THE NORTHERN VIRGINIA MINERAL CLUB INC

The Mineral Newsletter

Next meeting: January 6 Time: 7:30 p.m.

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



Writing about the Mineral of the Month

Duftite (green) with mimetite, Drienok, Banská Bystrica District, Slovakia.

Source: Mindat. Photo: Martin Števko.

Volume 65, No. 1
January 2025
Explore our website!

January Meeting Program:

Mineral Travels Worldwide

details on page 8

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Mineral of the Month

Writing About the Mineral of the Month

by Sue Marcus

This month, I'm taking a break from writing a Mineral of the Month column to tell you about my experience writing these columns for the last 9 years—since February 2016. I want to share some of the fun I've had doing the research and writing. You've been a part of this journey, and I'm not ending it yet. I would also like to pay tribute to people who have made these columns—and their lovely illustrations—possible.

Those involved in the columns, mostly newsletter editor Hutch Brown and me, have shortened Mineral of the Month to MoM when we communicate about it. Now we'll all know a MoM when we see one.

Readers of the NVMC newsletter have encouraged me and kept me going. It's nice to know people are reading these articles. Occasionally, someone has corrected me—thank you! We are learning together.

Personal Connections

Some of you know that Hutch Brown is a professional writer/editor who retired from the U.S. Forest Service after decades of writing and editing for the agency. Our club is lucky to have him as a volunteer editor. Unlike most of us, Hutch is not interested in mineral collecting, but he is fascinated by geology—by how rocks form, by plate tectonics, and by geomorphology because all this creates the landforms we see and the forested landscapes around us. He also has degrees in German literature, which is valuable when I have an original source written in German.

I always try to go to original sources, but when they are in languages other than English, I struggle. Many minerals have their initial descriptions written in German. Google does not like older versions of German or fancy antique fonts, so I turn to Hutch. The Google translation software is not fluent in mineralogical phrasing. The gibberish it comes up with can be amusing—but only if it isn't something I need so I can finally conclude my hours of research.

These columns have brought me personal connections from around the world. I met Herwig Pelckmans from Belgium and his lovely wife Christina when he gave a presentation at a meeting of the Mineralogical Society of the District of Columbia (MSDC). Our first conversation evolved into many emails and even WhatsApp calls despite a difference of many hours in our time zones. Herwig has advised me on early or original

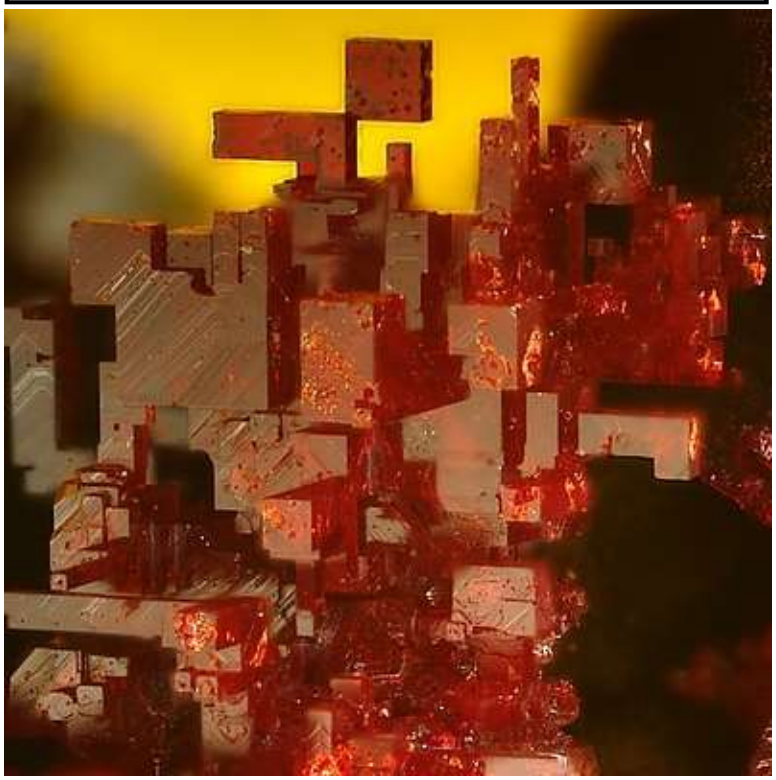


Northern Virginia Mineral Club members,

Please join our January speaker, Casper Voogt, for dinner on January 6 at 5:30 p.m. at:

BJ's Restaurant & Brewhouse
8027 Leesburg Pike, Suite 100, Vienna, VA
Phone: 703-356-7305

Reservations are under Craig Moore, Vice President, NVMC. If you plan to attend, please email Craig at vicepresident@novamineral.club by noon on the day of the meeting.



Cuprite, Ray Mine, Pinal County, AZl. MoM for October 2024. Source: Mindat; photo: Gianluca Fontana.



Titanite with fluorapatite, Miller Property, Sebastopol Township, Renfrew County, Ontario, Canada. MoM for December 2023. Specimen and photo: R. McDougall.



Atacamite, La Farola Mine, Cerro Pintado, Atacama, Chile. MoM for June 2023. Source: Mindat; photo: Rock Currier.

sources and has helped with translations of important references. He also works with me when references conflict about who first described a mineral.

Another friend I've made through these columns is Ray McDougall (of McDougall Minerals in Ontario, Canada). Ray does a lot of self-collecting, mostly zeolites in Nova Scotia, but he's also found nice minerals in Ontario. As with Herwig, I've emailed and called Ray many times. He's still an active-duty mineral exploration geologist, which has led to collecting stories he shares through presentations to clubs like ours. He's been a speaker (via Zoom) for our club and was recently also a Zoom speaker for the MSDC. Ray was instrumental in the late, great mineral symposium in Rochester, NY, where some of you may have met him.

Peter Megaw is one of the most eminent private collectors (not dealers) to respond favorably to my request to use his photos. Based in Tucson, AZ, Peter is an expert on Mexican localities. He is a consulting geologist, which gives him special opportunities to access mineral deposits and collect specimens. He's helped me understand some of the geologic and mineralizing processes of mineral deposits we've discussed.

Rock Currier (his real name) was a legendary dealer and collector who owned Jewel Tunnel Imports, a major wholesaler of minerals worldwide. He traveled widely to obtain specimens from many new localities and wrote articles for *The Mineralogical Record*. He managed, supported, and contributed to Mindat, an invaluable online source of mineral information and images. Among Rock's many Mindat contributions is an archive of about 9,000 images and several "best of species" articles. We are indebted to Rock for some of the images I've used in MoMs.

Sherman Marsh is another friend and professional in the geological field. He's a retired geochemist living in Denver. Sherm is a source I turn to for insights on the chemical relationship between the MoM I'm writing about and surrounding rocks or associated minerals. As a fellow collector and former dealer, Sherm shares his knowledge about localities and the most important characteristics of the MoM.

My husband, Roger Haskins, is a sounding board for me. As a professional geologist with broad experience in mineral exploration and metallic minerals, he reviews some columns, interprets professional papers that stump me, and answers my questions. He is also very tolerant of my time spent writing MoMs.

The Smithsonian Institution's mineral collection in the National Museum of Natural History helped inspire my career as an economic geologist. For me, the mineral galleries there are still a favorite part of living in the Washington metropolitan area, and every visitor should see them.

Dr. Jeffrey Post and Dr. Michael Wise, both with the museum, are familiar to most long-term club members.



Scheelite, Schuang, China. MoM for October 2017. Source: Smithsonian National Museum of Natural History; photo: Dana Penland.

They have provided many interesting presentations, such as on the museum's newest acquisitions or on what causes colors in many minerals. Sadly, the latest acquisitions were shown on slides rather than letting us ogle them directly. Mike and Jeff have also helped me resolve gnarly mineralogical and geological issues that arise during my column writing; they are always generous with their time. We also have permission to use Smithsonian images.

Another professional, known mostly for his specialty in gems, is Joel Arem, who provided photos of faceted euclase for the November 2022 MoM.

Finding Photos

Hutch and I hope that you enjoy the photos chosen to illustrate each mineral. Lately, I've gone through all the images posted on Mindat for the mineral I'm writing about that month. I've learned the hard way that if there are more than about 600 images posted there, I should select another mineral.

Why? When I review all the Mindat images, I glean information about the most important localities worldwide and about U.S. localities; I also discover whether the mineral is found as both macro- and microcrystals. Because I want to give readers the best images I can, reviewing too many of them takes time away from writing about the mineral itself.

I select the images I like best and share them with Hutch, who picks the ones that best fit the text. I try to choose images that show the mineral in its typical form, other images that show different forms, images from particular localities, and some that are stunning.

I try to ask people for permission to use their photos in the newsletter. The club is an educational organization, so—copyrights notwithstanding—we have "fair use" rights (see the last page of this newsletter). Still, asking for permission only seems right and courteous.

Getting in touch with the copyright holders can be an arduous adventure. Mindat has the most photos of any specific mineral in one place—on the Mindat webpage for that mineral. People from all over the world submit photos. Each posted photo gives the name of the photographer or copyright holder, usually with a link to the person's Mindat homepage. But contacting people through Mindat is undependable. Recently, I received a reply to a message requesting permission for use that I'd sent months before. That happens fairly often.

