THE NORTHERN VIRGINIA MINERAL CLUB INC

The Mineral Newsletter

Next meeting: December 7 Time: Doors open at about 6: 30 p.m.

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



Wulfenite

from Sonora, Mexico

Source: Smithsonian Institution. Photo: Chip Clark.

Deadline for Submissions

December 20

Please submit to the editor by the 20th of the month. Submissions received later might go into a later newsletter.

Volume 66, No. 10
December 2026
Explore our website!

December Meeting Program:

Holiday Party

details on page 9

In this issue …

Mineral of the month: **Wulfenite** ..... p. 2
Program: Holiday party ..... p. 9
Club officer elections ..... p. 9
Smithsonian curator honored ..... p. 10
World's largest geode ..... p. 10
November meeting notes ..... p. 11
President's message ..... p. 13
Wildacres in May 2027 ..... p. 17
Laurel Highlands geology ..... p. 18
Upcoming events ..... p. 24

Mineral of the Month
Wulfenite

by Susan Fisher

Many mineral collectors have a few favorite mineral species that attract their attention at every show or museum. For me and others, wulfenite is one of those minerals. While it occurs in numerous locations worldwide and is not really rare, the fragile beauty of well-formed crystals and vibrant colors attracts attention.

Geologic Environment

Wulfenite forms as a secondary mineral in the oxidized zones of hydrothermal lead deposits that contain some molybdenum sources. It is commonly associated with cerussite, anglesite, vanadinite, mimetite, hemimorphite, calcite, quartz, fluorite, and barite. It forms a solid state series with stolzite.

Pure wulfenite is colorless, but most samples display colors ranging from cream or pale yellow to bright orange and even intense red. Some samples even display blues, browns, and blacks.

Name

As Sue Marcus described in her February 2017 and December 2006 Mineral of the Month articles, wulfenite has gone through a series of names. It was originally called "plumbum spatosum flavo-rubrum, ex Annaberg, Austria" in 1772 by Ignaz von Born. (I am so glad I don't have to try to remember this or fit it onto a label!) In 1781, Joseph Franz Freiherr von Jacquin called the mineral "Kärntherischer Bleispath." (Again, I would never get this one correct.)

Luckily, in 1845 Wilhelm Karl von Haidinger renamed the mineral in honor of Franz Xaver Freiherr von Wulfen. Wulfen was born in Belgrade, Serbia, on November 5, 1728, and died in Klagenfurt, Austria, on March 16, 1805. He authored a monograph on the lead ores of Bad Bleiberg, the type locality for wulfenite in the Villach-Land District, Carinthia, Austria.

Technical Details

The generally accepted technical details for wulfenite are:

Chemical formula..... $Pb(MoO_4)$

Crystal form..... Tetragonal

Hardness 2.5-3

Density .....6.5-7.0, g/cm3 (measured) (depending on source)

Color .....Usually orange but can range from cream, to pale yellow, to orange, to orange-red, to brown; rarely colorless, gray, brown, olive-green, and even black

Streak .....White



Merry Christmas!

Happy Hanukkah!



Northern Virginia Mineral Club members:

Happy holidays! We will hold our annual holiday party at the Dunn Loring Fire Station (our usual meeting place) on **December 7, 6:30 p.m.**

See details on page 9.



Wulfenite, Red Cloud Mine, La Paz County, Silver Mining District, Arizona. Source: Wikipedia; photo: Ivar Leidus.

Cleavage ..... Perfect in one direction

Fracture ..... Conchoidal to uneven

Luster ..... Resinous, adamantine, sub-adamantine, vitreous (sources vary)

Specific gravity 6.5-7.5

Localities

Recently, Mindat listed 2,108 localities for wulfenite, and more will probably be added each year. Those that are most recognizable among collectors are the deep orange-red to red crystals from the Red Cloud Mine in Arizona; the blocky vivid orange tabular crystals from Los Lamentos, Chihuahua, Mexico; and the thin, bright yellow crystals associated with yellow mimetite from the San Francisco Mine in Sonora, Mexico.

Equally fine are the amazing yellow pyramidal crystals from the Ojuela Mine in Mapimí, Durango, Mexico; the sparkly drusy-quartz-coated crystals from the Finch (Barking Spider) Mine in Chilito, Gila County, Arizona; and the unique orange-and-black crystals from the Mammoth-Saint Anthony Mine, Tiger, Arizona.

The following is a very quick and limited look at these and other notable locations. (If your favorite location is not among these, I apologize; I'm sure your newsletter editor would appreciate an article and/or pictures from that site.)

Bad Bleiberg, Villach-Land, Carinthia, Austria

The flood of beautiful wulfenite specimens began in the mining area around Bad Bleiberg, a market town and the type locality for wulfenite. Bad Bleiberg is situated in a richly mineralized high valley on the northern slope of the Dobratsch (Villacher Alpen) massif in the easternmost part of the Gailtal Alps mountain range.

Mindat lists 61 valid minerals found in this locality, including hydrozincite, ilsemannite, and wulfenite. The mining activity was based on the recovery of lead, zinc, and barite. Wulfenite specimens from here are generally bright orange, but earlier pieces can be cream-colored or appear as tiny pale yellow crystals.



Wulfenite, Bad Bleiberg, Villach-Land, Carinthia, Austria (type locality). Source: Mindat; photo: Rob Lavinsky.



Wulfenite on limonite, Bad Bleiberg, Villach-Land, Carinthia, Austria (type locality). Source: Mindat; photo: Rob Lavinsky.

Red Cloud Mine, Silver Mining District, La Paz County, Arizona

The Red Cloud Mine produces some of the most vibrant orange-red to red wulfenite crystals in the mineral world. Many are on a contrasting dark matrix and tend to be translucent to transparent. Many are magnificently vibrant, glassy and gemmy tabular crystals with beveled edges. Beautiful pieces from this mine started reaching the market in 1880 when the Philadelphia mineral dealer A.E. Foote visited the locality that year.



Wulfenite, Red Cloud Mine, Silver Mining District, La Paz County, Arizona. Source: Mindat; photo: Rob Lavinsky.



Wulfenite, Red Cloud Mine, Silver Mining District, La Paz County, Arizona. Source: Susan Fisher Collection; photo: Susan Fisher.

Arizona's Silver District in the Trigo Mountains has been producing minerals for centuries. Surface workings and crude smelters, possibly dating to the 17th century, have been found in nearby districts.

In 1878, a prospector by the name of Warren Hammond discovered the Red Cloud deposit and named his claim after the nearby Red Cloud Trail. The claim produced mostly silver chloride (chlorargyrite) and galena. In 1879, the Red Cloud Mine and 18 others were sold to the Iron Cap Mining Company. The mining town of Silent grew up nearby but rapidly declined as production from the Red Cloud Mine dwindled. By 1890, the underground workings of the mine had reached their maximum extent and most of the high-grade ore had been removed.

The beautiful wulfenite specimens came to light when the smelter manager of the Silver Furnace in Silent noticed bright red minerals being smelted along with the galena. He shipped some to Benjamin Silliman, a mineralogist at Yale in 1881. Silliman described them in an article in the *American Journal of Science* in 1881, where they caught the attention of A.E. Foote. Foote visited the mine several times, advertising and selling wulfenite specimens through his shop. Other mineral dealers, including George English, soon followed.

The Red Cloud Mine is located in a fault zone that plunges down a contact between volcanic andesitic rock and an underlying monzonite granitic rock at an angle of about 25 degrees. Between the two rock types is a mass of compacted broken rock 1 to 4 meters (3-13 ft) thick that served as a channel for lead- and silver-bearing hydrothermal solutions to rise. In the arid regions of Arizona and northern Mexico, the weathering of granite porphyry has contributed minor amounts of molybdenum to the ground water. The combination of the ground water with the weathering of lead minerals in the hydrothermal deposits in the breccia formed the wulfenite deposits.

Erupción Mine, Los Lamentos Mountains, Ahumada Municipality, Chihuahua, Mexico

The thick, banded wulfenite from the Erupción Mine features brilliant orange crystals sandwiching a layer of darker wulfenite, forming a distinct aesthetic that has entranced mineral collectors for decades. The region, Los Lamentos, takes its name from the eerie sound made by the wind as it passes through a series of vertical cracks at the crest of the range above the mine.

