THE NORTHERN VIRGINIA MINERAL CLUB INC

The Mineral Newsletter

Next meeting: May 5 Time: 7:30 p.m. (doors open at 7 p.m.)

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



Ettringite on oyelite

N'Chwaning Mine, Kalahari Manganese Fields, South Africa

Source: Wikimedia Commons. *Photo: Rob Lavinsky.*

Deadline for Submissions

May 20

Please make your submission by the 20th of the month! Submissions received later might go into a later newsletter.

Volume 65, No. 5
May 2025
Explore our website!

May Meeting Program:

Recent Smithsonian Acquisitions

Details on page 9

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Mineral of the Month
Ettringite

by Sue Marcus

We will explore ettringite as May's Mineral of the Month. It is attractive and unusual (though not rare), and it's sometimes difficult to identify correctly.

Name and Type Locality

The German mineralogist Johannes Lehmann described and named ettringite in a letter he sent to Professor Gerhard vom Rath, who published the letter in a "yearbook" on minerals, geology, and paleontology in 1874. Derived from limestone inclusions in the local basalt, ettringite was named for its type locality, the German town of Ettringen in the Mayen-Koblenz District of the Rhineland-Palatinate in Germany.

An unrelated publication on an ettringite locality in Northern Ireland identifies an ettringite specimen from Lehmann's collection (in the British Museum as of 1936) as coming from "Winfeld stream, Ettringer-Bellerberg." Because the Bellerberg ("Beller Mountain") near Ettringen is an ancient volcanic crater, "Winfeld stream" could refer to a stream of lava rather than water. The specimen's matrix contains cavities of what was determined to be ettringite "coated with an opaque substance," which is probably an indication of dehydrated ettringite. Since Lehmann apparently used this specimen for his original analysis, it could be a type specimen.

Other names for ettringite include chalkomorphite/chalcomorphite (Rath's original name for the mineral); Candelot or Candlot salt (in French); cement bacillus (in the cement industry); and woodfordite (a name incorrectly given to a new mineral later identified as ettringite).

Geologic Setting/Mineralogical Complexity

I did not find any references that specifically describe the formation of ettringite. From the geologic environments where it occurs, it seems that igneous processes mobilized manganese- or iron-rich rocks. Yet the chemical formula for ettringite ($Ca_6Al_2(SO_4)_3(OH)_{12} \cdot 26H_2O$) does not include either metal.

Presumably, ettringite forms from the residue of hydrothermal fluids that deposit other minerals, including those with metals. At some localities, volcanic rocks and limestone are noted. At others, rocks con-

Happy Memorial Day!

Northern Virginia Mineral Club members,

Our next club meeting will be on May 5, 7:30 p.m., in person at our usual meeting place, the Dunn Loring Fire Station in Fairfax. We will join our speaker, Dr. Mike Wise, for dinner beforehand 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.



Ettringite, Casper Quarry, Ettringen, Mayen-Koblenz District, Germany. Source: Mindat; photo: Stephan Wolfsried.

taining iron and manganese were altered by orogenic (mountain-building) activities. A unique form of natural ettringite formation is described below in the section on Israel.

Identifying ettringite can be difficult or impossible without specialized analytical equipment like a mass spectrometer. Ettringite is a hydrous calcium aluminum sulfate ($Ca_6Al_2(SO_4)_3(OH)_{12} \cdot 26H_2O$), so identifying it with certainty is difficult. Ettringite is officially classified as part of an entire ettringite group with 17 members (see Mindat), some of which contain boron, silicon, manganese, and other elements or varying amounts of H_2O. These minerals do *not* form a solid solution series because they are not miscible—that is, they cannot form a homogeneous solution. The minerals most commonly mistaken for ettringite are charlesite ($Ca_6(Al,Si)_2(SO_4)_2[B(OH)_4](OH,O)_{12} \cdot 26H_2O$) and sturmanite ($Ca_6Fe^{3+}{}_2(SO_4)_{2.5}[B(OH)_4](OH)_{12} \cdot 25H_2O$), although thaumasite and others might also be called ettringite. Some authors suggest putting the name in quotes for specimens purchased as ettringite.

Ettringite is unusual because it can be anthropogenic—that is, caused by human activities. In the locality descriptions below, I have tried to include only natural occurrences; however, unless there is a significant description of the site, it can be difficult to tell. I arbitrarily decided not to include any localities that are known slag sites.

Localities

United States. Ettringite occurs in the United States but is scarce; only microcrystals have been reported. Single specimens were found near Pleasant Hill in Lebanon County, PA, and possibly from the Parker Shaft of the Franklin Mine in Franklin, NJ. No specimen was analyzed, so the reports should be considered as unconfirmed. The person who posted an image of the Franklin specimen on Mindat noted that it is probably charlesite, which has a similar chemical formula but contains boron.

The most prolific U.S. ettringite locality was near Riverside, CA. The Crestmore quarries were a source of limestone (primarily) and granodiorite (secondarily) for Portland cement. The granodiorite intrusion cooked the surrounding limestone when it was emplaced. The result of the heat, pressure, and fluids mobilized in the limestone created a skarn—and a happy place for mineral collectors. My husband and I were lucky enough to collect in a large main quarry when we lived nearby. At least nine new minerals were described from the locality.



Ettringite, Commercial Quarry, Crestmore Quarries, Riverside County, CA. Source: Mindat; photo: Douglas Merson.

Ettringite was also found at Crestmore. It took an odd form, with ettringite crystals altering to a chalky mixture of calcite and gypsum. The material was described as woodfordite in 1958 and 1960 in papers by J. Mudoch and R. Chalmers in a bulletin of the Geological Society of America and in *American Mineralogist*, although the name was apparently later discredited. All Crestmore specimens are microcrystals. The quarries closed in 2015, with part of the pit now flooded and buildings constructed on the property.

England. At the Milltown Quarry in Derbyshire, collectors in the early 1980s found attractive sprays of microscopic ettringite crystals. These were unusual specimens because ettringite is uncommon. Many of the sprays were composed of tiny crystals that were tapering and curved.

Northern Ireland. Ettringite microcrystals up to 1 centimeter (0.4 in) in size were found on a specimen at Scawt Hill. The crystals were identified as ettringite by 1931, with the material analyzed and confirmed to be ettringite by 1935. The matrix of the specimen was reported to have come from a contact zone between limestone and dolerite (usually known as diorite in American usage). The minerals associated with ettringite, such as afwillite and portlandite, are similar to those from other localities.



Ettringite, Caspar Quarry, Ettringen, Mayen-Koblenz District, Rhineland-Palatinate, Germany. Source: Mindat; photo: Stephan Wolfsried.

France. Ettringite was found at an abandoned quarry near Boisséjour in Auvergne-Rhône-Alpes, France. The white coatings on metamorphosed sediments are unattractive—until a micromounter puts them under a scope. Then, the microscopic tufts of white or colorless acicular ettringite pop into focus, looking like lovely prickly cotton balls.