So I attempt to find out how to contact people directly rather than through Mindat. Stalking? Some might call it that. I look at the person's homepage to find leads to where they might live or mineral clubs associated with them. I've found several photographers at overseas universities or companies. It's a bit of fun sleuthing but frustrating when I never hear from someone whose image I really want to use.

I've also learned that some Mindat homepages belong to people who have died or whose pages are "closed." The latter category includes people who simply don't want to hear from others.



Topaz thumbnail with bixbyite from Juab County, Utah. MoM for May 2018. Specimen and photo: Bob Cooke.

Our club members have been generous in letting us use their images. Former NVMC President Bob Cooke and Tom Tucker are talented photographers who photograph and share specimens from their collections. Bob provided images for a long time, and Tom has also come through with fine images.

Some images are copyrighted by professional photographers. Jeff Scovil is probably the most prominent mineral photographer in the United States. Matteo Chinellato is a professional mineral photographer in Italy. I am grateful to them both for letting us use their stellar photos; they sell these images, yet we have permission to use them—and we don't have to pay.

Mineral sales platforms (such as Etsy and eBay) and dealers' websites are additional sources of mineral images and sometimes information about localities or interesting anecdotes. I can't afford the very high-end specimens, but many dealers have given us permission to use their professionally shot images.

Many dealers post mineral images on Mindat. Sure, they are showing off their stock, but some of those specimens are museum quality. Dealers include Rob Lavinsky (The Arkenstone), Sharon and Eugene Cisneros (Mineralogical Research), Dan Weinrich (Weinrich Minerals), John Veevaert (Trinity Minerals), Martin Grüll (viaMineralia, Austria), Rudolf Watzl (Saphira Minerals, Austria), Steven A. Hardinger (Dragon Minerals), Nadya Georgieva and Todor Georgiev (Quebul Fine Minerals), and Angela and Brian Kosnar (Mineral Classics). I learned that Angela is the latter's excellent photographer, although Brian is better known to collectors. It's fun to use the image of a pricey specimen without having to buy it.



Epistilbite, Pu'u o Ehu Quarry, Kailua, Oahu, HI. MoM for June 2024. Source: Mindat; photo: Matteo Chinellato.



Smithsonite with aurichalcite, Kelly Mine, NM. MoM for March 2017. Specimen and photo: Tom Tucker.

Most images that Hutch and I use come from mineral collectors. Many live in the United States, although my correspondence has led to contacts in many parts of the world. Here is a list of the people who have generously allowed us to use their images: Jiang Bin, Paul Bongaerts, Jamison Kilby Brizendine, Zbyněk Burival, Jean-Francois Carpentier, Jean-Maire Claude, Michael D. Cline, Keith Compton, Charles Creekmur, Jean Dehaye, Dario Di Domenico, Gianluca Fontana, John Haupt, André Heyninck, Kjell Gatedal, Kyle Kevorkian, John Krygier, OT. Ljøstad, José Rafael González López, Rolf Luetcke, Douglas Merson, Harold "Fritz" Moritz. Kelly Nash, Gerhard Niceus, Demetrius Pohl, Eleftherios (Lefteris) Rantos, Branko Rieck, Vic Ridgley, Michael Roarke, Beth Schaefer, John Sobolewski, Christopher Stefano, Martin Stevko, Terry Wallace, and Stephan Wolfsried.

When I contact someone, I ask for permission to use a specific image. I also ask for blanket permission to use

any of their mineral images so that I don't have to contact them for each future use. Most give blanket permission, and many ask to be notified when their images are used. We always give proper photo credit.

Once I send a column file to Hutch, along with a list of possible images to use, he inserts the images during editing and sends me a copy to review. (I also review the entire draft newsletter.) I am not conscientious about contacting the owners of the images we use each time. I tend to go on with the rest of my life, and I humbly apologize to them.

Using Sources

Why do I keep mentioning Mindat? Though not infallible, Mindat is a treasure trove of information about minerals, and it has recently added resources on geology and fossils. For researching MoMs, Mindat provides photos and information on the mineral, where it is found, and how it was originally described and named.

More importantly, Mindat provides references to papers on each mineral. Sometimes there are links to the articles so you can read them yourself. Such papers lead me to original sources so I can see who wrote what about each mineral.

We all know the old telephone tree game, where one person whispers a message to another, passing it along. Then the players learn what the original message was and how it changed by the time the last person heard it. Research is similar in that it is best to find out how the original writers expressed themselves rather than reading how someone else paraphrased them.



Kyanite, Sponda Alp/Pizzo Forno, Chironico Valley, Switzerland. MoM for May 2021. Photo: Bob Cooke.



Carrollite on calcite with spherocobaltite, Kambove Principal Mine, Kambove, DR Congo. MoM for January 2024. Source: Mindat; photo: Angela Kosnar.

In addition to Mindat and other sources, I look at the International Mineralogical Association's (IMA's) list of mineral names, which usually provides information about the accepted first description of the mineral. However, I've sometimes found a description that preceded the original description cited by the IMA.

I also look for sources of information about particular localities. I try to include U.S. localities because we might visit them or want a U.S. specimen in our collection. Some minerals can occur in hundreds of localities. I usually mention the most productive sites for minerals, although my articles are not a comprehensive catalogue of every locality.

Hutch sometimes wants me to stop writing and submit the column in time for the next newsletter; I confess that I try to cram in information about one more locality before I send the column to him. That's why I've chosen less common minerals lately. Reflecting on some of the early columns, I'm bemused that I tackled some of the more common minerals. Those columns can't have been comprehensive—or even very complete as summaries.

The Mineralogical Record, *Rocks and Minerals*, and Mindat's "best of species" articles are excellent sources of information about specific minerals. I'm lucky enough to have a lifetime subscription to *The Mineral Record*. But I'm way behind on reading it, and my copies are not readily accessible (I should organize them to facilitate my research—so many tasks I *should*



Brucite (yellow), Killa Saifusa District, Balochistan, Pakistan. MoM for September 2022. Source: Mindat; photo: Jean Dehaye.

do!). More recently, I've started subscribing to *Rocks and Minerals*, but I'm behind on reading that too. Sometimes I can find articles from these two journals online. Occasionally, I'll contact the author of an article I want. Everyone I've contacted has been helpful and forthcoming, but all of this takes time.

Academic papers are particularly useful for understanding the geologic setting of many mineral localities and deposits. I don't have complete access to these papers, although I can usually find a source that allows me to read them. The papers can be complex, with some referencing older papers. Again, I try to use the most original sources I can get for the specific information I'm seeking.

Challenges

I'm a macro collector. I prefer minerals I can see in my hand with the naked eye. So my inclination in selecting a mineral to write about is to choose one with easily visible crystals.

With that said, micromounts can make for stunning photos (as you can see from the micromount photos by



Rutile with hematite, Novo Horizonte, Brazil. MoM for November 2021. Source: Mindat; photo: John Sobolewski.

Bob Cooke on previous pages), and I always try to mention localities of interest to micromounters. Some localities, such as those in the Alps, can have one or two Mindat images of the mineral I'm writing about as micromounts, such as in alpine fissures or veins.

Describing pretty minerals often becomes an exercise in finding synonyms. "Beautiful," "stunning," "gorgeous," "exceptional"—I've used them all.

And then, when I think I'm finished researching and writing, I come across a major locality that I'd missed. I can't skip something important, so more time is devoted to summarizing information about that locality. And then I have to find new and different synonyms to describe the lovely mineral found there. This volunteer job is good for maintaining my vocabulary!

Readers keep me motivated. Your encouraging words mean a lot to me. I welcome ideas for these columns—but please remember that I can devote only a limited amount of time to each column.

I learn each time I write about a mineral. Thanks for learning with me! And if anyone else would like to write about a MoM, please let me know—I'm happy to share the fun.



Casper Voogt

Mineral Travels Around the World

January 6 Program

Our presenter for January, Casper Voogt, will present a whirlwind tour of his mineral travels in Russia, Myanmar, Madagascar, Morocco, and Cyprus. He will also talk about seeing the Tucson, Munich, and Sainte-Marie mineral shows.

Casper is an avid traveler and a part-time mineral dealer. He runs a web development company and serves as webmaster for the NVMC, the Mineralogical Society of the District of Columbia, and the Gem and Mineral Society of Lynchburg, VA. His academic background is in architecture (with degrees from Princeton and Georgia Tech). He has lived in Aruba, the Netherlands, Switzerland, and the United States.



December Holiday Party and Club Officer Elections

December 2

by Almas Eftekhari, Secretary

President Jason Zeibel welcomed everyone to our annual joint holiday party together with the Mineralogical Society of the District of Columbia. We enjoyed good food, good company, fun games with great prizes, raffles, and our traditional gift exchange. (Check out the photos from Craig Moore and me!)

We started with a business meeting, including a discussion of our annual club show the week before. The grand prize winners walked away with a Peruvian pyrite crystal, which they picked up at our holiday party.

