THE NORTHERN VIRGINIA MINERAL CLUB INC

The Mineral Newsletter

Next meeting: September 2 (Labor Day) Time: 7:30 p.m.

Virtual Meeting Through Zoom



Franklinite with willemite, zincite, and calcite

Sterling Mine, Sterling Hill, NJ

Source: Wikipedia. Photo: Rob Lavinsky.

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Explore our website!

September Meeting Program:

Catching Up After Summer Break

details on page 7

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Mineral of the Month
Franklinite

by Sue Marcus

Franklin, NJ, is known to many mineral collectors in the United States. Some NVMC members have collected there. I believe that Mike Kaas ("Miner Mike") even worked underground at one of the mines in the area.

Franklin bills itself as the "Fluorescent Mineral Capital of the World." More than 360 mineral species occur in the Franklin-Sterling Hill area; about 90 fluoresce. The area is the type locality for many minerals, some of which are found only there.

Description and Naming

Originally known as Franklin Furnace, Franklin lent its name to franklinite, our Mineral of the Month—and the official state mineral of New Jersey. Franklinite is not fluorescent. It is a zinc-iron oxide that is opaque and black, with a submetallic to metallic luster. These characteristics, along with its customary octahedral crystal form, make franklinite relatively easy to identify.

When viewed under bright light and through a microscope, franklinite can look reddish-brown. Magnetic properties vary, depending on the amount of iron in a specimen. In some ore zones, hematite naturally exsolved from franklinite (meaning that it chemically separated from the original material).

Crystals are usually octahedral—four-sided pyramids with their bases attached (see the images in this article and on the cover). Franklinite is part of the isometric system in the classification of crystal shapes. The isometric system most commonly presents itself as cubes or octahedra, although the system has other forms as well. Some franklinite crystals were deformed by contact with other minerals or by the space available as they formed. Octahedral crystals can be easiest to spot, but dodecahedrons and modifications and distortions of diverse isometric crystal morphologies are also common. (For more on the isometric system, click here.)

Pierre Berthier described the new mineral in 1819 and named it for the locality where it was first found. He stated that the name of the place, and hence the mineral name, honors Bejamin Franklin.

Fall is almost here!

Northern Virginia Mineral Club members,

The next club meeting will be on **Monday, September 2, 7:30 p.m.** We won't have our usual meeting place (it's Labor Day), so the meeting will be online through Zoom.

See program details on page 7.



Franklinite on calcite, Sterling Mine, Ogdensburg, NJ. Photo: Ken Reynolds.

The original specimens described by Berthier were not well crystallized. Berthier did not mention the specific source or sources of his materials, although he noted that the mineral was found with an "orange-red zinc mineral" (zincite) and "a white laminated carbonate of lime [calcite], quartz, a peculiar greenish yellow garnet [likely willemite]," and other minerals. Zincite and

willemite were named later by others. Berthier noted that Franklin, Sparta, "Stirling" (Sterling), and Rutgers were the principal localities for both franklinite and the "orange-red mineral" (zincite), although he did not give a specific place for the type materials that he studied.

Localities

United States. The Franklin Mining District in Sussex County, NJ, has been and continues to be the best source of franklinite as well as the source of the finest crystals. The district includes (1) the Franklin Mine (Parker and Palmer shafts) and the Trotter Mine (and Trotter Dump), both in the Franklin area; and (2) the Sterling Mine (in the Sterling Hill orebody) in the Ogdensburg area. Mindat lists them all as the cotype localities for franklinite. Adding complexity, Palache (1935) called the deposits (1) Mine Hill and (2) Sterling Hill, respectively. The Passaic Pit and the Noble Pit (or Mine) were smaller workings on Sterling Hill that also produced franklinite.

The Franklin and Sterling Mines have produced most of the collectible specimens. The Franklin-Ogdensburg Mineralogical Society, in its online article on franklinite, gives a single type locality (Franklin). Berthier, in his original description of franklinite, gave both Franklin and "Stirling" (Sterling), along with Sparta and Rutgers, as the type locality, but Mindat does not list franklinite as occurring at the latter two locations.

The Buckwheat Dump contains rocks from both Franklin mines (Franklin and Trotter). Collecting is permitted on the Buckwheat Dump for a fee, with access controlled by the Franklin Mineral Museum.

Although franklinite is made up of zinc, iron, and oxygen, the chemistry of individual specimens can vary slightly. The mineralized fluids from which franklinite grew varied a bit, leaving traces of other elements, such as aluminum and manganese, in the franklinite crystal structure.

A study cited by the Franklin-Ogdensburg Mineralogical Society in its online article on franklinite showed that the content of franklinite was associated with the color of nearby willemite: if red willemite was adjacent to it, then the franklinite would be lower in iron, whereas black willemite correlated with higher-than-usual iron and lower-than-usual manganese contents.



Franklinite. ***Top:*** *With rhodonite on calcite, Franklin Mine, Franklin, NJ.* ***Bottom:*** *With willemite on calcite. Photos: Ken Reynolds (top); Harold "Fritz" Moritz (bottom).*

The Sterling Hill Mining Museum has described the origins of the Sterling and Franklin zinc ore deposits in detail. Whether as large subhedral crystals or as massive material, franklinite was formed as both a primary and a secondary mineral, meaning that it formed initially from ore-bearing fluids (primary) and then from recrystallization of the original mineral (secondary).



Franklinite. ***Top:*** *Franklin Mine, Franklin, NJ.* ***Bottom:*** *With willemite on calcite, Sterling Mine, Ogdensburg, NJ. Photos: Charles Creekmur (top); Rock Currier (bottom).*

The initial ore formation is believed to have started about 1.3 billion years ago when hot metalliferous fluids emerged from submarine vents, cooled when hitting seawater, and then precipitated metals onto calcareous seafloor sediments. Later, plate tectonics subducted the metal layers and calcareous muds, metamorphosing the calcareous muds into marble (the Franklin marble) that hosted the ore bodies.

The secondary processes included skarn formation when lime-rich host rocks were altered ("cooked") by the heat and pressure of intruding molten rock. Some ore zones at Sterling Hill consisted of franklinite and willemite in coarsely textured gneiss. Due to the coarse texture, specimens may not show evidence of their gneissic host rocks.

Larger, more perfect crystals were probably formed through the secondary processes. Crystals up to 17 centimeters (~7 in) in size have been extracted, and much larger crystals were once seen—more than 30 centimeters (12 in) in size. These larger crystals broke during extraction, and we can certainly sympathize with the collectors who saw the big ones get away.

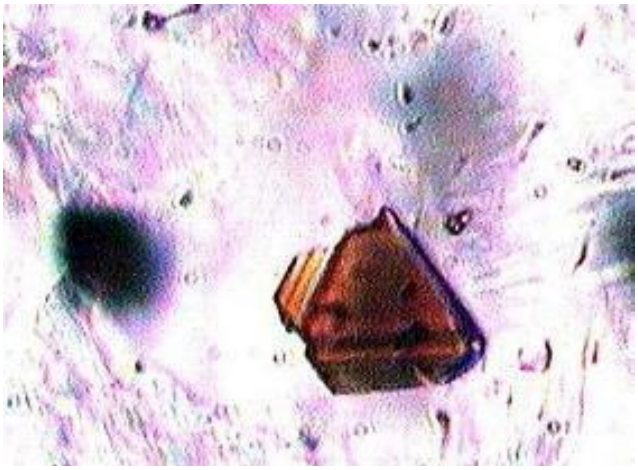
The Franklin-Ogdensburg Mineralogical Society's online article on franklinite gives a detailed description of franklinite from Franklin and its mineralogical relations with other minerals found there. The article also informs us that miners would fake specimens or repair broken crystals with plaster colored with lampblack. Specimens in the Canfield collection, donated to the Smithsonian in 1927, included some of these "enhanced" franklinites.