Germany. Although ettringite was first described from two localities in the Mayen-Koblenz District of Germany's Rhineland-Palatinate, I could not find any images of ettringite from either place, nor were there any specific locality descriptions. Lehmann, the person who described the new mineral from these places, refers to "fine little needles with a silky sheen." A white silky fibrous type of ettringite occurs at other German localities; ettringite also forms in German slag. Lehmann does not mention the color of his material.

Puffy white sprays of ettringite have been found at the famous Clara Mine near Oberwolfach. The acicular crystals are colorless when highly magnified. Specimens from this locality have been analyzed and proved to be ettringite. All known specimens from this locality are probably most interesting to micromounters.

At the Caspar Quarry near the Ettringen type locality, most ettringite specimens are opaque white to transparent colorless crystals. Crystals grew to at least 0.5 centimeters (0.2 in) in size, and specimens up to 2.5 centimeters (~1 in) in size were extracted.

The Eifel volcanics have produced microscopic crystals of ettringite, often associated with phillipsite. No locality has been very prolific, and all ettringite crystals are colorless or white and microscopic.

Israel. Two specimens I found online are identified as ettringite from the Negev Desert in southern Israel. One is a matrix specimen with afwillite; the other is a close-up photo, so I couldn't tell whether it is of the same sample. The specimen (or specimens) from Israel are reportedly from the Hatrurim Formation, which includes areas of natural Portland cement. Elsewhere in the world, ettringite formed naturally through the alteration of metamorphic rock by hydrothermal processes. By contrast, the mineral in the Hatrurim Formation is believed to have formed when hydrocarbons were heated through natural processes, analogous to the heating process used to make Portland cement.

Palestine. Yellow microscopic crystals of ettringite were found on the West Bank in Palestine. One Mindat photo showed a crust of these crystals on matrix, forming a specimen 3.7 centimeters (1.5 in) long.

South Africa. The South African Kalahari Manganese Fields are the source of the world's finest ettringite specimens, particularly for collectors of macroscopic crystals. All three of the N'Chwaning



Ettringite on manganite, N'Chwaning II Mine, North Cape, South Africa. Source: Mindat; photo: Rob Lavinsky.



Ettringite, N'Chwaning Mines, North Cape, South Africa. Source: Mindat; photo: Rudolph Watzl.



Ettringite, N'Chwaning Mines, North Cape, South Africa. Source: Mindat; photo: Nadya Georgieva.

mines and the nearby Wessels Mine have produced superb examples of this mineral. Crystals are usually bright yellow, although they can range from pale through dark yellow and from (rarely) transparent through opaque. Opaque white crystals have been labeled ettringite but might have dehydrated.

Mining started at N'Chwaning I Mine in 1972, with the first eye-catching ettringite specimens coming to market soon thereafter. N'Chwaning II was opened in 1981, with N'Chwaning III following in 2006. Mining was suspended at the Wessels Mine in January 2025 due to falling manganese prices.

The Wessels Mine is another large manganese producer in the Kalahari Manganese Fields that is a source of beautiful ettringite crystals. Plates of lemon-yellow ettringite without matrix are one form of Wessels ettringite. Others include paler transparent (gemmy) crystals on matrix. Colors of specimens posted on Mindat include honey orange-brown and greenish yellow.

The primary economic production from these mines is for manganese, of which South Africa is the world's largest producer. Hausmannite is the primary ore mineral, with lesser amounts of braunite, jacobsite, and kutnohorite. Although these minerals are uncommon, they are more abundant in the overall N'Chwaning deposit than anywhere else. Ettringite, when recovered, is valued by mineral collectors, but it is not an ore mineral.

The deposit is hosted in sediments laid down more than 2 billion years ago. Mineralization occurred about 1.2-1.0 billion years ago when geologic forces related to plate tectonics metamorphosed the host rocks. Alkaline hydrothermal fluids removed silica and carbonate minerals, concentrating manganese and forming a wealth of unusual minerals that interest collectors. Faulting helped channel the fluids. Ettringite formed late in the mineralizing process when fluid temperatures were still high.

Ettringite from the Kalahari Manganese Fields can be simple or complex. A simple specimen can have transparent yellow crystals. More complex crystals, often single crystals, can be zoned, either vertically (from the inside out) or horizontally (looking like one crystal with stacked layers). Complex crystals can be ettringite and sturmanite (see the lower left photo on the next page) or some combination of ettringite, sturmanite, charlesite, thaumasite, jouravskite, and other minerals. Only analysis can differentiate among these mineral species, and the analysis must be done carefully because different parts of the same crystal can be different minerals. That's why authorities like Dr. Bruce Caincross, who has studied this issue, have





Ettringite, Hotazel, North Cape, South Africa. Source: Mindat; photos: Matteo Chinellato.

recommended that collectors call their specimens "ettringite" (in quotation marks).

Ettringite crystals from the N'Chwaning and Wessels Mines can be stunning. Crystals range from lustrous, gemmy transparent pale yellow through opaque yellow to honey orange and opaque white. Short hexagonal or pseudohexagonal crystals that seem to be all termination and no prism faces are attractive; so are robust elongated, sometimes doubly terminated ones.



Ettringite, Wessels Mine, North Cape, South Africa. Source: Mindat; photo: Matteo Chinellato.

Rare specimens have yellow ettringite included in colorless gypsum (selenite).

Individual crystals grew to at least 8 centimeters (3.2 in) and up to 12 centimeters (4.5 in) in size for zoned crystals of sturmanite and ettringite (Gutzmer, pers. comm.). Matrix specimens up to 19 centimeters (7.5 in) in size have been reported. Associated minerals include hausmannite, calcite, andradite, manganite, gaudefroyite, oyelite, and bultfonteinite.

Ettringite formed relatively late in the paragenetic sequence—that is, in the sequence of mineral formation in a particular geologic setting. Evidence for this incudes ettringite on other minerals, such as oyelite or hematite. Evidence is also adduced in the extensive study of the paragenesis of the manganese deposits of this region by Gutzmer and Beukes (1996).

Other Localities. Mindat localities for Austria and Belgium could be slag sites and are therefore not discussed here. All ettringite specimens for these countries posted on Mindat are microcrystals.

Ettringite has also been reported from Japan, Russia, and Arizona (United States). However, the only mentions of ettringite from these localities were on lists of occurrences that I could not confirm.

Economic Uses

Natural ettringite does not occur in sufficient quantities to make extraction economic. However, synthetic ettringite is useful in various ways. Portland cement is commonly used for concrete, mortar, stucco, and some types of grout. Ettringite forms at an intermediate stage of dehydration and hardening of the finished material. The formation of ettringite in Portland cement products needs to be controlled: if ettringite catalyzes dehydration *after* hardening, the finished product can corrode or crack.

Additionally, synthetic ettringite can be used as a coating and whitening agent for paper, as white gloss for ceramics, and as a mineral filler. The chemical properties of ettringite make it potentially useful for neutralizing toxic metals. Like some zeolites, ettringite can be useful as a synthetic material without being useful as a natural material (except to collectors, of course).

Gems

The softness (low hardness value) of ettringite make it unsuitable as a wearable gemstone. Moreover, transparent crystals of a facetable size are rare. A 2.5-carat faceted stone from South Africa was reported by Joel Arem, who noted that it might be the largest cut ettringite in existence.

