



The Mineral Newsletter

Meeting: November 12 Time: 7:45 p.m.

Long Branch Nature Center, 625 S. Carlin Springs Rd., Arlington, VA 22204



Arsenopyrite
San Antonio Mine
Chihuahua, Mexico

Volume 59, No. 9

November 2018

Explore our [website!](#)

November Meeting Program:

Club Member Show and Tell
(details on page 4)

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Deadline for Submissions

November 20

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



Mineral of the Month Arsenopyrite

by Sue Marcus

The name arsenopyrite gives us clues to this mineral's chemistry. Yes, it is an arsenic mineral, the most common arsenic-bearing mineral in the world. Chemically, pyrite is FeS_2 . Arsenopyrite is FeAsS , so arsenic substitutes for some of the sulfur. This also lends this month's mineral a nickname of arsenical pyrite.

The German mineralogist Ernst Friedrich Glocker gave this mineral its official name in 1847, based on the contraction of arsenical pyrite. The derivation of arsenic originates in the Persian *zarnikh* and Syriac *zarniqa*, which became the Greek *arsenikon* (meaning masculine or potent), which then evolved to Latin *arsenicum*, then old French *arsenic*, from which we have modern English *arsenic*. Mispickel is another term for arsenopyrite, still used in Germany and France.

Pyrite is in the isometric system, forming cubes, pyritohedrons, and so forth; arsenopyrite is monoclinic, occurring as twinned crystals in dipyrramids, coxcombs, and other forms.

Arsenopyrite is described as silvery white, although many lovely specimens are more bronze due to oxidation or tarnish. Think of the color of fresh, gleaming metallic pyrite; now add some silver tones to it. That's what the color (not the shape or morphology) of lustrous arsenopyrite is like. When tarnished, it may still be lustrous but darker and more bronze. In photographs, the color may also be in the art of the photographer!

Although arsenopyrite can be found in all three major rock types (sedimentary, igneous, and metamorphic), it is most commonly found in metamorphic contact zones, like the ones that host major metallic mineral deposits in China; or in high-temperature igneous systems, like those in Panasqueira, Portugal. Arsenopyrite in organically derived sedimentary deposits is seldom interesting to collectors.

Butte, MT, was a domestic source of arsenopyrite. Tarnished though euhedral crystals came from the old Carmel, NY, locality. Places known for cobalt (like Cobalt, Ontario) host arsenopyrite, too. For the past decade or so, the sulfide deposits of Peru and Bolivia have been sources of excellent arsenopyrite specimens at all prices, along with the other sulfide minerals they

Happy Thanksgiving!

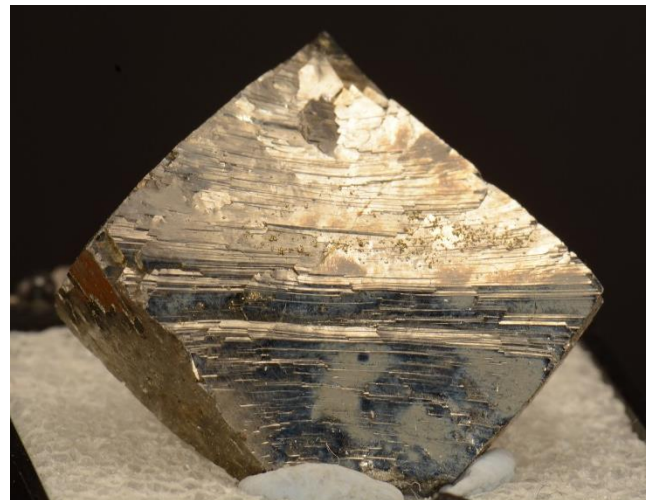


Northern Virginia Mineral Club members,

Please join your club officers for dinner at the Olive Garden on November 12 at 6 p.m.

*Olive Garden, Baileys Cross Roads (across from Skyline Towers), 3548 South Jefferson St. (intersecting Leesburg Pike), Falls Church, VA
Phone: 703-671-7507*

Reservations are under Vice-President Ti Meredith. Please RSVP to me at ti.meredith@aol.com.