The Erupción Mine occurs in an area where metal-bearing hydrothermal fluids have replaced the original sedimentary rock, usually limestone or dolomite, near igneous intrusions. This deposit averages 15 meters (50 feet) in height, 20-30 meters (65-100 ft) in width, and 1,500 meters (5,000 ft) in length (a down dip).

The mineralization consists mainly of massive galena and sphalerite, although zinc ores have not been mined. The oxidation process has produced anglesite, cerussite, hydrozincite, and willemite with abundant gypsum and native sulfur. The deposit was mined from the surface to the 700-foot level, although high-grade oxide ores continue to at least the 800-foot level. Water



Blocky wulfenite crystals, Erupción Mine, Los Lamentos Mountains, Ahumada Municipality, Chihuahua, Mexico. Source: Mindat; photo: Rob Lavinsky.



Banded wulfenite, Erupción Mine, Los Lamentos Mountains, Ahumada Municipality, Chihuahua, Mexico. Source: Mindat; photo: Rob Lavinsky.

inflow caused problems that prevented mining at deeper levels because the pumping technology of the 1920's could not keep the lower levels dewatered.

Most of the wulfenite occurs below the 500-foot level of the mine, with the anglesite and cerussite found above that level. Most specimen mining occurred in the 1920s-60s, although some specimens were recovered as late as the 1980s. Wulfenite and vanadinite first



Bipyramidal wulfenite on limonite, Erupción Mine, Los Lamentos Mountains, Ahumada Municipality, Chihuahua, Mexico. Source: Mindat; photo: Rob Lavinsky.

appeared in quantity just below the 500-foot level, and wulfenite increases in quantity and quality downwards at least to the 700-foot level. Mine owners recognized the specimen value of the wulfenite and employed field collectors to recover the pieces during mining operations.

Mammoth-Saint Anthony Mine, St. Anthony deposit, Tiger, Mammoth Mining District, Pinal County, Arizona

The Mammoth-Saint Anthony Mine is one of the great mineral localities in the United States. The claims that combined to create this mine were active from 1879 until the mine's closure in 1953. The mine produced substantial amounts of gold, molybdenum, and copper as well as over 90 mineral species, many in the form of very high-quality specimens.

Frank Schultz staked the first gold claim in 1879 in what was to become the Mammoth-Saint Anthony Mine. Other claims followed in 1881 and 1882. These were consolidated into the Old Hat Mining District. For the next several years, mining was somewhat sporadic due to significant cave-ins.

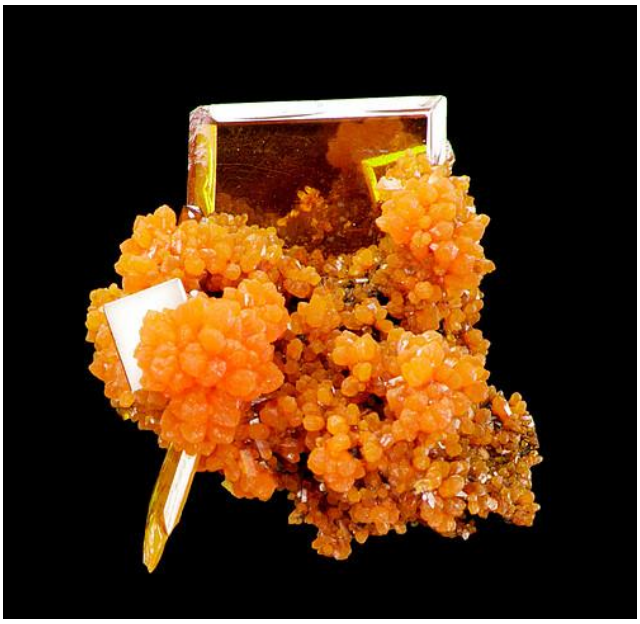
Until 1914, the mining activities centered on the recovery of gold, but World War I brought a need for strategic minerals, including molybdenum, and the mine contained large amounts of molybdenum-bearing wulfenite. Mining continued off and on until flooding from ground water and declining ore quality forced the mine's closure in 1935.



Bicolored wulfenite showing orange side (top) and dark side (bottom) of crystals from the Mammoth-Saint Anthony Mine, St. Anthony deposit, Tiger, Mammoth Mining District, Pinal County, Arizona. Source: Susan Fisher Collection; photo: Susan Fisher.

Mineralization in this district occurs in a series of veins within shear zones. Their gangue consists of brecciated country rock cemented and replaced by quartz and calcite, barite, and fluorite. Most of the gold is finely disseminated in dense, greenish-yellow quartz. Oxidation appears to have been complete down to the 700-foot level.

One of the more unusual types of wulfenite recovered from the early surface workings (the Schultz claim) was orange on one side and nearly black on the other.



"Windowpane" wulfenite with mimetite, San Francisco Mine, Cerro Prieto, Cucurpe, Cucurpe Municipality, Sonora, Mexico. Source: Mindat; photo: Rob Lavinsky.

San Francisco Mine, Cerro Prieto, Cucurpe, Cucurpe Municipality, Sonora, Mexico

The San Francisco Mine has produced some of the most striking wulfenite specimens found in Mexico. Many are wafer-thin, transparent yellow to bright orange "windowpanes" accented with spheres of yellow to orange-red mimetite.

The San Francisco Mine, started in the late 1800s, was initially worked as a gold mine, then as a gold-silver-molybdenum mine. It is located on a 20- to 30-meter-wide (65- to 100-ft-wide) shear zone on the western flank of the Cerro Prieto hill. The shear zone has numerous individual fault strands that are the sites for lenticular orebodies.

The original metallic sulfides, deposited from hydrothermal solutions, have been mostly oxidized to secondary minerals. Igneous dikes along the margins of the shear zone and a granite body below, at depth, are considered to be the source of the hydrothermal fluids containing molybdenum, gold, silver, lead, zinc, and arsenic that deposited the original ores.

The mine was closed in 1912 due to the Mexican Revolution. After a period in which it was intermittently worked by small local mining groups, the mine was



Wulfenite with mimetite, San Francisco Mine, Cerro Prieto, Cucurpe, Cucurpe Municipality, Sonora, Mexico. Source: Mindat; photo: Rob Lavinsky.



Pyramidal wulfenite, Ojuela Mine, Mapimi, Mapimi Municipality, Durango, Mexico. Source: Mindat; photo: Rob Lavinsky.

reopened from 1983 to 1992 by the Fresnillo Company, S.A. de CV. Workings extended to a depth of 350 meters (1,100 ft).

From the 1970s on, San Francisco Mine wulfenite was recognized for its quality, and various collectors/dealers obtained rights to collect from the mine. The beautiful San Francisco Mine windowpane wulfenite with mimetite first entered the market in the 1970s.

Ojuela Mine, Mapimí, Mapimí Municipality, Durango, Mexico

The Ojuela Mine is one of Mexico's most famous mineral localities, having produced over 141 documented mineral species. It is especially famed for vivid adamite, legrandite, mimetite, wulfenite, and aurichalcite. The mine produces outstanding wulfenite in several crystal forms and colors, but notable are those with very uncommon acute pyramidal forms. The color varies from butterscotch to yellow and orange. Most specimens have excellent luster and some occur on limonite matrix**.**

Worked for silver since the 1600s, the Ojuela Mine is located at the base of the northeast escarpment of the Sierra de Mapimi, about 5 miles southeast of the town of Mapimi, Durango**.** In 1893, the American Metals Company took over the property for the recovery of lead and silver. Large-scale operations ceased in the mid-20th century due to drainage difficulties and depletion of reserves. Sporadic work has been carried on by a mining cooperative as well as by mineral collectors and dealers.

The deposit formed in an area of folded and faulted limestone. Primary mineralization emplaced extensive sulfide bodies composed chiefly of arsenopyrite, pyrite, sphalerite, and argentiferous galena. Calcite, quartz, fluorite, and limonite are the important gangue minerals. Many of the original sulfide ores have been oxidized, resulting in a wide variety of additional minerals, including wulfenite. The mineralization in the area is controlled by a series of fractures. The Ojuela Mine shows signs of igneous activity in its lower workings, including small pegmatite veins. Enormous caves and pipes, widely separated by barren limestone, contain the principal orebodies.