Sweden. The Långban Mine in Varmland, Sweden, is famous among mineral collectors worldwide for the diversity of minerals found there. The mine, near Flipstad, operated from at least 1711 to 1972; the furnace was built in the 16th century and used until 1933. After 1950, only dolomite was extracted from the mine, which is now entirely a tourist attraction.

Like the Franklin District, Långban was the source of more than 300 mineral species hosted in skarns and metamorphosed iron deposits, along with pegmatites. The franklinite found at Långban was in a "cross-cutting vein with magnetite, bornite, chalcocite, sphalerite, cassiterite, wittichenite, and bismuthinite," according to Kjell Gatedal (in a personal communication on August 4, 2024). Ferrorhodonite was an associated mineral mentioned in the description posted on Mindat by Pavel M. Kartashov.

Kjell also photographed a lovely microscopic franklinite crystal that he states is rich in vanadium, the only V-rich specimen currently known. It is from Hasselhöjden, west of Ålvstorp, Sweden. This locality is a limestone quarry where the host limestone was intruded by quartz veins.

Other Localities. Unconfirmed reports of franklinite include an occurrence in Kazakhstan from the Niazatas



Franklinite (vanadium-rich), Hasselhöjden, Grythyttan, Hällefors, Örebro County, Sweden. Photo: Kjell Gatedal.

iron-manganese deposit, which might be the same as the Ushkatyn-III deposit. The Koduru Mine in Andhra Pradesh, India, and the Hraniend magnetite deposit in Silesia also reportedly produced franklinite.

Commercial Uses

When the mines in the Franklin Mining District were active (from 1897 to about 1954), they were among the top sources of zinc ore in the world. Franklinite was a major ore mineral at the Franklin and Sterling Mines, comprising 42 percent of the Franklin mill feed in the early 1930s. The mines finally played out in the 1950s, and franklinite has never been found in minable deposits anywhere else in the world.

Three-fourths of the zinc mined now is used to galvanize other metals (that is, to give them a protective coating) or as a metal alloy. Zinc makes up the interior of our pennies due to the higher price of copper, which coats the exterior. The remaining quarter of the zinc mined today is used in rubber production, in paints and chemicals, in agriculture, and for such common items as sunscreen.

Gems

Given a chance, lapidarists will craft a gemstone out of almost any mineral. For most minerals, Mindat has a link to its related site, Gemdat—but not for franklinite. Never fear: someone has faceted franklinite!

As of August 5, 2024, three faceted stones were offered for sale on one website. They ranged in size from 4.26 to 4.95 carats and were priced at 90-100 euros ($99-110). Though opaque and black, they had red hints showing either intrinsic franklinite color or exsolved hematite. Another site offered a 5.61-carat faceted stone for $139. All faceted stones seem to have nicks or pits.

Possibly more attractive "gemstones" would be specimens of franklinite with calcite and willemite shaped into cabochons. Under ultraviolet light, the cabochons would show off the calcite and willemite, contrasting nicely with the nonfluorescent franklinite.

Prices (2024)

Everyone who wants one should be able to afford a franklinite specimen. Possibly the cheapest ones are small hunks of rock sold for the fluorescent calcite and willemite in them; the black franklinite provides a nice color contrast, whether or not under ultraviolent light. These small, low-grade rocks are often sold in bulk starting at $12 per pound. One sample on eBay 5 centimeters (~2 in) long was offered for $3. For less expensive specimens, shipping can cost more than the mineral itself.

If you are interested in franklinite specimens, look for them at local rock shows or ask a local dealer. Some collectors of fluorescent minerals might even have one they'd give you for free.

At the other end of the purchasing spectrum, Arkenstone offers a 2.27-kilogram (5-lb) single crystal that is 13.2 centimeters (~5.2 in) in its largest dimension for $7,125—discounted from $9,500.

In short, specimens for sale range in price from $3 to $7,000 (prices were shown online on August 5, 2024). The price usually depends on the size and quality of



Franklinite with zincite on calcite, Sterling Mine, Ogdensburg, NJ. Photo: Modris Baum.



Franklinite on calcite, La Negra Mine, Antofagasta, Chile. Photo: André Heyninck.

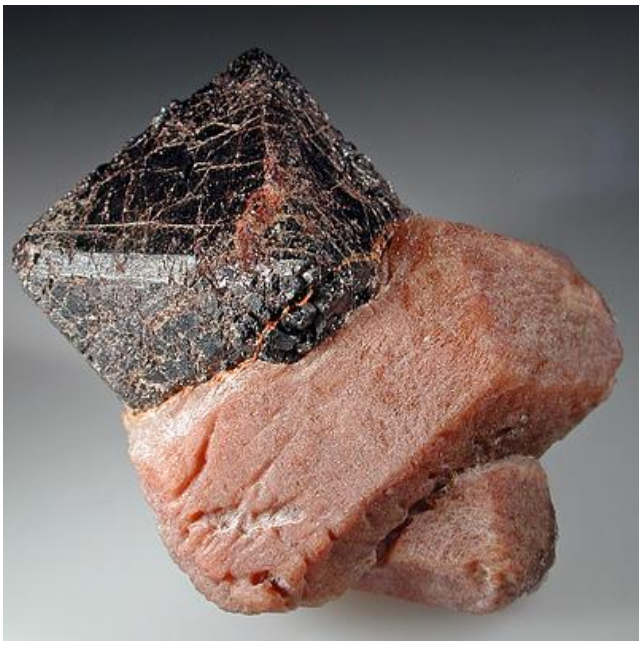
of the crystals. Lustrous franklinite crystals that stand out from their matrix are the most desired and therefore the most expensive. I could not readily find any franklinite specimens for sale that were not from the Franklin Mining District.

Technical Details

Chemical formula ..... $Zn^{2+}Fe^{3+}{}_2O_4$
Crystal form ..... Isometric
Hardness 5.5-6
Specific gravity 5.07-5.22
Color ..... Black (can be reddish-brown under bright light and under microscope)
Streak ..... Reddish-brown to black
Cleavage ..... None
Luster ..... Metallic to submetallic

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. This time, Kenny Reynolds came through with photos, as did Charles Creekmur, Kjell Gatedal, André Heyninck, and Kelly Nash. NVMC members who collect in the Franklin District include Kenny, Jason Zeibel and family, and Craig Moore.



Franklinite with willemite, Sterling Mine, Ogdensburg, NJ. Photo: Kelly Nash.

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Catching Up After Summer Break
September Program

Our club meeting on **September 2** will be remote (by Zoom) because it will be Labor Day and our normal meeting place won't be available. We will use the occasion for club members to touch base after the summer break. Please join us on Zoom at https://tinyurl.com/2tazkfck (meeting ID: 872 1753 7889; passcode: 557925).

During Rock-n-Talk, folks will have an opportunity to share summer finds and adventures related to our hobby. We will also catch up on summer field trips and the club picnic in August.

Kathy Hrechka—if she is available—will show us slides from her geology tour of Iceland last March. She has drone footage documenting volcanic eruptions on Iceland's Reykjanes Peninsula beginning in December 2023. (Some of her images are in the May club newsletter.)

In addition, we will discuss our upcoming gem, mineral, and fossil show on November 23-24. We had a successful show last year, so let's build on what we learned. Show Chair Tom Taaffe will lead the discussion; see his article on page 22. We will need volunteers to play the various roles required for a successful show.



EFMLS Recognizes NVMC for Growth in Club Membership

In June, Field Trip Co-Chair Katy Johnson received an email from EFMLS President Bill Stephens congratulating our club for winning the regional adult membership award for 2023-24 based on a 220-percent increase in our membership.

Our club growth helped the EFMLS win the AFMS's annual adult membership award for 2023-24 based on an overall EFMLS membership growth of 27.4 percent. The EFMLS now has 9,974 members, up from less than 6,000 a few years ago.

Bill plans on attending the NVMC holiday party on December 2 to bestow the award himself and to say a few words to us about the EFMLS.