At the show, we passed out many specimens donated to the club. At the Silent Auction, we sold more than $3,000 worth of specimens, clearing a lot of space in our storage unit. Treasurer Roger Haskins reported that we broke even at the show, with receipts from admissions and other income matching expenditures. That's a success for a nonprofit organization like ours because we don't aim to make a profit.

Jason called for suggestions on how to make the show better. Jim Keeley suggested giving volunteers more guidance before the show. Jason asked members to keep thinking about what we can do to improve the show, and he gave a shoutout to John Weidner and John Sanborn for all their help in the Kids' Room.







We also watched Field Trip Co-Chair Katy Johnson's awesome video covering most of our field trips in 2024. The video reflected an impressive bit of professional editing!

Vice President Craig Moore introduced a special guest, Bill Stephens, who traveled all the way from Wilmington, DE, to join us. Bill, who just completed 2 years as



Former EFMLS President Bill Stephens bestowing the EFMLS membership award for 2024 on our club.

president of the EFMLS, is now president of the Pennsylvania chapter of the Friends of Mineralogy and will become national president for the Friends.

Bill presented the NVMC with an award from the EFMLS for our membership growth last year, which exceeded 220 percent. He also outlined the role of the EFMLS in serving a total of 86 clubs like ours across the northeastern and mid-Atlantic states. The EFMLS provides our club with insurance and with safety guidelines for field trips. With its special focus on juniors, the EFMLS furnishes us with junior program materials and any other help we need.

Craig stressed the importance of EFMLS club insurance because we can't have field trips without it. Bill noted that insurance rates were climbing because quarries are getting more cautious. In response, EFMLS is trying to work with the quarries as partners so they see club field trips as a way for them to advertise and build public goodwill. In appreciation for Bill's service, for his joining us to bestow the membership award in person, and for his thoughts about the EFMLS, Craig presented Bill with a club T-shirt.

John Sanborn introduced members of the Micromineralogists of the National Capital Area who joined our holiday party. The club brought a crystallography tree made in the 1980s that represents all the crystal structures found in nature. John invited everyone to join their club, noting that "what you can see under a microscope is a whole 'nother world!"





Jason announced club officer elections for 2025. The current elected club officers (President, Vice President, Secretary, and Treasurer) were all reelected by acclaim.

Craig announced that Casper Voogt will be our speaker at the January club meeting (see details on page 8) and that we will join Casper for dinner at B.J.'s beforehand (details on page 2). At our March meeting, juniors (21 and under) will have an opportunity to make presentations of up to 10 minutes on any club-related topic of their choice.



President's Message

by Jason Zeibel

Happy 2025 to all the rockhounds out there!

It is still 2024 as I write this, but the New Year is nigh, and it always brings with it the opportunity for new hopes and adventures. Let 2025 be your opportunity to start collecting something new that excites you, free of the burdens of legacy plans and commitments.

The year 2025 will certainly be a milestone for me because it will soon mark the completion of my first half-century of life. Crossing that bridge will continue my journey from being a young rockhound to becoming a well-seasoned veteran.

Therefore, I challenge us as a club for 2025 (consider it a New Year's resolution!) to continue attracting young talent into our thriving organization. We have been honored twice in the last 2 years by the EFMLS for increases in membership. Let's continue the trend in 2025! While certainly remaining open to everyone, I hope we can focus on bringing in more young members this year! They are the future of our hobby and of our related professional fields.

So, whether you are young in age, young in spirit, or simply young at heart, let's say, "Out with the old year and welcome to the young new year of 2025!"

A lot has happened since our last newsletter. At the end of November, we joined the Department of Atmospheric, Oceanic and Earth Sciences at George Mason University (GMU) in hosting our 25th gem, fossil, and mineral show together. This marked both a milestone and a transitional year for our partnership.

It was the final show sponsored by Dr. Julia Nord, who will be retiring at the end of the academic year after a quarter century of sponsoring our show. I hope you will all take the opportunity to send Dr. Nord a note at some point by the end of next semester to thank her for all her contributions to our club and to our hobby in general. I am hopeful that we can find some opportunities before she heads off to have a club outing to help her with the GMU mineral collection in whatever way she sees fit.







Scenes from the NVMC mineral show in November 2024. ***Top:*** *A vendor display in the main show room.* ***Center:*** *The micromineral table staffed by the Micromineralogists of the National Capital Area.* ***Bottom:*** *The busy Kids' Room. All photos: Jason Zeibel.*





*Scenes from the NVMC mineral show. **Top:** NVMC member John Weidner running the Kids' Room. **Bottom:** Vice President Craig Moore staffing the NVMC table.*





*Scenes from the NVMC mineral show. **Top:** NVMC member Audra Zeibel holding a Megalodon shark's tooth against her jaw for size comparison. **Bottom:** President Jason Zeibel and daughter Celia crawling under tables to examine fluorescent mineral offerings away from the bright show lights.*

I also had the pleasure of meeting Dr. Jules Goldspiel, who will be taking over for GMU in their interactions with us, including as lead for cosponsoring the show. Dr. Goldspiel's research is in planetary geology and astrogeology. Like most of us, he has some fun stories about how he wound up in the role he has today. His stories include his time with the Naval Research Laboratory and as an adjunct professor. I look forward to getting to know him better and finding ways that NVMC can help him mentor the next generation of Earth science graduates.







Scenes from the NVMC mineral show. ***Top:*** *Club members staffing the admissions table.* ***Center:*** *The Silent Auction in full swing, monitored by Vice President Craig Moore and club member Jeff Guerber.* ***Bottom:*** *Club members Celia and Audra Zeibel checking out mineral and fossil offerings at the show.*

The show itself was a success by all metrics that matter. We had a very lively Kids' Room. Many thanks to John Weidner, John Sanborn, Germaine Broussard, Tom Taaffe, Celia Zeibel, Mickey Johnson, and the host of other volunteers who made that room my highlight of the weekend. John and Tom had both updated the various quizzes, puzzles, and games for the kids, and it made a big difference.

I also appreciated the upgraded fluorescent mineral display with blackout curtain and curtain rod. The crew from the Micromineralogists of the National Capital Area (MNCA) had a lively table all weekend long, and the Silent Auction was quite an adventure, bringing in way more income than last year. My daughter Celia and I even crawled under a few tables to examine some potential fluorescent mineral acquisitions. The always-helpful Ken Reynolds managed to walk away with some of our funds in exchange for a couple of pretty, glowing rocks.

One thing that I would like to see us work on for next year is to expand our displays. I think some of our proceeds should be used to acquire upgraded display cases, allowing us to attract more people to put on educational displays. My sincere thanks to those who displayed this year and in years past, but I think we can possibly add more displays by upgrading the cases and lighting we have.

Our last meeting of the year was our annual holiday party—an opportunity to share a meal, play some games, and take home some fun rock- and mineral-themed gifts. Celia owns a wonderful book with word searches, mazes, crosswords, and a variety of other geologically themed activities (*The Best Bathroom Book for Mineral Collectors Ever Written, No. 2*, by Amy Thyst, C. Albert Site, and Diamond Dan). I copied

about a dozen of the activities from that book for use at the holiday party. We had fun racing amongst ourselves to see who was able to solve puzzles the fastest, with each winner taking home a door prize.

We also got a chance to hear the 2024 field trip report, which we watched in the form of a video montage! That was truly epic and has set the bar high for future officer reports. A huge thank you to Field Trip Co-Co-ordinators Katy and Mickey Johnson for putting that together—and for getting us all out in the field in the first place!

Finally, it was a distinct pleasure to welcome the outgoing chair of the EFMLS, Bill Stephens, to our holiday party. He came to present us with the EFMLS award for our 220-percent increase in adult membership over last year! Go us!

Right after the holiday party, I made a work-related trip to Utah for a week. My team and I were there to do some field measurements in support of a DARPA (Defense Advanced Research Projects Agency) challenge. I flew into Salt Lake City and then headed southwest into the Utah desert.

This part of the country, called the Basin and Range physiographic province, has nearly perfectly flat desert plains pierced by jagged ridges. From the top of one ridge, you can see for 50-100 miles to the next ridge. This part of the country is also home to features such as the Bonneville Salt Flats.

In my spare time (ha!) I am slowly making my way through John McPhee's Pulitzer-Prize-winning *Annals of the Former World*. The book is a travelogue about the geology along Interstate 80 as it cuts across the nation. The first section of the book, titled "Basin and Range," is dedicated to part of western Utah and eastern Nevada. The roads that go through each basin are almost compass-point straight, bending only when reaching the next range.

When I was there in early December, the basin I visited was almost completely covered by a salty ice fog. It made driving difficult due to drastically reduced visibility and slippery roads. But even the slightest bit of elevation brought the car out of the fog like an airplane taking off on a London morning.

When I stopped in the fog or in the area just above the freezing fog line, I found gorgeous ice crystals growing. The area in which I spent a few days had north-facing ridges with areas that were completely in fog or





Outgoing EFMLS President Bill Stephens bestowing the federation's club membership award on the NVMC at our annual holiday party in December, with President Jason Zeibel and Vice President Craig Moore accepting the award (top). In appreciation, Craig then presented Bill with the NVMC club T-shirt (bottom).



