THE NORTHERN VIRGINIA MINERAL CLUB INC

The Mineral Newsletter

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

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



Plancheite

M'sesa Mine, Kambove, Haut-Katanga, Democratic Republic of Congo

Source: Mindat. Photo: Nadya Georgieva, Quebul Fine Minerals.

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May 2026
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May Meeting Program:

Winston Fancy Colored Diamonds

Details on page 10.

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Mineral of the Month
Plancheite

by Sue Marcus

Copper minerals, especially the oxide minerals, are attractive collectible specimens. The blues and greens add color to any display. Our May Mineral of the Month is the copper silicate plancheite (pronounced PLAN-chite). It was brought to the attention of A. Lacroix in 1892. The samples were poor, so he first described it in 1908 after receiving better specimens from François Gilbert Planche.

Planche was a French engineer, politician, and—of greatest importance to us—director of the mining company in French Congo. He and a "Mr. Lucas" gave the specimens from the French Congo mine in Midouli to Lacroix.

Lacroix was a mineralogist at the French Natural History Museum. He published two papers in 1908, including descriptions of the mineral he named plancheite, in honor of Planche.

Plancheite is a secondary copper mineral that formed from the alteration of primary copper minerals. It is usually found in the oxidized caps of some sulfide deposits. Rarely occurring in large specimens, it is usually found as colorful micromounts. Botryoidal plancheite or acicular tufts of this mineral provide a pleasing palate of blues and greens on specimens with lustrous dioptase or velvety malachite. When included in quartz, blue plancheite adds flamboyance to this common mineral.

Localities

United States

Plancheite is not abundant in the United States. Since it occurs as a secondary copper-bearing mineral, the copper mines of Arizona are where most specimens have been collected. The Arizona mines are also sources of similar blue or aqua minerals, such as shattuckite and chrysocolla, which can complicate identification of plancheite.

At the Morenci Mine, vugs in massive quartz-rich rock provided space for acicular plancheite to grow. The vugs are small, no more than a centimeter or two (less than an inch) across. Mindat shows multiple vugs in a specimen that is 4 centimeters (1.6 inches) wide. Plancheite included in quartz seems like a possibility in one specimen shown on Mindat. Mining began at the Morenci Mine in 1942 and is continuing. This mine has the largest copper reserves in the United States.

Happy Memorial Day!

Northern Virginia Mineral Club members,

Our next club meeting is on **Monday**, May 4, 7:30 p.m. (doors open at 7 p.m.), at our usual meeting place, the Dunn Loring Fire Station. Our speaker will be Dr. Gabriela Farfan, who will give a Zoom presentation on the Smithsonian's Winston Fancy Colored Diamond Collection; see program details on page 10.

(***Note:*** We will not meet beforehand for dinner.)



Plancheite, *Shangulowé Mine, Kambove, Kambove Territory, Haut-Katanga, Democratic Republic of Congo. Source: Mindat; photo: John Sobolewski.*

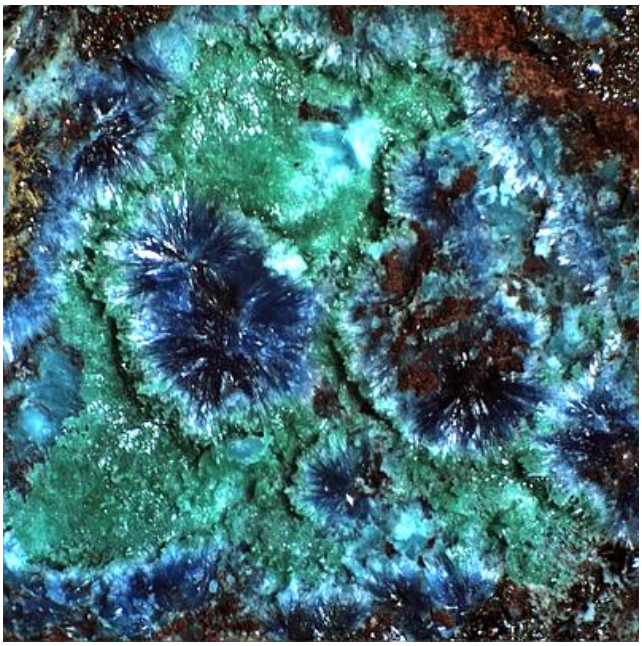
The Eagle Eye Mine in the La Paz Mountains is another source of U.S. plancheite. Specimens from this locality are primarily tufts of microcrystals. Contrasting colors of yellow mimetite and green conichalcite make attractive micromounts. Images on Mindat show underground workings that now look like good habitat for rattlesnakes.

Plancheite takes unusual forms at the Champie Mine near Copperopolis in Yavapai County. An acicular ball of plancheite was overgrown (included) in a microscopic euhedral quartz crystal. Another Mindat image either from the Champie Mine or the Lone Star Mine shows microscopic plateaus of limonite capped by plancheite, with chrysocolla appearing as frozen rivulets running down the sides of the plateaus. A few specimens exhibit flattened, radiating plancheite crystals while one 6.2-centimeter (2.4-in) specimen exhibits the more common botryoidal form.

Bisbee is another famous Arizona copper mine. Only a few plancheite specimens are known from Bisbee. Most are micromount-size specimens. One, with plancheite covering the surface, is 3.5 centimeters (1.4 in) across. Plancheite appears to have formed in open spaces in the host rock.

The Queen of Sheba Mine in Maricopa County was an underground copper mine that also produced silver and gold. Acicular balls and flattened rosettes of plancheite on limonite matrix make vivid micromounts, especially when malachite is present. The property is patented and therefore private. The dumps may be accessible, though the mine itself has been reclaimed.

A few specimens of plancheite were also found at the Nugget Fraction Mine (Silver Reef Mining District) and the Blue Star Mine, both in Pinal County; at the Omega Mine and Azurite Mine, both in Pima County; at the Bonanza Mine in LaPaz County; and at the Golden Rule Mine in Cochise County. (The caption accompanying a photo of a specimen from the Bonanza Mine shown on Mindat notes that it was acquired as a giveaway at a Baltimore Mineral Society event. Micromounters get the best freebies!) In Pima County, the Table Mountain Mine is another long-closed copper producer that yielded a few plancheite specimens. Botryoidal plancheite crusted the host rocks, forming specimens at least 3.4 centimeters (1.3 in) across.

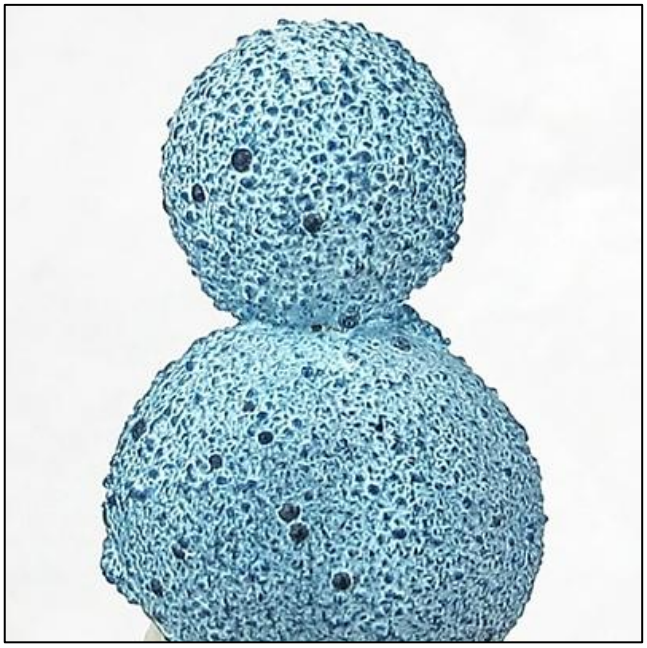


Plancheite with malachite and hematite, Queen of Sheba Mine, Maricopa County, AZ. Source: Mindat; photo: Rolf Luetcke.

Wonderful micros came from the Mammoth-St. Anthony Mine in Pinal County. In Mindat images, these display bright blue balls of tiny sparkling, radiating crystals. Some of these tiny gems fill vugs with lemon-yellow wulfenite or mimetite and colorless willemite. One even sports crystals of surite (I had to look that one up—it's a rare lead silicate).

Prismatic crystals reported to be plancheite were found at the Independence Mine in Luna County. One Mindat image shows a transparent blue crystal about 1 millimeter (0.04 in) long. Plancheite specimens seem to have been scarce, and the images all show microcrystals, nothing larger.

The text accompanying an image of plancheite and quartz from the Ray Mine indicates that plancheite has not been confirmed, although X-ray analysis appeared to show it as plancheite. The specimen is 3 centimeters (1.2 in) in all dimensions, with radial balls of plancheite across at least two surfaces of the underlying, slightly yellow drusy quartz. Botryoidal plancheite is light blue to teal blue. The Ray Mine is active, so perhaps more of these attractive specimens will be found and the identity of the mineral species confirmed.



Plancheite, Tantara Mine, Haut-Katanga, DRC.
Source: Mindat; photo: Rob Lavinsky.

A single image of plancheite from the Algomah Mine in northern Michigan's copper region has been posted on Mindat. It is a micromount with very pale blue, unusually scraggy, hairlike plancheite crystals.

Mexico

The Milpillas Mine in Sonora is best known to mineral collectors for its superb azurite crystals. Plancheite occurred in the upper, oxidized part of this copper deposit. It was not abundant, although specimens of blue botryoidal plancheite with emerald green malachite were especially attractive. Most of the oxidized part of the orebody, which hosted malachite, azurite, and plancheite, was mined out by the end of 2011. All mining was suspended in 2021 due to low metal prices and higher mining costs.

Argentina

Plancheite was found with other copper minerals in the Malpaso Quarry near Dumenil in Córdoba Province. Argentina is not widely known for dioptase crystals, but exquisite, transparent crystals occurred at this limestone quarry. Plancheite forms pseudomorphs after diopside, though specimens are rare.

Chile

Radial aggregates of microscopic crystals were found in Chile's Atacama Desert.

Italy

A few sites in Italy hosted plancheite. The most prolific was probably the Vallone stope of the Cape Calamita Mine on the island of Elba. Botryoidal plancheite from there forms crusts, usually associated with chrysocolla. According to the captions of the images posted on Mindat, most of the plancheite identifications were made visually, so confirmation would be useful. Iron was the primary economic ore at the Calamita Mine. The deposit is associated with skarns, which may have localized concentrated copper-rich mineralization. At the Botro del Diavolo, near Livorno, microscopic crystals were identified through analysis by the Muséum National d'Histoire Naturelle in Paris. Microcrystals were also found in a specimen from Sardinia.

The Congo Complexity

Our Mineral of the Month column needs to detour briefly from minerals and geology to geography and history. There are currently two separate countries with Congo in their names. The Republic of the Congo was under French colonial rule until independence in 1960. Plancheite was first identified from materials found in the Republic of Congo.

The Democratic Republic of Congo (DRC) was under Belgian colonial rule and has been known as the Bel-



Plancheite, Tantara Mine, Haut-Katanga, DRC.
Source: Mindat; photo: Nadya Georgieva, Quebul Fine Minerals.

gian Congo and Zaire at different times in its history. The DRC, which also become independent in 1960, has produced the most plancheite.

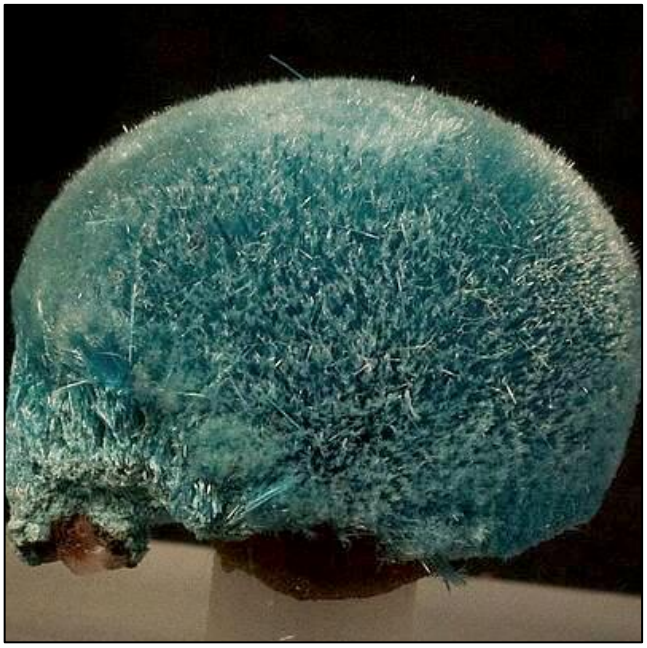
Copper deposits in the two countries formed by different processes. Ore deposition that formed the copper deposits of the Republic of the Congo is more enigmatic than in DRC deposits. In the West Congo Belt, which includes the Republic of the Congo, copper-lead-zinc (base metal) mineralization seems to be related to unconformities. The specific nature of this relationship is a likely topic of interest to mining companies seeking additional resources in that area.

