (recently closed) on Leesburg Pike in Tysons Corner. After the second show, the Westpark cut back on offered space and raised the asking price, which the club declined to pay.

The next year, we moved the show across the street to the then-headquarters of the National Wildlife Federation. After several shows there, the federation announced its headquarters relocation and the sale of its property in Tysons Corner to a church, and we were left without a venue for our show.

But along came Dr. Julia Nord and Peter Chin to the rescue!

Dr. Nord learned of the NVMC by attending one of our early shows and followed up by coming to one of our meetings. At the meeting, she met Peter Chin, later our club president (2002-03); Peter coauthored *The Mineralogy of Franklin and Ogdensburg, New Jersey* (3 volumes) and is the namesake for the mineral peterchinite. Their conversation led Peter to take Julia and a group of her students on a field trip to the zinc mines in Franklin and Ogdensburg, NJ. Julia and her students enjoyed a fun and educational trip—and, somewhere along the way, Julia learned from Peter about NVMC's need for a venue for our annual club show.



Dr. Julia Nord, professor of geology at George Mason University, has long supported the annual NVMC show.

It occurred to Julia that the facilities at GMU might be a suitable venue while also exposing her students to aspects of geology and mineralogy that would supplement classroom learning. Julia recalls attending a show planning meeting at my home in Vienna, VA. She relates how everything was easier back then, so she was able to reserve several rooms in a Student Union building for the NVMC show.

And that's how the geology department at GMU became our show sponsor, beginning a wonderful relationship that has lasted for the past 25 years. A bonus from GMU sponsorship was having help from strong young student volunteers in carrying things in, setting up the tables, and assisting in many other ways.

I continued as show chair for several years at GMU and then gladly passed the reins into the able hands of Tom Taaffe, who has successfully run the show for nearly 20 years. I greatly respect and admire what Tom, Julia, and GMU have accomplished with the NVMC show for so many years—and I look forward to the show's ongoing success for many years to come.

Spruce Pine: High-Purity Quartz

by Hutch Brown

Editor's note: *The piece is based on materials submitted by Sue Marcus (USGS Mineral Commodities Summary 2024, National Public Radio, 1 October 2024).*

Rockhounds know Spruce Pine (population 2,194) in the mountains of North Carolina for mineral collecting on local mine dumps and for its proximity to the biannual Wildacres workshops in Little Switzerland. Less well known is exactly what's still mined in the area: mica (starting with American Indians thousands of years ago), kaolin, feldspar, and quartz.

In fact, the Spruce Pine Mining District has Earth's largest reserves of high-purity quartz—quartz with less than 100 parts per million of impurities. Quartz, of course, is silicon dioxide, but iron, aluminum, and other elements often replace some of the silicon in the mineral makeup, adding colors prized by collectors but rendering the mineral of little commercial value. By contrast, the high-purity quartz mined by two companies in Spruce Pine is key to economies worldwide: high-purity quartz goes into electronics, specialty glass, fiber optic cables, high-temperature lamp tubing—and, according to USGS, "fused quartz crucibles for manufacturing silicon metal ingots that are later processed into silicon wafers for the photovoltaic cell and semiconductor markets." Think Silicon Valley and the microchips and solar panels that have become so crucial to technologies and energy supplies.

The high-purity quartz mined in Spruce Pine comes from pegmatites emplaced hundreds of millions of years ago by tectonic processes. Quartz deposits commonly come from hydrothermal fluids filling cavities in the bedrock during mountain-building events; the superheated waters contain silica and other substances, leading to impurities in the quartz as the fluids cool and minerals precipitate out. By contrast, the Spruce Pine pegmatites formed in the absence of water, so they contain quartz that is exceptionally pure.

Hurricane Helene struck Florida on September 26 and moved north as a tropical storm, dropping historic amounts of torrential rain on already saturated soils in the Southern Appalachians of Georgia, the Carolinas, eastern Tennessee, and southwestern Virginia. On September 27, the storm dumped 2 feet of rain on the Spruce Pine area; the local North Toe River flooded, putting the town under 10 feet of water. Floodwaters



Spruce Pine pegmatite mined for high-purity quartz, along with mica, kaolin, and feldspar. Source: Wikipedia.