Club President Jason Zeibel in eastern Utah at 5,700 feet elevation in the mountains southwest of the Great Salt Lake.





Ice crystals of various sizes in Utah near Great Salt Lake. The crystals form on vegetation and rocks on north-facing slopes not exposed to sunlight when salt-containing freezing fog hangs in the valleys.

shadow all day long. Every rock, pile of dirt, or scraggly mesquite branch was covered with delicate and intricate ice crystals. I couldn't help thinking how much fun it would have been to have my MNCA friends there with a camera and microscope to photograph all the delicate patterns. I did my best to photograph them and even remembered to place something in the scene for scale.

With a week to wander around the Utah mountains, I tried to find some interesting minerals to bring home. I was obviously there on the clock to do another job, so I didn't get to wander around too much, but I did bring back what I thought were exemplars of the minerals that I observed in the area.

There was a lot of sandstone and layered sedimentary material, in places interrupted by white silica minerals. Where I encountered it, the white silica material was 1-2 centimeters thick and pierced the surrounding sedimentary layers.



Rocks found southwest of Salt Lake City, UT.



Fluorescence in rocks found southwest of Salt Lake City, UT. ***Top:*** *Midwave ultraviolet light.* ***Bottom:*** *Longwave ultraviolet light.*

In places, the marine sediments were heavily pockmarked. I couldn't tell if this was from remnants of marine organisms from the Paleozoic Era or just a weathering phenomenon.

There was also what looked like a variety of shale, but it wasn't quite as layered as I would have expected. One piece had a layer of small crystals on it.

Also, some of the sandstone had a very thin layer of reddish mineral on it that fluoresced a bright orange in midwave ultraviolet light. The white silica layer also fluoresced a deep purple in longwave ultraviolet light, reminding me of calcite.

I certainly welcome any of the more highly trained geologists and mineralogists in our club to look through my samples and provide opinions. After all, the point of the club is to learn and to help others like me become better geologists and hobbyists so that I can find better rocks next time!

At this month's club meeting, we will welcome our own Casper Voogt to talk about his collecting trips around the world (see his program on page 8). I always look forward to hearing Casper grace us with tales of his travels to places that I can barely identify on a map. See page 2 for details regarding dinner with Casper before the January meeting.

Also, something to look forward to for March: Vice President Craig Moore is organizing the first of what I hope becomes an annual young-hobbyist presentation night. Everyone 21 and under is encouraged to take 10 minutes to talk about a topic of their choosing. That promises to be a fun evening and will hopefully showcase some of the strong talent that is emerging in our club.

Please continue to keep an eye out for good speakers and send a note to Craig as he tries to line up our speakers. If you have a topic that you are excited about and feel motivated to present on it at a club meeting, then let Craig know!

Until our next meeting, happy rockhounding—and don't forget to make a New Year's resolution to start collecting something new!

Jason



Our 32nd Annual Gem, Mineral, and Fossil Show

by Tom Taaffe, NVMC Show Chair

The NVMC held its 32nd Annual Gem, Mineral, and Fossil show at George Mason University (GMU) on November 23-24, 2024.

Since 1999, our annual event has been cosponsored by GMU's Department of Atmospheric, Oceanic and Earth Sciences. This year, the event took place as usual in GMU's Johnson Center, where our event filled three spacious halls and rooms.

Dewberry Hall (the largest of the three) was occupied by 19 of our longtime mineral and fossil dealers. These dealers somehow managed to surpass their wonderful offerings in 2023. Along with dealer displays, Dewberry Hall featured NVMC exhibits ("Meteorites," by Jeff Guerber; and "Garnets," by Diane Nesmeyer) and educational displays, such as "Minerals in Context." Door prize drawings were announced throughout the day on Saturday, along with nonstop preparations for our signature Silent Auction on Sunday. All these elements contributed to the steady buzz of activity in Dewberry Hall all weekend long.

And when showgoers were ready to experience something a little more hands-on, they left Dewberry to enter Pre-Function Hall, where they could visit micromounter tables staffed by the Micromounters of the National Capital Area. Both mineral enthusiasts and novices had the opportunity to examine minerals under magnification. The miniature world of crystals revealed by microscopes impressed all those who partook. Leading the team with microscopes was John Sanborn, along with Dave MacLean, Dave Fryauff, and Bob Cooke. Across the hall from the micromineral demonstration was our physics/science table managed by Robert Clemenzi, where surprising and clever experiments captivated both parents and kids.

In the Gold Room we set up our Kids' Activity Room, where each and every mineral or fossil activity attempted by a child earned a free specimen from our numerous Mini-Mines. Kids could choose more than once from the many learning activities and earn minerals and fossils as they went, with no limit on the specimens that could be earned. This year's showgoers found the Kids' Room overflowing with specimens for kids to add to their collections. In the Kids' Room, a relatively small number of our most dedicated and unselfish club members did their best to share the fun of mineral collecting.



Some of the 19 dealer displays at the NVMC mineral show in November 2024. ***Top:*** *Rob Evans, Geosol Imports, Hawley, PA.* ***Center:*** *Beth Smith, KBT Minerals & Fossils, Vienna, VA.* ***Bottom:*** *Casper Voogt, The Garnet Group, Sterling, VA. All photos: Tom Taaffe.*

Since 1999, GMU's Dr. Julia Nord has been our annual show sponsor, collaborator, and benefactor. Her role included negotiating on our behalf with GMU Events and Parking staffs and with GMU Police (for overnight security). Julia secured the facility for our use and arranged most GMU components of our show.

She always lobbied hard on our behalf, a skill invaluable in an academic bureaucracy.

Sadly for us, Julia is retiring at the end of this school year; her departure from GMU will affect our club for some time. However, Julia has recruited Dr. Jules Goldspiel to be our new show benefactor and GMU liaison. We are grateful for his coming on board, and we wish him all the success that Julia brought to our show.

This year, Julia again scored big in recruiting an exceptional group of student volunteers. This year's volunteers were attentive, proactive, and enthusiastically supportive of our show. They helped dealers with unloading, unpacking, and booth setup on the Friday evening before the show and helped again on Sunday afternoon at the close of the show. GMU faculty member Tom Wood, along with student volunteers, helpfully placed directional signs all over campus; Tom also generously donated time to drive the courtesy shuttle. Tom has been an active and steadfast supporter of Julia and her show efforts for at least a decade.

Julia's volunteers seemed to be particularly avid mineral enthusiasts and collectors, some showing up bright and early for the show opening on Saturday morning! The student volunteers over the entire weekend included Addy, Alyssa, Elianna, David, Parker, Maddie, Amber, Maya, Shannon, Brian, Jasemine, Robert, Ambrose, and Clay—a really great bunch! And those are only the names I can remember! We are deeply grateful to all our student volunteers, and we could not have done it without them! In fact, the laborious process of getting all our dealers loaded up and on their way home has never before gone so well. Every dealer I spoke to reported that they finished loading up—and in some cases were on the road home—in record time!

Holding a show on a campus always poses certain challenges. The Johnson Center uses an elevated loading dock, which makes loading difficult for dealers and exhibitors. As usual during show setup on Friday night, NVMC club volunteers brought signage, electrical supplies, exhibit cases, and boxes of rocks and other equipment for the Kids' Activity Room into the building. At the same time, arriving dealers were jockeying for space to unload all their inventory and booth supplies, all of which made for a somewhat chaotic scene.

This year, GMU Events staff informed me that the ballroom was fully set up ahead of schedule, available to us a full hour early! We parlayed that extra hour into getting our dealers and club materials successfully unloaded and into the ballroom well ahead of schedule. Dealers were particularly thrilled with the time saved.



Dr. Julia Nord (left) and Beth Smith at the NVMC show in November 2024.



Dave Hennessey with one of GMU's terrific student volunteers.







Kids' Activity Room, including seating (top), tables with quizzes and puzzles (center), and Kids' Mini-Mines.

Again this year, show attendance was excellent, on a par with a superb 2023 turnout. Numerous door prizes were awarded over the weekend (with Almas Eftekhari and Jasmine Chung announcing). This year, the Silent Auction (with more items donated than in recent years) required significant preparatory work and very close supervision, resulting in a truly tremendous job performed by Jeff Guerber and Craig Moore, with crucial assistance from Jason Zeibel!

One of several donations worth mentioning was the large (heavy and well-packed) flat-rate USPS box sent by Patrick Haynes filled with fluorite and declosite specimens from New Mexico. Thanks, Patrick!

The Kids' Room was anchored and laid out largely by John Weidner, with help from Jason and Celia Zeibel. Also helping in the Kids' Room over the course of the weekend were Michelle Keeley, Germaine Broussard, Craig Moore, Jennifer Mark, Hugo Nopo, Wendy Littman, Jonathan Diesel, Jasmine Chung, and Maria Nopo. They made sure that all the kids had fun while learning a lot and adding to their collections!