Arsenopyrite from Santa Eulalia, Chihuahua, Mexico. Photo: Bob Cooke.

have produced or are producing. More recently, the famous Huanggang and Yaogangxian mines in China have produced the best specimens on the market.

In Europe, the classic localities of Freiberg, Germany, and the Cornish mines in England are among the mostly past sources of arsenopyrite. The mines of Panasqueira, Portugal, are still active and, in conducting web research for this article, I saw new, well-crystallized arsenopyrite specimens from this locality.



Arsenopyrite, Canchaque Mine, Ancash, Peru. Photo: Bob Cooke.

Circling back to this hemisphere, Mexico also produced arsenopyrite, most notably from the Santa Eulalia (Chihuahua) and Zacatecas regions.

From Geology.com, I learned that arsenopyrite oxidizes to scorodite ($\text{Fe}^{3+}\text{AsO}_4 \cdot 2\text{H}_2\text{O}$). Since arsenopyrite is relatively abundant, I wonder why scorodite is relatively rare. That's a question for another day, although I invite your research and information on this.

Other Mineral of the Month articles have mentioned solid solution series, that is, the chemistry of minerals in which elements substitute for one another to form related but different minerals, with the amounts of substitution varying between the endpoints of the series. Arsenopyrite (FeAsS) forms a solid solution series with glaucodot ($(\text{Co,Fe})\text{AsS}$), with a bit of cobalt added to the basic arsenopyrite formula. Unlike arsenopyrite, glaucodot is rare, found in specimens that most collectors would cherish.

Gudmudite (FeSbS) and danaite ($(\text{Fe}_{0.90}\text{Co}_{0.10})\text{AsS}$ - $(\text{Fe}_{0.65}\text{Co}_{0.35})\text{AsS}$) are related to arsenopyrite. Mindat lists danaite as a variety of arsenopyrite rather than a separate species, along with a couple of rare, related, ruthenium-bearing species.

Arsenopyrite can include minor amounts of gold. Even those minor amounts may be worth recovering. Auriferous pyrite and arsenopyrite are autoclaved in large rotating kilns, which oxidizes the pyrites and drives off

the arsenic as a gas. The arsenic and sulfur are condensed into solids and sent out for disposal. The gold-iron residue is further processed through cyanide leach and carbon removal.

When arsenopyrite dissolves in nitric acid, the chemical reaction releases arsenic and sulfuric acid, both toxic materials. Both are useful but abundantly available. Despite its affinity for gold, arsenopyrite is not a favorite mineral for miners and mining companies because it presents disposal problems. Sulfur can be sold to chemical plants, but the market for arsenic is limited.

Best known as a poison, arsenic has many uses, including as a pesticide and herbicide (check labels and use carefully) and in weapons—a real killer! Arsenic can be used as a colorant in fireworks and pigments. It has been used in hardening munitions, a use that has been largely phased out. Similarly, the use of arsenic in medicines is less frequent now, although it still finds use in some cancer treatments.

The garlic odor distinctive of arsenic-bearing minerals helps collectors and geologists alike identify arsenopyrite. However, the smell is evident when the rock or specimen is struck by a hammer, so don't try this *before* making a purchase.

Do I need to mention that arsenopyrite is not a gemstone? Don't wear it! And wash your hands after handling any specimens.

Technical details:

Chemical formula.....	FeAsS
Crystal form	Monoclinic
Hardness	5–6.5 (sources vary)
Density	5.9–6.2 (sources vary)
Color.....	Slivery gold (fresh); Bronze, brown (tarnished)
Streak.....	Black, gray
Cleavage.....	Poor to good (sources vary!)
Fracture	Irregular
Luster.....	Metallic

Acknowledgment

I would like to acknowledge the helpful review and additions by my husband, Roger Haskins. ♪

Sources

Encyclopedia Britannica. N.d. [Arsenopyrite](#).
King, H.M. N.d. [Arsenopyrite: Mineral properties and uses](#). Geology.com.
Minerals.net. 2018. [The mineral arsenopyrite](#).
Mindat.org. 2018. [Arsenopyrite](#).
U.S. Geological Survey. 2018. [Arsenic](#). Mineral commodity summaries. Reston, VA.
Webmineral. N.d. [Arsenopyrite mineral data](#).
Wikipedia. 2018. [Arsenopyrite](#).