Republic of the Congo (Capital—Brazzaville). The type locality (source of the samples used for the first description of a mineral) is called the Sanda Hills occurrences. Outcrops of copper mineralization occurred over a distance of 3 kilometers (1.9 miles) near the town of Mindouli. French mining companies exploited the copper deposits through open pit and underground workings from 1948 to 1960, while the country was under French control. In 2011, a Chinese company reportedly gained exploration rights to the area. If they are mining below the oxidized layer of the orebody, more plancheite will probably not be found.

Specimens of gemmy dioptase contrasting with powder-blue botryoidal plancheite formed beautiful specimens. Plancheite covered by drusy quartz formed uniquely lustrous, sparkling specimens, somewhat similar to the specimens of drusy quartz over chrysocolla. Native silver and plancheite with dioptase, malachite, and quartz form unusual specimens. Quartz, malachite, cerussite, and duftite are the minerals most commonly associated with plancheite.



Plancheite, M'sese Mine, Kambove, Haut-Katanga, DRC. Source: Mindat; photo: Paul DeBondt.



Plancheite, Shangulowé Mine, Haut-Katanga, DRC. Source: Mindat; photo: Rob Lavinsky.

The original twin papers by Lacroix (1908a and 1908b) describe three forms of plancheite: (1) "dark blue concretions, with a mamillated surface and a very tight fibrous structure" with calcite rhombs and dioptase crystals; (2) "pale blue spherulites, formed of loosely bound needles" overgrown by malachite and native silver, with cuprite, forming veinlets in chalcocite-rich ore; and (3) "light blue fibers, reaching 4 centimeters [1.6 in], found alone in the fissures of a sandstone; this asbestos-like variety also forms small fibrous veinlets in the sandstone itself, which resemble those of chrysotile in serpentine."

The source and formation of copper mineralization in the West Congo Belt and specifically at Mindouli is still being debated. A relatively recent explanation suggests that limestone and sandstone were faulted, making the rocks more permeable to copper-bearing fluids. Ore mineralization is close to the surface, usually less than 100 meters (328 ft) underground, according to Demetrius Pohl (an exploration geologist who is familiar with these deposits (personal communication)).



Plancheite, M'sese Mine, Kambove, Haut-Katanga, DRC. Source: Mindat; photo: Jasun McAvoy, http://www.mineralman.com.



Plancheite, Shangulowé Mine, Kambove, Haut-Katanga, DRC. Source: Mindat; photo: Stephan Wolfsried.

Crusts and tuft-filled vugs of plancheite were found at the Renéville Mine. Flat, radial rosettes of plancheite exhibit multiple distinct concentric bands of different colors, presumably indicating slight changes in the chemistry of the depositional fluids. Most specimens shown on Mindat are bright, beautiful micromounts, although one is 1 centimeter (0.4 in) across.

Democratic Republic of Congo (DRC) (Capital—Kinshasa). The DRC copper deposits produced the finest specimens of plancheite, and they were also the most prolific producers. The plancheite-bearing rocks are part of a sequence of carbonate and clay-rich sedimentary rocks that were tectonically deformed.

In the Central African Copperbelt, a basin was formed by rifting, then filled with sediments. Ores formed by movement of brines that caused weakening in the sedimentary rock layers. These weak zones were prone to fractures due to tectonism and to the introduction of hydrothermal fluids over more than 800 million years since deposition of the original sediments. Less dense brines and salt deposits rose and deformed the overlying rocks, fracturing them, adding briny fluids, and facilitating chemical redistribution and deposition.

At the Shangulowé Mine near Kambove, plancheite usually forms acicular tufts, appropriately called "urchins" by one Mindat poster. Plancheite covers up to 7 centimeters (2.8 in) on some specimens, but the coverage is usually only 2 to 4 centimeters (0.8-1.6 in). Along with the urchins, jackstraw crystals (small clusters of needles growing in apparently random directions) and botryoidal masses of parallel to subparallel crystals occurred at this mine. Colorless barite crystals and malachite are commonly associated minerals. More rarely, plancheite may be included in calcite or heterogenite crystals formed on the plancheite. Vugs filled with thin plancheite needles are another form found at the Shangulowé Mine.

The M'sesa Mine, also near Kambove, was another copper mine that produced attractive plancheite specimens. Compositional zoning of plancheite, malachite, and possibly other minerals is exposed when some of the botryoidal structures are broken open, revealing their cross-sections. Rare specimens of plancheite pseudomorphs after euhedral cuprite crystals were extracted from a single pocket in this mine. Some of these pseudomorphs have unusually lustrous faces. Specimens of plancheite came from the M'sesa Mine as early as the late 1950s, with another surge of discoveries in the 1980s. Specimens greater than 13



Plancheite, Shangulowé Mine, Kambove, Haut-Katanga, DRC. Source: Mindat; photo: Stephan Wolfsried.



Plancheite? Nchanga Mine, Zambia. Source: Mindat; photo: Rob Lavinsky.

centimeters (5 in) in size were found. These may be the largest known plancheite specimens. The mine closed in the late 1970s, so some specimens may have come from dump material that has since been removed for reprocessing. At both the Shangulowé and the M'sesa Mines, extraction was conducted by open cuts, not underground.

The Tantara Mine is another former open cut copper mine in the Kambove region that produced collectible plancheite. Many Tantara specimens do not look like those from other Kambove mines. At Tantara, plancheite took many forms, often coexisting with lustrous dioptase and off-white calcite to form pleasing, colorful specimens. Dioptase was also replaced by plancheite in some specimens. Acicular plancheite formed tufts, while rare radiating clusters of this mineral grew to 2.8 centimeters (1.1 in). One plate of plancheite shown in Mindat is 13 centimeters (5 in) long. Some specimens of mixed minerals appear to have been broken and been reconnected by newer crystal growth. Mindat captions mention specimens found in the 1920s, 1970s, 2011, and 2013.

At the Mashamba West Mine, collectors have many beautiful forms of plancheite to enjoy. Botryoidal coverings show the radiating crystals packed together, while other specimens look like light blue branching corals. Quartz takes on a bright blue hue from included plancheite. Specimen sizes range from 5.4-centimeter (2.1-in) matrix specimens to micros: something for everyone.

The Mashamba West pit is now part of a much larger Chinese-owed Sicomines copper-cobalt operation, with the adjacent Dikuluwe pit being the main ore source. This mining complex is near Kolwezi, west of the Kombove mines.

The Kambove Principal Mine, now abandoned, produced plancheite specimens up to 4 centimeters (1.6 in) in size.

Zambia

In Zambia, the Mufulira Mine was the source of a pale blue plancheite specimen, 2.9 centimeters (1.1 in) across, that was found deep in this underground mine in 1977.

Plancheite is not included on the Mindat minerals list for the Nchanga Mine. Rob Lavinsky posted an image on Mindat of a specimen with the particular part of the orebody and mine level specified. The image is, confusingly, one of the images on Mindat for this locality. This specificity and the appearance of the mineral strongly suggest that it is plancheite, though analytical confirmation is warranted. The 5.8-centimeter (2.3-in) piece is almost entirely composed of radiating fans of aqua plancheite with minor

quartz. Since this specimen is almost entirely plancheite, other specimens likely existed. The Nchanga Mine is being renovated, so perhaps more plancheite—or other collectible minerals—will be found.

Namibia

For mineral collectors, the Tsumeb Mine is arguably the most famous mine in the world. The oxide zones of the copper deposit yielded some of the finest azurite specimens in the world, along with the best dioptase crystals to hit the collecting market at the time when it was producing dioptase, along with gorgeous reticulated cerussite crystal groups and at least 170 different mineral species, including plancheite.

Tsumeb is not noted for plancheite; the stellar quality and abundance of other minerals eclipses it. Plancheite from Tsumeb forms botryoidal mats of typically fibrous crystals, usually with nicely contrasting dioptase, in specimens that extend for 7 centimeters (2.8 in). It occasionally replaces azurite or calcite. It is even included in cerussite crystals.

Spheres of plancheite occurred at the Omaue Mine. Coatings of plancheite, looking like frozen rivulets of pale blue paint, were also extracted. Similar specimens bearing the more general locality of Kaokoveld Plateau are also shown on Mindat.

Economic Uses

Plancheite is not abundant enough to form economic deposits on its own. It can contribute minor amounts of copper when mined with more extensive ore minerals.

Gems

Plancheite is not a gemstone, but it has been formed into at least one cabochon. Rolf Luetcke has posted a cab that he owns, made from a specimen of quartz, malachite, and plancheite from the Milpillas Mine in Sonora, Mexico. No cabs were for sale when I conducted an online search on April 15, 2026.

Prices

When I checked online sources on April 15, 2026, specimens of plancheite were available but not abundant. A 4.4-centimeter (1.7-in) specimen was listed for about $60. Another piece, 2.9 centimeters (1.14 in) across, with plancheite partly covered by drusy quartz, was offered for $135.



Plancheite with dioptase, calcite, and smithsonite. Tsumeb Mine, Oshikoto Region, Namibia. Source: Mindat; photo: Neal Luppescu.

These specimens *appear* to be plancheite; potential buyers should be cautious because plancheite, chrysocolla, shattuckite, and possibly other secondary copper minerals can look very similar.

Technical Details

Chemical formula .....$Cu_8Si_8O_{22}(OH)_4•(H_2O)$

Crystal form .....Orthorhombic

Hardness.....5.5-6

Specific gravity.....3.65-3.80 g/cm^3 (measured)
3.85 g/cm^3 (calculated)

Color .....Shades of blue, from pale powder blue through deeper gray-blue and aqua to greenish blue

Streak .....Light blue

Cleavage.....None/unknown

Fracture .....None/unknown

Luster .....Silky to vitreous

Acknowledgments

Demetrius Pohl provided prompt and patient answers to my questions about the differences between African copper belts. He visited many of the localities mentioned while working as an exploration geologist in Africa. As an expert on the area—and a mineral collector—he also wrote a useful Mindat message on the differences between the two countries that now have Congo in their names.

Roger Warin graciously furnished photos not published elsewhere. While searching for a way to contact him, I learned of another terrific resource for mineral collectors: Friends of Minerals Forum.

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Plancheite with dioptase and calcite. Tantara Mine, Shinkolobwe, Haut-Katanga, DRC. Source: Mindat; photos: Nadya Georgieva, Quebul Fine Minerals.



Dr. Gabriela Farfan

The Winston Fancy Colored Diamond Collection

May 4 Program

Dr. Gabriela Farfan, curator of gems and minerals at the Smithsonian Institution's National Museum of Natural History, will deliver a Zoom presentation on the Winston Fancy Color Diamond Collection. The collection, an extraordinary showcase of some of the world's rarest and most dazzling gems, was unveiled at the Smithsonian on April 1 of last year.

The collection is the result of 60 years of dedicated acquisitions by Ronald Winston, the son of distinguished jeweler and gem collector Harry Winston. The collection includes the fabulous Winston Red Diamond alongside 40 other gems. The diamonds are arranged in a radiant rainbow of color, featuring every shade imaginable, from deep teal to soft peach.

Although some colorful diamonds get their pigmentation from atomic impurities in their crystal structure, the Winston Red Diamond's striking crimson hue is the product of extremely high pressure and temperature conditions deep within Earth that strained and altered the crystal.

Dr. Farfan is the Coralyn W. Whitney Curator of Gems and Minerals at the Smithsonian. She received her bachelor's degree in geological and environmental sciences from Stanford University and her Ph.D. in geochemistry from the MIT-WHOI Joint Program.

As a mineralogist, Dr. Farfan studies the crystal structures and chemistry of minerals formed under varying conditions in order to find answers to questions about environmental mineralogy, biomineralization, and gem science.

As a curator and lifelong mineral and gem enthusiast, Dr. Farfan is honored to be a steward for the National Gem and Mineral Collection and loves the thrill of adding rare and important specimens to the collection. She is also very dedicated to mineral and gem outreach for K-12 students and teachers.



Field Trip

Collecting Minerals at Mineral Hill, Maryland

by Katy and Mickey Johnson, Field Trip Co-Coordinators (photos by Katy Johnson)

On Saturday, April 11, 18 enthusiastic NVMC members traveled to Mineral Hill in Eldersburg, MD. We couldn't have asked for better weather—it was absolutely glorious!