Club members who helped out on Friday night included Roger Haskins, John Sanborn, Hutch Brown, Michael Palaschak, Jim Keeley, Jason Krusling, Eva Bousquet, Jonathan Diesel, and Jasmine Chung.

Many thanks to Roger Haskins, Sue Marcus, and their team of club volunteers who staffed the admissions desk over the busy weekend. And thanks to all other club members who helped out in some way this year!

Wildacres in Spring

Wildacres is a fantastic retreat located on Pompeys Knob just off the Blue Ridge Parkway about an hour north of Asheville, NC. Signing up for the May 12-18, 2025, session will give you the opportunity to take classes and hear excellent talks from the speaker-in-residence, Martin D. Fuller, a gemologist and renowned appraiser who will share his passion for gems and jewelry. You will also be able to participate in a variety of other activities.

You can register on the EFMLS Wildacres website. The speaker-in-residence and the courses listed below are firmly lined up for May.

Coming to Wildacres in May 2025 …

Cabochon Cutting (*Rick Marshall*): Learn the basics of creating a cabochon from a slab of rock! You will see a display showing each stage of the process. The class fee ($75) and material costs (up to $40) includes slabs, straight edge, super glue, marker, pen, notepad, instruction manual, polishing materials, and more. Bring an optivisor if you have it. You can bring your own slabs, plus I have slabs available for purchase.. No experience needed. 4-day class.

Chainmaille, beginner (*Jim Hird*): Learn the ancient art of chainmaille, creating fine jewelry using unsoldered links. Basic patterns will be taught using inexpensive copper rings as well as anodized aluminum and colored rubber. Printed handouts provided for all patterns. Lab fee of $20 for handouts. Project prices for base metal kits $20 or less each; total cost will depend on number of projects and type of materials you choose. Tools provided; bringing an optivisor suggested. No experience needed. 2-day class, semester 1.

Chainmaille, intermediate (*Jim Hird*): Build on the basics by doing more advanced patterns, working in more colors, or using gold-filled, argentum, and mixed-ring materials. Total cost will depend on number of projects and what materials you choose. Basic skills required. 2-day class, semester 2.

Faceting (*Bernie Emery*): Learn to cut and polish a 57-facet round brilliant quartz gemstone, how to identify well-cut stones, and select rough material. Materials fee $40. Bring optivisor or loupe. No experience needed. 4-day class.

Photography (*Michael Pabst*): Learn to photograph mineral specimens/lapidary objects at increasing levels of sophistication and magnification. Bring your favorite specimens, camera equipment, and memory sticks. Learn to fix problems using Adobe Photoshop, how to use digital cameras with detachable lenses, how to use Focus Stacking to increase depth-of-field, and how to use a digital camera attached to a stereo microscope. Push the limits of optical magnification using an automated focusing rail to take photos. Materials fee $25. 4-day class.

Metal Clay-Silver (*Susan Brooks*): Learn to use fine silver metal clay to create beautiful pieces of heirloom-quality jewelry. Learn basic skills (texturing, cutting, joining, stone setting, creating embellishments, and bail making). You will have project possibilities and techniques. Bring reading glasses or optivisor. Basic Class Kit fee $275; additional clay available for purchase. Lab fee $50. No previous experience required. 4-day class.

Silversmithing, basic (*Richard Meszler*): Learn to work silver sheet & wire to fabricate jewelry. You get a kit with metals/supplies & a step-by-step description of each project. Materials fee $100. Optivisor an Materials fee $100. Optivisor and apron recommended. d apron recommended. No experience needed. 2-day class, semester 1.

Silversmithing, intermediate (*Richard Meszler*): Learn to make a bezel setting & bail for setting a cabochon to make a pendant. You get a kit with all you need. Materials fee $100. Optivisor and apron recommended. Basic silversmithing experience, including soldering. 2-day class, semester 2.

Wirewrapping (*Jacolyn Campbell*): Use pliers/gold-filled or sterling silver wire/assorted beads or gemstones/ basic wirecraft techniques to create rings, bracelets, pendants, and earrings. All tools/materials provided.

Session I (beginner): Make an adjustable ring, 2 bracelets, pendant, 2 pairs of earrings. Estimated materials cost $100. 2-day class, semester 1.

Session II (intermediate): Make a fitted ring, 2 pairs earrings, cabochon pendant, and bracelet. Estimated materials cost $120. 2-day class, semester 2.

The Rocks Beneath Our Feet

Geology of Upper Accotink Creek

by Hutch Brown

On November 9, 2024, professional geologists Roger Haskins and Sue Marcus led an NVMC field trip in 7-acre Country Club Hills Common Park in suburban Fairfax City. We examined the metamorphic bedrock exposed by upper Accotink Creek, part of a major watershed in Fairfax County. About 20 club members and others participated (see the stories and photos in the December 2024 newsletter).

I visited the site and took photos multiple times to help plan the trip, and I used USGS materials to study the geology there. How do the bedrock exposure and alluvial rocks we saw fit into our area's geologic history?

Bedrock Characteristics

The gravel bars along Accotink Creek have lots of angular quartz in various hues (fig. 1, top). Pieces of dark metamorphic bedrock are mixed in, along with fragments of brick, concrete, and other materials from past construction. Some streambanks are lined with gray boulders called riprap to help control erosion.

Most bedrock pieces in the alluvium are greenish-gray in color, some with a silvery sheen from tiny mica crystals (fig. 1, yellow arrows). The bedrock exposed in and along the stream looks brown (fig. 1, center), but breaking it with a rock hammer shows its greenish interior (due to chlorite in the rock). The bedrock is thinly foliated (finely layered) and upturned; it readily crumbles when probed. As it weathers, the metamorphic bedrock in our area crumbles into our red clay mineral soils. Where it underlies wet soils on streambanks, the bedrock transitions into what geologists call saprolite—a reddish-brown material that looks like rock but is soft as clay and easily penetrated with a knife (fig. 1, bottom, white arrow).

Bedrock Types

The USGS geologic map for the Fairfax Quadrangle shows two adjacent bedrock types at the field trip site (fig. 2): in the upper left on the map is Peters Creek schist (**CZps**); in the lower right is part of a two-member geologic unit called the Popeshead Formation—specifically, its Old Mill Branch metasiltstone member (**Cpo**).



Figure 1—*Bedrock exposed along upper Accotink Creek. Note the mica sheen on some rocks (yellow arrows).* ***Top:*** *Greenish-gray rocks in the quartz alluvium.* ***Center:*** *Uptilted bedrock in the stream.* ***Bottom:*** *Saprolite along a streambank, with a knife blade (white arrow) stuck into it. Photos: Hutch Brown.*

[***Note:*** Peters Creek schist in Virginia and Maryland has been reclassified by geologists as the Mather Gorge Formation. Because old maps like the one for the Fairfax Quadrangle still label it as Peters Creek schist, I retain the term here to avoid confusion. The components, of course, have not changed.]

The two bedrock units are hard to tell apart on the map because they are colored in almost identical shades of brown. Figure 2 shows the jagged boundary line between them, partially traced in white, including through the field trip site (circled in white). Peters Creek schist is marked **CZps**—**C** for Cambrian and **Z** for Proterozoic, reflecting uncertainty about the age; **p** for Peters Creek, the locality in Pennsylvania where the unit was first described; and **s** for schist. Old Mill Branch metasiltstone is marked **Cpo**—**p** for Popeshead Formation and **o** for Old Mill Branch, the naming locality in Fairfax County. The white star shows the approximate location of the bedrock exposure we saw; the white arrows indicate the line of Accotink Creek, including its southward bend through the field trip site.

Geologic mapping can be imprecise, especially near boundary lines. Accordingly, the bedrock materials we saw in Country Club Hills Common Park could have been from either unit—Peters Creek or Old Mill Branch. Because Accotink Creek erodes materials and washes them downstream, we probably saw rocks from both units on gravel bars. I will therefore describe both based on my USGS sources (Drake 1986; Drake and Lyttle 1981), starting with Old Mill Branch metasiltstone.

Siltstone is a sedimentary rock made up mainly of silt—soil particles that are finer than sand but coarser than clay. In addition to metamorphosed siltstone, the Old Mill Branch unit (**Cpo**) contains lesser amounts of metamorphosed shale (phyllite) and metamorphosed volcanic tuff (metatuff). All three components (metasiltstone, phyllite, and metatuff) are reportedly fine-grained, greenish-gray, and micaceous, with a phyllitic (thinly foliated) cleavage. Accordingly, all three can be hard to tell apart in the field. The bedrock pieces we saw in the alluvium could have been any (or all) of the three.