For interesting reading about the uses of arsenic:

Frith, J. 2018. [Arsenic: The “poison of kings” and the “saviour of syphilis.”](#) *Journal of Military and Veterans' Health* 21(4).



Club Member Show and Tell November 12 Program

by Ti Meredith, Vice-President

Following our business meeting, club members will have the opportunity to show off acquisition(s) related to our hobby, whether rock, mineral, gem, fossil, or lapidary.

Do you have a favorite acquisition? Self-collected or self-created items go first! ➤



The Prez Sez

by Bob Cooke

My apologies for the monstrous mixup on the October meeting date. Advertising the wrong date was not conducive to maximum attendance. I certainly hope not to repeat that error.

That said, there is only one item of business that we need to address: the Mineral Show. Tom Taaffe has done the prep work of coordinating with George Mason University and contracting with dealers. All that is left for us to do is the total mobilization of the club to turn out volunteers, set up the show, run the show, and take down the show. Piece of cake!

Holiday Party



Please join us for a fun-filled evening on Monday, December 17, at 6:30 p.m. to celebrate the holiday season. The NVMC and the Micro-mineralogists of the National Capital Area will provide fried chicken, honey-baked ham, and drinks for our holiday party.

Please help round out our menu by bringing a side dish. We would appreciate salads, sides, desserts, and more.

Please click on the URL below for the app to sign up if you are coming—and to sign up for a bringing a dish. It really is very easy! Just click and follow the directions!

Thank you. Looking forward to seeing everyone at this wonderful holiday celebration!

Holly Perlick

P.S.: If you would like to participate in the gift exchange, please remember to bring a gift valued between \$5 and \$20.

<https://www.signupge-nius.com/go/20F094AADAF2AA46-northern>

Last year, some dealers—who are also show chairs for their clubs—confided to me that they didn't understand how NVMC was able to pull it off. They have to browbeat their members all year long in order to achieve the participation, organization, and commitment to put on a mineral show. I'm sure that is an effective way to run a show, but it's not my style. I am not the drill sergeant who can coerce people into doing something they don't want to do.

This is your club and you're all members because you want to be! I would appreciate your cooperation in signing up for volunteer slots so Tom and I can try to manage the crisis.

But if no one wants to volunteer, we can't make you. I have found it exasperating in prior years when it's the

day of the show and half of the required volunteer slots are still empty. But somehow members show up and pitch in. That just appears to be the nature of the club!

Tom and I will run the show as best we can and hope for the best. It's all up to you! ↗

Bob



Club Show Volunteers Needed!

by Bob Cooke

Our 27th Annual Gem, Mineral, and Fossil Show is coming up on November 17–18. We desperately need volunteers for all positions!

We will have signup sheets at the November meeting, but I'd greatly appreciate your letting us know before then what you are willing to do. The snafu on the October meeting date eliminated early volunteer signups, and now we're behind schedule.

Please email me, rdotcooke@gmail.com, to volunteer; just tell me what category of work you are willing to do and what hours you're available.

Setup is on Friday, November 16. If you help with setup, save your receipt for the parking garage and NVMC will reimburse you.

Friday setup, starting at 4 p.m.:

- Load cars at storage shed
- Set up Kids' Mini-mines & kids' rooms
- Sort rocks for door prizes & auction
- Set up & cover tables
- Tape down electrical cords
- Assemble poles with club banner on stage
- Assemble display cases in kids' room
- Float

Saturday, 9:30 a.m.–6 p.m.:

- Admissions table
- Announcer for door prizes
- Kids' Mini-Mines/kids' activity rooms
- Float

SPECIAL DONATIONS NEEDED FOR KIDS' MINI-MINES!

This is a great opportunity to help the club by donating items you no longer want.

Specimens can be either minerals or fossils. Fossils should be identifiable, and minerals should be attractive enough in color, crystallization, or character to make a kid want them!