Flooding in Spruce Pine, NC, caused by torrential rains in the aftermath of Hurricane Helene in September 2024. Source: National Public Radio.

toppled trees, washed out roads and rails, and left much of the region isolated from the outside world.

Mining operations ended on September 26 in preparation for the storm; as of early October, flooding impacts on the mines were still unclear, although operations resumed at one mine on October 11. Even so, transporting quartz out of the area was sure to pose problems. The quartz is shipped by rail, and the railroad running along the North Toe River was badly damaged, leaving critical supplies of high-purity quartz at (hopefully) short-term risk.

The Rocks Beneath Our Feet

Virginia's Gold-Pyrite Belt, Part 1: Cosmic Genesis

by Hutch Brown

Editor's note: *This is an edited version of an article that appeared in* The Mineral Newsletter *in June 2018.*

In 1607, colonists founded Jamestown in Virginia, the first permanent English colony in North America (fig. 1, red diamond). The colonists and their commercial sponsors in England hoped to find gold. After all, Spain had become fabulously rich from gold and silver mines in its American colonies; so why not England in its colony of Virginia?

But the colonists found no gold. The only metal used by American Indians in Virginia was copper acquired through trade from sources near Lake Superior. The local tribes had no precious metals, so the colonists gave up their dreams of finding gold.

Yet an undiscovered belt of gold-bearing rock lay west of Jamestown beyond the Fall Line zone (fig. 1, green lines). Located in the Piedmont geologic province, the rock contained substantial quantities of both gold and iron-bearing pyrite. Today, we know the area as the Gold-Pyrite Belt (fig. 1).

Like most landforms in our area, the Gold-Pyrite Belt is oriented from southwest to northeast (roughly parallel to the Blue Ridge Mountains). After gold was finally discovered in Virginia in the late 18th century, hundreds of mines and prospects opened, mostly in the Gold-Pyrite Belt (fig. 1). From 1804 to 1947, Virginia produced about 100,000 troy ounces of gold.

How did all that gold get there?

Gold in the Earth's Core

The gold really shouldn't be there—not according to the "core accretion model," the prevailing theory of Earth's formation.

The solar system began about 4.6 billion years ago as a cloud of dust and gas. After the sun formed, gravity collapsed much of the remaining matter into growing clumps of rock. The rocky cores consolidated about 4.5 billion years ago into Earth and other planets.

Earth's first geologic period, known as the Hadean Eon, lasted from about 4.5 billion to 3.8 billion years ago, long before life evolved. The Hadean Eon was characterized by volcanism and by showers of meteorites and other celestial bodies, some of them huge. One such collision about 4.48 billion years ago resulted in formation of the moon.

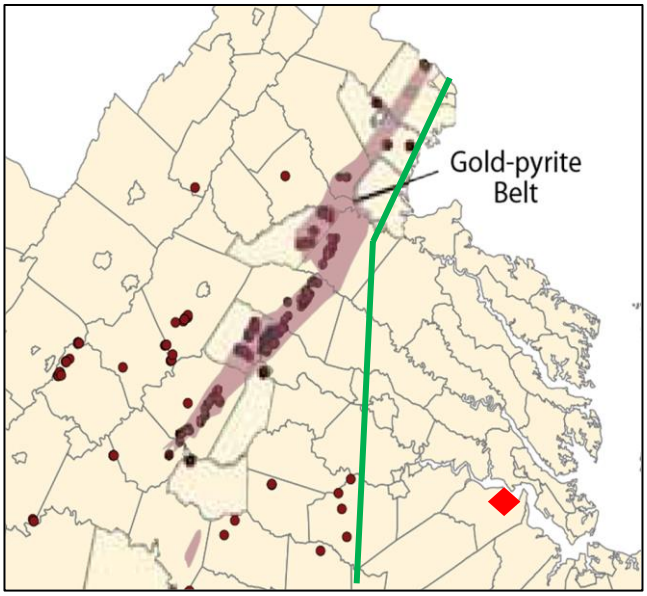


Figure 1—*The Gold-Pyrite Belt in north-central Virginia (shaded area). Purple dots = gold mines and prospects; red diamond = Jamestown; green lines = Fall Line zone. Source: Sweet (2007).*

As Earth grew by accretion, its mounting mass created pressure and heat, melting its components. During the early Hadean, Earth was mainly molten matter circulating in convection currents, much like Earth's molten mantle does today.