The walk was through the forest on a natural trail, but we did have to climb over a few large logs that had fallen across the trail. The trail meandered through a pine forest up hills and around a bend to finally reach the tailings pile, remnants of a retired copper quarry.



The main pit produced beautiful blues and greens, alongside some toxic minerals to be added to Mickey's collection. The minerals we found included chrysocolla, malachite, pyrite, chalcopyrite, and actinolite, as well as copper and iron ore.

Three of us ventured to the second tailings pile, which was touted as being better than the main one. But I personally was not convinced.

The walk back was a whole lot slower and quite a workout for those like me who like the larger yard rocks. It was also a lesson in what belonging to a mineral club should be like because everyone was willing to help each other carry out heavy loads. We left with full buckets and full hearts.

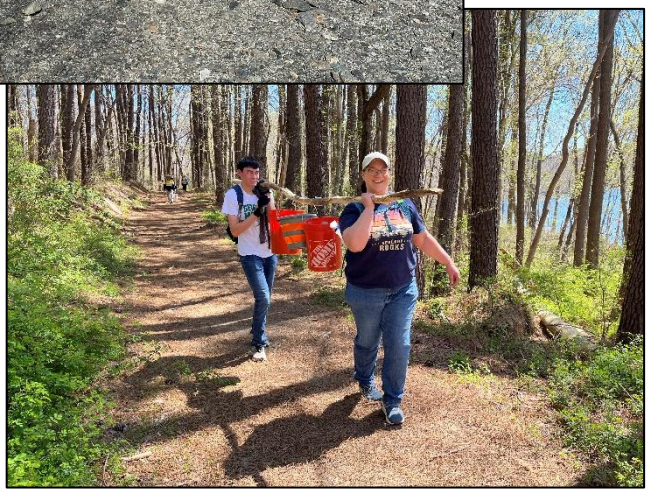
Some ambitious members went on a bonus trip to look for garnets at a location that had been shared by some of the local rockhounding Facebook groups.

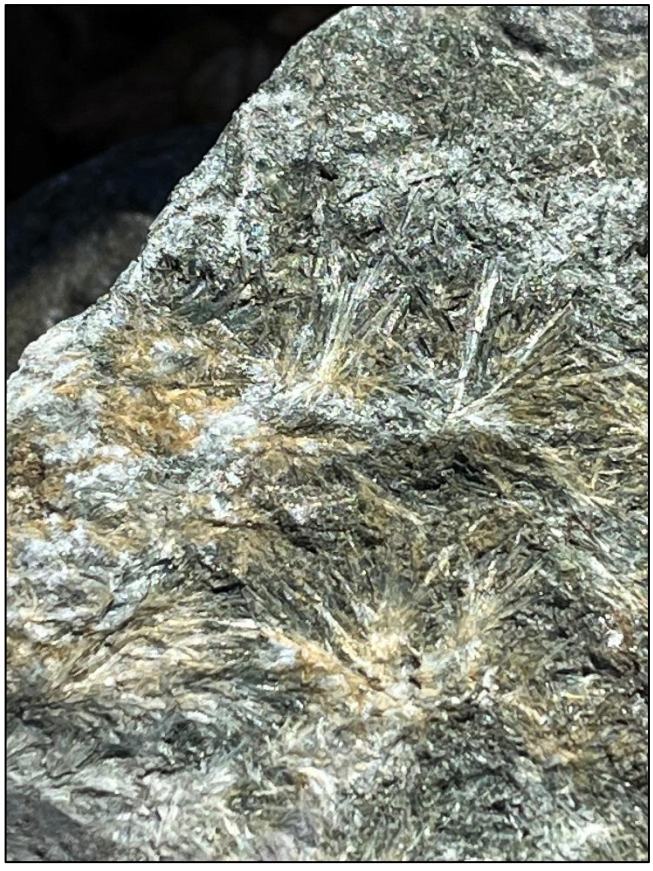
Upcoming field trips:

- Sunday, May 3: Texas Quarry
- Saturday, May 9: Geology of Glencarlyn Park, Arlington (see p. 21 for details)
- Saturday, June 13: National Limestone Quarry, Pennsylvania











Meeting Summary
April 6 Club Meeting

by Almas Eftekhari, Secretary

President Jason Zeibel welcomed everyone to our biannual club auction. He called for visitors to introduce themselves, but no one did. He then noted that new name tag orders are in and asked anyone who ordered one to pay the club treasurer and then pick it up from him.

Club Secretary Almas Eftekhari, assisted by Jake Broughton, showed off the new club hoodies, noting that two styles will be available for purchase in the coming weeks.

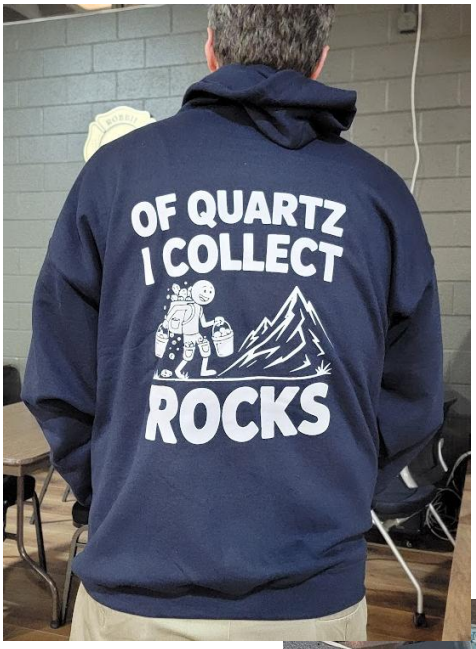
Youth Leaders Celia Zeibel and Maria Nopo announced that the new NVMC Instagram account has been launched. You can find it here.

Vice President Jennifer Grimes announced our tentative speakers for May and June. The May program will feature Dr. Gabriela Farfan, curator of the Gem and Mineral Hall at the Smithsonian Museum of Natural History (see page 10 for details).

Field Trip Co-Coordinator Mickey Johnson then announced collecting trips coming up on April 11 at Mineral Hill, MD; on May 3 at the Texas Quarry in Cockeysville, MD; on June 13 at the National Limestone Quarry and Mt. Pleasant, PA; and on June 27 at the Travilah quarry near Rockville, MD. On Saturday, May 9, Hutch Brown will lead a geology walk at Glencarlyn Park on Four Mile Run in Arlington (see page 21 for details). A collecting trip to Willis Mountain is planned for September/October but the date is not yet set. Field Trip Co-Coordinator Katy Johnson said that more field trips would be announced soon.

Jason announced that the club's lapidary equipment is being refurbished, with the first saw now ready for use. We have lots of equipment that will soon be available for one-month checkout on request. We will showcase some of the new equipment at the club picnic on August 16, which will again be at Jason's home. Details will be forthcoming.

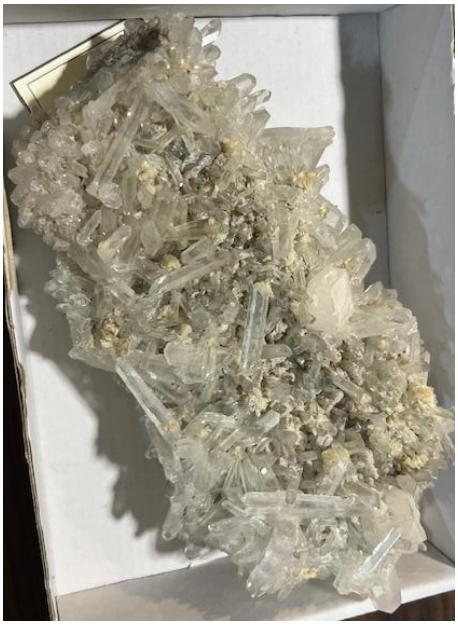
Jason went over the auction rules and procedures, and then the auction began, with Jason himself presiding and dozens of fossils, minerals, and other items sold to lucky buyers.



Hoodie design and color available for purchase by club members. All photos: Almas Eftekhari.



Jason auctioning off an optivisor.



Euhedral quartz crystals on calcite, one of many great specimens sold to lucky buyers.



President's Message

by Jason Zeibel

Greetings, NVMC, and welcome to May! The days have become suddenly hot, and the trees are in full canopy. In our household, May ushers in a crescendo of activities that builds towards the end of the school year. Extracurricular events such as Scouts and band come fast and furious and school projects come due.

Professionally, it seems like I have lots of travel all of a sudden as every program manager is trying to get in some form of meeting or review before summertime. Our club is no different, I suppose, because we have upcoming field trips, geology walks, and some amazing speakers over the next couple of months as we race to get out and enjoy the weather.

April brought our family a great opportunity to take a long-awaited excursion to the Virgin Islands in the Caribbean Sea over Spring Break. Long-time readers of my column may recall that I have mentioned this island chain before because it's where I spent several years of my youth. Therefore, I always relish the opportunity to go back and enjoy a mix of beautiful scenery and personal nostalgia.

The Virgin Islands are an archipelago of hundreds of islands about 100 miles east of Puerto Rico. They lie on a complex, tectonically active boundary between the Caribbean and North American Plates. The Virgin Islands are part of a microplate that also encompasses Puerto Rico and that is moving eastward about 2 centimeters per year toward the North American Plate.

In the past, the Virgin Islands had significant volcanism and subduction, but there is no volcanic activity today. However, the region gets frequent minor earthquakes. Past volcanic activity has made the islands quite hilly, with steep cliffs and a complex topography.

Geopolitically, the Virgin Islands are split roughly down the middle between the United States and the United Kingdom (fig. 1), with the United States controlling St. Thomas, St. John, and St. Croix on the western side of the islands and the British controlling Tortola, Virgin Gorda, Jost Van Dyke, and Anegada to the east.

A popular geologic feature of the British Virgin Islands is on the southern end of the island of Virgin Gorda in an area known colloquially as "The Baths." The name does not stem from the popularity of the area's crystal-clear waters for bathing. Instead, the name comes from the large granite batholith boulders that occupy an area of about 10 square kilometers.