Donated items should be neither too small nor too big and bulky—maybe 1 to 3 inches and a pound or less in weight. Nothing toxic or in any way dangerous, please!

Please contact Tom Taaffe, Ti Meredith, or Bob Cooke to donate (you can find our email addresses on the last page of this newsletter).

Thanks so much for contributing to the success of our show!

Sunday 9:30 a.m.–4 p.m.:

- Admissions table
- Announcer for door prizes
- Kids' Mini-Mines/kids' activity rooms
- Silent Auction
- Float

Sunday takedown, 4 p.m.–?

- Collect mineral show signs on campus (begin at 3:30 p.m.)
- Remove electrical cords
- Remove table covers
- Disassemble & wrap display cases
- Disassemble poles with club banner
- Load vehicles
- Drive to storage shed & unload

For details, see the full description of activities by Show Chair Tom Taaffe on page 7 below. ↗



Meeting Minutes October 22, 2018

by David MacLean

President Bob Cooke called the meeting to order at 8:45 p.m. at the Long Branch Nature Center in Arlington, VA. The minutes from the September 24 meeting were approved as published in *The Mineral Newsletter*.

Bob recognized past President Barry Remer in attendance. No quorum of members was present, so no business was transacted. New nametags were distributed.

Bob invited members to volunteer for the upcoming annual club show on November 17–18 for such positions as the admissions table, the Silent Auction, and the kids' activity rooms. The kids' rooms will need donations of rocks, minerals, and fossils.

For details on the show and on opportunities for volunteering, see the articles by Bob Cooke on page 5 and by Show Chair Tom Taaffe on page 7.

Geologist Sarah Christensen delivered the club program, a slide presentation on her winter honeymoon to Iceland. The slides included maps of Iceland showing the island's regions and the spread zones along the mid-Atlantic ridge. Other slides showed a wide trench, the center of the spread zone between the Eurasian and North American plates. ↗

Nominations for the 2019 Club Officer Elections

by Bob Cooke, President



At the December club meeting, we will elect club officers for 2019. I will be stepping down as club president, and Sue Marcus has agreed to throw her hat into the ring.

So far, the nominations are:

President.....Sue Marcus
Vice-President.....Ti Meredith
Secretary.....David MacLean
TreasurerRoger Haskins

I encourage you to make additional nominations! We need both long-term club members and newer members in officer positions for the leadership we will need in the future. Former club officers are willing to mentor new officers as needed.

The most recent part of the NVMC Hall of Fame, featuring our four club officers in the last 10 years, is shown below. We track all club positions (see the list on the last page of this newsletter) as part of our club history. Add your name to the list!

Please send your nomination(s) to me (Bob Cooke) at rdotcooke@gmail.com. ↗

NVMC Hall of Fame: Club Officers, 2009–2018

Year	President	Vice-President	Secretary	Treasurer
2018	Bob Cooke	Ti Meredith	David MacLean	Roger Haskins
2017	Bob Cooke	Ti Meredith	David MacLean	Rick Reiber
2016	Bob Cooke	Ti Meredith	David MacLean	Rick Reiber
2015	Wayne Sukow	Kathy Hrechka	David MacLean	Rick Reiber
2014	Wayne Sukow	Kathy Hrechka	Ti Meredith/ Laurie Steiger	Kenny Loveless/ Rick Reiber
2013	Rick Reiber	Kathy Hrechka	David MacLean	Kenny Loveless
2012	Sue Marcus	Barry Remer	Kathy Hrechka	Rick Reiber
2011	Barry Remer	Sue Marcus	Kathy Hrechka	Rick Reiber
2010	Barry Remer	Sue Marcus	Kathy Hrechka	Rick Reiber
2009	Wayne Sukow	Barry Remer	Kathy Hrechka	Rick Reiber



27th Annual Show Back at the Hub!

November 17–18, 2018

by Tom Taaffe, Show Chair

The NVMC holds its 27th Annual Gem, Mineral, and Fossil Show on November 17 and 18 at George Mason University. This event is cosponsored by GMU's Dept of Atmospheric,

Oceanic and Earth Sciences.