Pat Flavin with Dr. Lance Kearns, professor of mineralogy at James Madison University in Harrisonburg, VA. In January 2014, Pat and fellow club member Kathy Hrechka visited Dr. Kearns, who gave them a tour of the JMU Mineral Museum. Photo: Kathy Hrechka.

Bon Voyage, Pat!

Pat Flavin, a longstanding member of the NVMC, has moved to Florida, and we bid her a fond farewell!

Pat, a realtor and cat lover, joined our club more than a decade ago as an avid collector of fossils. She enjoys finding specimens herself—and she was in luck because our area features numerous fossil-collecting sites in roadcuts, on beaches, and in such famous localities as Calvert Cliffs, MD.

Pat was an active club member who organized collecting trips for our club, especially for sharks' teeth at Flagg Pond in Maryland. She carefully picked the best times to go, made the arrangements herself, and helped field trip participants with equipment and techniques. Her efforts yielded some great finds and happy moments for many club members.

For years, Pat helped to organize our annual holiday parties, and she lent a hand at our annual club shows at George Mason University. She also contributed articles on various topics to our club newsletter.

Before she left, Pat made a final contribution to our club: a sizable donation of minerals and fossils, which she left with NVMC Vice President Craig Moore.

We thank Pat and will miss her!



President's Message

by Jason Zeibel

In June, we welcomed Scott Duresky to our club meeting (fig. 1, top). Mr. Duresky is one of the leading experts on the history of the pegmatites of the Rutherford Mine in Amelia, VA. He gave a wonderful talk on his and others' many years of characterizing the minerals there, showing many examples.

Mr. Duresky also brought a jar of garnets for us to distribute to club members! The jar will make a reappearance at the club picnic in late August, and lucky attendees can help themselves to their own sample of Rutherford pegmatite! Many club members showed off their own minerals from the Rutherford and Morefield Mines and swapped stories about collecting them (fig. 1, bottom).

Please continue to keep an eye out for good speakers; if you find one, send a note to our club vice president, Craig Moore, who has the difficult job of coordinating our speakers. If you have a topic that you are excited about and feel motivated to present on it yourself, let Craig know! We will likely go out to dinner before the club meeting whenever we have an in-person speaker.

September's meeting will be on Labor Day. Since the meeting hall is not available, we will have an online-only meeting. I encourage you to come with stories about any geological activities you might have had this summer—or any other time, really.

To start the summer for our household, we led our Scout troop (Troop 1345G from Burke, VA) on an all-day spelunking adventure in Laurel Caverns near Farmington, PA (fig. 2). Laurel Caverns is Pennsylvania's largest cave network, with over 4 miles of tunnels. The upper section of the cave system is lighted and an easy stroll, but more adventurous groups like our Scout troop find plenty of crawl-on-your-belly action using only the light you bring. We were also treated to a discussion of the regional geology, with folded limestone layers visible all around us.

In the second half of June, we took a family trip to the north of Italy. It was an amazing adventure in the mountains of the region, the Dolomites (fig. 3). The Dolomite Mountains, about 250 million years old, are mainly sedimentary rocks such as limestone. Today, we can hardly imagine that the mighty mountains were once an enormous coral reef in a primordial ocean called Tethys. This part of Italy is classified as a UNESCO World Heritage Site due to its rugged beauty. We were there in late June; it was a windy 60 degrees in the mountain passes but in the high 30s up on the mountains. We took the Passo Pordoi cable car up to the peak of Sass Pordoi, elevation 2,950 meters (9,680 feet). The area on top is a rocky plateau, home



Figure 1—*Scenes from the June NVMC meeting.* ***Top:*** *Club Vice President Craig Moore (right) with our guest speaker, Scott Duresky, one of the leading experts on the pegmatite of the Rutherford Mine in Amelia, VA.* ***Bottom:*** *Celia Zeibel and NVMC Field Trip Chair Katy Johnson examining specimens from the Rutherford and Morefield Mines in Amelia, VA. All photos: Jason Zeibel.*



Figure 2—*Celia Zeibel gets up close and personal with the geology of southwestern Pennsylvania at Laurel Caverns.*



Figure 3—*Lyra and Celia Zeibel pose in front of majestic peaks of the Dolomites in Val Gardena, Italy.*



Figure 4—*Audra and Celia Zeibel at the Geological Museum of the Dolomites in Predazzo, Italy.*

to some of the world's most amazing skiing in the winter. While we were there in June, it was still cold enough for an impromptu snowball fight.

Our next stop was the Geological Museum of the Dolomites in Predazzo, Italy (fig. 4). Founded in 1899, the museum contains over 11,000 artifacts, with a focus on the geology of the Dolomites and, in particular, the Fiemme and Fassa Valleys. I particularly enjoyed the display showing examples of the various types of limestone and other sedimentary rocks associated with famous mountains in the Dolomites. The rocks did look very different from one another, even though they formed at roughly the same time in roughly the same sea. The museum had many other displays of all sorts of rocks and minerals native to the mountainous regions of northern Italy.

The next stop was in Trento, Italy, one of the largest towns in the Dolomite Mountains, where we toured the Science Museum of Trento. It had four floors of exhibits spanning all the sciences—including a try-it-yourself Quantum encryption simulator! Many of the exhibits were hands on and really engaged the kids. The museum contained about half a floor dedicated to geology and another large display hall filled with fossils and other paleontology displays and interactive exhibits. We learned more about the geology of the region, including from an exhibit on the commercial materials that were mined in the region and what those minerals were used for.

My favorite display explored how the varying geology in the region interacts with viticulture (fig. 5). The display explored several of northern Italy's famous wine-producing regions and how the mineralogy of the soil affects the choice of grapes grown, when they are harvested, and how the wine is bottled.

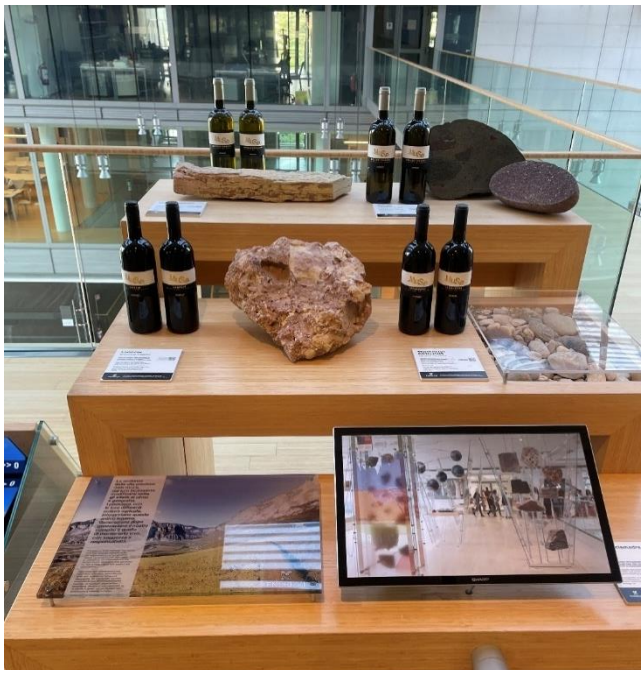


Figure 5—*Exhibit discussing the effects of geology on Italian wine production at the Trento Science Center in Trento, Italy.*



Figure 6—*The Zeibel family (Celia, Audra, Lyra, and Jason) exploring the erosion mechanics of the Dolomites in northern Italy while canyoning through the mountains near Lago di Garda.*

The next day, we got up close and personal with the erosion mechanisms taking place in the area after booking a canyoning adventure in the hills above Lago di Garda (fig. 6). We followed a stream down from the mountains as it worked its way to the lake below. We descended about 250 feet through a combination of rappelling, sliding down rocks, and jumping from the top of waterfalls. The water was quite chilly, so it was good that the tour came with wetsuits!

As we worked our way through the canyons, the dramatic layering of the limestone was all around us, often tilted and folded into acute bends, with layers that met at strange angles, only to be tilted yet again. The creek had a way of finding the weak spots in the rock until encountering harder layers of rock or dikes that passed through the limestone seemingly at random. This combination often resulted in dramatic slices through the hillside and towering waterfalls.