Finch (Barking Spider) Mine, Keystone Gulch, Chilito, Hayden area, Banner Mining District, Gila County, Arizona

The Finch Mine is well known for producing the instantly recognizable, unique and beautiful specimens



Wulfenite coated by drusy quartz, Finch (Barking Spider) Mine, Keystone Gulch, Chilito, Hayden area, Banner Mining District, Gila County, Arizona. Source: Mindat; photo: Rob Lavinsky.

of wulfenite coated by quartz. Most specimens consist of tabular, orange-colored crystals of wulfenite coated by drusy quartz. The result is an attractive sparkling peach color.

The mine and several other claims are located near Chilito. They were mined before 1923, when Lee Reagan acquired them. After 1953, the rights passed through several companies. Because production was minor and irregular, very little of the mining history is well documented. Workings include surface and underground openings on the south side of Keystone Gulch.

The mineralization is a polymetallic deposit in the thinly bedded Naco limestone, with a large plug of basalt porphyry over most of the claims. The best mineral showing is along the north contact of the basalt porphyry with Naco limestone.

Acknowledgment

I would like to thank Sue Marcus for offering me the opportunity to contribute this Mineral of the Month on wulfenite and for advising me on how to proceed and helping with photos. Her assistance was invaluable!

Sources

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Panczner, W.D. 1987. Minerals of Mexico. New York, NY: Van Nostrand Reinhold Company Inc.: 94, 143, 205, 214, 275, 318, 397.

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Holiday Party

December 7, 6:30–9:00 p.m.



The NVMC, the Micromineralogists of the National Capital Area, and the Mineralogical Society of the District of Columbia are jointly hosting a holiday party this year, continuing a seasonal tradition. We will start setting up at 6 p.m.

We're holding the party at the Dunn Loring Fire Station, 2148 Gallows Road, Dunn Loring, VA. The clubs will furnish the main course and drinks; we ask you to sign in here to RSVP and to volunteer to bring a dish of some kind (appetizer, side dish, dessert, etc.).

For anyone interested, we'll do our traditional gift exchange. If you want to participate, please bring a wrapped gift valued at $5 to $25 and related to geology, rocks, fossils, or minerals, labeled appropriately and noted if for kids.

2027 Club Officer Elections

Our December holiday party will include a business meeting to elect club officers for 2026. We have many club officers (see the list on the last page of this newsletter), but only four positions are elected each year:

- The ***President*** presides over club meetings and helps to coordinate club activities, ranging from auctions and the annual club show to field trips and the club newsletter.
- The ***Vice President*** assists the President and coordinates programs/speakers for the monthly club meetings, including club dinners with speakers.
- The ***Secretary*** takes minutes at club meetings for the newsletter and summarizes presentations at club meetings, again for the newsletter.
- The ***Treasurer*** collects club dues, keeps records of club members, and handles all club financial transactions.

Jennifer Grimes has agreed to stand again as Vice President. Jason Zeibel, Almas Eftekhari, and Roger Haskins are stepping down as President, Secretary, and Treasurer, respectively, so we need volunteers to fill their capable shoes. Noah Khan, Jennifer Marks, and Kirk Abriola have volunteered to run for President, Secretary, and Treasurer, respectively. If you would like to put your name into the hat for any of the four positions, please let Jason know!

We also have a number of unelected club officers (see the list on the last page of this newsletter). Please consider volunteering for any position—or making up your own position (such as club photographer) if you see a need to be filled.

Past officers will always be there to support their successors. If you might be interested in volunteering—or just finding out more—please contact Jason at president@novamineralclub.org or Jennifer at vicepresident@novamineralclub.org.

NVMC Hall of Fame: Elected Club Officers, 2017–2026

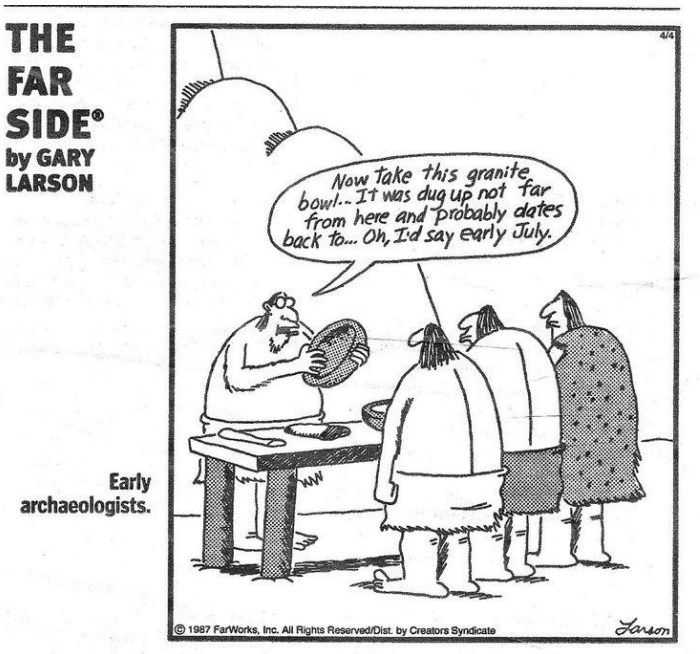
Year	President	Vice President	Secretary	Treasurer
2026	Jason Zeibel	Jennifer Grimes	Almas Eftekhari	Roger Haskins
2025	Jason Zeibel	Craig Moore	Almas Eftekhari	Roger Haskins
2024	Jason Zeibel	Craig Moore	Almas Eftekhari	Roger Haskins
2023	Jason Zeibel	Craig Moore	*Vacant*	Roger Haskins
2022	Tom Kim	Sue Marcus	David MacLean	Roger Haskins
2021	Tom Kim	Sue Marcus	David MacLean	Roger Haskins
2020	Tom Burke	Ti Meredith	David MacLean	Roger Haskins
2019	Sue Marcus	Ti Meredith	David MacLean	Roger Haskins
2018	Bob Cooke	Ti Meredith	David MacLean	Roger Haskins
2017	Bob Cooke	Ti Meredith	David MacLean	Rick Reiber



World's Largest Geode

Editor's note: *The article is adapted from the winery's online information. Thanks to Sue Marcus for the reference!*

You can actually stand inside a huge underground geode in Ohio surrounded by celestite crystals up to 3 feet in width (the photo shows Larry and Mary Austin for scale). Crystal Cave lies 40 feet under a winery in Put-in-Bay, OH, a town on an island in Lake Erie. Discovered by workers in 1897 while digging a well for the winery, the cave walls are covered in strontium sulfate (celestite). The crystals range from 8 to 18 inches long. The original cave was much smaller than what appears today because crystals were harvested and sold for manufacturing fireworks. Owned and operated by Heineman Winery, Crystal Cave helped save the family-run business from demise during Prohibition. Tours of the cave helped pay the bills when other wineries on the island closed.





Smithsonian Curator Honored

Editor's note: *The article is adapted from a piece in the Smithsonian Institution's* Science News *(21 October 2026). Thanks to Sue Marcus for the reference and photo!*

For more than a decade, *Science News* has recognized early- and mid-career scientists tackling some of today's biggest challenges. This year, Dr. Gabriela Farfan was named one of 10 scientists making an impact on our world through her research on minerals and biomineralization, the process by which organisms build structures such as shells, corals, and pearls.

As the Coralyn W. Whitney Curator of Gems and Minerals for the Smithsonian Institution's National Museum of Natural History, Dr. Farfan uses crystal structures, chemistry, and spectroscopy to uncover clues hidden within these natural objects, revealing insights into ocean temperatures, sea-level changes, and environmental stress. Her work highlights how minerals can preserve a record of Earth's history and help scientists understand how our planet is changing.

Club members might remember that Dr. Farfan gave a Zoom presentation on the Smithsonian's Winston Fancy Diamond Collection to our club in May 2026. You can find a summary of her talk on page 5 in the June 2026 issue of this newsletter.



Club Meeting Summary
November 2

by Almas Eftekhari, Secretary

President Jason Zeibel welcomed new club members and visitors, asking them to introduce themselves.