Please note: The show site will again be the HUB's Ballroom, as it was in 2016. Sorry for any confusion. We plan to return the show to the Johnson Center in

Show volunteers needed!!

2019. Show Setup is Friday evening, November 16, starting at 5:30 p.m.

We will need a host of club volunteers to help with Friday night setup as well to fill various positions over the course of Saturday and Sunday. We encourage volunteers to sign up for shifts of at least 2 hours—more, if you can manage it. We are very grateful to all the volunteers who have so generously helped out at past shows, and we hope that many of you return to help us again at our 2018 show.

We need volunteers for the tasks and activities summarized below. If you can volunteer or have any questions, please feel free to contact me (Tom Taaffe) at rockclctr@gmail.com or call me at 703-281-3767; you can also text me at 571-345-5310. In addition, you can volunteer by contacting NVMC President Bob Cooke at rdotcooke@gmail.com. Bob will be taking the lead on keeping track of who volunteers for what.

Friday Night Setup (A): Volunteers bring materials from the club's storage unit to the Hub, arriving by 5–5:30 p.m. Materials include exhibit cases, heavy-duty electrical cords, table coverings, and miscellaneous supplies; mineral specimens for the auction and for the Kids' Mini-mines, plus materials for the kids' activity

Annual Gem, Mineral, and Fossil Show Participating Dealers

Alan's Quality Minerals, Mount Laurel, NJ

The Mineral House, Tom & Pam Kottyan, Bucyrus, OH

The Prospector Shop, Marianne Cannon, Ligonier, PA

KBT Minerals & Fossils, Tom Taaffe, Vienna, VA

Williams Minerals, Keith Williams, Rio, WV

Hartstein Fossils, Gene Hartstein, Newark, DE

Arrowwood Minerals, Dick Ertel, Lexington, VA

Dave Hennessey, Woodbridge, VA

Jonathan Ertman, Rockville, MD

Bob Farrar, Bowie, MD

Geosol Imports, Rob Evans, Hawley, PA

Yinan Wang, Fossils, Arlington, VA

Jan Minerals, Jehan Sher, Stafford, VA

Zembla Minerals, Casper Voogt, Sterling, VA

Don Soechting, Agates, Charlottesville, VA

Victor Yount, Minerals

Barry Remer, Reston, VA

Crystal Luxe Lighting, Aldeane Josephs, Bethesda, MD

rooms; and campus directional signs. This task typically requires 2 to 3 vehicles and their drivers, depending on the size of the vehicles. The club storage unit is conveniently located a few miles from GMU. Materials are brought into the kids' rooms (3, 4, and 5) and the Hub Ballroom.

Friday Night Setup (B): Starting at about 5:30 p.m. at the Hub Ballroom, volunteers help arrange the exhibit room layout and assemble the exhibit cases. They also help set up the kids' activity room with all the tables, quizzes, Mini-mines, and workstations. Other tasks include arranging and securing heavy-duty electrical cords in the Ballroom and helping make sure that the table floor plan is accurate.

Friday night volunteers should use the parking garage; please do not park vehicles in front of the Hub. Of course, volunteers who are bringing and unloading

club materials may park in front of the Hub while unloading. Once unloaded, they should promptly move their vehicles to the parking garage. This is to make more parking spots available for dealers who would like to unload Friday night. The NVMC typically reimburses volunteers for the amount of Friday parking ticket.

Saturday Morning Setup: GMU won't give us access to rooms 1 and 2 until Saturday morning. We will need to have a few volunteers arrive at 8 a.m. to finish setting up what we couldn't set up Friday night. The exhibit cases, Micromounters, Touch Minerals, and "Science Table" will all be in rooms 1 and 2. This double room is directly across from the kids activities in rooms 3, 4, and 5.

Admission Desk: Volunteers greet show attendees, collect admission, and issue door prize tickets. You can sign up for slots on Saturday from 10 a.m. to 5:30 p.m. and Sunday from 10 a.m. to 3:30 p.m. Admissions volunteers could possibly help with picking and announcing door prize winners!