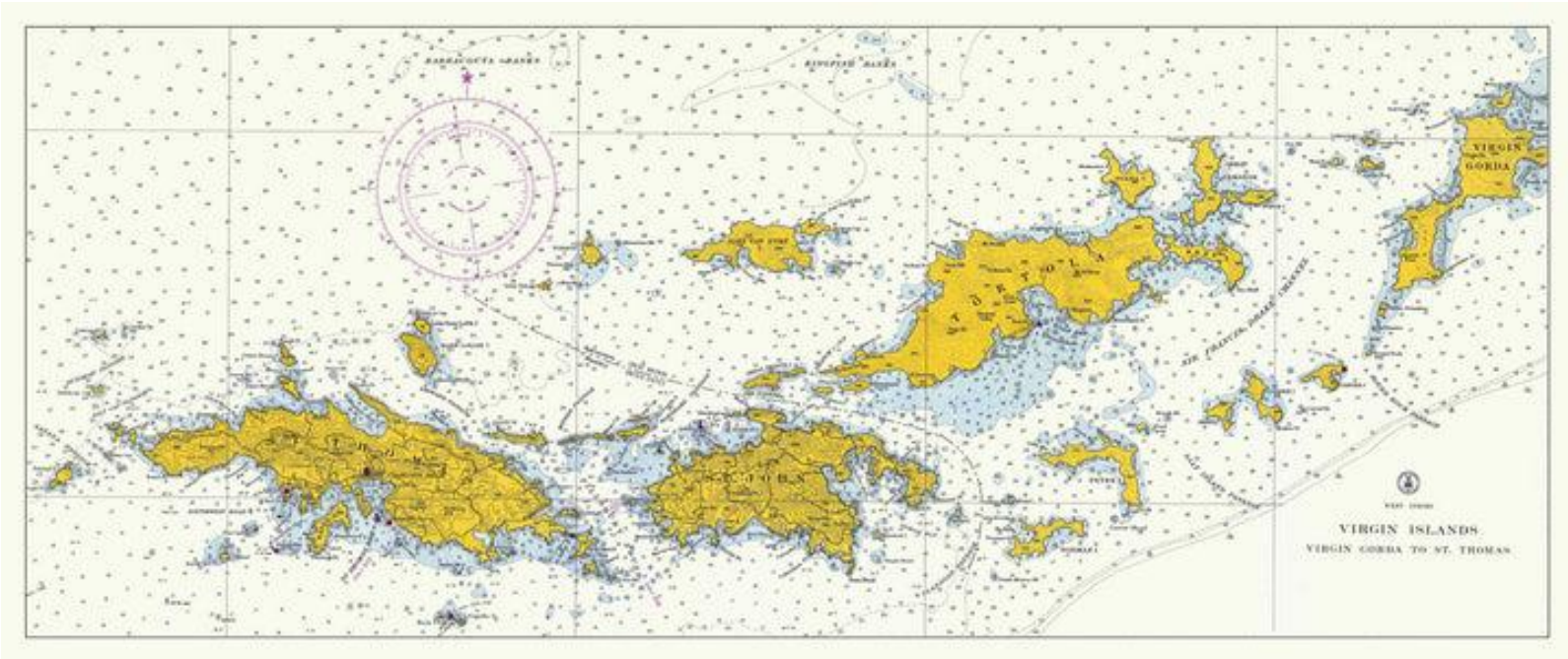
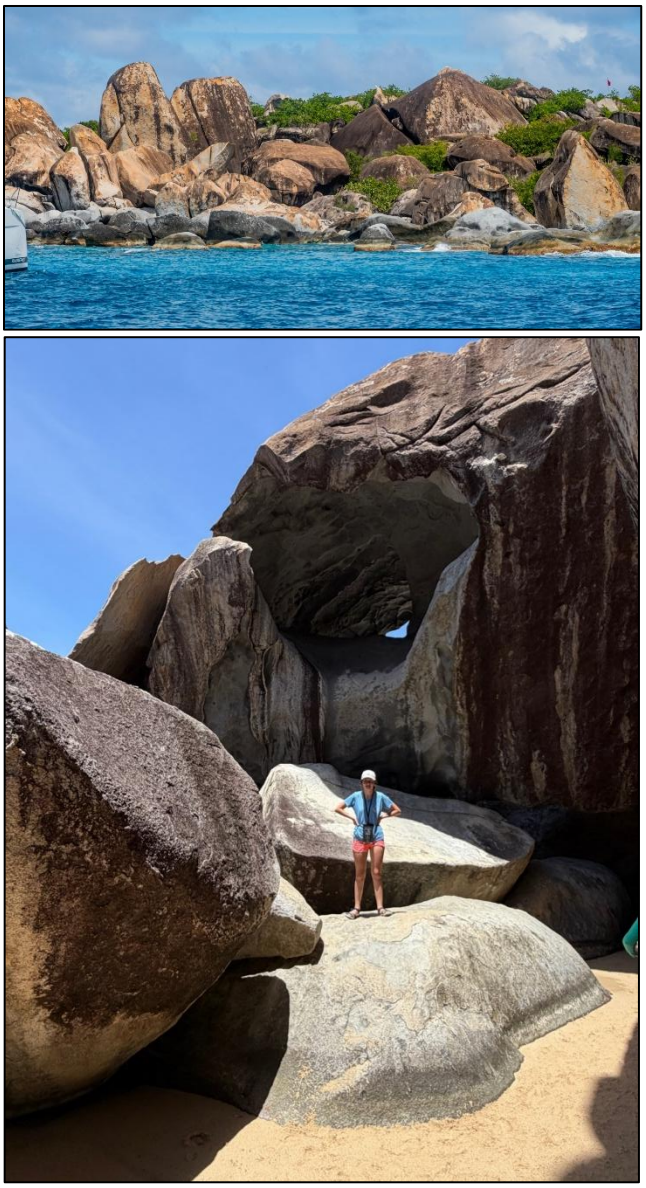
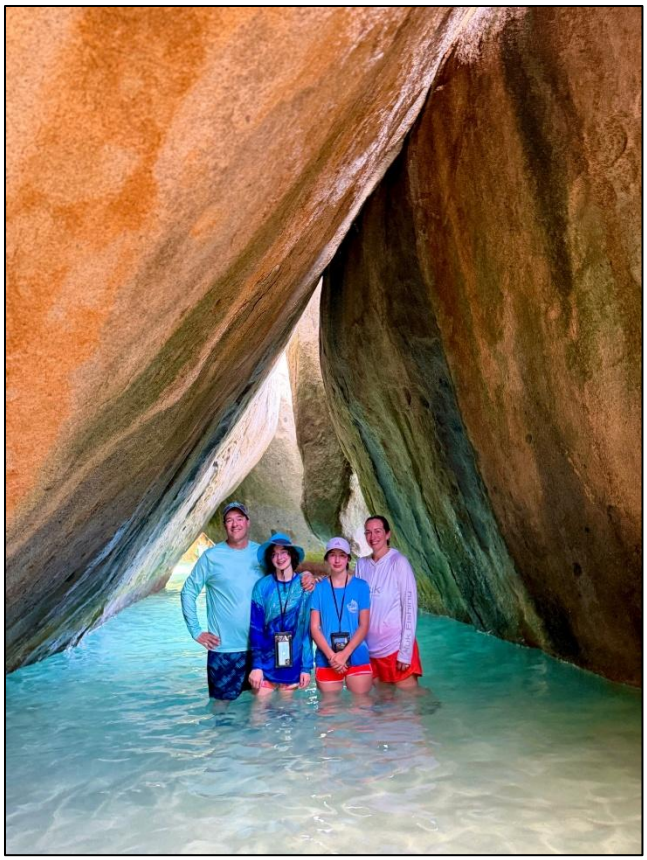


Figure 1—*Map of the central Virgin Islands, from St. Thomas and St. John of the U.S. Virgin Islands in the west to Tortola and Virgin Gorda of the British Virgin Islands in the east.*



The Baths National Park on Virgin Gorda, one of the British Virgin Islands, from a boat just offshore (top) and with Celia standing on one of the granite boulders (bottom). Note the giant bubble and arch in the background. All photos: Jason Zeibel.

A batholith (a term derived from ancient Greek words meaning "deep stone") is a huge granite mass formed from a chamber of magma that cooled and crystallized deep underground. The granite batholith on Virgin Gorda, with boulders up to 40 feet in diameter, formed about 50 million years ago from slow-cooling subsurface magma intruding into softer rock. The boulders exhibit a bubbly, pock-marked surface with a large crystalline internal structure. The entire area



The Zeibel family in the Cathedral Room in the Baths National Park on Virgin Gorda, British Virgin Islands.

was subsequently faulted and uplifted due to the interaction of the Caribbean and North American plates.

Over millions of years, erosion exposed the granite boulders as the softer surrounding rock weathered away. The combination of sand, wind, waves, tidal erosion, and earthquakes over millennia resulted in the haphazard stacking of these enormous stones. The Baths National Park, established in 1990, boasts unique natural tunnels, arches, grottoes, tidal pools, and scenic trails that allow visitors to climb, crawl, and swim through the boulder field.

Many sites within the Baths National Park have colloquial names, such as The Grand Cavern, Neptune's Hideaway, The Throne, the Turtle & the Anvil, and the Cathedral Room. One of the most famous sites in the Baths is the Cathedral Room. This enclosed space at the water's edge was made famous by several well-known photoshoots for swimwear and top models.

In today's tourist-populated world, it is rare to be in the Cathedral Room without a host of other people. Fortunately for us, there were few cruise ships in port on the day we visited, so we were able to spend a few hours in the park and get some amazing pictures.

Since I came here as a kid, perhaps climbing on, over, and around the batholith boulders was what at least partially inspired my love of geology. It certainly is a wonderful place to spend time immersed in a geologic wonderland while working on your suntan.

Our April club meeting featured our semiannual club auction. We auctioned off nearly 100 items, and the club brought in over $600 in proceeds to put towards our operating fund. I had a great time being the auctioneer, and I think everyone left satisfied—most with some new specimens to enjoy.

Our club's youth co-coordinators, Celia and Maria, gave a short presentation about the club's new Instagram page. If you do your social media on Instagram or Facebook, check out our club's presence and give us a like!

We also got a chance to see some prototypes of the new NVMC hoodie designs, thanks to our club Secretary, Almas. You can look forward to having an opportunity to get one or two of your very own hoodies coming up in time for fall.

I want to give a reminder that the latest club name tag order has come in. If you requested one, please come pick it up and pay the $15 to the club.

Also, if you have not paid your 2026 club dues, please do so. Only current dues-paying members are authorized to sell in our auctions and to go on field trips.

This month's program is going to be a treat because our club Vice President, Jennifer, has convinced one of her Smithsonian friends to talk about diamonds (see the program on page 10)! Since my wife and one of my daughters both celebrate diamond as their birthstones, they will be all in on this topic. I think we are going to get a chance to see some of the diamonds that none of us will likely ever be able to afford and that kingdoms went to war over. So come on out and enjoy the sparkle!

Jason



NVMC youth co-coordinators Celia and Maria discuss the club's new Instagram page.



Club Secretary Almas shows off the prototype samples of new NVMC hoodies.

Fluorescence and Phosphorescence of Aragonite From the Giumentaro Mine in Sicily, Italy

by Calvin Harris

This article describes the fluorescence and phosphorescence displayed by several aragonite ($CaCO_3$) specimens from the Giumentaro Mine in Sicily. Ultraviolet (UV) light sources that emit midwave and certain longwave radiation types have been developed, but written accounts of their effects on aragonite from this site are lacking. Describing the fluorescence and phosphorescence caused by shortwave (254-nm), midwave (312-nm), and longwave (351-nm and 370-nm) UV light will help fill this information gap.

Site Setting

The Giumentaro Mine became a source of sulfur in the 18th century. It was part of the Sicilian Sulfur District, which included several sulfur mines within some 3,000 square kilometers (~1,160 mi^2) in southern Sicily. According to Mindat, the mine's location corresponds to 37.51168, 14.14290.

The sulfur deposits occur in an Upper Miocene argillaceous limestone associated with gypsum and bituminous marl. Aragonite can be found as coatings and cavities in the limestone.

Collecting specimens of aragonite and other minerals such as celestine, gypsum, sulfur, and calcite has occurred at the site at least since the mid-1800s. The Giumentaro Mine was closed in 1984, but fine aragonite specimens, available through Internet sales, are highly sought by collectors. All specimens discussed here were acquired through Internet sales.

Mineral Description

I evaluated 14 specimens that are cabinet to large cabinet in size; 5 samples of the 14 specimens are presented here, labeled A-E (fig. 1). The specimens all consist of well-developed pseudo-hexagonal crystals in clusters, with small amounts of sulfur and little or no matrix. The crystals are muted green in daylight and under incandescent lighting conditions; they measure about 1 to 2-plus centimeters (0.4-0.8+ inches).

Figure 1 shows sample specimens A-E in daylight.

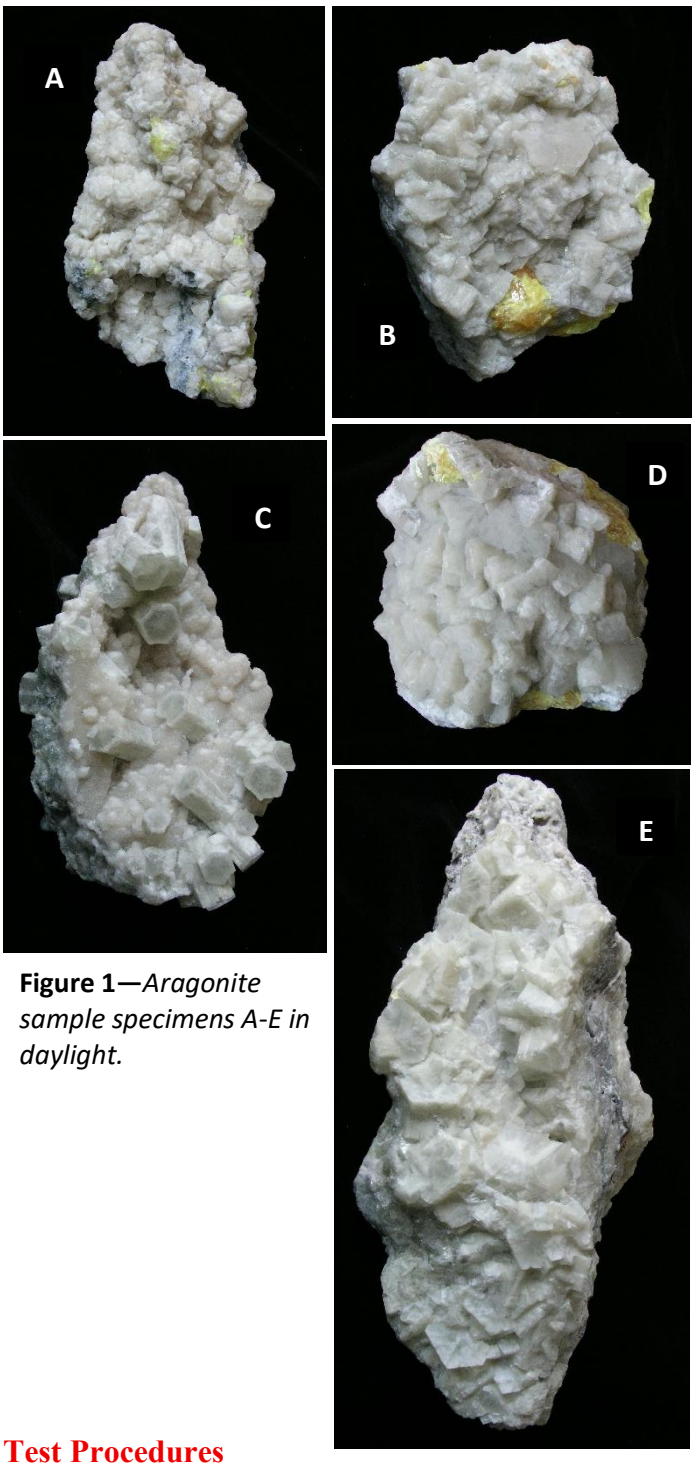


Figure 1—*Aragonite sample specimens A-E in daylight.*

Test Procedures

The procedures can be easily repeated and provide consistent results. To observe fluorescence and phosphorescence, UV lamps manufactured by UVSYSTEMS, INC., based in Renten, WA, were placed 3 to 4 inches from the specimens. A DC electric source was used to operate the lamps.