Ariel, from Alexandria, came to the meeting to learn about rocks. Susan, from Vienna, thought our club could help her do more rockhounding. Caleb, from Arlington (originally from Ohio) and a lifelong collector, spent the last week collecting at mines in Arizona. He wants to learn about lapidary and connect with others who have lapidary experience. Nicolette, from Sterling, loves to collect rocks; her father came to support her but also enjoys collecting.

Field Trip Co-Coordinator Katy Johnson announced an upcoming field trip on December 12—a historical walk led by Paul Kreinfeld, author of *Finding the Perfect Stone*, about the history of the Potomac marble columns in the Capitol. Paul will take field trip participants to the hidden quarry he discovered. Katy urged club members to sign up early for the limited number of slots by using the Google form she will send out.

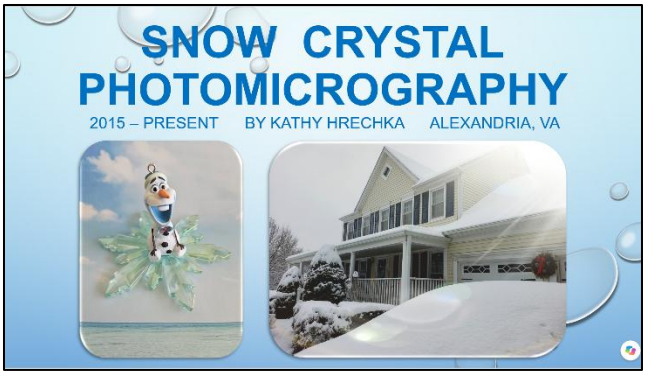
Jason noted that our annual holiday party will be on December 7 this year (see page 9 for details). In addition to food and a gift exchange, we will have geology-themed games and contests.

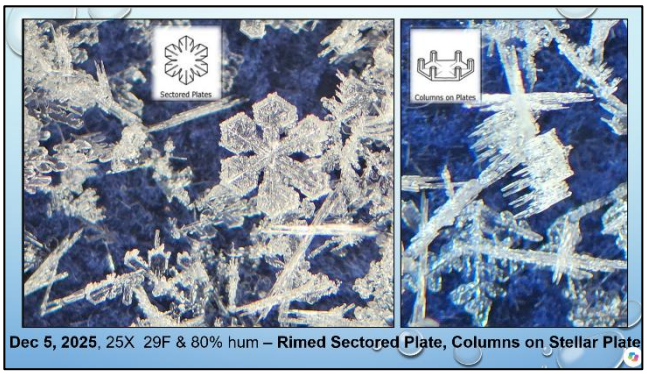
We will also hold annual elections for our four elective club offices (President, Vice President, Secretary, and Treasurer)—see details on page 9. Jason noted that we will need to find a new Show Chair because Tom Taaffe is stepping down after 18 years.

Secretary Almas Eftekhari asked club members to contact her if they wanted to reserve a zip-up club hoodie. Hoodies were sold at the November club show.

Youth Co-Coordinator Celia Zeibel asked members to follow the club on Instagram: the more people who follow, the more people we can reach. The handle is Nova Mineral Club. She said she would be adding stuff to promote the November club show.

Jason announced our speaker for the evening, Kathy Hrechka, whose presentation was titled "Snow Crystal Photomicrography." Kathy has been in the club for over 40 years, second in longevity only to Dave Hennessey, who proceeded to introduce Kathy.





Kathy, who served for many years as a flight attendant, is now a docent at the Smithsonian Institution's Natural History Museum, where she teaches children about minerals.

Kathy noted that ice is a valid mineral species recognized by the International Mineralogical Association. The hexagonal symmetry of snow crystals derives from the ice crystal lattice. Snowflakes are classified into various forms, such as stellar dendrites, columns, plates, and needles.

Kathy uses an Olympus microscope paired with either a Canon Power Shot digital camera or a Samsung Galaxy S23 to capture images of snowflakes before they melt. She collects snowflakes on blue felt to provide contrast and prevent melting. She uses magnification levels between 15x and 30x.

Kathy shared her findings from various snowstorms over the years at her home in Alexandria, VA. She noted that humidity levels (often reaching 80 percent) affect the speed of melting and crystal structure. She used many examples to illustrate how temperature and humidity influence crystal shapes. Different atmospheric conditions result in diverse forms, such as capped columns and sectored plates.

Kathy also discussed Wilson Bentley, a pioneer in photomicrography who documented snowflakes using glass plates.

After Kathy's presentation, Jason invited Show Chair Tom Taaffe to discuss the logistics of the upcoming club show at George Mason University on November 21-22, the weekend before Thanksgiving. Jason noted that the club owes Tom a debt of gratitude for all the energy that he's put into making our shows so awesome over the past 18 years.

The club featured 10 exhibit cases at the show. The cases were equipped with new LED arrays to provide improved lighting for displays.

One case was open to any club member interested in showing off a treasure. Jason invited anyone who wanted to take advantage of the opportunity to let him know.

Another case featured a special group of fluorescent minerals under ultraviolet light. Jason invited anyone interested in contributing to let him know, reminding everyone to label their specimens

Security guards were to be stationed overnight on Friday and Saturday to protect dealers' goods and our exhibit cases. Tom encouraged club members to be vigilant during daytime hours and to assist dealers if needed.

For the first time, show attendees were able to use the QR code on the show flyer (shown at upper right) to register for free parking in lot A at George Mason University for both Saturday and Sunday. Tom noted that volunteers working on Friday night had to use a separate registration link provided by the club to receive free parking.

Tom said that the admissions tables would be managed by Treasurer Roger Haskins. Roger and admissions staff handled registration and parking issues for those attending the show.

For the Kids' Room, John Widener was in charge of this high-traffic area, where children participated in activities to earn specimens as a reward. Tom said that more volunteers were needed because attendance was expected to be high.

On Friday, volunteers were needed to help about 20 dealers unload items from cars onto the three-bay loading dock and take them inside. Student volunteers from the Geology Club at the university have usually helped



out, but club volunteers were also needed to lend a hand.

An extra person was needed on Saturday and Sunday to help manage sales of T-shirts, hoodies, mugs, and other club merchandise. As usual, help was needed on Friday and Sunday in moving exhibit cases and other club equipment from and back to the storage shed on Fred Oaks Road in Fairfax.

For the future, Tom recommended forming a show committee of dedicated people. They would manage show promotion, donations, and organization. Different members could have specific duties and report after completing their tasks. Delegating responsibility to various committee members would keep the burden from falling on a single person (the Show Chair).

Tom encouraged club members to donate items for door prizes, the Kids' Room, and the silent auction. Craig Moore and Jeff Guerber volunteered to take responsibility for managing materials for the silent auction on Sunday. Donations were brought to the designated table at the back of the main show room for sorting by organizers.

The meeting closed with door prizes!



President's Message

by Jason Zeibel

Greetings, NVMC, and welcome to the Holiday Season!

We started off November with a fun and interesting presentation by our own Kathy Hrechka on the crystallography of snowflakes. In a similar vein, I had several hours of free time on a trip to Dugway, UT, last year, and it had recently snowed. So I wandered around taking pictures, amazed by the complexity of the humble snowflake. It was nice to know that I am not the only one with that thought!

Of course, at the November meeting, the main course is always preparation for our annual show. We had a lot to go over, and kudos to Tom Taaffe and our club show team for getting everything ready.

The first thing that I noticed at the show this year was how many people were in the room from start to finish. In some years, it seemed like we had a lull at some point during the day. Not this year, as people kept coming. We had over 1,500 paid admissions to the show this year, which is up 20 percent from last year (which was itself up a good bit from the previous year). That total doesn't include George Mason students, young kids, Scouts in uniform, and club members, so our true total was likely closer to 1,800.

Clearly, we are doing a good job of putting something out there that the public is interested in and enjoys. Kudos to everyone in the club who helped out in any part of the weekend's adventures. Some special shoutouts are in order: to Linda, John, Jennifer, and Celia in the Kids Room; to Sue, Roger, and Almas at the registration table; to Craig, Jeff, and Diane for running the auction; and to the many folks who helped out with show setup and breakdown.