After a few days at (or below) sea level in Venice, we headed back across the Apennines to the western side of the Italian peninsula. In Florence, we had a few free hours one afternoon, so—based on a suggestion by an NVMC member—we toured the Museum of Geology and Paleontology (fig. 7). Located on the campus of the University of Florence, the museum provides perhaps the easiest-to-follow fossil display that I have



Figure 7—*Celia Zeibel checking out the mammals exhibit at the Museum of Geology and Paleontology in Florence, Italy.*



Figure 8—*Lyra and Celia Zeibel checking out the geologic time fossil display at the Museum of Geology and Paleontology in Florence, Italy.*

ever seen. Successive display cases move from the Cambrian Period up to now (fig. 8), showing striking examples of fossils from each epoch. In addition, the hall of prehistoric mammals features impressive large-mammal displays and a full-size prehistoric whale skeleton from the region. Although the museum has few if any mineral displays like we saw in Predazzo, it is very well laid out.

The next day, we went to see art in the Uffizi—lest you think this trip was only about rocks and fossils.

After all our vacationing early in the summer, most of the rest of the summer was dedicated to summer school classes, summer camps, and marching band for the girls.

As I write this, we are a few days away from the start of another school year. This will bring a new series of homework assignments and demands on our time as a family.

I am very grateful to Katy Johnson, our field trip chair, for setting up some amazing opportunities for both collecting and pure observational geology (see the June field trip article on page 13). Please do your best to take advantage of these opportunities as well as opportunities to share and tag along with other clubs.

One scheduling note: our club picnic is coming up. This year, we scheduled it for Sunday, August 25, 4-7 p.m., at the Zeibel house; watch for emails closer to the event. Please plan on bringing a side dish or dessert as well as rocks to share and trade.

We will be sure to have pictures of the event in the October newsletter!

Jason



Club Meeting Summary
June 2

by Almas Eftekhari, Secretary

President Jason Zeibel opened the meeting at the Dunn Loring Fire Station with about 20 people in attendance, including a visitor. It was the last club meeting before summer break.

Jason announced that his family will host the annual summer picnic on August 25, with details to come by email. The club will provide protein and nonalcoholic beverages; members were asked to bring side dishes and desserts.

Members were also invited to bring rocks! Tables will be available for displaying and swapping fossils and minerals, and the family pool will be available for swimming.

The next club meeting is on Labor Day, September 2, but our usual meeting place will be closed so the meeting will be virtual only. See the program on page 7.

Our first in-person meeting will be on Monday, October 7, when we will hold our annual fall club auction. Members should bring fossils and minerals to sell and cash for buying.

Vice President Craig Moore announced that our November meeting will be devoted to preparing for the annual club show, which typically takes place on the weekend before Thanksgiving. If she is available, Kathy Hrechka will also give a presentation on her experiences collecting diamonds at Crater of Diamonds State Park in Arkansas.

Field Trip Co-Chair Katy Johnson talked about upcoming field trips, beginning with a trip to Lake Fairfax County Park on June 30. The field trip leader, Rob Robinson, wanted to get an early start at 9:30 a.m., with details to come by email. (See the field trip article on page 13.)

Additional field trips were to take place at upper Accotink Creek in Fairfax and at Virginia's Willis Mountain. The dates were not yet confirmed.

During Rock-n-Talk, Jason Zeibel showed specimens he collected as a boy at Morefield Mine in Amelia County, VA. The mine operator excavated pegmatite materials from the mine and dumped them from a frontloader on the ground for paying visitors to search through. Jason showed us a fist-size amazonite and a small clear topaz he found. Craig Moore also brought minerals from Morefield Mine to show.

Craig introduced Scott Duresky, who gave a presentation on the Rutherford Mine in Amelia County, VA. Scott covered the results of his research on the minerals of the historic Rutherford Mine Pegmatite #2 in collaboration with Michael Pabst. Scott has been doing his research for 11 years.

After giving a brief history of the mine, Scott showed images of various minerals found there. He said that the minerals are generally more interesting or unique than they are beautiful. However, they include some of the rarest minerals in the world, so he wants to preserve them for the public.

Following his presentation, Scott donated a container of small Rutherford Mine garnets to the club. Door prizes concluded the meeting.



Spessartine (top) and microcline, var. amazonite (bottom), Rutherford Mines, Amelia County, VA. Source: Mindat; photos: Rob Lavinsky.

June Field Trip

Lake Fairfax County Park: Exploring the Local Bedrock

by Hutch Brown

On the morning of June 30, 2024, 11 club members and master naturalists gathered for a field trip in a county park in Reston, VA, to explore exposures of the local bedrock. NVMC Field Trip Co-Chair Katy Johnson planned the trip in coordination with Rob Robinson, the field trip leader. That morning, forecasts of heavy thunderstorms caused them to call off the trip.

But we were already there, with no impending rainstorm in sight, so we decided to proceed under the able leadership of geologist Sue Marcus assisted by NVMC Vice President Craig Moore and me. I had been there a month before and thought I knew my way around; I was mistaken, but we still managed to stumble across bedrock exposures in what I (for one) recall as an interesting geology walk.

Setting and Meanderings

Lake Fairfax County Park comprises 476 acres of woods and fields, including a small (18-acre) reservoir and extensive campgrounds, playing fields, and other recreational facilities. Colvin Run (fig. 1, top) flows through the park and into Lake Fairfax before joining Difficult Run, which feeds the Potomac River in Great Falls National Park just below Mather Gorge.

I picked up a trail map from the visitor center, but using the map was guesswork because the trails were unmarked. From the parking lot where we met, we headed down #15 trail until somehow getting onto #8 trail, where we found trailside exposures of what we thought were phyllite and schist. After blundering onto #7 trail, we backtracked and headed up #10 trail, finding a large schist outcrop near a campground. From there, we headed back to our parking lot.

Some of us then continued down the other side of #15 trail to the head of Lake Fairfax (fig. 1, white star), where we found what appeared to be an old quarry. We then searched the nearest gravel bar on Colvin Run, where we found lots of quartz and schist, along with a few pieces of what we thought might be gneiss. On the way back up #15 trail to the parking lot, we found a small exposure of what we thought was serpentinite. This article discusses what we saw (or thought we saw), along with some of the underlying geology.