Results

Table 1 shows fluorescence and phosphorescence for each of the 5 sample aragonite specimens. Figures 2-6 show UV fluorescence for sample specimens A-E.

Observations and Remarks

Shortwave radiation generally produced fluorescent intensity that was moderate to bright and blue to pink in color. Midwave radiation generated colors similar to shortwave, but the intensity equaled or exceeded shortwave. Longwave radiation generally produced moderate to bright intensity. The pink color was especially notable for its high degree of saturation. Interestingly, longwave (371 nm) had a higher degree of color saturation than longwave (351 nm).

Phosphorescence generated by shortwave radiation generally produced moderate to high intensity, different shades of green, and duration as long as 15 seconds and as short as 6 seconds. Midwave radiation generally produced moderate to bright intensity, with a few exceptional instances of low intensity. The colors included various shades of green and a duration of 5 to 15 seconds. Longwave (351-nm) radiation produced moderate-low to bright intensity, various shades of green, and a duration of 4 to 11 seconds. Generally, longwave (370-nm) radiation produced moderate to high intensity, various shades of green, and duration times of 5 to 9 seconds, a timespan that was notably different from longwave (351 nm).

It appears that organic activators and inorganic activators caused the luminosity in these specimens. Studies by Shoppov (2003) and Emmermann (2017) have shown that luminosity in aragonite and other carbonates can be attributed to fulvic acid, humic acids, and other organic substances, although rare earth elements such as samarium also play a role.

The variety of results offers the mineral collector an awareness of how aragonite from the Giumentaro Mine responds to different UV wavelengths.

Selected References

Pagano, R.; Wulson, W.E. 2016. The sulfur mines of Sicily. The Mineralogical Record 43(2): 161-206.

Emmermann, A. 2017. Some new insights on the fluorescence of aragonite from Agrigento Province, Sicily and the Boccheggino Mines, Tuscany. UV Waves 47(1): 8-11.

Mindat.org: Giumentaro Mine, Capodarso, Emma, Enna Province, Sicily, Italy, accessed November 7, 2025, http://www.mindat.org

Shopov, Y.Y. 2003. Luminescence of spelothems. Acta Geologica 80: 95-104.

Table 1—Fluorescence and phosphorescence by wavelength for 5 aragonite sample specimens (A-E).

Wavelength	Fluorescence	Phosphorescence
Specimen A (see figure 2 for images of fluorescence)		
Shortwave (254 nm)	Moderate-low intensity, pink, blue, cream colors.	Moderate-low intensity, blue-green color, 6-second duration.
Midwave (312 nm)	Moderate-low intensity, cream with green tint, pink colors.	Low intensity, blue-green color, 5-second duration.
Longwave (351 nm)	Moderate intensity, similar to shortwave but more saturated pink color.	Very low intensity, blue-green color, 4-second duration.
Longwave (370 nm)	Similar to longwave (351 nm) but larger area of pink color.	Similar to Longwave (351nm), except 3-second duration.
Specimen B (see figure 3 for images of fluorescence)		
Shortwave (254 nm)	Moderate-bright intensity, pink color; some crystals display pink with blue tint.	Bright intensity, blue-green color, 11-second duration.
Midwave	Moderate-bright intensity, pink with blue	Moderate-bright intensity, blue-green color,

Wavelength	Fluorescence	Phosphorescence
(312 nm)	tint; some crystals display muted blue color.	10-second duration.
Longwave (351 nm)	Moderate-bright intensity, pink with orange tint.	Moderate intensity, muted blue-green color, 7-second duration.
Longwave (370 nm)	Similar to longwave (351 nm) but slightly brighter.	Similar to longwave (351 nm).
Specimen C (see figure 4 for images of fluorescence)		
Shortwave (254 nm)	Moderate-bright intensity, powder-blue color, especially outer areas of crystals, smaller crystals display pink color.	Moderate-intensity, blue-green color, 6-second duration.
Midwave (312 nm)	Moderate-bright intensity, pink color; some crystals display cream with blue tint. Smaller crystals display moderate-bright intensity, pink color.	Moderate-bright intensity, lime-green color, 9-second duration.
Longwave (351 nm)	Moderate-bright intensity, rich, deep pink color with orange tint.	Moderate-low intensity, blue-green color, 7-second duration.
Longwave (370 nm)	Similar to longwave (351 nm), except slightly brighter.	Low intensity, blue-green color, 5-second dura-tion.
Specimen D (see figure 5 for images of fluorescence)		
Shortwave (254 nm)	Moderate-bright intensity, pink color.	Moderate-bright intensity, blue-green-color, 9-second duration.
Midwave (312 nm)	Bright intensity, pink with red tint.	Bright intensity, blue-green-color, 11-second duration.
Longwave (351 nm)	Moderate-bright intensity, deep, rich pink color with red tint.	Moderate intensity, blue-green-color, 7-second duration
Longwave (370 nm)	Similar to longwave (351 nm) but slightly brighter.	Similar to longwave (351 nm) but slightly brighter.
Specimen E (see figure 6 for images of fluorescence)		
Shortwave (254 nm)	Moderate intensity, muted pink color, some crystals muted blue color.	Moderate-bright intensity, blue with green tint, 6-second duration.
Midwave (312 nm)	Bright intensity, similar to shortwave but with muted colors.	Bright intensity, lime-green color, 9-second duration.
Longwave (351 nm)	Moderate-bright intensity, pink color, trace of blue color.	Moderate intensity, lime-green color, 6-second duration.
Longwave (370 nm)	Slightly brighter than longwave (351 nm), pink color more saturated.	Similar to longwave (351 nm) but brighter intensity, 7-second duration.

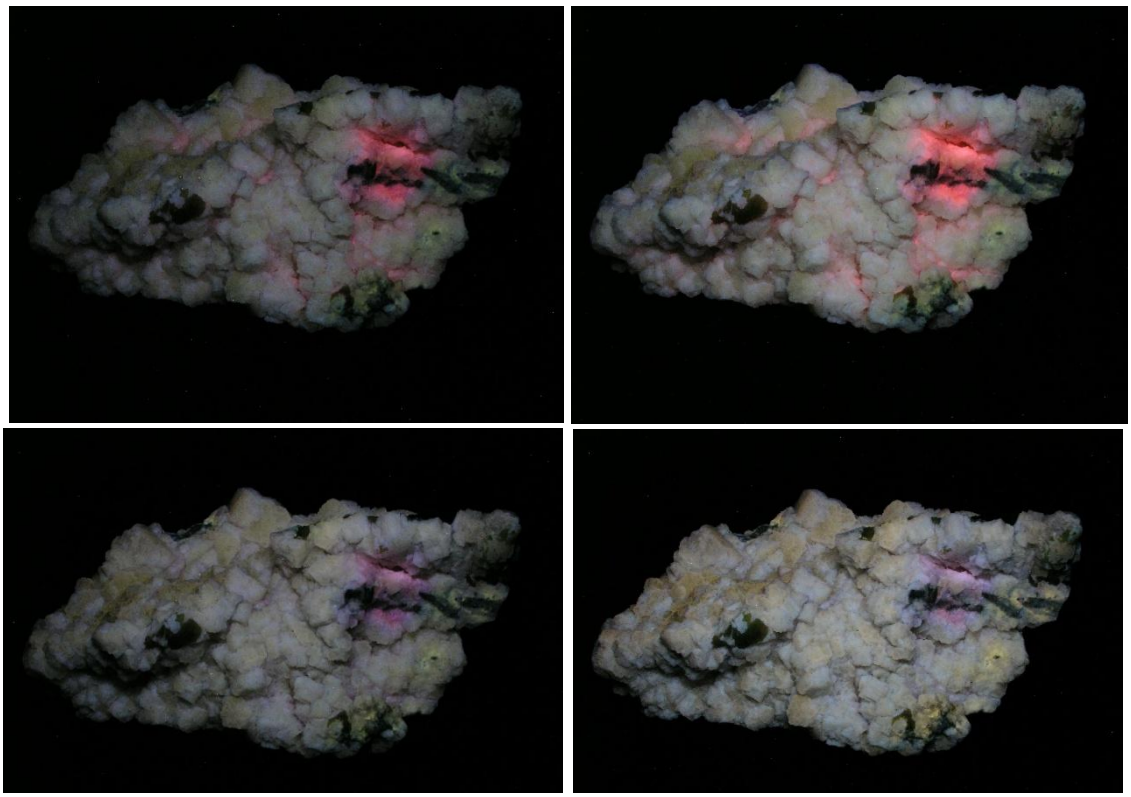


Figure 2—*Aragonite specimen A under shortwave (254-nm) (top left), midwave (312-nm) (top right), longwave (351-nm) (bottom left), and longwave (370-nm) (bottom right) fluorescence.*

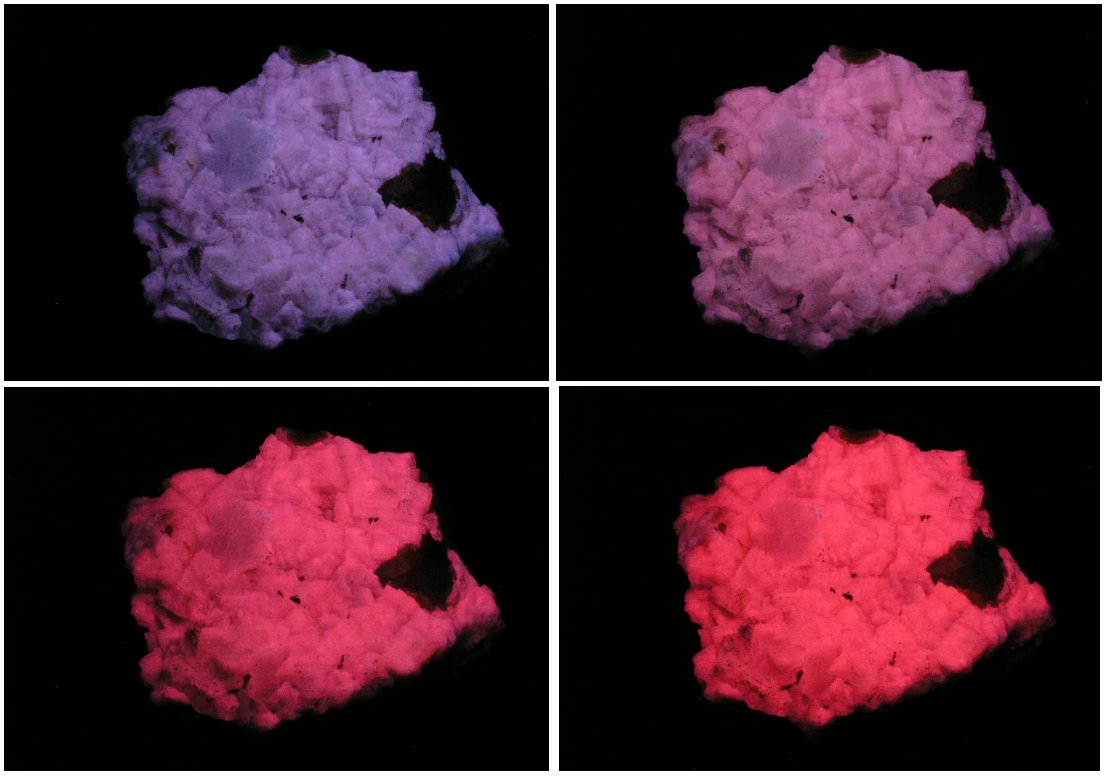


Figure 3—*Aragonite specimen C under shortwave (254-nm) (top left), midwave (312-nm) (top right), longwave (351-nm) (bottom left), and longwave (370-nm) (bottom right) fluorescence.*