One other area that is near to my heart is the success of the exhibits. As longtimers will recall, we originally had two or three old cases that were not showing us off at our best. Now we have 11 cases to show off members' collections. Thanks to everyone who helped transport, assemble, and disassemble the cases, as well as to the folks who took time to put together displays. Upping our exhibit game was one of my main goals when I became club President, and I'm thrilled to have seen it succeed.



Club Historian Kathy Hrechka giving a talk on the crystallography of snowflakes at the November NVMC meeting. All photos: Jason Zeibel.

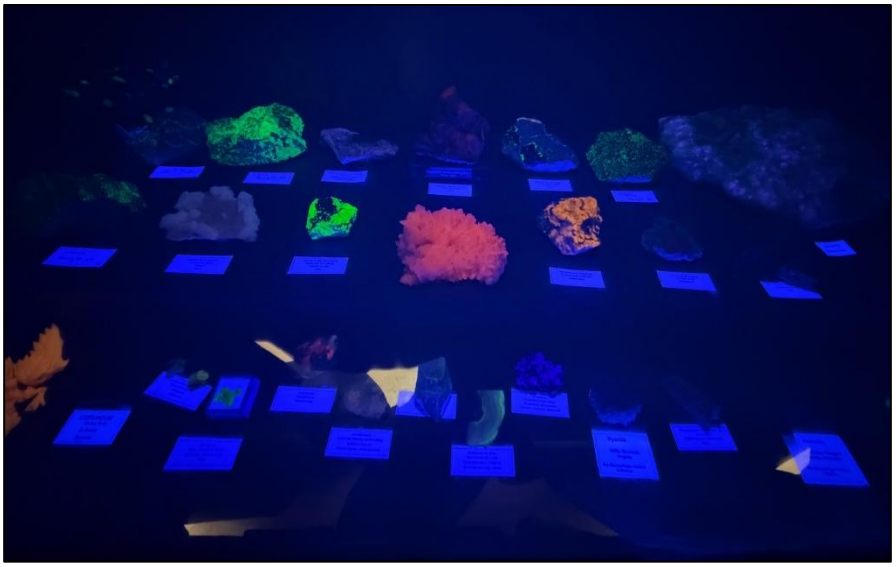


The organization Minerals in Context had a prominent informational and educational display at the November club show.

Of course, there is still room to grow. As we found out, the sticky on the back of the LED lights in the cases was apparently not up to the challenge of holding onto the roof of a matte black piece of wood. After a series of duct tape reattachments, I think we should have a case maintenance day at the storage unit sometime in the spring to switch over to screwed-in lighting. There is always room for improvement, and I hope to see the exhibits and the cases improve in the years ahead.

One last note on the show: I would like to acknowledge the tremendous support we got from our George Mason University sponsors. Dr. Jules Goldspiel walked into this role when Dr. Julia Nord retired, and it has





The NVMC table featured a UV fluorescent display this year!

been a treat getting to know him over the last 2 years. The geology students at Mason who supported our show are also hard workers as well as smart students. The future of our hobby is bright.

One last meeting remains this year—a fun one! Our holiday party is coming up on December 7 (see details on page 9). This year, we are holding the party jointly with the MSDC and MNCA. Given the increase in attendance at some of our meetings, it promises to be a fun evening. There will be games, puzzles, prizes, and—of course—dinner! So, come early, with doors opening around 6:30 p.m., and we will share a meal, share some stories, share some rocks and fossils, and share a toast to 2026. If you are able, please bring a side dish or dessert. Also, there will be an optional gift exchange. Just bring a wrapped, geology-themed gift not to exceed $25 and go home with something else fun and exciting.

At our December meeting, we will also hold our annual elections for the four elected club officer positions: President, Vice President, Secretary, and Treasurer. If you are interested in running for one of these positions, please come and join the fun!

It has been my distinct pleasure to serve as NVMC President these past 4 years. When I look back on where we were in 2022, it hardly seems like the same club. We have an expanding core of strong volunteers, along with many youth and young adults and a thriving show with increasing attendance. These are all the hallmarks of a strong and successful organization. I look forward to many more years in the club as a regular member, helping as needed—but maybe not up in front as often. But that's good because the club is ready for new ideas and pet projects.



The club had some new merchandise for sale this year, including hoodies, gem trees, and UV fluorescent lights (both MW and SW).

So I thank you all for the support you have given me over these 4 years, and I ask that you support our new President and the other club officers, elected and non-elected, as we continue to explore this wonderful hobby of ours!

Jason





The club had 10 display cases this year, with exhibits including meteorites, calcite, pyrites, Virginia minerals, garnets, faceted stones, and the minerals in Minecraft! By all accounts, the exhibits were a big hit.



Ms. Christina Arthur was the winner of the show's Grand Prize, a beautiful amethyst geode section.



Club members Linda Benedict, John Weidner, Celia Zeibel, Jennifer Marks, and many more all pitched in to keep the Kids Room humming along.



Club members Jeff Guerber, Craig Moore, and Diane Nesmeyer ran a very successful silent auction at the NVMC table, bringing in over $1,300 for the club.

Wildacres Next Spring

by Hutch Brown, NVMC Editor



The Eastern Federation of Mineralogical and Lapidary Societies (EFMLS), the regional umbrella group for our club, sponsors a weeklong series of classes each spring and fall. The classes are on topics related to our club's lapidary, mineralogy, and geology interests; they are held at the Wildacres retreat near Spruce Pine, NC. The spring session next year will be during the week of **May 10-15**, and registration will open on **January 1, 2027**.

In the past, this newsletter has summarized the upcoming Wildacres session after the information first appeared in an EFMLS newsletter (for the May session, typically in winter/spring). This year, the EFMLS published information for the spring session early. In case it helps anyone interested in registration, I have summarized next spring's offerings here by listing classes, instructors, and brief descriptions. (More information is online in the November EFMLS newsletter.)

Cabochon Making *(Rick Marshall)*. The class will give you the basics for producing beautiful, usable cabochons. It will also be useful if you already have experience but want to improve the quality of your cabochons.

Faceting *(Bernie Emery)*. Faceting is the skill of taking a rough piece of gem material and turning it into a gemstone, with many flat planes or facets. You will explore how to select rough for cutting and how to use a faceting machine to properly cut, place, and polish facets, using proper angles and degrees to produce a standard round brilliant gemstone.

Fused Glass Basics *(Carol Zodrow)*. Learn how to manipulate glass components into your personal creations. Using glass sheet, frit, stringers, and confetti, you will cut and shape pieces to fire in a kiln. Add in dichroic glass to make it sparkle! You will work with millefiori, copper sheet and wire, mica powders, decals, stencils, and more.

Pegmatite Geology *(Dr. Michael Wise)*. You will learn about the origin of granitic pegmatites. You will also learn how to identify major and accessory pegmatite minerals, recognize textural features of pegmatites, and interpret their geological significance. You will develop the skills necessary to explore various pegmatite types, including gem-bearing and industrial pegmatites. Weather permitting, we will take field trips.

Intarsia *(Chuck Bruce)*. Intarsia is making intricate scenic and/or geometric patterns using various small stone pieces of colorful or otherwise interesting matrix cut to precision and fitted together while leaving no gaps between the pieces. You will learn to cut and shape square or linear stones to create a composite piece that can be made into a cabochon.

Mines, Mining Museums, and Gemstones of the West. *(Helen Serras-Herman)*. We will focus on one or two states every day. You will learn about each state's landmark museum attractions and mines while also examining its rare and beautiful gemstones.

Bronze Metal Clay *(Susan Brooks)*. You will learn about the world of bronze metal clay, which results in a beautiful gold metal for jewelry and a multitude of other items. Both beginner and intermediate students will enjoy creating unique pieces of jewelry and some three-dimensional sculptural items.

Soapstone Carving *(Ken Valko)*. You will start by using stone that has been cut to a rough form template or pattern. Using the subtractive method, you will then remove unwanted stone to reveal the object within, turning a simple rock into a creation of wonder and beauty.

Wire Wrapping *(Jocelyn Campbell)*. Discover the fascinating world of traditional, structured wire wrap jewelry. Using pliers, gold-filled or sterling silver wire, assorted beads and gemstones, and a few basic techniques, you will learn how to create your own fashion jewelry.