A 9.05-carat stone was offered on Etsy for $575, but prospective buyers should use caution. The specimen appears to have a massive, opaque yellow ettringite in white, gray, and black matrix. The source of the stone is given as New Jersey; ettringite can occur in the area of Franklin, NJ, but the known specimens have not been analyzed and may be charlesite. In any case, this large stone is not pure ettringite, nor is the ettringite in it transparent or translucent. The website also said that the shop is "taking a short break."

Prices

Ettringite isn't common, so most dealers won't have specimens available—but if you're interested, you can find them. (Prices were found during online searches on April 15, 2025.)

Ettringite micromounts from Germany cost about $28 and up, plus shipping. I don't know how micromounters would be able to determine whether the tiny crystals are natural or from slag. Larger specimens on matrix from Germany were priced at about $106.



Ettringite, N'Chwaning II Mine, North Cape, South Africa. Source: Mindat; photo: Tama Higuchi.

At the low end of ettringite prices, a small ettringite crystal included in gypsum was offered on eBay auction for $1, plus $11 for shipping. The specimen was 2.1 centimeters (0.8 in) in size, with the ettringite crystal measuring about 0.5 centimeter (0.2 in).

A nice specimen of macroscopic ettringite crystals from South Africa is likely to cost at least $100. One high-end dealer was offering a single 3-centimeter (1.2-in) bright-yellow crystal for $9,500. Another dealer offered a 4.7-centimeter (1.5-in) plate of ettringite crystals for $150.

Technical Details

Chemical formula	$Ca_6Al_2(SO_4)_3(OH)_{12} \cdot 26H_2O$
Crystal form	Trigonal
Hardness	2 to 2.5
Specific gravity	1.77 (measured)
Color	Colorless, white, pale pastel yellow through neon yellow
Streak	White
Cleavage	1 perfect
Fracture	Uneven
Luster	Vitreous

Acknowledgments

I owe thanks to several people who offered information, answered questions, and helped with translations to make this article possible.

Dr. Bruce Cairncross is a noted author who has published articles in *The Mineralogical Record* and *Rocks and Minerals*. He's also a geologist and an authority on the Kalahari Manganese Fields who has published books and peer-reviewed articles in professional journals. He was particularly helpful in explaining specimens that showed mixed species and by sending an article that I could not otherwise access. Dr. Jens Gutzmer was also kind and helpful. He shared an article on the paragenesis of the Kalahari deposits and promptly responded to my questions. Drs. Gutzmer and Cairncross have coauthored many papers on the South African manganese deposits.

Herwig Pelckmans informed me about the original description of ettringite. He and our wonderful editor, Hutch Brown, provided translations of a German publication, translations that online translation programs tend to mangle.

These columns teach me about minerals, which I enjoy. They also bring warming connections with people who share and encourage my enthusiasm for minerals, which is gratifying.

Sources

Bannister, F.A. 1936. Ettringite from Scuwt Hill, Co. Antrim. Mineralogical Magazine and Journal of the Mineralogical Society 24(153): 324-329.

Corrosionpedia. 2024. Ettringite.

Evans, D.A.D.; Gutzmer, J.; Beukes, N.J.; Kirschvink, J.L. 2001. Paleomagnetic constraints on ages of mineralization in the Kalahari Manganese Field, South Africa. Economic Geology 96(3): 621–631.

Gutzmer, J.; Beukes, N.J. 1996. Mineral paragenesis of the Kalahari Manganese Field, South Africa. Ore Geology Reviews 11(6): 405-428.

Mindat. N.d. (no date). Ettringer Feld.

Mindat. N.d. Ettringite.

Mindat. N.d. Feuerberg. Eifel volcanic fields.

Mindat. N.d. Mayener Feld.

Mindat. N.d. Schellkopf. Eifel volcanic fields.

RRUFF. N.d. Ettringite 070208: Raman spectrum.

Sedawie, R. 2024. Ettringite gemstone: properties, meanings, value & more. Gem Rock Auctions. 22 January.

Wiener Edelstein Zentrum. N.d. Ettringite.



Ettringite, N'Chwaning Mines, North Cape, South Africa. Source: Mindat; photo: Lawrence Violet.

Wikipedia. N.d. Ettringite.

Wikipedia. N.d. Crestmore Heights, CA.

GeoWord of the Day

(from the American Geoscience Institute)

block-and-ash flow deposit

A small-volume pyroclastic flow deposit characterized by a large fraction of dense to moderately vesicular juvenile blocks in a medium to coarse ash matrix of the same composition.

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





Dr. Mike Wise

Recent Acquisitions to the National Gem and Mineral Collections

May 5 Program

Our May meeting will feature Dr. Mike Wise, a mineralogist in the Department of Mineral Sciences at the Smithsonian Institution's National Museum of Natural History. Dr. Wise will speak about the latest acquisitions to the museum's gem and mineral collections.

Dr. Wise got his Ph.D. from the University of Manitoba in 1987. He is a prolific author and speaker who has made presentations at the Annual Tucson Mineral Symposium in Tucson, AZ.

Dr. Wise's research focuses on the mineralogy, petrology, and geochemistry of granitic pegmatites to better understand the geological processes responsible for the genesis and evolution of granitic pegmatite melts. Pegmatites are an igneous rock type much like granite, forming from magma cooling deep underground. But they cooled much slower than granite and therefore have much larger grains, including fully formed macrocrystals.

Pegmatites are major sources of industrial, technological, and gemological materials. They are important sources of rare elements; when present in economic quantities, these elements can be extracted for use in a wide range of technological applications. Some of the world's best known gem materials and mineral specimens (aquamarine, emerald, sapphire, topaz, tourmaline, and more) came from pegmatite deposits. So we need a thorough understanding of the processes that generate pegmatites, which has guided Dr. Wise's career.

Dr. Wise has several decades of field-based experience studying pegmatites and has long been active in projects related to the classification of pegmatite types, the regional mineralogical and geochemical patterns of large pegmatite populations, and the exploration of critical minerals associated with pegmatite deposits.

In addition to his research program on pegmatites, Dr. Wise is highly active in education and outreach activities and is heavily involved in the management of the Smithsonian's mineral and gem collections.

Bench Tip

Easier Prong Setting

Brad Smith

When setting stones in a prong mount, the tool is less likely to slip off the prong if you grind a shallow groove into its face or rough up the face a bit with sandpaper. Some folks prefer a prong pusher for doing this, and others like a set of pliers with a slight groove on one jaw.

The easiest way to create a slot on the pusher is with a file, and the quickest way to create a slot on one jaw of your pliers is with a separating disc. Then do a rough polish on the slot with a medium-grit, knife-edge silicone wheel.

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





President's Message

by Jason Zeibel

Welcome to May! The windy, cloudy April mornings have given way to long days of sunshine, warm weather, beautiful blossoms, and maybe a toxic level of pollen.

I spent most of today outside doing yardwork and getting the estate ready for summer. It filled me with an air of anticipation—even optimism—for what I hope will be a fun-filled (but not too hot) summer.

Like many of you, I have a spring to-do list that I am slowly clicking through. Some of the tasks are mundane and otherwise uninteresting, but others are geological in nature.