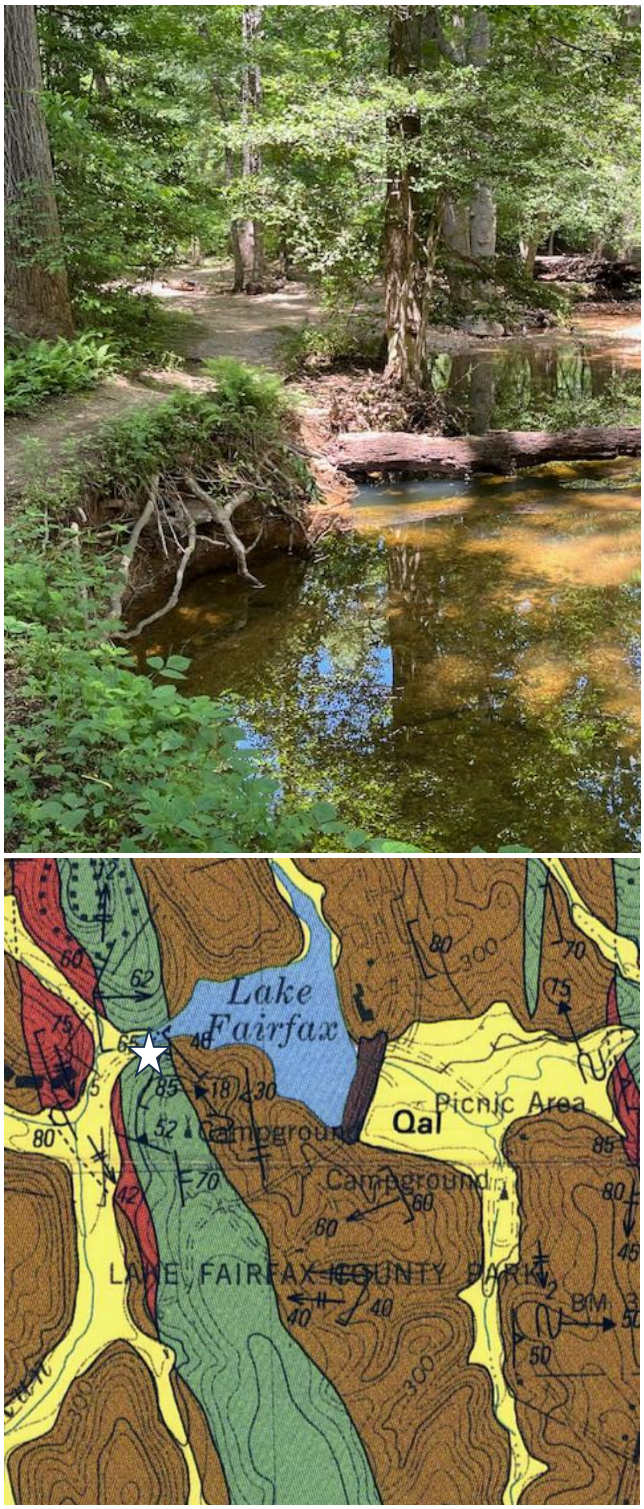


Figure 1—*Lake Fairfax County Park.* ***Top:*** *A park trail (#9) along Colvin Run.* ***Bottom:*** *Detail from a geologic map of the Vienna Quadrangle. Brown = Mather Gorge schist; red = Mather Gorge metagraywacke; green = ultramafic rock (serpentinite, soapstone, and talc schist); yellow = Quaternary alluvium (***Qal****); white star = old quarry. Source: Drake and Lee (1989).*

Metamorphic Bedrock

The park is on bedrock that is typical for the Piedmont in our area. The bedrock is part of a great band of metamorphic rocks that geologists call the Potomac Terrane (fig. 2). The rocks stretch from central New Jersey to south-central Virginia and reach from the sediments of the Coastal Plain in southeastern Fairfax County to the sedimentary rocks of Culpeper Basin in the northwestern part of the county.

In the early 1980s, USGS geologists "provisionally" classified the Lake Fairfax bedrock as Peters Creek schist, named for a locality in Pennsylvania. In 1997, they reclassified the Peters Creek unit in Virginia and Maryland as the Mather Gorge Formation, named for prominent bedrock exposures along the Potomac River's Mather Gorge. In the area of Lake Fairfax, the Mather Gorge Formation is mainly schist (fig. 1, brown) cut by bands of metagraywacke (red) and ultramafic rock (green).

Figure 1 (bottom) shows a detail from the 1989 USGS map of the Vienna Quadrangle, with the schist, metagraywacke, and ultramafic rock all still classified as parts of the Peters Creek unit. Later maps (such as the 1999 USGS map of the Seneca Quadrangle) show the schist, metagraywacke, and ultramafic rock as separate units. Respectively, they appear on later maps as **CZms** (**C** for Cambrian and **Z** for Proterozoic, reflecting uncertainty; **m** for Mather Gorge; and **s** for schist); **CZmg** (**g** for the "graywacke" in "metagraywacke"); and **CZu** (**u** for ultramafic).

According to the Vienna Quadrangle map (fig. 1, bottom), the schist (brown) and ultramafic rock (green) are both prominent within the park, whereas the area of metagraywacke (red) is small. However, pieces of all three bedrock units, eroded from exposures south and east of Lake Fairfax and carried downstream, might be found in the Colvin Run alluvium (on gravel bars), especially near the stream's confluence with Lake Fairfax (fig. 1, white arrow). That's why we looked there; a more careful and complete search of gravel bars might have revealed more.

Bedrock Description

Mather Gorge Schist (CZms). The Seneca Quadrangle map describes the Mather Gorge schist (fig. 1, brown) as containing schist along with lesser amounts of mica-rich gneiss, metagraywacke, and "calc-silicate rock" (parent rock metamorphosed through contact with hydrothermal fluids). Rob Robinson commented

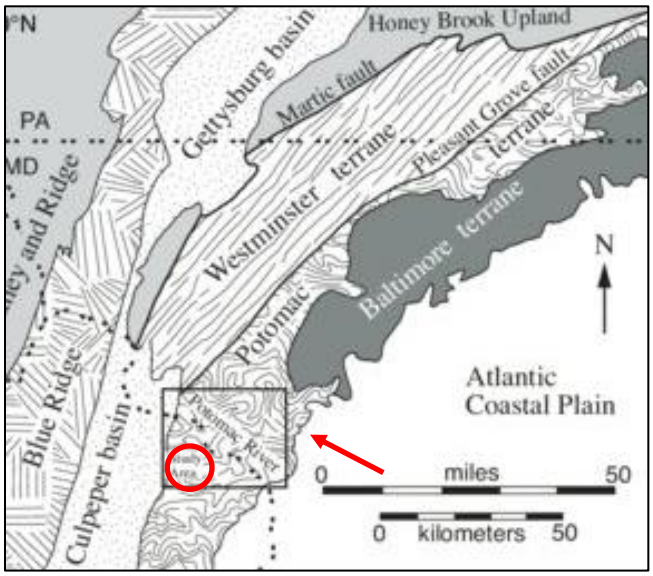


Figure 2—*Location of the Potomac Terrane (red arrow) in the mid-Atlantic Piedmont. The square encompasses the Washington metropolitan area; Lake Fairfax County Park lies within the circled area. Source: Kunk and others (2005).*

on a draft of this article based on his own expertise, saying that the unit was "quartz schist" containing "blocky quartz-rich massive rocks" with "chlorite-muscovite schist" and "abundant quartz veins."

The parent rock was likely shale, a sedimentary rock made up mainly of clays. Under intense heat and pressure, shale undergoes four stages of metamorphism, starting with slate and moving through phyllite (pronounced FILL-ite) and schist to gneiss (pronounced NICE). Heat and pressure squeeze the clay particles into progressively thinner sheets of rock while separating out micas and other platy minerals. Schist comprises very thin folia (sheets) of rock with a pearly luster from the mica. In gneiss, the minerals are separated into uneven bands of light and dark rock. Mica crystals are reportedly visible in both the schist and the gneiss.

The Mather Gorge schist ranges from fine to coarse and from greenish-gray to gray in color while weathering to a reddish-brown (fig. 3). Typical mineral assemblages are mainly silica (silicon dioxide) and micas (muscovite and biotite) but can include chlorite (giving the rock a greenish tinge), plagioclase, epidote, magnetite, hematite, and more.

Figure 4 (top) shows the only large natural outcrop we found in Lake Fairfax County Park—an extensive area of uptilted schist near a campground. The angled rock



Figure 3—*Mather Gorge schist along a trail (#8) in Lake Fairfax County Park. Note the foliation (thin parallel sheets), the mica sheen in places, the greenish-gray color, and the weathering to reddish-brown as the rock crumbles into the surrounding clay soils. Photo: Hutch Brown.*

indicates the tremendous pressure the bedrock underwent in an ancient orogeny (mountain-building event). The orogeny not only uptilted the bedrock but also folded, faulted, and fractured it in the process of metamorphosing it into schist and gneiss.

Mather Gorge schist is known to have undergone multiple orogenies, including one with curious effects. We found lots of schist with odd striations on the surface (fig. 4, bottom). According to Rob Robinson (citing Kunk and others 2004), the lineation is due to "a secondary foliation formed by the recrystallization" of large muscovite flakes in the schist during a later orogeny after the schist was first formed.