The molten rock gradually separated out into lighter and heavier materials. Less dense silicates rose toward Earth's surface, whereas iron and other metals sank into the center of Earth, forming its core.

Many elements readily attach to iron. Bonded onto the sinking iron, they too vanished into the center of Earth. The five most widely used siderophile ("iron-loving") elements are iron itself, aluminum, gold, nickel, and platinum. In fact, Earth's solid core has enough precious metals such as gold, silver, and platinum to cover the entire surface of Earth with a layer 13 feet thick.

The scarcity of such metals on or near Earth's surface is what makes them precious. Yet precious metals still occur in Earth's crust at rates up to a thousand times greater than the core accretion model would predict. Rich deposits of gold, for example, are mined in China and Australia, the world's top two gold producers.

How can that be? Why isn't every ounce of siderophile, whether gold, silver, or iron itself, buried in Earth's core?

Gold From Outer Space

Scientists believe that most of the siderophiles in Earth's crust accreted to the planet about 200 million years *after* it first formed. By then, Earth's original siderophiles had sunk into the planet's solid metallic core. With further accretion of siderophiles from the cosmos, however, Earth began forming crust containing them. Scientists call it the late veneer.

The siderophiles arrived in the form of meteor showers (fig. 2, left). About 4.3 billion years ago, Earth was bombarded by what geologists call chondrites—rocky extraterrestrial bodies unmodified by melting and differentiation. The chondrites therefore contained plenty of siderophiles, including iron and gold.

The chondritic meteorites and asteroids not only cratered the moon but also broke through Earth's thin crust, adding their mass to the planet's molten mantle. The late veneer meteor showers were heavy enough to account for 0.5-1 percent of Earth's entire mass today, enough to alter the chemical composition of Earth's mantle. The chondrites enriched the mantle with iron, nickel, cobalt, tungsten, and other siderophiles, including gold (fig. 2, right).

Driven by convection currents, the ocean of magma in Earth's mantle is still sorting itself out. In the process, it forms solid crust at Earth's surface, moving it around in vast plates and occasionally breaking through it in volcanic eruptions and lava flows. When undifferentiated magma enriched with siderophiles rises in plumes that cool underground, the cooling process can separate out the siderophiles, leaving rock rich in precious metals.

But how exactly does gold-bearing rock form? And why did it form in what is now Virginia?

Next: How tectonic processes about half a billion years ago contributed to gold deposits in Virginia.

Acknowledgment

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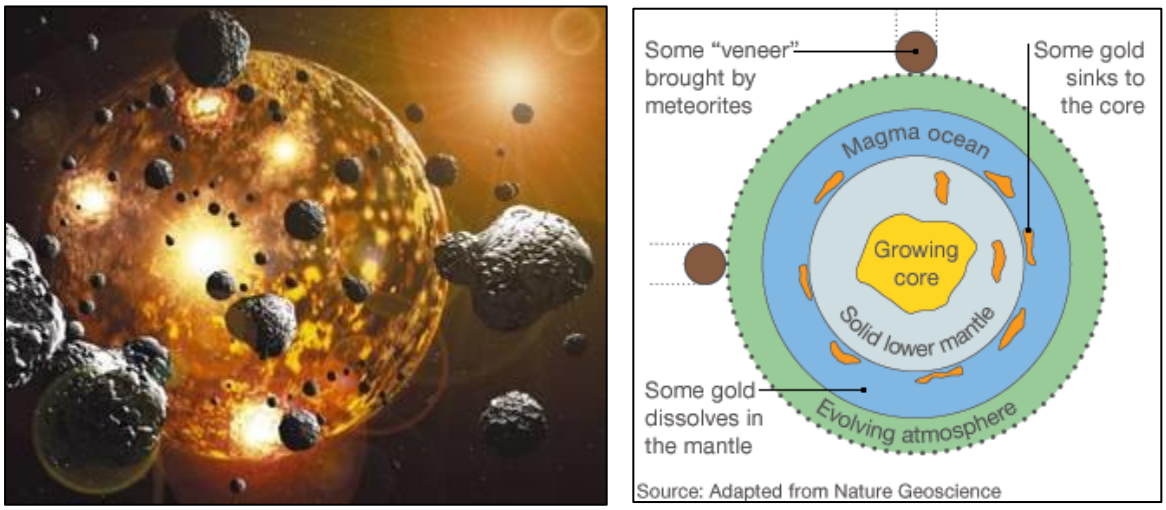