Kids' Activities: Volunteers administer mineral- and fossil-related quizzes, manage the Kids' Mini-mines, and do what they can to help kids learn. Hours are Saturday from 10 a.m. to 6 p.m. and Sunday from 10 a.m. to 4 p.m. Peak times, when help is needed most, are Saturday from 11 a.m. to 5 p.m. and Sunday from 12 p.m. to 3 p.m.

Silent Auction: One or two designated volunteers organize donated specimens and create bid slips. Several volunteers monitor 1 or 1-1/2 hours of the actual auction, collect winning bids, and distribute specimens. The auction is held on Sunday from about 12:30 to 2 p.m. We usually need three to four volunteers.

Floater: Volunteers attend the show and help as the need arises. Often, the kids' activity tables or admission tables get overwhelmed, and our floaters step in to help out during the rush. When things calm down, they go back to enjoying the mineral show.

Door Prize Announcer-Manager: A volunteer pulls hourly winning door prize tickets for kids as well as for adults, announces the winners, escorts winners to the door prize table, and supervises prize selection. It's important to locate each door prize winner make sure each winner successfully selects a prize.



*Display at the annual club show in November 2015.
Photo: Sheryl Sims.*

Floater/Security: Volunteers attend the show and rotate from room to room to make sure everything is running smoothly and that exhibits, activities, and demonstrations are not being overrun and volunteers are not overstressed. We ask for up to 4-hour shifts (half a day) for these trouble-shooting positions. For example, you might work on Saturday from 10 a.m. to 2 p.m. or from 2 to 6 p.m., but we will happily accept whatever a volunteer can do.

Sunday Takedown: This is the reverse of the Friday night setup, starting at 4 p.m. at the show's close on Sunday. Volunteers carefully take apart exhibit cases (after the owners have collected their display materials) and pack them for the next year. They also gather up all club materials: the Mini-mines and kids' specimens, the heavy-duty electrical cords, and everything else. Volunteers deliver these items to the club's storage unit and put them away. Additionally, we need someone with a vehicle to gather all the campus directional and shuttle signs and make them ready for returning to the club's storage unit. Sunday night takedown goes pretty fast if numerous people help and volunteer their vehicles for the return trip to the storage unit. You don't need a vehicle to help out, but a few (perhaps three) people with vehicles will be needed. ↗



Safety Matters The Price of Safety

by Ellery Borow, EFMLS Safety Chair

Editor's note: The article is adapted from EFMLS News (June/July 2018), p. 3.



The price of safety is rarely discussed.

Having read many safety manuals from OSHA and other organizations, I have rarely seen mention of why.

Why be safe? At what cost? One might think the answers are obvious. Then why aren't more people striving to be safe?

Curious as to the why and what of safety, I have asked many folks that last question. Their answers included:

- It costs too much.
- It takes too much time.
- It is too distracting.
- My own safety ideas are better.
- No one was watching so I didn't need to.
- I'm a lucky kind of guy.

Well, let's evaluate those answers.

Yes, I will freely admit that if you suffer a minor laceration and apply a 15-cent adhesive bandage, it appears that the cost of prevention—an \$8 pair of gloves—is much higher than the cost of suffering the injury. But what about a \$900 emergency room visit to remove something from your eye compared with the cost of a pair of \$3 goggles? Prevention is far cheaper.

Taking too much time? Too much time (3 seconds) to lower and secure the hood of a slabsaw? Too much time (2 seconds) to buckle your seatbelt? Too much time (4 seconds) to put on and adjust your safety goggles? Too much time (9 seconds) to walk over and turn on the ventilation fan for the soldering torch fume exhaust hood? Really? Too much time?

Distraction does indeed occur with some safety gear. Gloves might not fit well. Goggles may restrict vision. Hearing protection sometimes muffles voices. I would, however, submit that undamaged hands and eyes and slightly muffled voices are preferable to slight inconveniences.

Your own safety ideas might be advantageous under certain circumstances, but safety experts have thought

through instructions for tools, equipment, and hobby supplies. Please give considerable weight to the collected wisdom of manufacturers, suppliers, and various safety organizations.