Shale, made up mostly of clays, undergoes grades of metamorphism ranging from slate to phyllite, schist, and gneiss. The Peters Creek unit (**CZps**) reportedly contains not only schist but also lesser amounts of mica-rich gneiss. The schist ranges from fine to coarse



Figure 2—*Detail from the USGS geologic map for the Fairfax Quadrangle showing the field trip site (circled in white) and the bedrock exposure we visited (white star). The white line traces part of the boundary line between Peters Creek schist (***CZps***) and Old Mill Branch metasiltstone (***Cpo***). White arrows show the line of Accotink Creek. Yellow = alluvium; thick black line = Rt. 50; angled black lines = bedrock folds; black structure = Fairfax High School. Source: Drake (1986); markings in yellow/white by Hutch Brown.*

in texture and from greenish-gray to gray in color, and it weathers to a reddish-brown. Gneiss is characterized by bands of light and dark minerals separated out by high heat and pressure during metamorphism. Mica is reportedly visible to the naked eye in both the schist and the gneiss.

Overall, the similarities in greenish-gray color, reddish-brown weathering, phyllitic cleavage, and mica sheen or sparkle can make the rocks of both units hard to tell apart and difficult or impossible to identify with certainty in the field.

However, we probably saw metasiltstone based on its reported prevalence within the Old Mill Branch unit. The multicolored bands we saw in some fine-grained rocks on gravel bars might have been siltstone bedding preserved in the metamorphosed rock (fig. 3, top). We also saw lots of thinly foliated greenish-gray rocks in the alluvium, some with the mica sheen typical of both schist and phyllite. Some pieces contained tiny crystals of black magnetite or reddish garnet (fig. 3, bottom).



Figure 3—*Metamorphic rocks along upper Accotink Creek.* ***Top:*** *The multicolored banding in the elongated rock might be bedding in a parent siltstone.* ***Bottom:*** *Thinly foliated gray and greenish-gray rocks, possibly phyllite or schist. The smaller piece contains tiny crystals of magnetite (yellow arrow). Photos: Hutch Brown.*



Figure 4—*Metamorphic rocks along upper Accotink Creek.* ***Top:*** *A coarse-grained rock cracked open with a rock hammer shows distinct areas of light and dark minerals (yellow arrows), suggesting gneiss.* ***Bottom:*** *The thinly foliated upturned bedding in the bedrock exposure at the field trip site is probably metasiltstone but possibly phyllite or schist. Photos: Hutch Brown.*

In addition, we saw a coarse-grained greenish rock with distinct areas of light and dark minerals (fig. 4, top), possibly gneiss. The weathered brown bedrock exposure in and along the creek (fig. 4, bottom), with its thin foliation, was probably metasiltstone (based on its location on the geologic map) but could have been phyllite or schist (based on its cleavage). The upturned bedrock reflects the tight folds (closely spaced angled lines) shown on the map in figure 2. In effect, the bedrock is like a flat rug that was pushed by mountain-building events into tight folds.

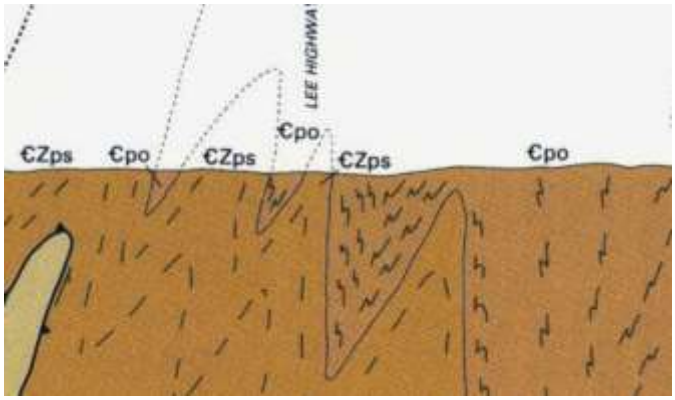


Figure 5—*Detail from the USGS geologic map for the Fairfax Quadrangle showing bedrock relationships in cross-section. Old Mill Branch metasiltstone (**Cpo**) overlies Peters Creek schist (**CZps**), forming synclines of metasiltstone that alternate with anticlines of schist. (Light brown is the Sykesville Formation.) Source: Drake (1986).*

Figure 5 shows the relationships in cross-section. The folds follow the bedrock types, with synclines (downfolds) of the overlying Old Mill Branch metasiltstone alternating with anticlines (upfolds) of the underlying Peters Creek schist. The fold patterns reflect tremendous heat and pressure generated by tectonic forces during mountain-building events (what geologists call orogenies). The parent rocks, whether siltstone, shale, or tuff, were relatively flat. Mountain building folded and faulted them while also metamorphosing them into the Piedmont rocks we see today.

Peters Creek schist (**CZps**), possibly Proterozoic (**Z**) in age, is much older than the overlying Old Mill Branch metasiltstone (**Cpo**) and has a more complex geologic history. The Old Mill Branch unit reportedly underwent metamorphism only once, whereas the Peters Creek unit underwent multiple metamorphic events—hence the schist and gneiss it contains, which are at higher grades of metamorphism than metasiltstone or phyllite. According to the geologic map for the Fairfax Quadrangle, the Peters Creek rock is partly at the staurolite-andalusite grade of metamorphism, the highest for the area. By contrast, the Old Mill Branch rock is at the area's lowest grade, biotite.

The discrepancies in age and complexity between the two rock layers are because layers between them are missing; geologists call that kind of break in the geologic record an unconformity. Unconformities are typically caused by erosion.

What caused the metamorphism?

Plate Tectonics

Bentley (2020) provides an excellent tutorial on plate tectonics, a theory that coalesced in the 1960s-70s from notions about continental drift and seafloor spread. Plate tectonics has had unprecedented explanatory power for all kinds of geologic events and phenomena. It has therefore become what Bentley (2020) calls "***the*** key idea in modern geology."

The term comes from Latin *tectonicus*, "pertaining to building." Plate tectonics is the theory that Earth's lithosphere (rocky crust) comprises "plates," the building blocks of our oceans and continents. Driven by convection currents in the asthenosphere (the viscous magma underlying the lithosphere), the plates collide at their margins, with some plates subducting (sliding) under others and melting into the asthenosphere. In the process, continents expand through accretion—or break apart, forming new oceans.

Over time, scientists have pieced together the geologic history of our area based on the theory of plate tectonics and evidence found in the rocks. However, the story is still evolving as new discoveries are made and new insights gained. As one source puts it, "Tectonic models are akin to Norse myths" (Hibbard and others 2016): they have explanatory power but might not exactly or entirely reflect reality.

Taconian Orogeny

One tectonic model for the Piedmont, based on Bentley (2020) and Fichter and Baedke (1999), begins more than half a billion years ago with the continent Laurentia (proto-North America) bordering the ancient Iapetus Ocean. Driven by convection currents, an oceanic microplate was approaching Laurentia while forming volcanic islands (fig. 6, top left), much like the Mariana Islands in the Pacific Ocean today.

The Laurentian plate subducted under the approaching microplate, melting into the asthenosphere (fig. 6, top left). Magma rose and erupted on the ocean floor, forming an arc (curved line) of volcanic islands in the microplate. A deep-sea trench took shape at the edge of the subducting plate, much like the Mariana Trench in the Pacific today. The trench gradually filled with accreted sediments scraped up from the seafloor.

In the course of the collision, a depression (called a foreland basin) formed in the buckling continental rock (fig. 6, top right). Another depression (a forearc basin) formed behind the trench (fig. 6, bottom right),