I swung by the club's storage facility today and pulled out one of our show exhibit cases. My hope is to use it as a prototype to be improved on by a local woodshop as we try to increase our display space for this fall's club show at George Mason University. Of course, the display cases were in the absolute back of the storage unit, but—infused with optimism on a warm spring day—I was able to extract it.

Another geology-themed spring goal involves organizing our family's fluorescent rock display so that the best specimens are more prominent and the not-quite-as-glowy ones are relegated to a secondary case. That is still on the to-do list, so we'll see if I make it through that one before this summer's club picnic!

We had a wonderful spring NVMC club auction in April at the Dunn Loring Fire Station (fig. 1). Over 50 people attended, and fun was had by all! Most people there made off with a new treasure or two, and some took home quite a bit more.

Club member Fred Gillis brought in three large amethyst geodes for the auction—spectacular highlights for the evening! However, those were certainly not the only items to draw spirited bidding. A section of stalactite from Luray Caverns drew a lot of interest, as did several fluorescing beauties submitted by Ken Reynolds. All told, the auction netted well over $1,000, and everyone had a great time. If you missed out, be sure to stay tuned for the fall auction coming up in October!







Figure 1—*Scenes from the spring club auction at the Dunn Loring Fire Station on April 1. All photos: Jason Zeibel.*

With the warmer weather, we have a host of field trip opportunities on the horizon. The Accotink Gorge nature walk happened on April 19 (see the article on page 13). We have a collecting trip coming up at Willis Mountain, as well as a potential overnight trip this summer to Franklin, NJ. There is also a trip on June 7 to West Virginia to look for trilobites! A big thanks to our club's amazing field trip co-chairs, Katy and Mickey Johnson!

The club is trying to reinvigorate the educational outreach we are committed to by our constitution. In addition to the work that several club members are doing with local elementary schools, we are going to again work with both George Mason University's Department of Atmospheric, Oceanic, and Earth Sciences and the Geology Department at Northern Virginia Community College to sponsor a small scholarship at each school. I certainly feel that educational outreach is a bedrock part of our club's purpose (see what I did there?). Since the COVID-induced lockdowns, we have struggled to put that part of our mission into action again, and I am going to try to ensure that we do.

Another educational opportunity that we are going to sponsor is near and dear to my family. The club has decided to offer sponsorships for youth members (21 and under) for up to $250 towards travel and/or registration for a national-level geology seminar or show. It could include attending seminars at Wildacres or traveling to a national show like the one in Tucson. Anyone interesting in applying would have to give a presentation to the club on their experience at the event.

I've started to reach out to some folks to gauge interest in volunteering for club positions for 2026. Please give it serious consideration. I definitely want to spread out the duties as we move forward. We have sufficient members at this point, and I think that more folks can help take ownership of the club by helping out in a defined role. Please come talk to me or send me an email if you are at all interested in being an officer taking another support position in 2026.

While the club president was busy running the auction for the club, the club president's wife was busy exploring the local geology on a work trip to Barcelona, Spain (fig. 2). I feel very proud knowing that she came across some amazing sedimentary layers in the rock outcrops on the Mediterranean coast. There were apparently some wonderful folds and tilted lay-



Figure 2—*Club member Audra Zeibel admired the colorful and tilted layers of sedimentary rock along the shores of northeastern Spain near Sitges (just south of Barcelona).*

ers exposed on the shoreline. I am a little disappointed that she didn't bring me along for her trip.

However, if I had gone with her, then I would not have been able to be at the auction. Clearly, I made the dutiful choice to come to the auction and pass on the paella and sangria this time around. However, I did love seeing all her pictures from Spain—both the geology ones as well as the progress that is being made on the Sagrada Familia.

A few business items of note. The NVMC name tag order has arrived! Please bring a check or cash for $15 to the May meeting and we will trade for your new name tag. The May meeting is also one to not be missed. Craig, our club's vice-president is bringing in a treat. Come hear about the Smithsonian's latest acquisitions and what is being planned for the National Collection! It will be a wonderful experience with lots of oohs and ahs. Also, look forward to the return of the zoom-hybrid meeting for those of you that can't make the in-person meeting. As usual, I will send out a Zoom link a couple days ahead of time. We are planning on doing dinner before the meeting as well. So, reach out to Craig (our club vice-president) for details.

Jason



Meeting Minutes
April 1

by Almas Eftekhari, Secretary

The NVMC's April club meeting featured our spring auction, which drew scores of participants, including many new faces. NVMC President Jason Zeibel called it a record-breaking turnout.

Vice President Craig Moore announced that Dr. Mike Wise, a minerologist with the Smithsonian Institution's Department of Mineral Sciences, will be the speaker at our May club meeting. Dr. Wise specializes in pegmatites (exceptionally coarse-grained igneous rocks). Pegmatites are major sources of industrial, technological, and gemological materials, including beautiful specimens of topaz, sapphire, emerald, tourmaline, and aquamarine.

Our June speaker will be NVMC Webmaster Casper Voogt. Casper will talk about trilobite fossils from West Virginia in preparation for a field trip he will lead on June 7 to collect trilobites in West Virginia.

Field Trip Co-Chair Katy Johnson announced a new process for signing up for field trips using a Google form. She set up a geology walk led by Sue Marcus and Hutch Brown in Accotink Gorge on April 19 (see the article on page 13) and a collecting trip on May 17 to the National Limestone Quarry in Mount Pleasant, PA. Another planned field trip on June 7 to collect trilobites in West Virginia will have limited parking, so we might have to cap attendance or arrange for carpooling. Katy is also preparing a field trip to Calvert Cliffs in Maryland during the summer.

Jason announced that he will order more club name tags. If you want one, please contact him soon with your name and city/state. The cost is $15.

Secretary Almas Eftekhari asked for a show of hands for buying sweatshirts with the club logo. Many hands went up if the cost is in the $30 range. We will try our best to find a corresponding vendor.

Jason thanked everyone who made donations to the club, with a special thanks to Fred Gillis. Jason then went over the rules for the auction and then started the bidding. The first item, a large amethyst geode, sold for $85; at least one later item topped $300, so we might have had record-breaking income for the night.



A few of the many specimens for sale at the spring club auction on April 1. Photos: Hutch Brown.

April Field Trip
Accotink Gorge

by Katy and Mickey Johnson, Field Trip Co-Chairs

Saturday, April 19, was a perfect day for a "walk on the wild side" (for the uninitiated, this refers to the famous 1972 song by Lou Reed). Super big thanks to Sue Marcus and Hutch Brown for leading our geology/nature walk with more than 30 participants.