Figure 2—*The late veneer event, a bombardment of Earth by meteorites and asteroids about 4.3 billion years ago. The extraterrestrial bodies added their mass to Earth's liquid mantle, enriching it with gold, silver, iron, and other metals, some of which eventually went into forming ores in Earth's crust. Sources: Kremer (2013); Smith (2011).*

November 2024—Upcoming Meetings/Shows in Our Area (see details below)

Sun	Mon	Tue	Wed	Thu	Fri	Sat
					1	2 Show, Philadelphia, PA
3 Show, Philadelphia, PA	4 **NVMC mtg**	5	6 MSDC mtg	7	8	9 Shows, PA, VA
10	11 **Veterans Day** GLMSMC mtg	12	13	14	15 Shows, NC, PA	16 Shows, NC, PA
17 Shows, NC, PA	18	19	20	21	22 **NVMC show (setup)**	23 **NVMC show**
24 **NVMC show**	25	26	27 MNCA mtg	28 **Thanksgiving**	29	30

Event Details

2-3: Oaks, PA—Annual show, Tuscarora Lapidary Society; Greater Philadelphia EXPO Ctr, 100 Station Ave; Sat 10-6, Sun 10-5; adults $6, kids under 12 $1, 2-day adult tickets $, Scouts in uniform with Scoutmaster free; info: Linda Green, tuscaroralapidary@gmail.com, www.lapidary.org.

4: Dunn Loring, VA—Northern Virginia Mineral Club mtg; https://www.novamineralclub.org/.

6: Washington, DC—Mineralogical Society of the District of Columbia mtg; httpwww.mineralogicalsocietyofdc.org/.

9: Mechanicsville, VA—Annual Rock Sale & Swap, Richmond Gem & Mineral Society; St Paul Lutheran, 8100 Shady Grove Rd; Sat 9-3; admission free; info: https://www.rgmsva.com/.

9-10: Johnstown, PA—Symposium, PA Mineralogy/Mineral Show; Friends of Mineralogy (PA Chptr); Heritage Hall, U. Pittsburgh-Johnstown; Sat 8-5, Sun: field trip, Mt Pleasant Mills Quarry; reg: https://www.rasloto.com/FM/whats-new.

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

15-17: Raleigh, NC—Show, Treasures of the Earth, Inc; North Carolina State Fairgrounds, 4285 Trinity Rd; Fri 12-6, Sat 10-5, Sun 10-5; adults $8, 16 and under free; info: Ellen White, 804-642-2011, Ellen.White@TreasuresOfTheEarth.com, www.TreasuresOfTheEarth.com.

15-17: Lebanon, PA—Show, Mid-Atlantic Gem and Mineral Ass'n; Expo and Fairgrounds, 80 Rocherty Rd; Fri 12-6, Sat 10-5, Sun 11-4; adults $6, kids under 12 free; info: Teresa Schwab, 301-807-97, eventcoordinator@gem-show.com, www.gem-show.com.

22-24: Fairfax, VA—NVMC/GMU show (details on page 18).

27: Burke, VA—Micromineralogists of the National Capital Area mtg; http://www.dcmicrominerals.org/.

The Northern Virginia Mineral Club, Inc.

Visitors are always welcome at our club meetings!

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

Please send your newsletter articles to:
Hutch Brown, editor
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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).

2024 Club Officers

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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 possibly 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 Fairfax County schools.*

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