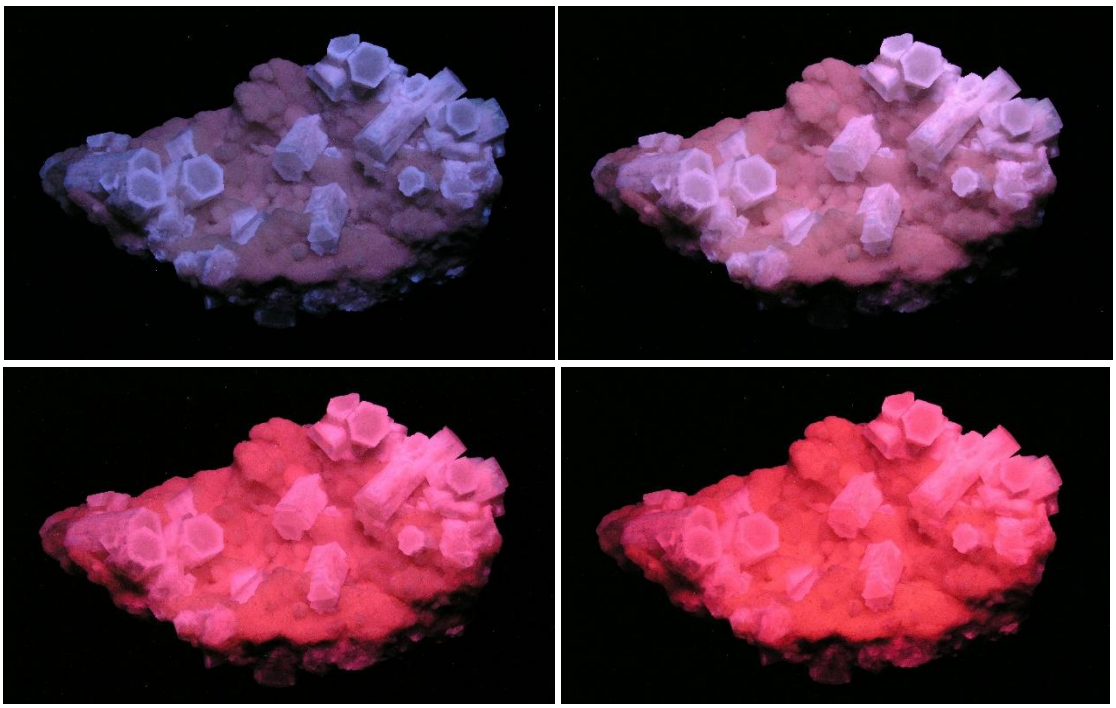


Figure 4—*Aragonite specimen I under shortwave (254-nm) (top left), midwave (312-nm) (top right), longwave (351-nm) (bottom left), and longwave (370-nm) (bottom right) fluorescence.*

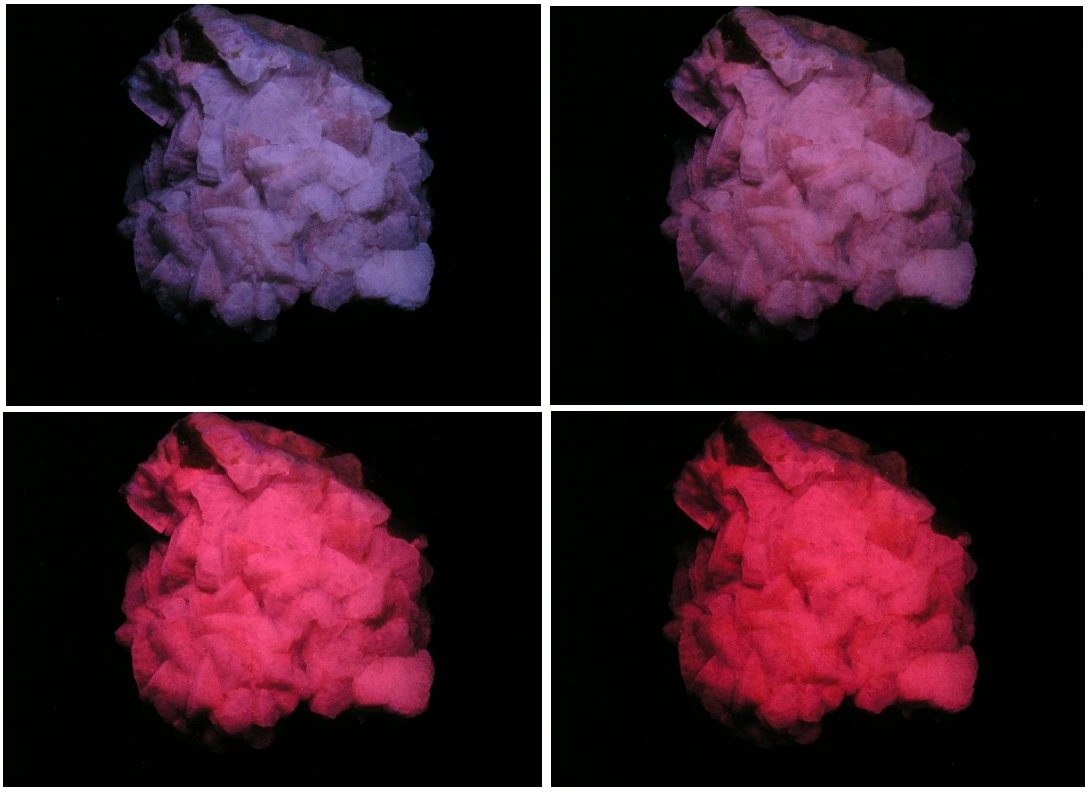


Figure 5—*Aragonite specimen J under shortwave (254-nm) (top left), midwave (312-nm) (top right), longwave (351-nm) (bottom left), and longwave (370-nm) (bottom right) fluorescence.*

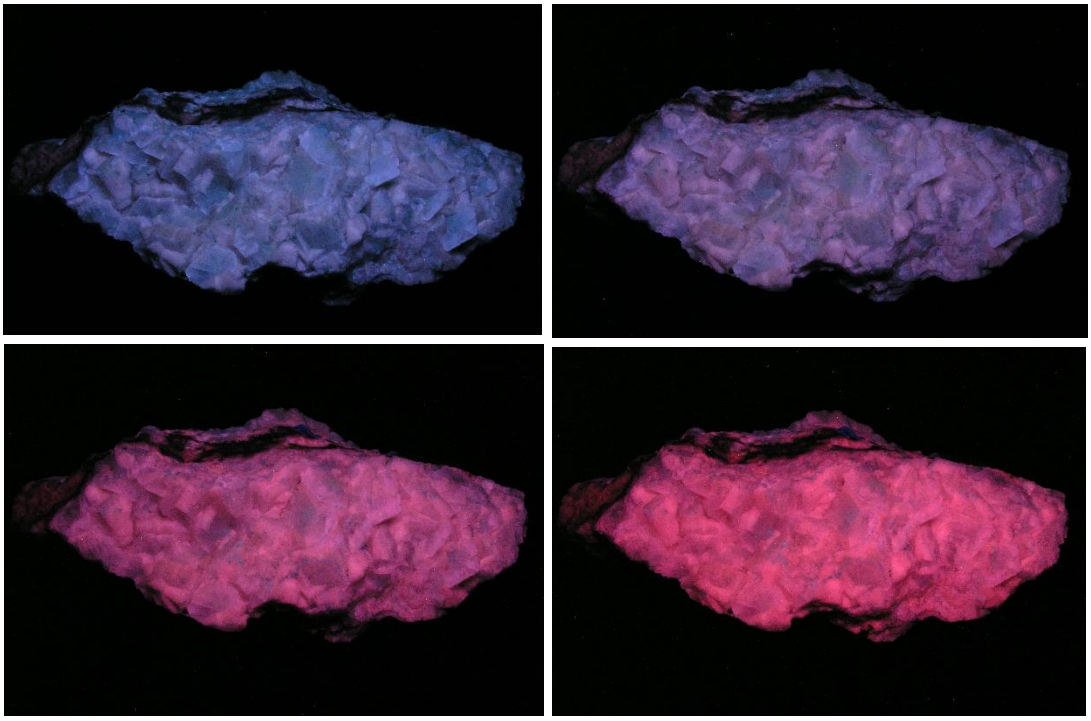
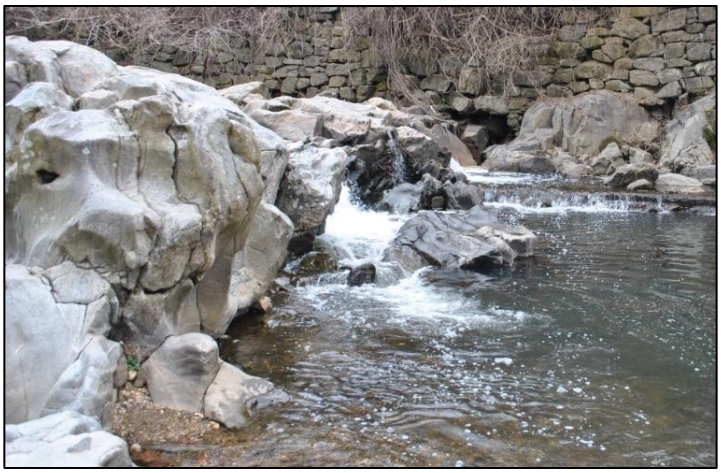


Figure 6—*Aragonite specimen M under shortwave (254-nm) (top left), midwave (312-nm) (top right), longwave (351-nm) (bottom left), and longwave (370-nm) (bottom right) fluorescence.*

Upcoming Geology Walk: Arlington's Glencarlyn Park

Arlington's Glencarlyn Park has unique natural and geological features. Club member Hutch Brown will talk about them on a walk of a mile or two through the woods on gently sloping paved and dirt trails. We will meet on **Saturday, May 9, at 10 a.m.** at Arlington's Long Branch Nature Center (625 S. Carlin Springs Rd.) and finish by noon. The risk of ticks and poison ivy is low, but wear sturdy shoes. To join us, please sign up at https://forms.gle/sxeu5SLAU7mJbp187.

After an overview of the geology of our area, we will walk down the paved trail along Long Branch, a tributary of Four Mile Run, Arlington's main stream. We will discuss the metamorphic bedrock, Indian Run sedimentary melange. We will then proceed uphill on dirt trails, stopping to see the Cretaceous and Neogene deposits overlying the bedrock.



Huffman's Falls, a key part of the Fall Line zone for Four Mile Run near its confluence with Long Branch. Note the waterworn formations in the granite bedrock, an igneous intrusion in the surrounding metamorphic bedrock (Indian Run sedimentary melange). Photo: Hutch Brown.

We will next descend to Four Mile Run and Huffman's Falls, counterpart of Great Falls on the Potomac (and large enough to be heard at times by pedestrians on a popular regional trail overlooking the stream). Part of the falls is a prominent granite outcrop too small to show up on geologic maps. We will discuss the granite exposure, the quartz veins in the rock, the falls and the Fall Line zone, and some of the local history. On the way back to the nature center, we will see a rare shoot of American chestnut on the edge of old-growth forest in Glencarlyn Park.

The Rocks Beneath Our Feet

Geology of Lake Fairfax Park Revisited

by Hutch Brown

On a chilly Saturday in March, about 30 NVMC members and master naturalists gathered for a geology walk in Lake Fairfax Park in Reston, VA (fig. 1, top). The trip was organized by Field Trip Co-Chairs Katy and Mickey Johnson and led by retired USGS geologist Rob Robinson. Participants explored the same geology described in the September 2024 issue of this newsletter, which was based on a walk on a *much* warmer day in June 2024. Both trips followed trails near Colvin Run, a small stream that feeds Lake Fairfax before joining Difficult Run, a tributary of the Potomac River in Great Falls National Park.

Geologic Setting

Rob began with an overview of the park's geology. (What follows is largely based on my own sources.)