"No one was watching so I didn't need to." Do I really need to talk about this one? To the individual who offered this response: if you are reading this, please remember that it is not just about you.

You no doubt have brothers or sisters, a husband or wife or significant other, parents, neighbors, friends, or a four-footed friend who cares about you. If you don't want to be safe for yourself, please consider being altruistic and stay safe for the special people in your life.

I'm a lucky kind of guy. Hm, are there any math majors out there? Answer me this, if you will: after tossing a coin 10 times and getting heads each time, what are the odds that it will again be heads? Still 50/50. Each toss of a coin, each strike of a chisel by a hammer, each lighting of a torch is a new game. Whenever doing something that might be unsafe, please consider doing the right thing and stay safe.

Safety is more than any rule book; sometimes it even defies commonsense. (Shouldn't that 11th toss of the coin also come up heads?) Safety is an attitude, an attention to detail, and a certain modicum of creativity.

Your safety matters, no why's or what's about it. ↗

GeoWord of the Day

(from the American Geoscience Institute)

beach ridge

A low, essentially continuous mound of beach or beach-and-dune material (sand, gravel, or shingle) on the backshore of a beach beyond the present limit of storm waves or the reach of ordinary tides. It occurs singly or as one of a series of approximately parallel deposits. The ridges are roughly parallel to the shoreline and represent successive positions of an advancing shoreline.

(from the [Glossary of Geology, 5th edition, revised](#))



Federation News 2019 Regional Federation Conventions

Editor's note: Adapted from A.F.M.S. Newsletter (October 2018), p. 8. (Not all federations had yet set dates.)

Some club members might have the opportunity to attend regional federation conventions next year. The following list is intended for them to see what the opportunities might be. (The two federations that have not yet set dates/locations are Rocky Mountain and Southeast.)

January 19–20	South Central Fed'n Fredericksburg, TX
March 8–10	California Federation Pomona, CA
March 23–24	AFMS/Midwest Fed'n Cedar Rapids, IA
June 1–2	EFMLS Monroe, NY
October 18–20	Northwest Federation Lewiston, ID ➤

Scientists Make Mineral That Removes CO₂ From Atmosphere

by Kreigh Tomaszewski

Editor's note: The article is adapted from AFMS Newsletter (October 2018), p. 6.

Scientists have found a rapid way of producing magnesite, a mineral that stores carbon dioxide (CO₂). If the technology can be developed on an industrial scale, then the door is open to removing CO₂ from the atmosphere for long-term storage, thus countering the global warming effect of atmospheric CO₂. The work was presented at the Goldschmidt conference in Boston.

Scientists are already working to slow global warming by removing carbon dioxide from the atmosphere, but their technology development faces serious practical and economic limits. Now, for the first time, researchers have explained how magnesite forms at low temperatures and offered a way to dramatically accelerate its crystallization.



Magnesite (MgCO₃) from Slovakia in its natural form. Source: Wikipedia.

A tonne of naturally occurring magnesite (MgCO₃) can remove around half a tonne of CO₂ from the atmosphere, but the rate of formation is very slow. Project leader Professor Ian Power (Trent University, Ontario, Canada) said:

“Our work shows two things. Firstly, we have explained how and how fast magnesite forms naturally. This is a process which takes hundreds to thousands of years in nature at Earth's surface. The second thing we have done is to demonstrate a pathway which speeds this process up dramatically.”

The researchers were able to show that, by using polystyrene microspheres as a catalyst, magnesite would form within 72 days. The microspheres themselves are unchanged by the production process, so they can ideally be reused.

Read more [here](#). ➤

Field Trip Opportunity

Geology at Long Branch

Dec. 1, 1–4 p.m. (rain date: December 9), led by Joe Marx; members \$26, nonmembers \$36; Audubon Naturalist Society event, [register here](#).