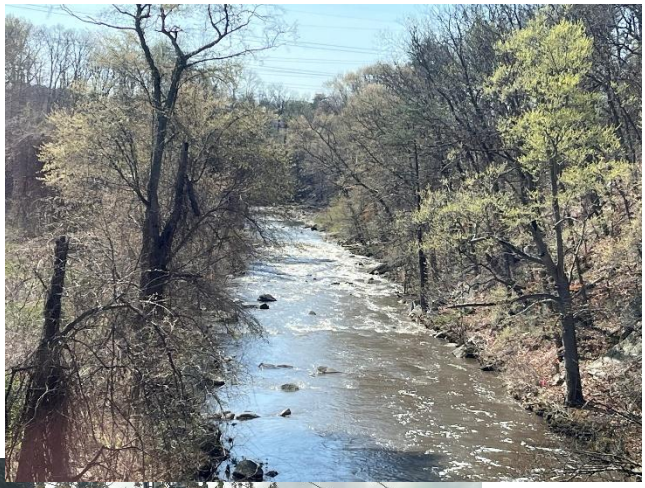
We descended into Accotink Gorge in Springfield, VA, to learn about its interesting geology in our area's Fall Line zone (see the article on page 14). As one of us described the trip, "Rather than being purely educational, it felt more like an in-the-field fun-fact adventure."

The walk highlighted the origin of the granite outcrops we saw and the beautiful stones under our feet, telling their stories of being emplaced, weathered, and stretched. The walk also raised awareness of a special place that needs special attention. Accotink Gorge is a hotspot for biodiversity; unfortunately, many of the beautiful native plants are being choked out by invasive vines, especially Chinese wisteria.

NVMC, along with Friends of Accotink Creek (who currently care for the park), were joined by the Fairfax chapter of the Virginia Master Naturalists, known as FMN. While enjoying learning about our local geology, NVMC took this opportunity to introduce an amazing little gem of nature that has managed to survive mass development in northern Virginia to FMN in order to have the site adopted as an official chapter project. By adopting the site, FMN will provide volunteers to meet the many needs of a park that doesn't even have a sign, thereby preserving its natural beauty and geologic wonders for future generations to enjoy.

We were also joined by Ana Ka'ahanui, cofounder of Capital Nature, who introduced us to the annual City Nature Challenge coming in late April and invited us to participate. An active nature educator, Ana said during the trip, "I can't believe I live 15 minutes away from here and I have never heard of this place."

Overall, it was a great day in a great spot with great people. We've given links to information on Accotink Gorge and the organizations that joined us so you can reach out and get involved in preserving this special site.







Photos: Katy Johnson (top); Ana Ka'ahanui (above); John Sanborn (right).

Friends of Accotink Creek, The Accotink Gorge.

Fairfax Master Naturalists.

Capital Nature.

The Rocks Beneath Our Feet

Geology of Accotink Gorge

by Hutch Brown

On April 19, NVMC members explored the part of Accotink Creek—one of Fairfax County's principal streams—where it crosses from the Piedmont onto the Coastal Plain (see the article on page 13). For millions of years, Accotink Creek has carved a gorge into the Piedmont bedrock (fig. 1), creating a series of rapids and at least one waterfall before crossing onto the relatively flat Coastal Plain.

Accotink Gorge is analogous to Mather Gorge, where the Potomac River cuts through bedrock near the top of a zone of rapids reaching from Great Falls at least to Little Falls, a distance of some 5 miles. The analogous zone for Accotink Creek (fig. 2, white oval) reaches from well above its confluence with Field Lick Branch (the location of the waterfall in figure 1) to a point where the stream slows and widens after crossing under the I-95 bridge on its way to Accotink Bay, an arm of the Potomac estuary at Fort Belvoir.

The gorge is relatively unknown. Though public land, it has no maintained trails and no clearly marked access points. On both sides of the gorge are busy roads and commercial properties within an area of suburban homes, but it is largely ignored and unseen by people.

As in most suburban settings, invasive plants abound, including Japanese honeysuckle and Chinese wisteria. Yet Accotink Gorge—perhaps because of its relative isolation—also has an exceptionally rich native biota. Local naturalists have listed dozens of native plants growing in the gorge, including wild pink, wild bergamot, golden ragwort, and butterfly weed.

The native plants flourish in the thin, dry, and rocky soils supported by the underlying bedrock; the terrain is suited to the grassy open area and dry oak-hickory forest in the gorge. The slopes have massive outcrops of a rock type—granite—that is very unlike the metamorphic bedrock in most of northern Virginia.

How did it get there?

Bedrock vs. Sediments

Earth has three basic rock types (igneous, sedimentary, and metamorphic), only two of which are anywhere near Accotink Gorge. In school, I learned two wrong things about our area's geology: (1) that the Fall Line is an actual line dividing two different rock types; and (2) that streams at the Fall Line form waterfalls dropping from metamorphic rock onto softer and more erodible sedimentary rock.



Figure 1—*Accotink Gorge (top), looking upstream from the narrow floodplain just below the Springfield Costco. Beyond the bridge in the distance is a small waterfall (bottom), part of the many rapids in the gorge. Photos: Hutch Brown.*

But Fairfax County has almost no sedimentary rock. At Great Falls, Little Falls, and elsewhere in our area, the waters plunge from one kind of bedrock (usually metamorphic) onto the exact same kind of bedrock.

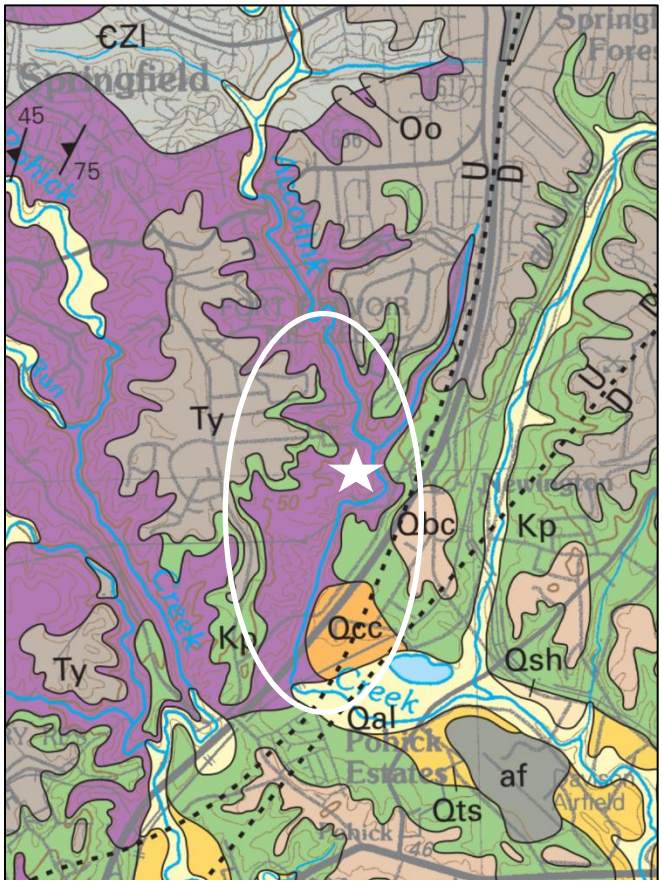


Figure 2—*Detail of a geologic map showing lower Accotink Creek (blue line) and the approximate location of its Fall Line zone (white oval) and Accotink Gorge (white star). Light gray (***CZl***) = Lake Barcroft metasandstone; purple (***Oo***) = Occoquan granite; green (***Kp***) = Potomac Formation (Cretaceous sediments); brownish-gray (***Ty***) = Yorktown Formation (Pliocene sediments); dark gray (***af***) = artificial fill; other colors (***Qcc***, ***Qsh***, ***Qal***, ***Qts***) = Quaternary sediments. Source: Lyttle and others (2017).*

Accotink Creek originates on the metamorphic bedrock that underlies its headwaters near the city of Fairfax. It continues over various kinds of metamorphic rock, finally reaching metasandstone before passing onto the igneous rock (granite) that makes up the entirety of Accotink Gorge (fig. 2).