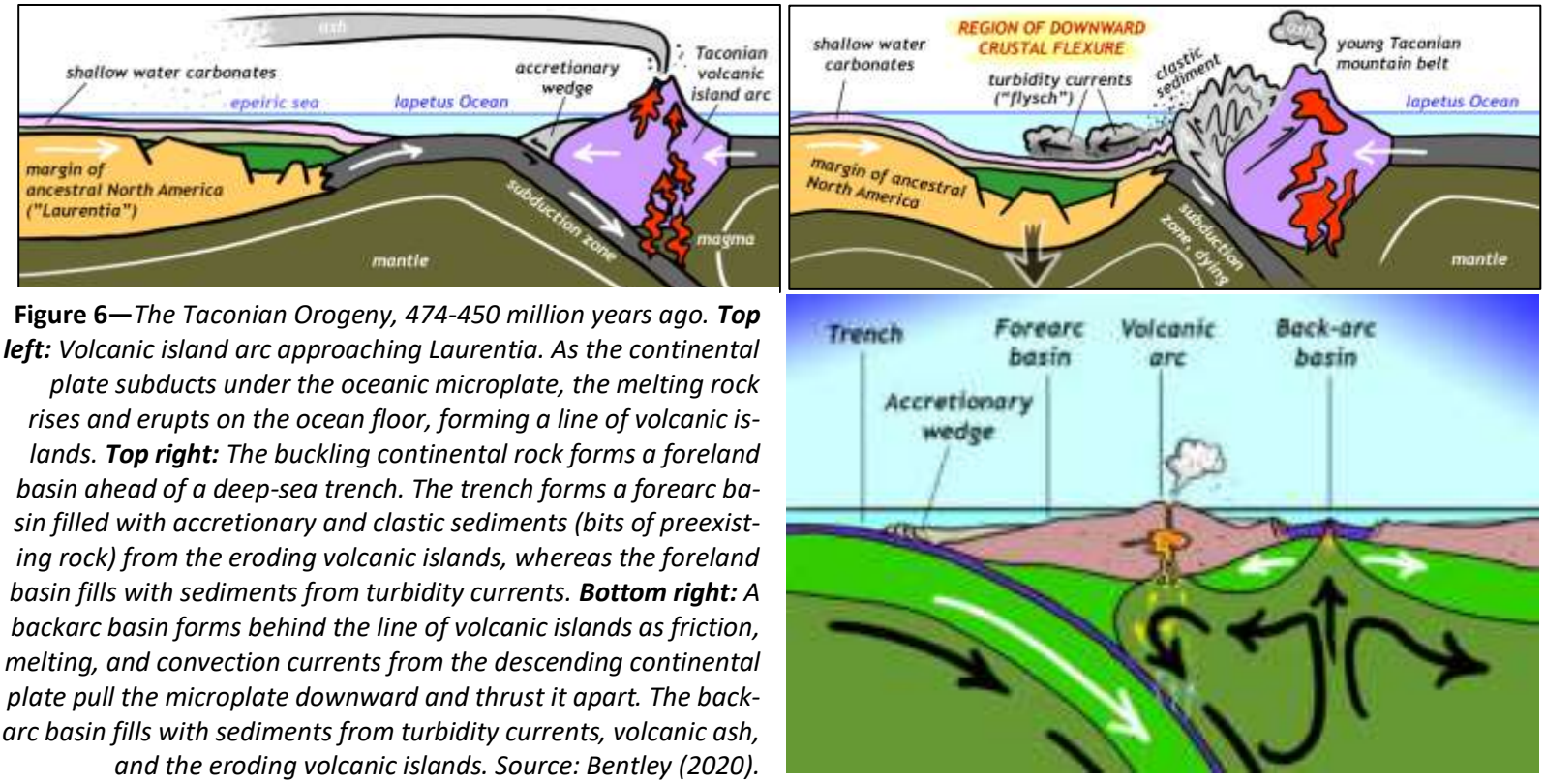


Figure 6—*The Taconian Orogeny, 474-450 million years ago.* ***Top left:*** *Volcanic island arc approaching Laurentia. As the continental plate subducts under the oceanic microplate, the melting rock rises and erupts on the ocean floor, forming a line of volcanic islands.* ***Top right:*** *The buckling continental rock forms a foreland basin ahead of a deep-sea trench. The trench forms a forearc basin filled with accretionary and clastic sediments (bits of preexisting rock) from the eroding volcanic islands, whereas the foreland basin fills with sediments from turbidity currents.* ***Bottom right:*** *A backarc basin forms behind the line of volcanic islands as friction, melting, and convection currents from the descending continental plate pull the microplate downward and thrust it apart. The backarc basin fills with sediments from turbidity currents, volcanic ash, and the eroding volcanic islands. Source: Bentley (2020).*

and a third depression (a backarc basin) formed behind the volcanic islands (fig. 6, bottom right). The three basins filled with sediments from volcanic ash, from turbidity currents (caused by undersea landslides associated with volcanic eruptions), and from the eroding volcanic islands themselves.

As the clays, silts, and other sediments thickened in the basins, they hardened into sedimentary rocks like shale and siltstone; the volcanic ash became tuff. Both units at our field trip site (Old Mill Branch and Peters Creek) originated mainly from what geologists call turbidites—from sediments emplaced by turbidity currents caused by submarine landslides (fig. 6, top right).

The advancing microplate—known to geologists as the Taconian (or Taconic) Terrane—finally slid up onto the Laurentian plate in a great mountain-building event called the Taconian (or Taconic) Orogeny (fig. 7). During the orogeny, the Taconian basin rocks, along with the volcanic island rocks, were pushed up into mountains on the continental margin. The tremendous heat and pressure generated by mountain building metamorphosed the underlying sedimentary rock into slate, phyllite, metagraywacke, and other Piedmont rock types, including the Peters Creek schist and Old Mill Branch metasiltstone of upper Accotink Creek.

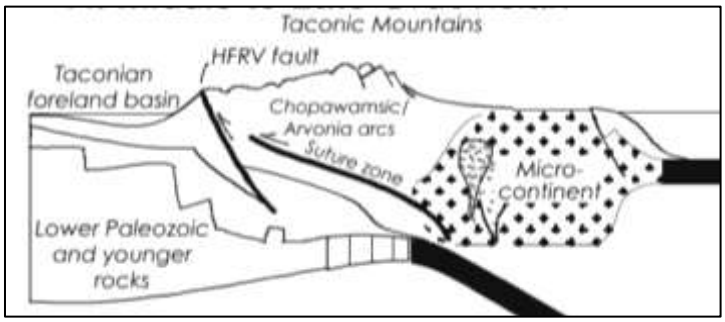


Figure 7—*Our area about 450 million years ago, dominated by the Taconian Mountains following the Taconian Orogeny. The microplate is firmly attached to the continental margin. The foreland basin has shallow seas gradually filling in as the Taconian Mountains erode. (HFRV fault = Haysville-Fries-Rockfish Valley Fault.) Source: Fichter and Baedke (1999).*

Scientists have estimated the timing of the Taconian Orogeny by using special tools and techniques to determine the metamorphic and (for igneous rock like granite) isotopic ages of the rocks involved. They concluded that Taconian mountain building occurred over a period of about 25 million years (about 474-450 million years ago) during the Ordovician Period (which occurred about 485-444 million years ago).

Tectonic Aftermath

Even the highest mountains weather away in a few tens of millions of years: by about 420 million years ago, the Taconian Mountains were gone (fig. 8, top). However, the Taconian roots remained attached to the continental plate, forming the metamorphic bedrock for today's Piedmont Province.

Other tectonic events followed, culminating in the great Alleghanian Orogeny (fig. 8, bottom), when proto-Africa collided with proto-North America beginning about 320 million years ago to help form the supercontinent Pangaea. Under renewed heat and pressure, many Piedmont rocks underwent further fracturing, folding, faulting, and partial melting. In the process, the Alleghanian Orogeny broke parts of the underlying bedrock free and moved them dozens of miles inland on great thrust faults. That's why so many Piedmont rock formations are upturned along thrust faults. Near the field trip site, for example, the underlying Sykesville Formation emerges on the Plummers Island Thrust Fault next to the overlying Peters Creek schist.

Pangaea began to break up about 230 million years ago as proto-Africa pulled away from proto-North America, forming a widening Atlantic Ocean. A long period of relative tectonic calm followed in our area. Erosion eventually transformed the landscapes into flat and featureless plains drained by braided rivers, precursors of the Potomac.



Figure 9—*Accotink Creek below Spring Lake Terrace upstream from Country Club Hills Common Park. The deeply incised stream, having lost connectivity with its floodplain (visible in the background), is eroding its streambanks. Source: City of Fairfax (2007).*

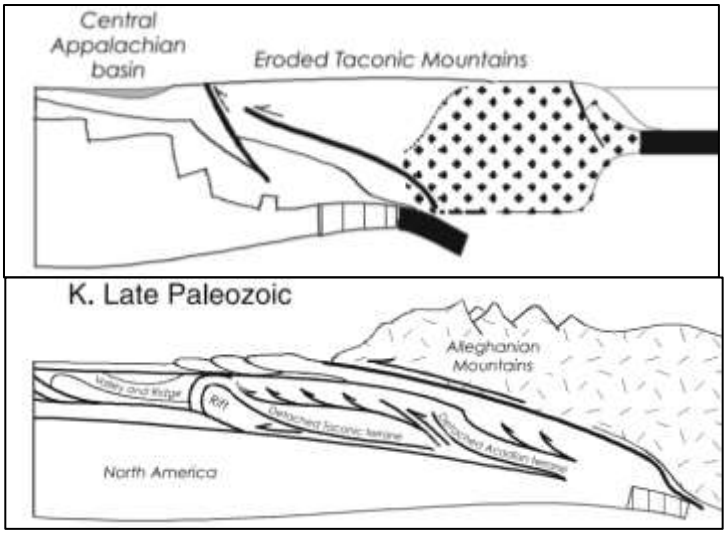


Figure 8—***Top:*** *Our area about 420 million years ago, following erosion of the Taconian Mountains ("Eroded Taconic Mountains" is where mountains once stood).* ***Bottom:*** *Our area about 300 million years ago during the Alleghanian Orogeny. Source: Fichter and Baedke (1999).*

About 5 million years ago, gentle uplift began again in our area from the Allegheny Plateau to the Piedmont. In response to the steepening gradient, the Potomac River and its tributaries, including Accotink Creek, shaped new watersheds. Some rivers and creeks carved deep valleys (such as Mather Gorge on the Potomac).

Upper Accotink Creek drains its own gently sloping valley (fig. 9), but development has paved so much of the watershed that floodwaters have eroded the creek down to the bedrock. Paving prevents soils from absorbing precipitation, so stormwaters flood streams and erode their beds. Eroded streambanks now block connectivity with the Accotink floodplain (fig. 9), so the creek is in the process of collapsing its streambanks while building up gravel bars inside bends. Over time—riprap permitting—a new and lower floodplain will emerge, with the remains of the old floodplain forming terraces at its outer edges.