That could explain why we found few if any mica crystals in the Mather Gorge schist large enough to be visible to the naked eye. Visible mica crystals are a main way of distinguishing schist from phyllite. However, both phyllite and schist have a diagnostic sheen caused



Figure 4—*Ancient mountain-building impacts on schist along trails #10 (top) and #5 (bottom) in Lake Fairfax County Park.* ***Top:*** *Large schist outcrop uptilted by tectonic forces.* ***Bottom:*** *Gray schist with surface striations caused by recrystallization of muscovite in the schist. Photos: Craig Moore (top); Hutch Brown (bottom).*



Figure 5—*Schist fragment broken off with a rock hammer shows tiny mica crystals that reflect light, giving the rock face a characteristic sheen. Photo: Hutch Brown.*

by mica crystals embedded in the metamorphic matrix. At the large schist outcrop (fig. 4, top), a fragment broken off with a rock hammer revealed myriad mica crystals embedded in the greenish schist (fig. 5). Large crystals—often garnets—embedded in a schist matrix are known as porphyroblasts; they can help to distinguish schist from phyllite, but we found none.

The Mather Gorge schist reportedly contains gneiss. We found a few pieces of what looked to us like gneiss on a Colvin Run gravel bar just upstream from Lake Fairfax (fig. 6); the rock appeared to have the characteristic alternating bands of light and dark minerals. However, Rob Robinson said the specimen wasn't gneiss but rather "a quartz-vein cobble with thin schistose layers." He said it had eroded from a quartz vein in the Mather Gorge schist.

Mather Gorge Metagraywacke (CZms). In addition to Mather Gorge schist, the Vienna Quadrangle map shows a sliver of Mather Gorge metagraywacke in Lake Fairfax County Park (fig. 1, red). Because the unit's area in the park is so small, exposures are hard to find and we saw none.

However, metagraywacke is on vivid display at nearby Great Falls (fig. 7). The parent rock, graywacke (from German *Grauwacke*, "gray stone"), is intermediate between shale and sandstone, with less quartz and more feldspar and volcanic ash than in quartzose sandstones. Graywacke often forms on seafloors from ash and sediments eroded from adjacent volcanic islands.



Figure 6—*A rock fragment on a gravel bar along Colvin Run that appeared to be gneiss (note the light and dark bands) but instead seems to be from a quartz vein in the Mather Gorge schist. Note the prevalence of quartz in the alluvium because quartz resists weathering more than do most other rocks in our area. Photo: Hutch Brown.*



Figure 7—*Mather Gorge metagraywacke at Great Falls in Virginia. Note the light- to medium-gray color and the angled bedding (traced in white). Photo: Hutch Brown.*

The Seneca Quadrangle map describes the Mather Gorge metagraywacke as "well-bedded" (with distinctive bedding) and light- to medium-gray in color (fig. 7). Rob Robinson called it "a finely layered schistose rock" that "largely lacks quartz veins" and "is more easily weathered" than Mather Gorge schist.

Rob said that the metagraywacke in Lake Fairfax County Park contains small magnetite crystals in places. In the rock debris around the large schist outcrop, we discovered fragments of what we took to be schist with tiny crystals of magnetite embedded in the rock (fig. 8). According to Rob, the specimens containing the crystals are "float fragments" of weathered metagraywacke eroded from a small exposure uphill.

The Mather Gorge metagraywacke contains lesser amounts of schist and calc-silicate rock. The mineral assemblages are the same as for Mather Gorge schist, with silica and micas predominating. You can sometimes see tiny mica crystals glittering in the sun.

Ultramafic Rock (CZu). The ultramafic unit (fig. 1, green) is mainly greenish-gray serpentinite. Mafic minerals like serpentinite are rich in magnesium, iron, and aluminum. The greenish color comes from chlorite, just as it does for the schist in the park. The unit also contains lesser amounts of soapstone and talc.

Near the head of Lake Fairfax (fig. 1, white star), we found what appears to be an old quarry in ultramafic rock (fig. 9). A side trail leads into a cut in the rock about 50 feet long and up to 8 feet deep, possibly created by American Indians or European colonists in extracting the rock.

The rock in the quarry is weathered and covered with lichens and mosses, but pieces broken off with a rock hammer showed a fine-grained bluish interior (fig. 10). The exposed rock was easily scratched with a knife and even a fingernail; that suggests talc, which has a hardness of 1 on the Mohs scale of mineral hardness. Rob Robinson said it is soapstone, a soft talc-rich rock that can be easily worked for a variety of purposes.

Along the trail (#15) back to the parking lot, we found a small exposure of serpentinite, a lovely greenish-black crystalline rock (fig. 11).

Quartz. Along one trail (#8) earlier in the day, we saw a schist exposure containing a large vein of white quartz (fig. 12, top). Farther up the same trail, we found schist alongside a small white quartz boulder tinged with pink (fig. 12, bottom).



Figure 8—*Weathered metagraywacke with tiny magnetite crystals embedded in the matrix. Photo: Hutch Brown.*



Figure 9—*An old quarry near Lake Fairfax. A side trail leads through a dip in the bedrock where rock was extracted. Photo: Hutch Brown.*



Figure 10—*Inside the old quarry, fragments broken off with a rock hammer revealed a fine-grained bluish bedrock rich in talc. Photo: Hutch Brown.*





Figure 11—*Serpentinite along a trail (#15) in Lake Fairfax County Park, including a weathered piece in the lower photo. Photos: Hutch Brown.*





Figure 11—*Quartz along a trail (#8) in Lake Fairfax County Park.* ***Top:*** *Schist with a vein of white quartz.* ***Bottom:*** *Schist next to a small boulder of white quartz (partially covered by mosses). Photos: Hutch Brown.*

Quartz is one of the most common minerals on Earth, and much of our area's metamorphic rock (such as schist) is rich in silica. How does solid quartz form from silica in the bedrock?

Silica has a relatively low melting point. During mountain building, intense heat melts silica in the bedrock, mixing it with water and other minerals; intense pressure then forces the superheated fluids into fissures and other voids in the buckling rock. The silica cools and solidifies in the cavities as solid quartz. The process is called lateral secretion, and the result is known as segregation quartz.

Segregation quartz veins and lenses, ranging from tiny to huge, are common in our area's metamorphic rock. Some quartz intrusions are large enough for mapping, showing up on geologic maps as purple lenses marked

Cq (**C** for Cambrian and **q** for quartz). The geologic map for the Vienna Quadrangle shows a large quartz lens near Wolf Trap but nothing near Lake Fairfax.

Overall, however, solid quartz is only a small part of our area's bedrock, dwarfed as it is by the sheer volume of schist, phyllite, and other metamorphic rocks. So why do we find so much of it lying around, especially in and around our streams, where it usually dominates the alluvium (fig. 6)?

Quartz is a highly durable mineral with a value of 7 on the Mohs scale. Quartz wears away only very slowly, whereas the metamorphic rocks in our area are mineral composites that quickly crumble into our red clay mineral soils. So we sometimes see erosion-resistant quartz outcrops, often see quartz veins in the bedrock, and always see lots of quartz in and along our streams.

Memorable Trip

We certainly missed field trip leader Rob Robinson's expertise and his knowledge of Lake Fairfax County Park. Nevertheless, I enjoyed our impromptu field trip, which included club members who were relatively new to the club, giving us all a chance to get to know one another better.

We also got to see a good part of Lake Fairfax County Park (relatively new to us all), spending several hours on various trails and even seeing a deer. In the process, we were lucky enough to stumble across numerous bedrock exposures. We found several of the rocks listed for the three units shown on the Vienna Quadrangle map (fig. 1), including schist (and possibly phyllite), soapstone, serpentinite, and lots of quartz. Some of us even collected specimens.

And maybe we can visit the site again with Rob in the fall!

Acknowledgments

Thanks to Katy Johnson and Rob Robinson for planning and arranging the field trip. Thanks also to Sue Marcus and Craig Moore for leading the trip. Thanks to Rob, Sue, and Craig for reviewing and improving the article with their comments/photos.

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Field trip participants at a large schist outcrop in Lake Fairfax County Park. Photo: Craig Moore.