Moreover, the waterfalls in our area are not dividing lines. They occur in zones of rapids that can go on for miles as streams cut valleys into the hilly Piedmont. Upon reaching the Coastal Plain, the slowing streams deposit their sediments, which form increasingly thick layers covering the bedrock. The sediments can get thousands of feet thick towards Chesapeake Bay, and they are very compacted and hard to pick apart, but they are not solid rock.

The Fall Line zone for Accotink Creek begins on igneous bedrock called Occoquan granite (fig. 2, purple). The zone ends with the overlying sediments of the Potomac Formation (fig. 2, green), which were deposited by ancient rivers—forerunners of the Potomac—from 140 million to 100 million years ago. On top of the Cretaceous Potomac Formation are younger sediments (Pliocene and Quaternary, fig. 2).

Ordovician Mountain-Building

Using isotopic dating, geologists have concluded that Occoquan granite originated during the Ordovician Period about 484 million years ago (Lyttle and others 2017). The granite formed on the eve of a great mountain-building event called the Taconian Orogeny. The timing was no coincidence; figure 3 shows what generally happened in three stages.

At the time, an advancing oceanic plate called the Taconian Terrane was beginning to slide over the continental margin of proto-North America (fig. 3, top). As the continental plate subducted under the advancing terrane, the resulting friction melted the subsiding bedrock. Plumes of magma rose to the ocean floor, forming an advancing line of volcanic islands, much like the arcs (curved lines) of volcanic islands in the Aegean and Caribbean Seas today.

In the process, some of the magma plumes and chambers cooled deep underground (fig. 3, center, black masses). The cooling was slow enough to form igneous rock types with visible crystals. Known as plutonic rocks (as opposed to volcanic rocks like basalt and diabase), they include Occoquan granite.

The volcanic islands finally collided with proto-North America in an Ordovician mountain-building event lasting for about 25 million years (from 474 million to 450 million years ago (Bentley 2020)) (fig. 3, bottom). The Taconian Orogeny formed a mountain chain rivaling the Alps today. The tremendous heat and pressure resulting from the colliding plates metamorphosed sedimentary rocks uplifted from the ocean floor ahead of the advancing terrane.

The resulting metamorphic rock types dominate our area today—schists, phyllites, metagraywackes, and more. Igneous plutons and batholiths (from bodies of magma that cooled deep underground) intruded the metamorphic rocks. Over time, they were exposed by

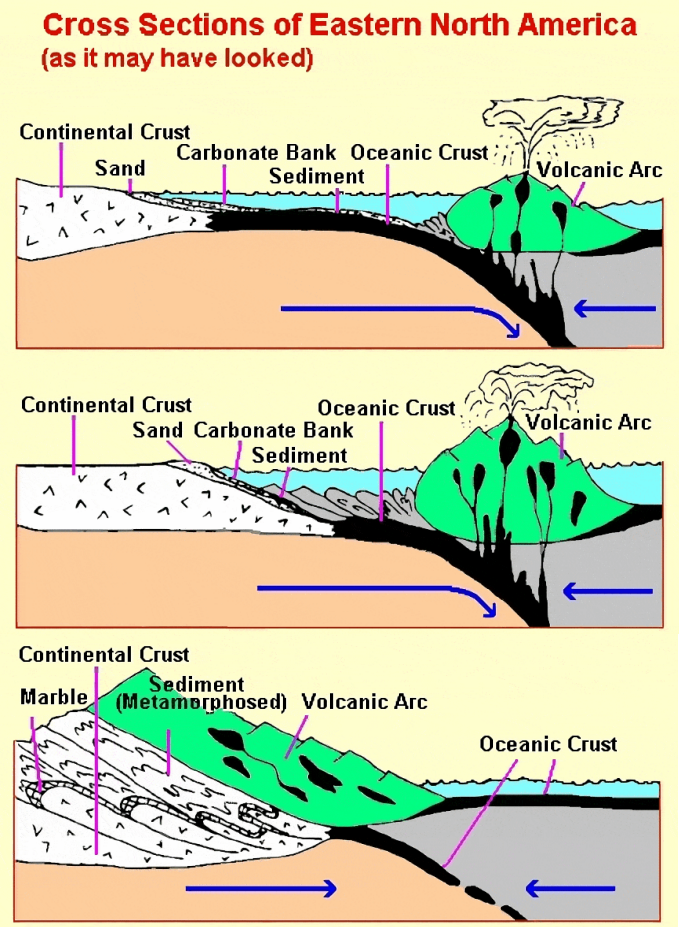


Figure 3—*Graphic representation of the Taconian Orogeny about 474-450 million years ago.* **Top:** *As the continental plate subducts under the approaching Taconian Terrane, the melting rock rises in plumes of magma to form a line of volcanic islands.* **Center:** *The advancing terrane pushes up seafloor sedimentary rock at its leading edge.* **Bottom:** *The colliding land masses form mountains underlain by metamorphic rock and igneous intrusions (indicated by the black masses). Source: Wikipedia.*

erosion alongside the metamorphic bedrock. We know them today by such names as Falls Church Pluton and Occoquan Batholith.

Occoquan Granite

The Occoquan Batholith forms the bedrock for a large part of Fairfax County, ranging from Springfield south to the Occoquan Reservoir and beyond (hence the name Occoquan granite). Outcrops of Occoquan granite abound in Accotink Gorge (fig. 4). Exposures are best seen near the stream, where recently broken rocks are common.



Figure 4—*Granite outcrop in Accotink Gorge above the waterfall at the creek's confluence with Field Lick Branch. The bedrock is covered with greenish lichens that hide its surfaces, making it hard to identify as granite without breaking off a piece with a rock hammer. Photo: Hutch Brown.*

Lyttle and others (2017) describe Occoquan granite as a "light-gray, medium- to coarse-grained muscovite-biotite monzogranite with lesser granodiorite and tonalite." Monzogranite, granodiorite, and tonalite are closely related granitoids made up mostly of quartz and feldspar minerals. The QAPF diagram for the makeup of plutonic rocks shows monzogranite as the "classic" granite, with a rough balance among its three main components: quartz, alkali feldspars, and plagioclase feldspars.

Occoquan granite has up to 42 percent quartz in its mineral makeup, with lesser amounts of both feldspar types. The granite in Accotink Gorge is also relatively rich in micas: black specks of biotite are often evident, as are specks of muscovite sparkling in the sun. Occoquan granite also contains small amounts of epidote, a greenish silicate mineral.