Pennsylvania's Laurel Highlands: Story of the Rocks

by Hutch Brown

Last October, my wife Kathy and I visited Fallingwater, Frank Lloyd Wright's architectural masterpiece and a UNESCO World Heritage Site in southwestern Pennsylvania's Laurel Highlands. We had never been there before, and we took a tour through the house and grounds hosted by the site's current owner and manager, the Western Pennsylvania Conservancy.

We then spent several days enjoying peak fall color in an Appalachian landscape of forested ridges and gorgeous streams with spectacular waterfalls. I found trace fossils in the bedrock, and we visited Laurel Caverns, the largest cave system in Pennsylvania.

It got me to wondering about how it all came together geologically over the past 300-plus million years.

Fallingwater

Figure 1 (top) shows the iconic view of Fallingwater from downstream. The creek is called Bear Run; the original homeowners loved to fly fish for trout in the stream. Wright took pains to fit the home into its natural surroundings, and every room in Fallingwater is filled with sound from the Bear Run falls—hence the home's name. The house also features lovely concrete terraces cantilevered over a waterfall and painted pink to match fall color in native rhododendron leaves.

But most of the house is set into the native bedrock, which became Wright's main building material. Other than the terraces and roof, Fallingwater is constructed entirely from the local sandstone, part of the Pottsville Formation (named for an eastern Pennsylvania town). Wright brought in stonemasons to quarry the rock on-site about a hundred yards uphill from the house. For the floors, the masons cut flagstones from the native sandstone; for the walls, they matched horizontal joints in the sandstone bedrock with flat stones featuring the rock's craggy textures (fig. 1, bottom).

The stones range in color from gray-white through yellow and orange to a deep pleasing red from oxidized (rusted) iron impurities in the bedrock. Pottsville sandstone is relatively coarse-grained, and we saw lots of wet spots—even trickling water—on the bedrock adjacent to the house. The homeowners fought constant battles over the years to keep water out of the house.

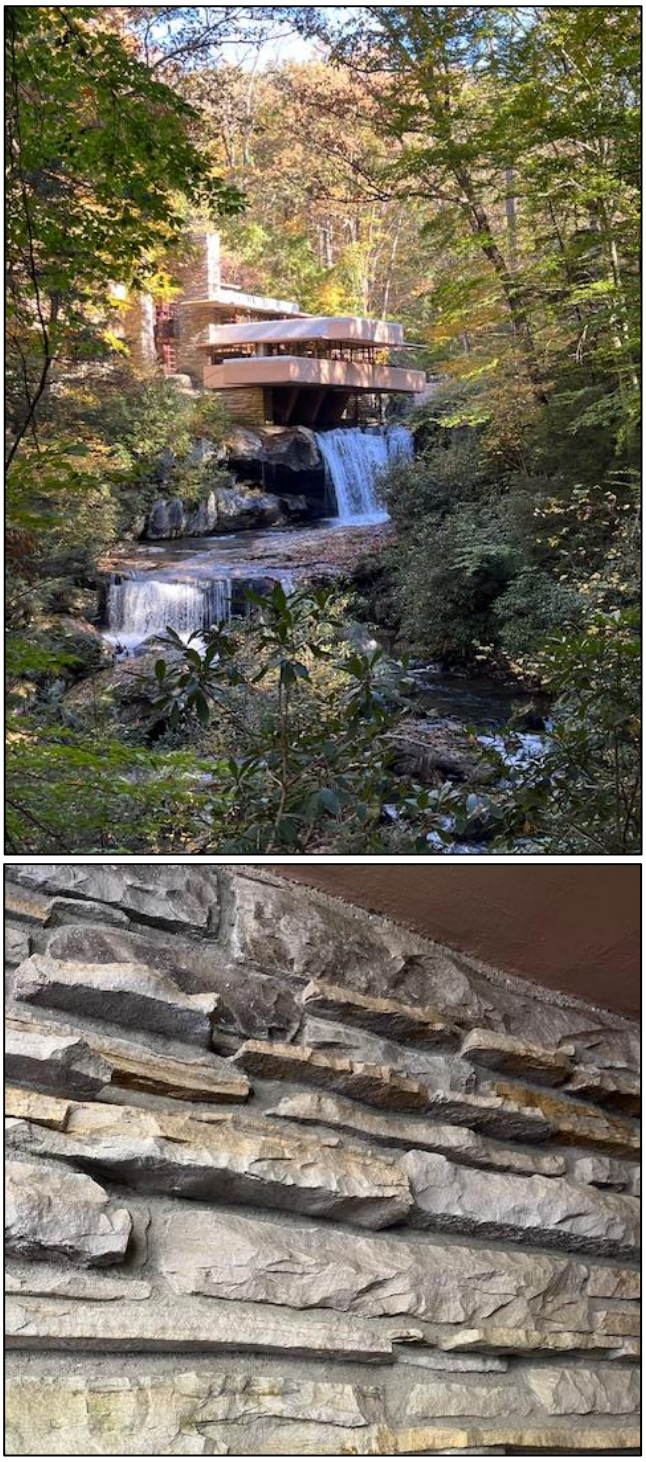


Figure 1—*Fallingwater, Frank Lloyd Wright's architectural masterpiece.* ***Top:*** *The classic view from below the house on Bear Run shows how it is built into bedrock shaped by the falls.* ***Bottom:*** *Wright quarried the sandstone bedrock to construct the house, mirroring the bedrock's texture, colors, and horizontal joint lines. All photos: Hutch Brown.*

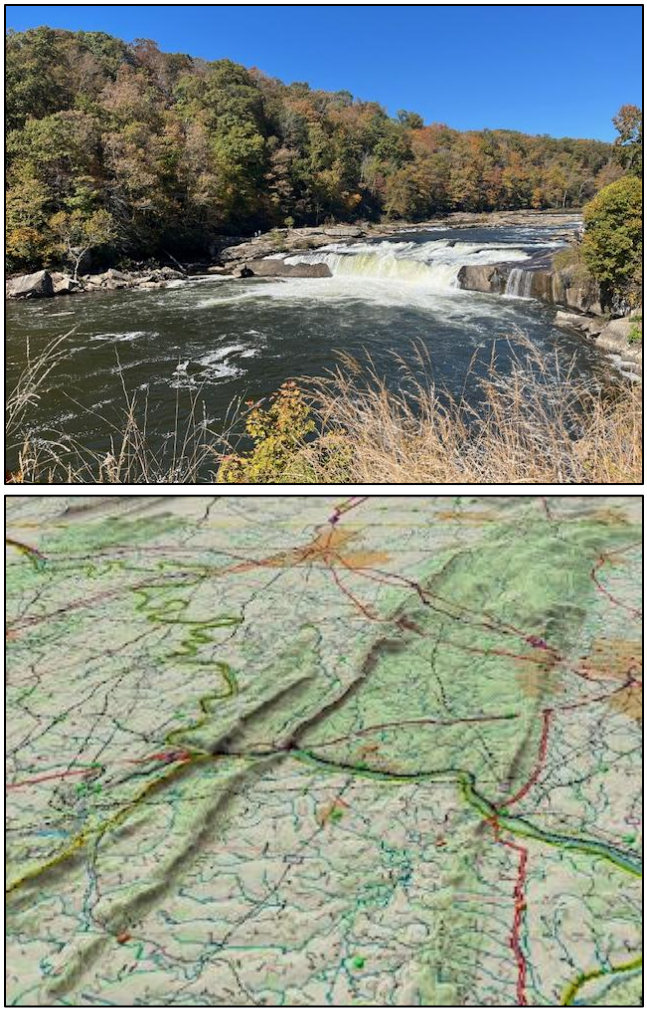


Figure 2—*Rivers cutting through ridges.* ***Top:*** *The Yawk River cuts through a ridge at Ohiopyle Falls near Fallingwater.* ***Bottom:*** *Contour map of the Potomac River cutting through three parts of the Blue Ridge Province (at Harpers Ferry, South Mountain, and Catoctin Mountain) on its way to Chesapeake Bay. Map: Hopper (2009).*

Geologic Setting

Fallingwater lies in the Maryland/Pennsylvania extension of Virginia's westernmost physiographic province, the Allegheny Plateau. Like western Virginia, southwestern Pennsylvania has low parallel ridges that trend from southwest to northeast, reflecting the same great continental collision and mountain-building event across our region about 300 million years ago. The collision pushed sedimentary rock layers together like folds in a rug, resulting in alternating synclines (downfolds) and anticlines (upfolds). The folds were imprinted into the bedrock, even after the mountains were gone. Gentle regional uplift has rejuvenated the ancient ridge lines.