The park's bedrock is part of a great band of metamorphic rocks that geologists call the Potomac Terrane, which stretches from central New Jersey into south-central Virginia. Within the Potomac Terrane, geologists once classified a band of metamorphic rocks in Maryland and northern Virginia as part of a larger unit called Peters Creek schist (pronounced SHIST) (Drake and Lee 1989), named for a Pennsylvania creek. In the 1990s, geologists separated the Maryland and Virginia rocks from Peters Creek schist, reclassifying them as the Mather Gorge Formation (Drake and others 1999), named for outcrops along the Potomac River below Great Falls.

Figure 1 (bottom) shows the three bedrock units in Lake Fairfax Park: Mather Gorge schist (brown); ultramafic rock (green); and Mather Gorge metagraywacke (red, pronounced met-uh-GRAY-wackee). As Rob explained, geologists mapped the area from samples collected in the field. The geologic map is therefore imprecise, especially near boundary lines. Where the map might suggest schist, for example, you might find ultramafic rock (and vice versa).

Moreover, each unit contains multiple bedrock types. In addition to actual metagraywacke, for example, the metagraywacke unit (red on the map) contains a lesser amount of schist. In fact, we saw no metagraywacke at all on our walk but three kinds of schist: one in the metagraywacke unit; another in the actual schist unit; and the third (talc schist, a kind of soapstone made up mostly of talc) in the ultramafic unit. The soapstone was mined in colonial or precolonial times in a small quarry near the head of Lake Fairfax (fig. 1, bottom, white star).

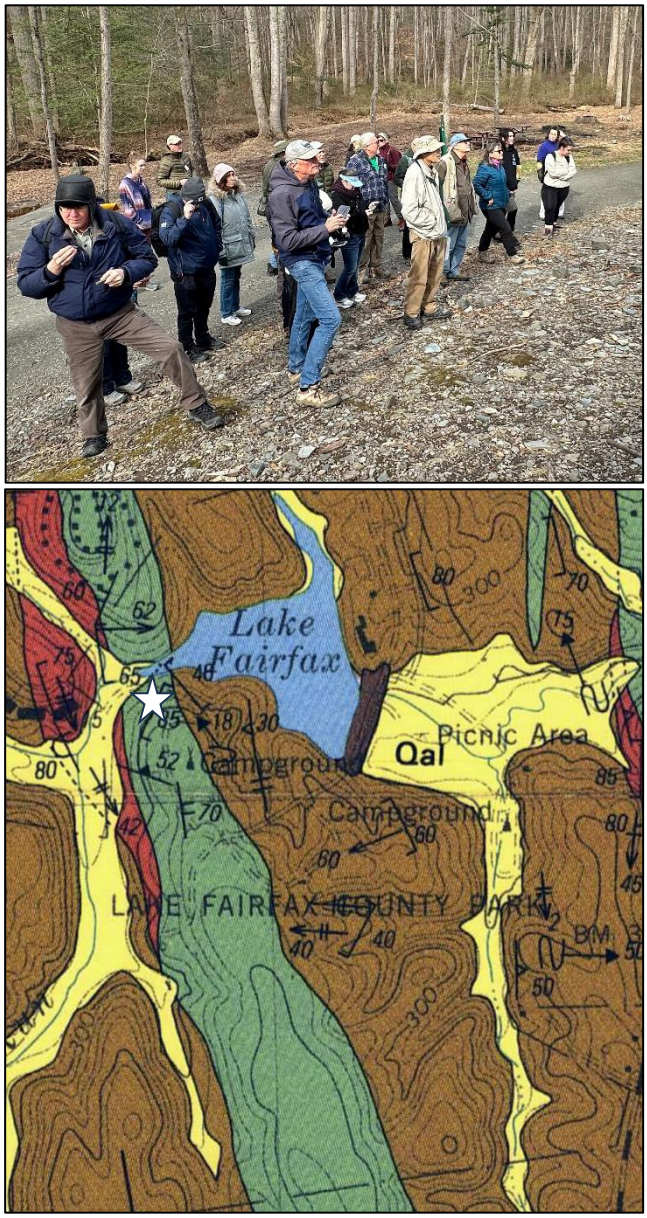


Figure 1—*Lake Fairfax County Park.* ***Top:*** *Field trip participants listen to Rob Robinson (center, white jacket and hat) talk about a schist outcrop.* ***Bottom:*** *Detail from a USGS geologic map of the Vienna Quadrangle. Brown = Mather Gorge schist; red = Mather Gorge metagraywacke; green = ultramafic rock; yellow = Quaternary alluvium (***Qal***); white star = old soapstone quarry. Photo: Ana Ka'ahanui; map: Drake and Lee (1989)*

Ancient Seafloor Rocks

The schists, metagraywackes, and other rocks of the Mather Gorge Formation originated in sediments on the floor of an ancient ocean, dubbed by geologists the Iapetus (pronounced eye-APP-pet-us). About half a billion years ago, Earth's continents were slowly converging, driven by convection currents in the viscous asthenosphere underlying Earth's lithosphere. Over the next 200 million years, the continents merged into a single supercontinent called Pangaea (pronounced pan-JEE-uh). In the process, the colliding tectonic plates in our area caused several mountain-building events (what geologists call orogenies).

One orogeny took place about 474-450 million years ago when a smaller plate collided with proto-North America. As it approached the continent, the plate (which geologists call the Taconian—or Taconic—Terrane) formed a line of volcanic islands behind a deep-sea trench where the continental plate subducted (slid under) the advancing plate and melted into the mantle (fig. 2). The melting rock rose in plumes of magma to erupt on the seafloor, forming an arc (curved line) of volcanic islands. Volcanic ash and eroding sediments accumulated in the forearc basin, and accretionary sediments scraped up from the colliding plates collected in the deep-sea trench.

The thickening sediments hardened into shales, siltstones, mudstones, and other sedimentary seafloor rocks. The advancing Taconian Terrane closed the remnant Iapetus Ocean, pushing the seafloor rocks up onto the continental margin, followed by the volcanic islands and backarc rocks. In the process, seafloor rocks from the Taconian Terrane formed the roots of mountains as high as the Alps are today. The mountains are long since gone, but the tremendous heat and pressure of the Taconian Orogeny altered sedimentary seafloor rocks into the Mather Gorge metamorphic rocks we find in the Piedmont today.

Ultramafic Mantle Rocks

The band of ultramafic rocks shown in figure 1 (bottom, green) has very different origins. It formed not from seafloor sediments but rather from solid rock in Earth's upper mantle many miles below Earth's surface. The upper mantle is mainly made up of a green igneous rock called peridotite (pronounced pair-RID-uh-tight). Peridotite comprises olivine and pyroxene minerals; you might have collected a green olivine mineral called peridot (pronounced PAIR-i-dot).

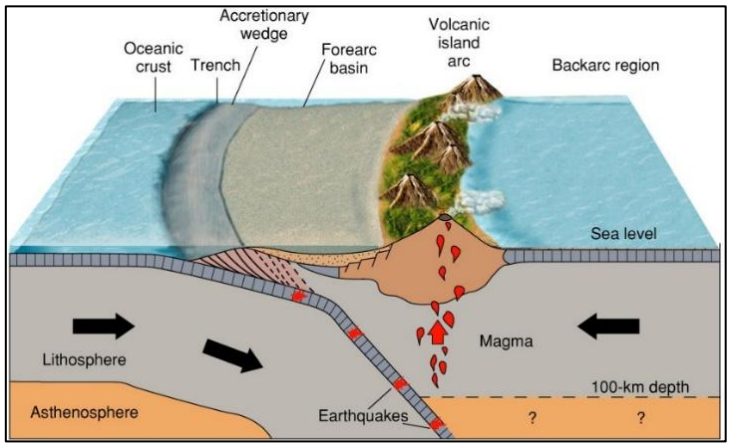


Figure 2—*Subduction of the proto-North-American plate under the advancing Taconian Terrane about 490 million years ago. As the subducting plate melts into the asthenosphere, rising magma forms an arc of volcanic islands. Sediments filling the forearc basin and deep-sea trench harden into sedimentary seafloor rock, forming the basis for much of the metamorphic rock in our area today. Source: Herman (2013).*



Peridot, the gemstone variety of forsterite, an olivine mineral in peridotite. Source: Wikipedia; photo: Rob Lavinsky.

Peridotite is ultramafic, meaning exceptionally (ultra) rich in metals like magnesium (ma-) and iron (-fic, from the chemical symbol Fe). It is therefore relatively poor in feldspars and quartz, containing less than 45 percent quartz. By comparison, mafic rocks like basalt contain 45 to 55 percent quartz, whereas felsic rocks like granite are much higher in feldspars (fel-) and quartz (-sic, from the chemical symbol Si for the silicon in quartz), containing more than 55 percent quartz. Some granites, for example, contain more than 70 percent quartz.

Felsic rocks are lighter and more buoyant than mafic rocks. Rising over time to Earth's surface, they make up most of Earth's continental rock. By contrast, mafic and ultramafic rocks, richer in heavy metals like iron, make up most of Earth's oceanic crust and upper mantle.

So how did a band of ultramafic rocks originating in Earth's mantle end up surrounded by felsic Mather Gorge rocks originating on an ancient seafloor?

The answer has to do with subduction during the Taconian Orogeny beginning about 474 million years ago (fig. 4). During subduction, the ultramafic rocks in Lake Fairfax Park were altered by what geologists call metasomatism, a kind of metamorphism caused by a process known as serpentinization: the reaction of peridotite to superheated fluids rich in dissolved silica.

As the proto-North-American plate slid under the Taconian plate during the Taconian Orogeny, the subducting oceanic crust heated up enough to release superheated waters (fig. 4). Although oceanic crust is mafic, it still contains plenty of quartz—45 to 55 percent. Filled with dissolved quartz, the superheated waters reacted with peridotite minerals in the upper mantle to form serpentinite (pronounced ser-PEN-tinite), an often greenish rock chiefly made up of the minerals antigorite, lizardite, and chrysotile. For example, the olivine mineral forsterite in peridotite reacted with superheated silica-rich waters to produce the serpentine mineral lizardite:

$$3Mg_2SiO_4 + SiO_2 + 4H_2O \longrightarrow 2Mg_3Si_2O_5(OH)_4$$

Serpentinization also yielded small amounts of brucite and magnetite as well as talc, sulfide minerals, and native metals like nickel. For example, serpentinization involving enstatite (a pyroxene mineral) produced talc:

$$3MgSiO_3 + SiO_2 + H_2O \longrightarrow Mg_3Si_4O_{10}(OH)_2$$

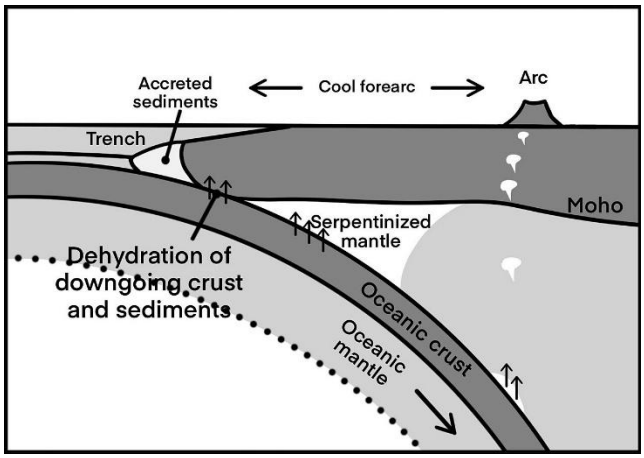


Figure 4—*Serpentinization of upper mantle rock during subduction. Superheated waters released by the subducting crust react with peridotite to form serpentinite. Less dense than the oceanic crust and mantle, serpentinite then rises into seafloor rock in the forearc basin. Source: Hyndman and Peacock (2003).*

Serpentinite Emplacement

Serpentinization hydrated the ultramafic parent rock (peridotite), expanding its volume and reducing its density. In the process, the hydrated ultramafic rock rose from the upper mantle through the oceanic crust to penetrate sedimentary seafloor rock, as suggested in figure 4. Tectonic uplift pushed the lighter hydrated rocks up through the overlying heavier ones.

Drake and others (1999) surmised that an "advancing ophiolitic thrust sheet" during the Taconian Orogeny "calved" bands of serpentinite as olistoliths, depositing them in ancient seafloor sediments. Olistoliths are loose rocks of various sizes—some the size of mountains—that broke off from steep seafloor slopes in submarine debris flows caused by massive earthquakes tied to tectonic events.