Figure 5—*Exposures of Occoquan granite.* **Top:** *The typical light-gray coloring comes from quartz and plagioclase crystals in the rock.* **Center:** *Pink orthoclase adds color to a piece of granite in the gorge.* **Bottom:** *Biotite darkens a weathered granite, setting off light grains of erosion-resistant quartz and a vein of milky quartz. Photos: Hutch Brown.*

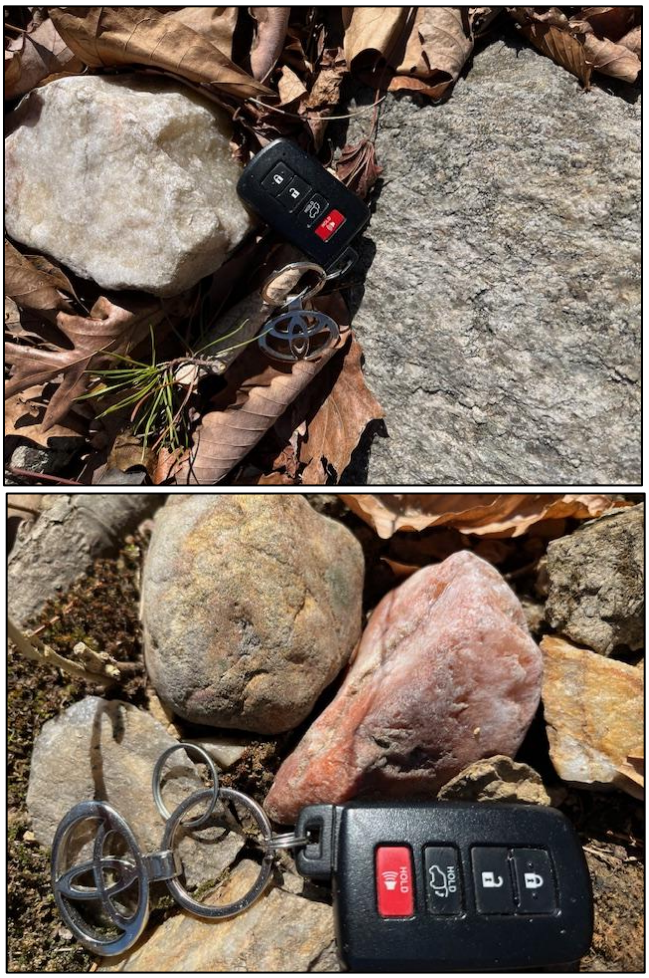


Figure 6—*Samples of quartz in Accotink Gorge.* **Top:** *Milky quartz with light-gray granite.* **Bottom:** *Mixed cobble in the gorge, including a piece of deep pink quartz next to a yellowish quartz fragment. Photos: Hutch Brown.*

Most Occoquan granite is light gray, but variations in the mineral makeup can tinge it pink (colored by high amounts of orthoclase, an alkali feldspar) or dark gray (due to high amounts of biotite) (fig. 5).

Pieces of quartz up to boulders in size are common in Accotink Gorge (fig. 6). Granite is rich in quartz, which melts at relatively low temperatures. As magma cools into granite deep underground, quartz is one of the last minerals to crystallize. Quartz-rich hydrothermal fluids circulate through the cooling rock, filling cavities; with enough cooling, silica precipitates out as veins and lenses of solid quartz. Tiny bubbles of gas trapped in the quartz render it milky white, but iron, aluminum, and other impurities tinge some of it red, pink, yellow, and orange (fig. 6).

Signs of Metamorphism

The granite in Accotink Gorge is medium- to coarse-grained (fig. 5), with crystals of quartz and feldspar that are visible to the naked eye. The crystals are up to the size of large sugar grains, and they range in color mainly from clear to white and gray. They often appear to be randomly intermixed with mica crystals, without any obvious patterns (fig. 5).

But some Occoquan granite in Accotink Gorge shows lineation (fig. 7)—telltale signs of tectonic stress, when colliding tectonic plates put the bedrock under tremendous pressure, reorienting its crystals into parallel lines. Seiders and Mixon (1981) note such "post-emplacement metamorphic features" in Occoquan granite, with "mica foliation" and "strong quartz rodding." "In many exposures," note Lyttle and others (2017), "the unit has a strong quartz-rod lineation and, in places, two foliations." The sample in figure 7 shows a clear quartz-rod lineation, with aligned quartz crystals stacked like a bundle of straws (fig. 8).

Tectonic pressure might have come not long after the Occoquan Batholith first formed, when the Taconian Terrane collided with proto-North America in the Taconian Orogeny. In any case, the pressure eased (for whatever reason) enough to keep the rock from recrystallizing in parallel bands—that is, from metamorphosing into gneiss. By comparison, figure 9 shows a sample of metagranite (metamorphosed granite) from the Western Gneiss Region of Norway. It has deformed black sheets of biotite, along with recrystallized pink orthoclase as well as recrystallized bits and bands of gray quartz and white plagioclase.

The lineated granite in Accotink Gorge is nothing like it. Though altered by tectonic pressure—and therefore technically metamorphosed, at least in part—Occoquan granite did not undergo full metamorphism into metagranite or gneiss. Accordingly, despite noting the lineation and even foliation in some Occoquan granite, geologists have consistently classified it as an igneous monzogranite (Seiders and Mixon 1981; Lyttle and others 2017).



Figure 7—*Lineation in Occoquan granite in Accotink Gorge. The weathered quartz outcrop (with Japanese honeysuckle for scale) shows lines in the rock where tectonic pressure reoriented the crystals in the same direction. Photos: Hutch Brown.*

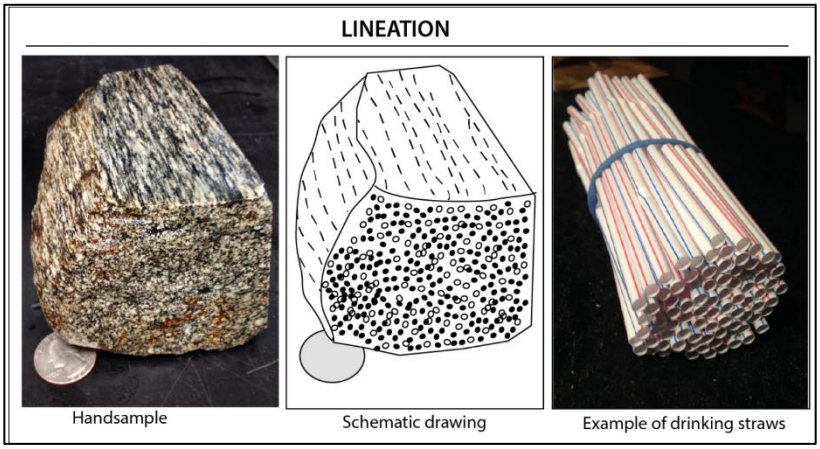


Figure 8—*Quartz-rod lineation in granite. Quartz and other minerals (note the black lines of biotite) align in the same direction, much like a bundle of straws; but the crystals do not form parallel planes (as in foliation). Source: Johnson and others (2017).*

Weathering Effects

Granite is known for exfoliation—for peeling away in great sheets from domes like El Capitan in California's Yosemite National Park, sometimes resulting in huge rock slides. Outcrops of Occoquan granite can exfoliate too, though on a much smaller scale (fig. 10).