Quartz Alluvium

Like Peters Creek schist, Old Mill Branch metasiltstone is rich in quartz; both rock types also contain muscovite and biotite mica, plagioclase feldspar, chlorite (giving the rock its greenish tinge), and more. Quartz has a relatively low melting point, and some metamorphic rocks in the Accotink alluvium display white quartz veins (fig. 10, arrows). During metamorphism (under intense heat and pressure), the quartz



Figure 10—*Greenish-gray metamorphic rocks in the Accotink Creek alluvium, showing reddish-brown weathering and white veinlets of segregation quartz (arrows) in the rocks with phyllitic cleavage. Note the prevalence of angular quartz in the alluvium. Photos: Hutch Brown.*



Figure 11—*Accotink Creek alluvium with an exposure of brown metamorphic bedrock. Pieces of greenish-gray metamorphic rock litter the alluvium, which is dominated by angular quartz ranging in size from pebbles to a small orange boulder. Photo: Hutch Brown.*

melted out of the parent rock and filled crevices in the emerging metamorphic rock; the process is called lateral secretion, and the result is known as segregation quartz. Segregation quartz ranges from tiny veinlets to huge lenses in our area's metamorphic rock.

The size of some of the quartz specimens we found (fig. 11) suggests large quartz veins or lenses somewhere upstream or uphill in the bedrock; however, we found no large quartz intrusions in the bedrock exposure we saw. Although the metamorphic rock in our area contains lots of quartz in its mineral makeup, thick quartz veins and lenses can be hard to find.

That raises a question: If large quartz intrusions are not all that obvious in our area, then why does quartz ranging in size up to boulders—proof of massive quartz embedded in the bedrock—make up so much of the alluvium in Accotink Creek? Angular quartz fragments in various hues and sizes plainly dominate the alluvium in Accotink Creek (figs. 10, 11).

Development has probably buried some quartz outcrops under urban soils; moreover, the metamorphic bedrock is much more prone to weathering than quartz. The bedrock is a mineral composite that readily breaks down, whereas quartz is a single mineral (silicon dioxide) with a hardness of 7 of 10 on the Mohs scale. Quartz is highly resistant to breakage and erosion, so it weathers relatively slowly. That's why quartz dominates the gravel bars of most if not all of the rivers and streams in our area.

Typical Piedmont Geology

What we saw along upper Accotink Creek is typical of the metamorphic bedrock across the Piedmont. The upper Accotink bedrock (whether schist, metasiltstone, phyllite, metatuff, or gneiss) originated from ancient sedimentary rock and volcanic tuff under extreme heat and pressure, proof of a major tectonic event. The bedrock is now weathering into mineral soils; the alluvium is therefore mainly quartz, with segregation quartz appearing in some of the metamorphic rocks, again reflecting the tremendous heat and pressure associated with mountain building. Overall, the tectonic model of the Taconian Orogeny explains much of what we see in our area today.

Acknowledgments

Thanks to Field Trip Co-Chairs Katy and Mickey Johnson for planning and arranging the field trip and to Roger Haskins and Sue Marcus for leading the trip. Thanks also to Roger and Sue for visiting the field trip site with me beforehand and explaining some of what we saw, including the difficulty of identifying the metamorphic bedrock and pieces in the alluvium with any certainty.

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What's in a Name: Why Taconian and Not Taconic Orogeny?

The terms geologists use should be clear enough to avoid any confusion.

Geologists have long called the mountain-building event that took place in our area about 474-450 million years ago the Taconic Orogeny, named for the Taconic Mountains of upstate New York, where research on the orogeny was first done.

Bentley (2020) argues that the name is misleading on several counts. New York's Taconic Mountains are what he calls a "piddly" range about 12 miles long and no more than 1,300 feet high. By contrast, the ancient mountain range stretched from Canada to Alabama, and it rivaled the Alps in height, with peaks more than 13,000 feet high.

Moreover, the ancient mountains are gone, whereas you can visit the Taconic Mountains today—so they are not the same thing. The ancient Taconian Mountains stemmed from an oceanic microplate, the Taconian Terrane, that slammed into proto-North America in a tectonic event lasting tens of millions of years. After the great mountains weathered away, the roots remained attached to our continent, forming much of the rock for an entire geologic province a thousand miles long, the Piedmont. The Taconic Mountains pale into insignificance by comparison.

Although most geologists still refer to the Taconic Orogeny, it would avoid any confusion to draw a clear distinction between the ancient event and today's Taconic Mountains. That's why Bentley (2020) urges geologists to call the ancient mountain-building event the Taconian Orogeny.

The Rocks Beneath Our Feet

Grades of Metamorphism

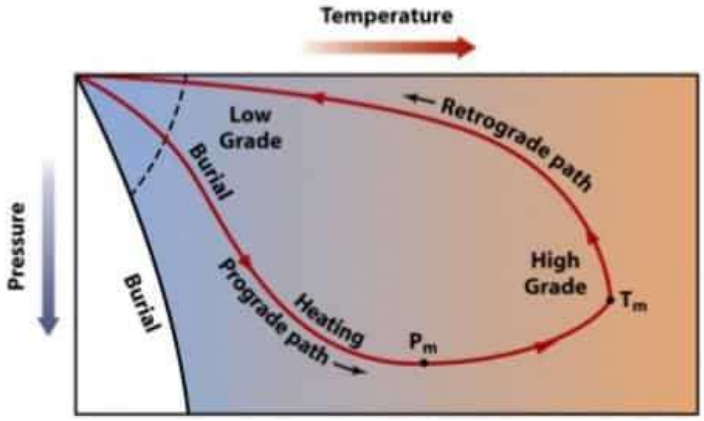
by Hutch Brown

The Piedmont in our area is dominated by a bedrock type called metamorphic. Derived from the Greek prefix *meta-*, "trans-," and the noun *morphē*, "form," the term "metamorphism" means changes to the composition or structure of a rock through heat and pressure generated by tectonic events, often orogenies (what geologists call mountain-building events).

In an orogeny, heat and pressure rise with growing friction and burial underground, and rocks subject to both can undergo multiple stages of metamorphism. For example, shale (a sedimentary rock) first becomes slate; if the heat and pressure keep rising, then slate becomes phyllite, then schist, and finally gneiss. Geologists call this progression through successive metamorphic stages "prograde" metamorphism.

The reverse can also happen: the underground environment can cool and lose depth and pressure as mountain building ends and erosion proceeds. Under such conditions, metamorphic rocks can undergo "retrograde" metamorphism, with further changes in their structure and chemistry. Phyllonite, common in some of the Potomac bedrock downstream from Great Falls, is an example of retrograde metamorphism (from migmatite to mylonite and then phyllonite—see the sidebar).

The diagram below (by Hamed-Geo, Metamorphic Rocks) represents the path from low-grade metamorphism (such as for slate) through prograde metamorphism at maximum pressure (**Pm**) to high-grade metamorphism at maximum temperature (**Tm**), then back through retrograde metamorphism (such as for phyllonite) as temperatures and pressures fall.



Mather Gorge Phyllonite

Peters Creek schist was reclassified by geologists as the Mather Gorge Formation with the release of the geologic map for the Falls Church Quadrangle (Drake and Froehlich 1997). The formation's phyllonite component, marked on the map as **CZmp** (**p** for phyllonite, pronounced *fill*-uh-nite), spans much of the area along the Potomac River downstream from Mather Gorge.

Mather Gorge phyllonite underwent multiple metamorphic events. It started as a coarse-grained metamorphic rock, then was partially melted by tectonic forces, recrystallizing as migmatite (a composite rock with gneiss-like bands and igneous melt zones) during prograde metamorphism. Then the rock underwent shearing and recrystallization as mylonite (a fine-grained banded rock) before transitioning to phyllonite during retrograde metamorphism.

Resembling phyllite, Mather Gorge phyllonite is described as "fine-grained, lustrous, greenish-gray … [and] characterized by pods and knots of quartz that stand out on weathered surfaces." In the specimen shown below (broken off with a rock hammer near Scotts Run), you can see a phyllitic (thinly foliated) cleavage showing white quartz, green chlorite, and black biotite (mica). You can also see quartz pods on the weathered phyllonite backdrop.

Source

Drake, Jr., A.A.; Froehlich, A.J. 1997. Geologic map of the Falls Church Quadrangle, Fairfax and Arlington Counties and the City of Falls Church, Virginia, and Montgomery County, Maryland. GQ 1734. Reston, VA: U.S. Geological Survey.



January 2025—Upcoming Meetings/Shows in Our Area (see details below)

Sun	Mon	Tue	Wed	Thu	Fri	Sat
			1 New Year's Day	2	3	4
5	6 NVMC mtg	7	8 MSDC mtg	9	10	11
12	13 GLMSMC mtg	14	15	16	17	18
19	20 MLK Day	21	22	23	24	25
26	27 MNCA mtg	28	29	30	31	

Event Details

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

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

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

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

No shows in our area this month.

The Northern Virginia Mineral Club, Inc.

Visitors are always welcome at our club meetings!

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

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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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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