The Piney Branch Complex, a bedrock type southeast of Lake Fairfax Park, was apparently the "advancing ophiolitic thrust sheet" that spawned the serpentinite olistoliths. Made up of peridotite, pyroxenite, and gabbro altered by serpentinization, the Piney Branch Complex is, according to Drake (1986), "believed to be a fragment of a large dismembered ophiolite" (pronounced OFF-yo-lite). An ophiolite is a vertical slice of mafic and ultramafic rock from Earth's crust and upper mantle. Though rare, ophiolites have been emplaced by tectonic events on continental margins worldwide, including (apparently) the Piedmont.



Figure 5—*A weathered block of quartz-rich Mather Gorge schist shows folia (thin layers of mica crystals aligned in parallel sheets) and a greenish tinge from chlorite in the rock. (The brownish coloring in places is from oxidation—rusting—of iron in the rock.) Photo: Ana Ka'ahanui.*

Bedrock Exposures

Mather Gorge Schist. The first stops on our geology walk were to see exposures of Mather Gorge schist. Rob showed us a large block of what he called quartz schist (fig. 5), placed there, perhaps, by park attendants. We also saw a huge outcrop of greenish quartz-rich schist near a campground (fig. 6, top). According to Drake and others (1999), quartz is the main component of Mather Gorge schist, followed by muscovite mica and often (but not always) chlorite. The high chlorite content in many exposures accounts for the greenish color of the rock.

At the base of the huge schist outcrop were piles of what Rob called float (random pieces of eroded rock). Some pieces showed tiny black crystals of magnetite embedded in the mica (fig. 6, bottom). In my article about the geology of Lake Fairfax Park in the September 2024 issue of this newsletter, I erroneously called the float metagraywacke when it was obviously schist—I stand corrected.

Along trails elsewhere in the park, much of the Mather Gorge schist we saw was light gray rather than greenish (fig. 7). Some schist analyzed by Drake and others (1999) lacked green minerals like chlorite and epidote. Their absence, along with the prevalence of gray quartz and white muscovite mica, accounts for the light gray color of the rock.





Figure 6—*Mather Gorge schist.* ***Top:*** *Large outcrop of quartz-rich schist uptilted by tectonic forces. Standing on the outcrop are Field Trip Co-Coordinators Mickey and Katy Johnson.* ***Bottom:*** *Weathered schist shards with tiny magnetite crystals embedded in the mica. Photos: Ana Ka'ahanui.*



Figure 7—*Mather Gorge schist showing light gray color and striations in the rock caused by tectonic forces realigning mica crystals in the schist. Photo: Hutch Brown.*

Some Mather Gorge schist, both gray and green, showed striations (parallel lines) in the mica sheets (fig. 7). Rob said that the lines came from the incipient realignment of mica crystals under tremendous pressure from a tectonic event after the Taconian (such as the Alleghanian Orogeny about 320-280 million years ago). The striations reminded me of similar lines—with the same cause—in Occoquan granite, a phenomenon known as quartz-rod lineation. (For details, see the November 2025 issue of this newsletter.)

Mather Gorge schist originated in silts and muds that hardened into shale on an ancient seafloor. During Taconian mountain building, enormous heat and pressure altered the shale to slate, then to phyllite (pronounced FILL-ite), and finally to schist. Had metamorphism continued, the schist would have altered to gneiss (pronounced NICE), a banded metamorphic rock. In fact, the schist unit reportedly contains lesser amounts of gneiss (Drake and others 1999), though we saw none.

We did see plenty of loose white quartz eroded out of the Mather Gorge schist, along with quartz veins in the schist (fig. 8), reflecting Rob's use of the term "quartz schist." Schist, a mineral composite, is far more erodible than quartz. At 7 on the Mohs hardness scale, quartz is one of the hardest (and most common) minerals on Earth.

Mather Gorge Metagraywacke. Metagraywacke, on prominent display at Great Falls (fig. 9), originated as a slurry of mud, sand, and gravel on an ancient seafloor. Undersea landslides caused by earthquakes precipitated by tectonic events mixed the sediments in what geologists call turbidity currents and deposited them in a blend. The sediments hardened over time into graywacke (from German *Grauwacke*, "gray rock"), a sort of silty sandstone. Metamorphosed by tremendous heat and pressure during the Taconian Orogeny, the rock altered to metagraywacke (metamorphosed graywacke), which resembles a grayish

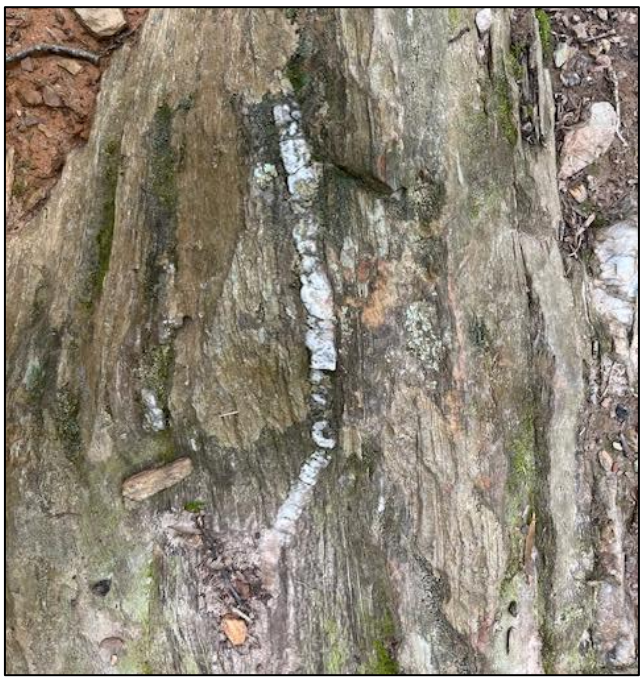


Figure 8—*Weathered Mather Gorge schist with a prominent vein of white quartz. Photo: Hutch Brown.*



Figure 9—*Mather Gorge metagraywacke at Great Falls. Note the visible bedding, the sediments of various sizes and colors, and the nodules of white quartz. (The blue is chalk residue from rock climbers.) Photo: Hutch Brown.*



Figure 10—*Weathered schist in the Mather Gorge metagraywacke unit. Photo: Ana Kaʻahanui.*

quartzite with embedded silts, quartz nodes, and quartz veins. At Great Falls, the sedimentary layers are still visible in the rock, which ranges from brownish to medium gray in color (fig. 9).

We saw nothing resembling metagraywacke in Lake Fairfax Park. Rob pointed out crumbling exposures of what he called chlorite schist (fig. 10), a weathered greenish rock in the Mather Gorge metagraywacke unit. A geologic map refers to schist in the unit but calls it quartzose (Drake and others 1999).

Ultramafic Rock. Rob showed us a random boulder of serpentinite (fig. 11), apparently placed by park attendants near a campground. Grayish-brown in color, the rock was too weathered to break open with a rock hammer for a view of the interior.

Along trails, however, we found solid serpentinite outcrops that we broke open. Serpentinite is a blend of minerals with colors ranging from white and yellow through green and bluish-gray to black (the latter from magnetite in the rock—for more on that, see the March 2026 issue of this newsletter). We found bluish-gray to greenish-gray exposures of the rock (fig. 12, top), along with a weathered piece of float with serpentinite's distinctive green (fig. 12, bottom), possibly from the serpentine mineral antigorite.

Towards the end of our field trip, on a trail approaching the head of Lake Fairfax, we found pieces of talc and soapstone (fig. 13), the talc schist component of the ultramafic unit in the park. Like serpentinite, the



Figure 11—*Weathered serpentinite boulder. Photo: Hutch Brown.*



Figure 12—*Bluish-gray serpentinite (top) (the reddish-brown is from iron oxidation). The typical green of serpentinite (bottom) is possibly from antigorite. Photos: Hutch Brown (top); Ana Kaʻahanui (bottom).*



Figure 13—*Talc (top left), serpentinite (top right), and soapstone (left—note fingernail scratch). Photos: Hutch Brown.*

talc derived from peridotite as a product of serpentinization during Taconian subduction. Talc is the main component of soapstone, which also contains small amounts of chlorite and amphiboles like tremolite. The talc we found was whitish-brown; the soapstone, easily scratched with a fingernail, was bluish.

Near Lake Fairfax, we passed an old soapstone quarry dating to colonial or precolonial times (fig. 14). The relatively soft soapstone could have been worked with stone or iron tools for a variety of purposes.

Takeaways

I enjoyed our trip, despite the frigid winter temperatures, partly because of what I learned. Again, I saw the value of approaching geology as the art of telling the story of the rocks in plain language. A key part of telling that story is using a geologic map as a baseline for understanding what we see in the field.

But I now better understand the limitations of using a map. Geologic mapping is an inexact science, especially near boundary lines; and geologic units usually contain multiple bedrock types, which can easily confuse, partly by creating and then confounding expectations. In using a geologic map, it helps to understand its limitations.

Acknowledgments

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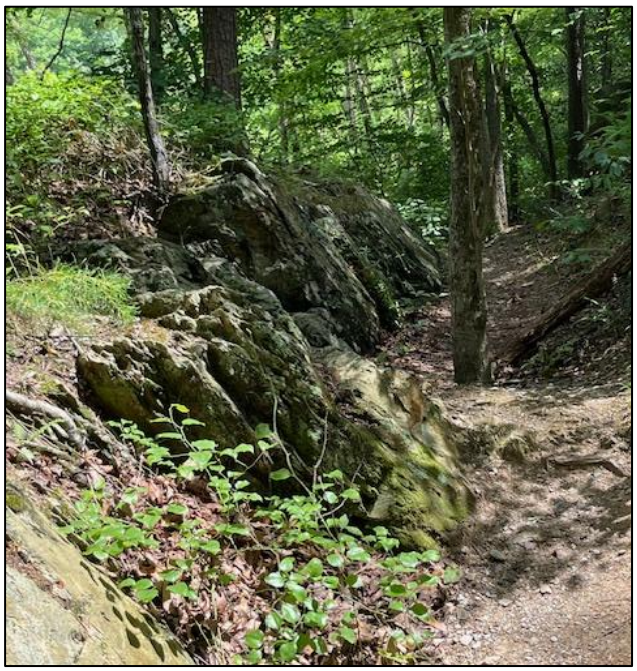


Figure 14—*Old soapstone quarry in Lake Fairfax Park in June 2024. Photo: Hutch Brown*

May 2026—Upcoming Events in Our Area/Region (see details below)

Sun	Mon	Tue	Wed	Thu	Fri	Sat
					1	2 Show: W. Friendship, MD
3 **NVMC field trip**	4 **NVMC mtg**	5	6 MSDC mtg	7	8 Shows: Franklin, NC; Marietta, GA	9 Shows: NC, GA; **NVMC geology walk**
10 Shows: Franklin, NC; Mariet-ta, GA	11 GLMSMC mtg	12	13	14	15	16 Show: Mays Landing, NJ
17 Show: Mays Landing, NJ	18	19 MNCA mtg	20	21	22	23
24	25	26	27	28	29	30

Event Details

3: Cockeysville, MD—Collecting trip at Texas Quarry; info: Katy Johnson, fieldtrips@novamineralclub.org.

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

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

8-10: Franklin, NC—Wholesale/retail show; Franklin Gem & Mineral Society; Robert C. Carpenter Ctr, Macon Cty Comm Bldg, 1288 Georgia Rd; Fri 10-5, Sat 10-6, Sun 10-4; $3 adults, under 16 free; info: Varshana Dholakia, (828) 342-3135; Email: varshana.dholakia@gmail.com.

8-10: Marietta, GA—Annual show; Georgia Mineral Society; Cobb County Civic Ctr, 548 S Marietta Pkwy; Fri 10-6, Sat 10-6, Sun 10-5; free; info: Robert & Jane Stone, 717-357-6619, mayshow@gamineral.org.

9: Glencarlyn Park, Arlington—Geology walk in Four Mile Run Gorge, 10 a.m.-noon; info: Katy Johnson, fieldtrips@novamineralclub.org.

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

16-17: Mays Landing, NJ—Biannual show; Cape Atlantic Rockhounds; Atlantic Cty 4-H Fairgrounds, 3210 US Rt 50; Sat 10-4, Sun 10-4; free; info: Bob Bowman, 856-207-1381.

19: Burke, VA—Micromineralogists of the National Capital Area; info: http://www.d centimetersicrominerals.org/.

The Northern Virginia Mineral Club, Inc.

Visitors are always welcome at our club meetings!

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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).

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Meetings: At 7:30 p.m. on the first Monday of each month 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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