Granite originates deep underground under tremendous pressure from the overlying rock. As erosion gradually releases the overlying weight and exposes the underlying granite, some of the exposed rock responds by fissuring into thin sheets. Figure 10 shows the rounded top of an Occoquan granite outcrop in



Figure 9—*Metagranite from Norway, showing recrystallized orthoclase (pink) and deformed sheets of biotite (black). Like gneiss, the specimen is foliated, with bands of gray quartz and white plagioclase interspersed with bands of orthoclase and biotite. Source: Perkins (no date).*

Accotink Gorge near the stream. The surface shows layers that are gradually flaking away as exfoliation proceeds on a small scale.

Like other rock types exposed to weathering, Occoquan granite can decay and crumble into soil. Figure 11 shows a boulder along the stream in Accotink Gorge that has partly lost its crystalline structure due to weathering and decay. The rock on the right broke away by hand, showing a chalky interior resembling siltstone. But the rock overall preserves the lineation common to some Occoquan granite; the part on the left (arrow), when broken with a rock hammer, still showed granite's typical crystals.

Sources

Bentley, C. 2020. Historical geology: a free online textbook for historical geology courses.

Browne, J. No date. The story of Ravensworth.

Fichter, L.S.; Baedke, J.K. 1999. The geological evolution of Virginia and the mid-Atlantic region. Harrisonburg, VA: College of Science and Mathematics, James Madison University.

Friends of Accotink Creek. 2015. The Accotink Gorge.

Geocaching. No date. Occoquan granite geocache.

Perkins, D. No date. Metamorphosed granitic rocks. LibreTexts.



Figure 10—*Occoquan granite exposure in Accotink Gorge showing exfoliation: the fissuring of thin sheets on top of a rounded surface leads to their flaking away as the granite weathers. Photo: Hutch Brown.*



Figure 11—*Weathered Occoquan granite resembles siltstone after losing its crystalline structure. The lineated rock on the left (arrow), broken off with the rock hammer, retained the usual crystals. Photo: Hutch Brown.*

Lyttle, P.T.; Aleinikoff, J.N.; Burton, W.C. [and others]. 2017. Geologic map of the Washington West 30' by 60' Quadrangle, Maryland, Virginia, and Washington D.C. Open-file rep. 2017-1142. Reston, VA: U.S. Geological Survey.

Johnson, C.; Affolter, M.D.; Inkenbrandt, P.; Mosher, C. 2017. An introduction to geology: 6. metamorphic rocks. Salt Lake Community College.

Seiders, V.M.; Mixon, R.B. 1981. Geologic map of the Occoquan Quadrangle and part of the Fort Belvoir Quadrangle, Prince William and Fairfax Counties, Virginia. Misc. Investig. Series map I-1175. Arlington, VA: U.S. Geological Survey.



Bizarre New Dinosaur With Giant Claws Unearthed in Mongolian Desert

by Darren Naish

Editor's note: *The article is from* Discover Wildlife, *27 March 2025. Thanks to Sue Marcus for the reference!*

A very odd new dinosaur has been described from Mongolia, adding to our knowledge of dinosaur diversity and anatomy.

Dubbed *Duonychus tsogtbaatari* ("Tsogtbaatar's two-claw") by Yoshitsugu Kobayashi and colleagues, the new species is from the Upper Cretaceous Bayanshiree Formation of Mongolia's Gobi Desert and is 96-90 million years old.

Its species name honors paleontologist Khishigjav Tsogtbaatar, former director of the Institute of Paleontology at the Mongolian Academy of Sciences in Mongolia's capital Ulaanbaatar, the institution that houses the fossil today.

The sole specimen is incomplete but well preserved, consisting of the forelimbs and hips, part of the shoulder girdle, and vertebrae from the back, hip region, and tail base. *Duonychus* is a therizinosaur, a mostly Asian, mostly Cretaceous group.

Therizinosaurs are theropods (the group that includes all predatory dinosaurs in addition to birds), and part of the same subgroup—the maniraptorans—as *Velociraptor*, birds, and the omnivorous and herbivorous oviraptors. They were bipedal, long-necked, and short-tailed, with deep, wide hips and clawed, feathered forelimbs.

The biggest therizinosaurs were giants that weighed several tons. *Duonychus* was medium in size. The sole known specimen wasn't mature at death but close to adult size, so it weighed about 575 pounds and stood about 10 feet tall. Its skull is unknown but was presumably like that of other therizinosaurs: long, narrow, and with small, leaf-shaped teeth suited for eating leaves. … *Read more*.



May 2025—Upcoming Events in Our Area/Region (see details below)

Sun	Mon	Tue	Wed	Thu	Fri	Sat
				1	2	3 Show: Pittston, PA
4 Show: Pittston, PA	5 **NVMC mtg Cinco de Mayo**	6	7 MSDC mtg	8	9 Show: Franklin, NC	10 Show: Franklin, NC
11 **Mother's Day** Show: Franklin, NC	12 GLMSMC mtg; Wildacres	13 Wildacres	14 Wildacres	15 Wildacres	16 Wildacres	17 **NVMC field trip**; Show: Mays Landing, NJ
18 Show: Mays Landing, NJ	19	20	21	22	23 Show: Salem, VA	24 Show: Salem, VA
25 Show: Salem, VA	26 **Memorial Day**	27	28 MNCA mtg	29	30	31

Event Details

3-4: Pittston, PA—Annual show; Mineralogical Society of N.E. Penna; Oblates of St. Joseph Seminary, 1880 Hwy 315; Sat 10-5, Sun 10-4; admission $3, 12/under free; info: George Walko, 570-200-5987, Anthracitecoin@gmail.com.

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

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

9-11: Franklin, NC—Annual show; Franklin Gem & Mineral Society; Carpenter Community Ctr, 1288 Georgia Rd, 441 South; Fri 10-6, Sat 10-6, Sun 10-4; adults $3, seniors $2, under 12 free; info: Varshana Dholakia, 828-342-3135, email FranklinGemSociety@gmail.com, FGMM.org.

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

12-18: Little Switzerland, NC—EFMLS Wildacres Workshop, spring session; info: www.efmls.org/wildacres.

17: Mt. Pleasant, PA—NVMC collecting trip to National Limestone Quarry. Info: Katy Johnson, fieldtrips@novamineral.club.

17-18: Mays Landing, NJ—Annual show; Cape Atlantic RockHounds; Clubhouse Grounds, 2653 Cologne Ave; Sat 10-5, Sun 10-4; free admission; info: Greg Graupp, 223-229-0557, email greggraupp@yahoo.com.

23-25: Salem, VA—Annual show; Salem Gem, Mineral and Jewelry Show; Salem Civic Ctr, 1001 Roanoke Blvd; Fri 10-6, Sat 10-6, Sun 11-4; 18+ $8, 11-17 $3, 10/under free; info: Alan Koch, www.americangemshow.com.

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

The Northern Virginia Mineral Club, Inc.

Visitors are always welcome at our club meetings!

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Club purpose: To encourage interest in and learning about geology, mineralogy, lapidary arts, and related sciences. The club is a member of the Eastern Federation of Mineralogical and Lapidary Societies (EFMLS—at http://www.amfed.org/efmls) and the American Federation of Mineralogical Societies (AFMS—at http://www.amfed.org).

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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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