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The Rocks Beneath Our Feet

Curious Pockmarks on Lava Rock in Hawai‘i

by Hutch Brown

Since buying a condominium on the Hawaiian island of Maui a few years ago, my wife and I have been exploring the island on foot. Almost all rock on Maui is lava of various types, often a dark gray basalt; the lighter colored lavas, with names like benmoreite, trachyte, and mugearite, tend to be high in felsic minerals (“fel” from feldspar and “sic” from silica (quartz)).

Figure 1 shows benmoreite on Hawea Point at Kapalua on West Maui. The point, which juts about a quarter mile into the ocean, was formed by some of the last lava flows from the West Maui Volcano before it went extinct about 320,000 years ago. Benmoreite is very light gray, and it has a smooth and sinuous texture—except in places where it appears to be pocked with tiny craters (fig. 1).

What caused the pockmarks?

One clue is the location in places that get salt spray along the coast. The spray finds minute cavities in the rock and evaporates, leaving salt that crystallizes and grows with each new salt spray. As the sun heats the rock, the salt crystals expand, placing pressure on the surrounding grains of rock. The rock begins to crumble under the pressure, leaving growing cavities connected by little ridges in the remaining rock. In time, the cavities can grow 3 feet or more across.

The process is a physical (as opposed to chemical) form of weathering called salt weathering (or haloclasty). The results, common in the Mediterranean region, are known as tafoni (a term perhaps derived from Corsican *taffoni*, “holes”). Tafoni typically develop in vertical or sloping rock faces (figs. 1, 2). The kind of tafoni you see on Maui is called (for obvious reasons) honeycombing; tafoni honeycombs are largely limited to very fine-grained silica-rich rocks like benmoreite.

However, you can find other kinds of tafoni in rocks of various kinds, particularly in arid climates. Figure 2 shows tafoni as scattered holes in coarse sandstone in northeastern New Mexico. The weathering process involves wind and rain rather than salt spray, possibly in connection with dissolution of a calcite sandstone matrix, but the result is largely the same: a curious pattern of cavities in the rock.



Figure 1—*Benmoreite lava on Hawea Point in Kapalua on Maui, HI. Parts of the sloping faces have been weathered into tafoni honeycombs (red arrow). Photo: Hutch Brown.*



Figure 2—*Sandstone cliffs at Pajarito Canyon, part of Bandelier National Monument in New Mexico. The sandstone features tafoni. Photo: Hutch Brown.*

Mineral/Fossil Donations Needed!

To support our educational purpose …

by Roger Haskins, Treasurer

A primary purpose set forth in our club's constitution is education—to "cooperate with educational and scientific institutions or other groups engaged in increasing the knowledge and popular interest in geology, mineralogy, paleontology, the lapidary arts, and related subjects."

To that end, we have established relationships with two elementary schools in Fairfax County: Braddock Elementary School (near Annandale High School, just inside the Beltway near Braddock Road) and Providence Elementary School (on Jermantown Road, not far from the Fair Oaks Mall).

At both schools, we are committed to assisting the 5th grade Earth sciences program in covering rocks, minerals, and fossils beginning this fall. (As geologists, Sue Marcus and I might offer guest programs of our own.)

The science teachers have told us that if the kids can take something home from the classroom, it keeps their interest alive as they get towards middle school. The teachers have requested "kits" containing minerals and fossils. I am thinking of egg cartons with an assortment of both.

I am therefore asking you to search your stockpiles for whatever materials you can find that we can use for these kits. Specimens should be small enough to fit inside egg carton pockets. Minerals might include quartz, calcite, garnets, fluorite, feldspars, mica, kyanite, gypsum, and so on. Mineral specimens should have developed faces (for quartz, garnets, kyanite, and feldspar) or good cleavages (for calcite, fluorite, and mica). Fossils might include brachiopods, oysters, sharks' teeth, clams, trilobites, ferns, petrified wood, and so forth.

For those of you going to Willis Mountain, please bring back several extra pieces, hand size or better. The schools and our own Kids' Activity Room at our annual club show could use them. I will do the trimming.

I expect to supply 20 to 30 kits per school and would like to have them ready by the end of September. You can reach me at dahlgrenxi@gmail.com or at 703-403-0415.

NVMC Helps Students Learn

Thank you note to our club …

Editor's note: *This email, lightly edited, was sent by Mrs. Kelly Miller to club officers on 30 July 2024.*

Thanks to the members of the Northern Virginia Mineral Club for sharing your geology resources ... they've come in handy!

My daughter Corrine signed up for a Girls in STEM summer program, and she's been LOVING it! Right now, they're working on a Geology 101: Understanding the Earth project. (As a kid, I always loved learning about Pangaea and how the Earth changed over time ... this project is fun for both of us!)

The instructor asked the girls to put together a report explaining why geology and the study of the Earth is so important to Earth sciences. The students will need to briefly discuss how plate tectonics work and the concept of geologic time; describe the rock cycle and how rocks and minerals are formed; and explain how the oceans, weather, and climate all affect the Earth. You listed some wonderful websites to explore ... thanks again!

I'm not sure if you've seen it, but I also wanted to share a geology guide that Corrine really enjoyed. It's a nice little overview that was perfect for their project. The glossary of geology terms was fantastic, as was the career information for students interested in geology. (Sometimes it's hard to see the big picture of your career choice when you're a kid!) Corrine thought it might help other students who are new to geology and would like to explore it further.

Do you mind adding it to your links page for us? Corrine would be delighted to share this with the rest of the STEM group if you include it. Please get back to me when you have a chance ... they meet again on Friday afternoon. 😊

Thanks again!

Mrs. Miller



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 suggestions for ways that NVMC members can help with this year's show.

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. 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 will probably do so 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.

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).

Safety

When Do I Need to Replace My Hard Hat?



Editor's note: *The article, lightly edited, is from the DuraLable website on OSHA and ANSI hard hat requirements. Thanks to Sue Marcus for the reference!*

Hard hats must be replaced if they show signs of damage (dents, cracks, penetration, or fatigue due to rough treatment). It is essential to inspect hard hats for damage and signs of fatigue each time they are used. In addition to visual inspections, you can test a hard hat by grasping it in two hands and squeezing. If you hear creaking or other unusual sounds, it is time to replace the hard hat.

Although the Occupational Safety and Health Administration (OSHA) has no specific provision for an expiration date, manufacturers are allowed to determine whether their equipment expires on a specific calendar date. In lieu of an expiration date, a generally accepted rule is to replace the support strap yearly and to replace the hard hat every 5 years. Harsh chemicals and extreme temperatures can make a hard hat degrade more quickly. Be sure to check with the manufacturer for guidelines on hard hat replacement and maintenance.

A hard hat may also expire if OSHA adopts more rigorous requirements. It is essential to regularly check OSHA standards for changes that may require your personal protective equipment to be updated.