Fallingwater is not far from a major river in the Laurel Highlands, the spectacular Youghiogheny River (pronounced yaw-kee-oh-GAY-nee—locals simply call it the Yawk River). As figure 2 (top) shows, the Yawk cuts through Allegheny ridges on its northwesterly course towards Pittsburgh, where it joins the Monongahela River just south of the city.

Cutting through ridges was possible only because the area was relatively flat in the recent geologic past (hence "plateau" in its physiographic name). Rivers do not bore through solid rock, and most rivers in our region are no more than 3 million years old (the New River is an exception). The Allegheny Plateau, like the Blue Ridge, has undergone gentle regional uplift for millions of years, resulting in gaps through ridges from downcutting (continuous erosion) by rivers ranging from the Yawk to the Potomac (fig. 2, bottom). The Blue Ridge Mountains are riddled with water gaps, most of which failed when smaller streams couldn't keep up with the pace of tectonic uplift. Their elevated dry gaps are now called "wind gaps" (a misnomer).

For much of its geologic history—unlike today—southwestern Pennsylvania was not only flat but also low enough in elevation to be covered by shallow inland seas. When we entered the excellent visitor center for the Laurel Highlands in the tourist town of Ohiopyle, we saw samples of marine fossils in the local Pottsville sandstone. Sure enough, when we hiked around Ohiopyle Falls—a spectacular 30-foot waterfall on the Yawk River (fig. 3, left)—we came across trace fossils in the sandstone bedrock (fig. 3, center). The imprints probably came from plants, including trees (genus *Calamites*), that grew in an ancient wetland. On a hike up a nearby ridge, I spotted a similar trace fossil overhead under a ledge near the trail, also in sandstone (fig. 3, right).

Sandstones of various ages predominate in the Laurel Highlands (McElroy and Shaulis 1988). The Pottsville sandstone we saw at Fallingwater and near Ohiopyle formed during the Late Carboniferous Period (318-299 million years ago), a time when continental drift had placed proto-North America at or near the equator. Terrestrial vegetation was lush and tropical, but the interior of what is now the United States was still covered by a great epeiric (from ancient Greek *épeiros*, meaning continental) sea. In terms of Laurel Highlands geology, the two great "elephants in the room" about



Figure 3—*Fossils in Pottsville sandstone in the Laurel Highlands.* ***Left:*** *Sandstone bedrock at Ohiopyle Falls, with Kathy for scale (the yellow color in the falls is probably from tannin leached from autumn leaves).* ***Center:*** *Trace fossils in the sandstone bedrock at the falls.* ***Right:*** *Trace fossil under a sandstone ledge on a ridge near the falls.*

300 million years ago were the epeiric sea and its location at the foot of a growing mountain range that became as high as the Himalayas are today (fig. 4). Geologists have dubbed the ancient mountain range the Alleghanian Mountains.

Alleghanian Orogeny

The Appalachian Mountains across our region today are generally thought to have formed from three orogenies (mountain-building events), starting in the Ordovician Period about 470 million years ago and ending in the Permian Period about 280 million years ago. The last and greatest of these events was the Alleghanian Orogeny, which took place about 320-280 million years ago when proto-Africa closed the remnant Rheic Ocean to collide with proto-North America. Figure 4 shows the result: a huge mountain range extending across what is now the entire U.S. Atlantic seaboard. To the west of it is the remnant epeiric sea.

Even as mountains rise, they already weather away. Rivers and streams carried silts, sands, and other sediments westward from the Alleghanian Mountains into the epeiric sea. The mountains were so enormous that, over tens of millions of years, their sediments filled most of the shallow inland sea. In time, a great river system the size of today's Mississippi was flowing

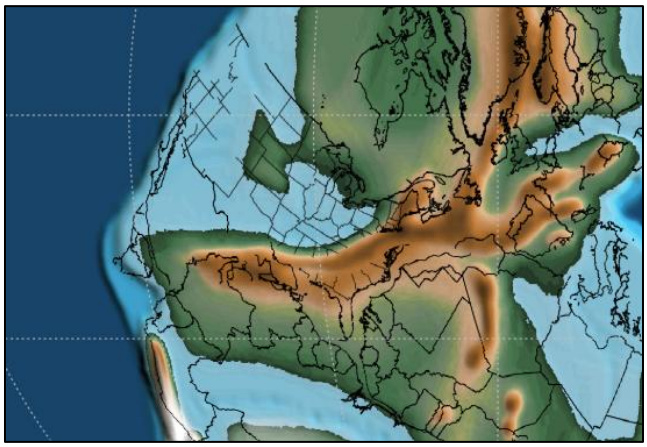


Figure 4—*Detail from a map showing the Alleghanian Orogeny about 300 million years ago. Proto-Africa (lower right) collides with proto-North America (center), raising mountains (brown) across what is now the entire Atlantic seaboard. Beyond the mountains lies the remnant epeiric sea (light blue). Map: Scotese and others (2024).*

southwestward across the continent. Sediments at the river's mouth are thought to have buried and fossilized Arizona's Petrified Forest (Bentley 2025).

You can read the orogeny's impacts on what is now the Laurel Highlands in the local rocks. According to



Figure 5—*Artist's rendition of what the area of the Laurel Highlands might have looked like 300 million years ago. "Along the warm beaches of this ancient sea were great amphibians, the ancestors of the dinosaurs. In the air were the largest insects that ever lived: giant dragonflies with wingspans of over a meter." Illustration: Cale and others (2024).*

a geologic map (McElroy and Shaulis 1988), sandstone in the Pottsville Formation is interbedded with siltstone, shale, and coal. That says a lot about the area's changing environment during the Late Carboniferous: slowly but surely, conditions changed as retreating shorelines gave way to advancing sands and other sediments carried by rivers and streams from the Alleghanian Mountains into the epeiric sea.

Figure 5 shows what the area might have looked like 300 million years ago, with amphibian predecessors of the dinosaurs foraging in the epeiric sea as enormous dragonflies soared overhead. Ancient shorelines with dunes, beaches, and offshore sands explain the prevalence of sandstones in the Laurel Highlands. The buried remains of sea creatures left marine fossils imprinted into what became Pottsville sandstone. Over time, the rivers and streams approaching seaside lowlands formed wetlands with lush vegetation in the tropical climate, leaving wetland fossils and beds of coal.

Laurel Caverns

Limestone is also part of the story. Pottsville sandstone is underlain by a "siliceous" (sandy) limestone called the Loyalhanna (McElroy and Shaulis 1988), named for a local creek. The sandy limestone formed from offshore sands and the calcium carbonate remains of



Figure 6—*Loyalhanna limestone in Laurel Caverns. The sandiest limestone is near the entrance to the caverns, where it shows cross-bedding (top). Limestone from the caverns also contains marine fossils (bottom).*

ancient sea life on the epeiric seafloor. Unlike most limestones, the Loyalhanna is more than half silica (quartz sand). In Laurel Caverns, you can see cross-bedding from ancient marine currents depositing sands (fig. 6, top). Unsurprisingly, the Loyalhanna limestone also contains marine fossils (fig. 6, bottom).

Visitors were few so late in the year, so we got practically a private 1-hour tour hosted by the Laurel Caverns Conservancy. The cavern entrance is at the top of a steep ridge where the overlying sandstone has worn away, exposing the limestone. The tour guide took us about 12 stories down through about 2,000 feet of caverns. The rock is mostly drab gray in color and without distinctive features, so the managers light it up in various colors along the way (fig. 7).