A Periodic Table Reflecting Sustainability

by the European Chemical Society

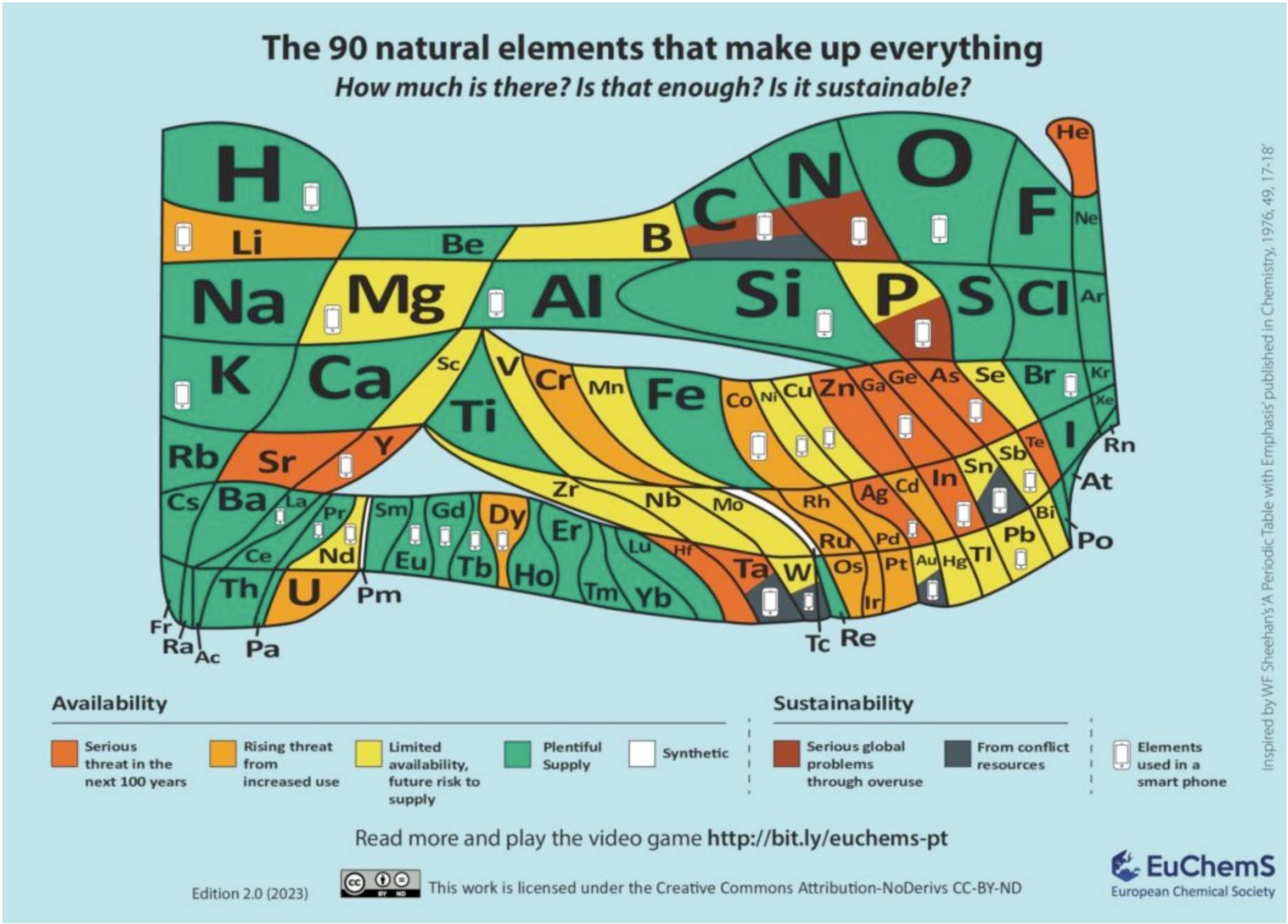
Editor's note: *The table was featured in the May 2024 volunteer newsletter of the Geology, Gems, and Minerals Hall in the Smithsonian Institution's National Museum of Natural History. Thanks to Sue Marcus for the reference!*

As Mike Wise often says, "Everything that is not grown must be mined!"

The European Chemical Society updated its version of the periodic table reflecting elemental abundance and sustainability, shown below. The legend contains two groups of colors related to availability and sustainability, plus an icon depicted in elements making up smartphones.

The deep red color for nitrogen, phosphorus, and carbon highlights the overturning of the biogeochemical cycles of these elements, which is severely affecting the biosphere. The massive release of carbon dioxide, as well as of nitrogen and phosphorus in soil and water bodies, has largely overtaken the so-called planetary boundaries.

The work is licensed under the Creative Commons Attribution NoDerivs CC BY-ND. You can read more about it here.



September 2024—Upcoming Events in Our Area/Region (see details below)

Sun	Mon	Tue	Wed	Thu	Fri	Sat
1 Show: Raleigh, NC	2 **Labor Day** **NVMC mtg** Show: Raleigh, NC	3	4 MSDC mtg, Washington, DC	6	6 Show: Winston-Salem, NC	7 Show: Winston-Salem, NC
8 Show: Winston-Salem, NC	9 GLMSMC mtg, Rockville, MD	5	6	12	13	14
15	16	17	18	19	20 Shows: Richmond, Fishersville, VA	21 Shows: VA, KY
22 **Fall begins** Shows: VA, KY	23	24	25 MNCA mtg, Arlington, VA	26	27	28 Show: Harrisburg, PA
29 Show: Harrisburg, PA	30					

Event Details

1-2: Raleigh, NC—Retail show; Treasures of the Earth, Inc; North Carolina State Fairgrounds, 4285 Trinity Rd; Sun 10-5, Mon 10-4; adults $8, 16/under free; info: Ellen White, 804-642-2011, www.TreasuresOfTheEarth.com.

4: Washington, DC—Mineralogical Society of the District of Columbia; Smithsonian Natural History Museum, Constitution Ave lobby; http://www.mineralogicalsocietyofdc.org/.

6-8: Winston-Salem, NC—Annual show; Forsyth Gem & Mineral Club, Inc; Educational Bldg, Winston-Salem Fairgrounds, Gate 9, 412 27th Street, NW; Fri 10-6, Sat 10-6, Sun 11-5; adults $3, kids thru grade 12 free with adult; info: Arvil Marion, mariona1@yadtel.net.

9: Rockville, MD—Gem, Lapidary, and Mineral Society of Montgomery County; Rockville Senior Ctr, 1150 Carnation Dr; https://www.glmsmc.com/.

25: Dunn Loring, VA—Northern Virginia Mineral Club; Zoom mtg (normally at Dunn Loring Fire Station, 2148 Gallows Rd; https://www.novamineralclub.org/.

20-22: Richmond, VA—Retail show; Treasures of the Earth, Inc; Richmond Raceway Complex, 600 E Laburnum Ave, Old Dominion Bldg; Fri 12-6, Sat 10-5, Sun 10-5; adults $8, 16/under free; info: Ellen White, 757-641-2124, Ellen@TreasuresOfTheEarth.com.

20-22: Fishersville, VA—Annual show; Shenandoah Valley Gem & Mineral Society; The Augusta Expo, 277 Expo Rd; Fri 2-6, Sat 10-6, Sun 11-5; adults $5, students/seniors $3, children 12 & under/Scouts/military in uniform free; info: Scott Gregory, 727-542-9723; sgregory357@hotmail.com.

21-22: Irvine, KY—Retail show; Southeast Kentucky Gem, Mineral & Fossil Club; Estil Co. Schools Central Office Gymnasium, 253 Main St; Sat 9-6, Sun 10-5; info: David Davis, 606-481-0868, kyrockclub@gmail.com.

25: Burke, VA—Micromineralogists of the National Capital Area; Kings Park Library, 9000 Burke Lake Rd; http://www.dcmicrominerals.org/.

28-29: Harrisburg, PA—Annual show; Central Pennsylvania Rock & Mineral Club; Zembo Shrine Auditorium, 2801 N 3rd St; Sat 10-6, Sun 10-4; admission $6 or $5 with ad; info (website): www.rockandmineral.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
4814 3rd Street North
Arlington, VA 22203
hutchbrown41@gmail.com

RENEW YOUR MEMBERSHIP!

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

OR

Bring your dues to the next meeting.

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

2024 Club Officers

President: Jason Zeibel
president@novamineral.club
Vice President: Craig Moore
vicepresident@novamineral.club
Secretary: Almas Eftekhari
secretary@novamineral.club
Treasurer: Roger Haskins
treasurer@novamineral.club
Communication: Vacant
Editor: Hutch Brown
editor@novamineral.club
Field Trip Co-Chairs: Katy/Mickey Johnson
fieldtrips@novamineral.club
Greeter/Door Prizes: Vacant
Historian: Kathy Hrechka
historian@novamineral.club
Show Chair: Tom Taaffe
show@novamineral.club
Tech Support: Tom Burke
tech@novamineral.club
Webmaster: Casper Voogt
webmaster@novamineral.club

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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