Figure 7—*Laurel Caverns features a light show with music (Aaron Copland's "Appalachian Spring") at one point along the way.*

Though sandy, the limestone contains enough calcium carbonate to dissolve in rainwater. Weathering began with rainwater filtering through organic topsoils and taking up dissolved carbon dioxide. The slightly acidic water then reacted with the limestone to form calcium bicarbonate dissolved in water ($Ca(HCO_3)_2$). In effect, the rainwater leached away the limestone, creating openings that widened as stormwaters poured into fissures and wore away sands in the rock.

The reverse also happened in a few places. The dissolved calcium bicarbonate ($Ca(HCO_3)_2$) released carbon dioxide (CO_2), leaving water (H_2O) and calcium carbonate ($CaCO_2$). The calcium carbonate then precipitated out of the water as calcite. We found a small calcite deposit on one wall and the incipient formation of one sandy stalagmite (fig. 8). Unlike in most caves, however, erosion by water was more important than chemical reactions in forming Laurel Caverns because the limestone contains so much sand.

As a teen, I explored caves in our area using the carbide lamps of the time. The caves were much prettier than Laurel Caverns because they formed in purer limestone with many more calcite formations. But



Figure 8—*Laurel Caverns calcite precipitating out on a wall (top) and forming a stalagmite (bottom).*

Laurel Caverns is the rare cave system that might be said with some truth to have formed in a limey sandstone, so it was interesting to see the difference. One unusual feature is red coloring in some of the limestone from oxidized iron impurities in the rock, reminiscent of the overlying Pottsville sandstone.

Natural Beauty

Fallingwater is remarkable, but it isn't the only house that Frank Lloyd Wright built in the Laurel Highlands. A century ago, with coal and steel production booming in the area, southwestern Pennsylvania had the highest concentration of industrial magnates in the country. It was "the Silicon Valley of its day," so to speak—so it's no wonder that the area's many wealthy oligarchs could afford to buy a Frank Lloyd Wright house in the beautiful Laurel Highlands.

Another home built by Wright in the area is on a hill called Kentuck Knob. Freeze/thaw cycles have broken up the Pottsville sandstone on nearby cliffs (fig. 9, top), revealing its parallel, nearly horizontal joints. Wright built the Kentuck Knob home into the same sandstone bedrock, again using Pottsville sandstone as his building material and again showing off its natural colors and patterns (fig. 9, bottom).

Today, with coal and steel production mostly gone, the Laurel Highlands depend heavily on visitors to Fallingwater and on tourism for outdoor recreation—hiking, biking, camping, caving, trout fishing, rock climbing, whitewater rafting, and more. With so much to see and do, it's well worth a trip!

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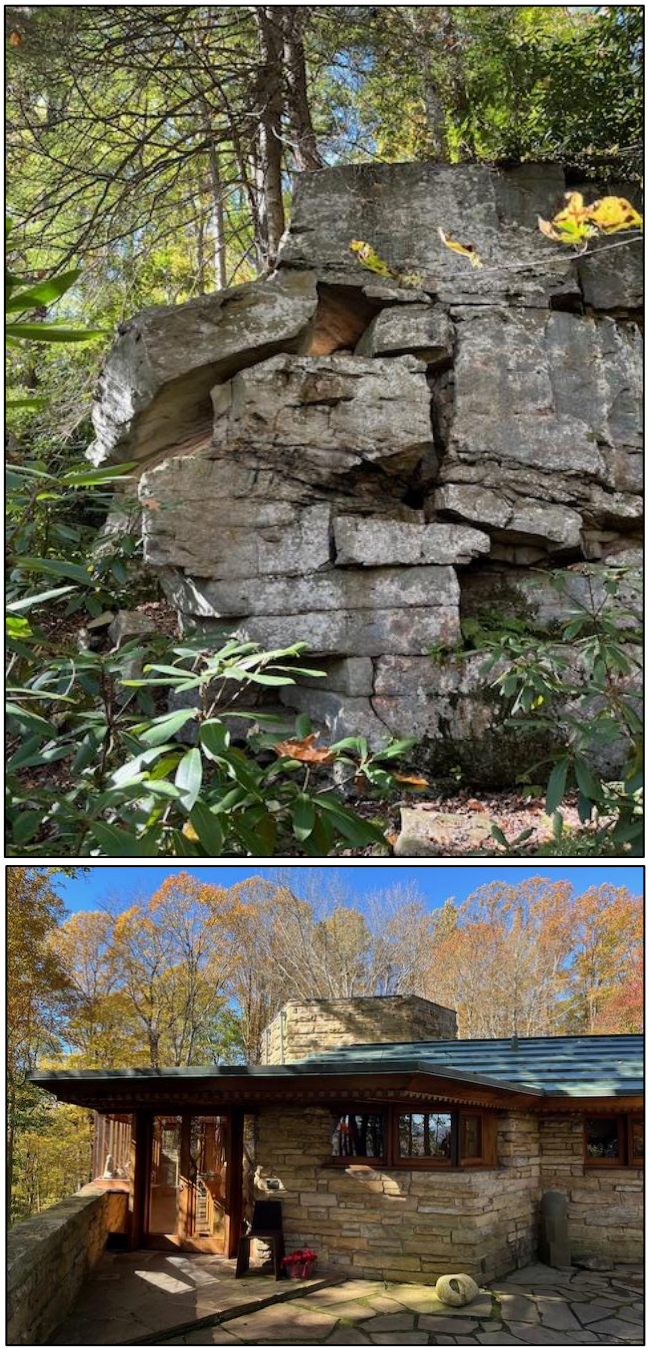


Figure 9—*Pottsville sandstone in the Laurel Highlands.* ***Top:*** *Freeze/thaw cycles breaking up a sandstone cliff reveal relatively horizontal joint lines in the rock.* ***Bottom:*** *Kentuck Knob, a Frank Lloyd Wright house, has walls constructed from Pottsville sandstone with its characteristic flat lines.*

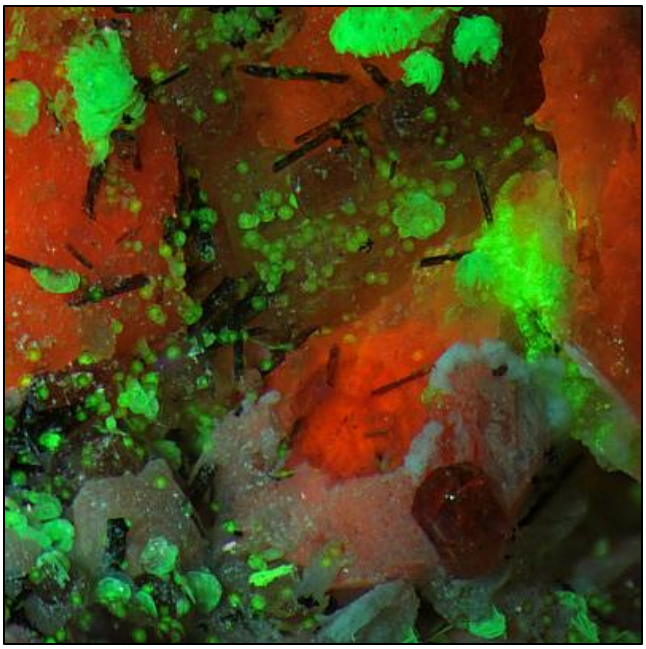
December 2026—Upcoming Events in Our Area/Region (see details below)

Sun	Mon	Tue	Wed	Thu	Fri	Sat
		1	2	3	4	5
6	7 Joint club holiday party!	8	11	12	13	14
13	14 GLMSMC mtg	15	16	17	18	19
20	21	22	23	24	25 Christmas	26
27	28	29	30	31 New Years Eve		

Event Details

7: Dunn Loring, VA—Northern Virginia Mineral Club/Micromineralogists of the National Capital Area/Mineralogical Society of the District of Columbia joint holiday party (see page 9 for details); https://www.novamineralclub.org/.

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



Mindat photo in Christmas colors, Eudialyte Group specimen under UV light. Poudrette Quarry, Mont Saint-Hilaire, Montérégie, Québec, Canada. Photo: Modris Baum. Thanks to Sue Marcus!

The Northern Virginia Mineral Club, Inc.

Visitors are always welcome at our club meetings!

EXPLORE OUR WEBSITE! FIND US ON FACEBOOK!

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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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 club member).

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Youth Coordinators: Maria Nopo, Celia Zeibel

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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