Starting from Arlington's Long Branch Nature Center, we will hike a mile or so along Long Branch and Four Mile Run. A variety of rock units are exposed along the trail, including an undersea landslide frozen in time, long-vanished seaside flats, and the bottommost layer of the coastal plain. To add botanical icing to our geological cake, we will traverse an old-growth upland forest and a quicker changing floodplain forest. ➤



The Rocks Beneath Our Feet Virginia's Gold-Pyrite Belt: The Kirk Mines

by Hutch Brown

Editor's note: The article is the last in a four-part series on the geology of Virginia's gold-pyrite belt. The first part is in the June 2018 issue, the second part in the September issue, and the third part in the October issue.

Virginia's gold-pyrite belt is an area of gold-bearing rock reaching from Fairfax County southwest to Appomattox County (fig. 1). The belt is not a mapped geologic entity. Instead, the gold-bearing rock (mostly quartz) is embedded in veins and cavities in the country rock (the native bedrock, mostly metamorphic). Figure 2, for example, shows a sketch of gold-bearing bodies of quartz embedded in schist in Orange County (fig. 1), to the west of Fredericksburg, VA.

Tectonic Origins

The gold-pyrite host rocks are classified as early Ordovician in age. They are thought to have formed about 470–485 million years ago, at about the same time as many of the igneous intrusions into the metamorphic bedrock of the Piedmont geologic province.

The gold-pyrite belt originated at a time of tremendous tectonic activity. It was associated with rising plumes of magma in the Taconic Terrane, a volcanic island arc at the edge of an oceanic terrane that was colliding with proto-North America. The colliding plates melted the bedrock, driving volcanic activity in the island arc as it approached the continent. The collision also created tremendous pressure, causing fractures, shear zones, and possible metamorphism in the bedrock.

The Taconic Terrane collided with proto-North America about 450 million years ago and rode up over the

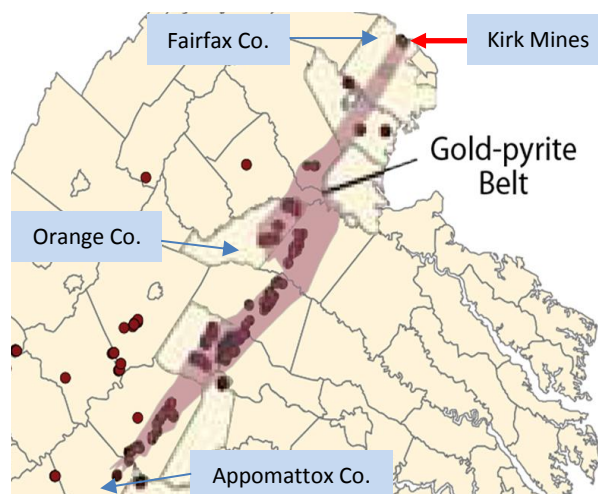


Figure 1—The gold-pyrite belt in north-central Virginia (shaded area). Purple dots = gold mines and prospects; red arrow = approximate location of the Kirk Mines in Fairfax County. Source: Sweet (2007).

continental margin, raising a mountain chain in an event known as the Taconic Orogeny. The orogeny further fractured, sheared, and deformed the bedrock, resulting in more magmatic intrusions, hydrothermal activity, and possible metamorphism.

The mountain-building event lasted until about 435 million years ago. When the mountains finally eroded away, the Taconic roots form most of the bedrock for today's Piedmont Province.

Accordingly, the igneous intrusions visible in the Piedmont today were once zones of rising magma that drove superheated fluids rich in dissolved minerals into cracks and crevices in the country rock. When the liquids cooled, they left veins, lenses, and irregular bodies of quartz (fig. 2). When the superheated fluids contained sulfides and metals, gold and pyrite precipitated out onto the quartz, sometimes leaving ores.

Colonists from Europe sought gold in Virginia but found none. The earliest record of gold came from Thomas Jefferson in 1782. An amateur naturalist, Jefferson described a 4-pound gold-bearing rock found along the Rappahannock River about 4 miles below the falls. The rock must have come from the gold-pyrite belt upstream, to the west of the Fall Line zone.

Gold prospecting and mining in Virginia began in 1804 and lasted until 1947. In that time, the state produced about 100,000 troy ounces of gold, worth more than \$100 million at today's prices.

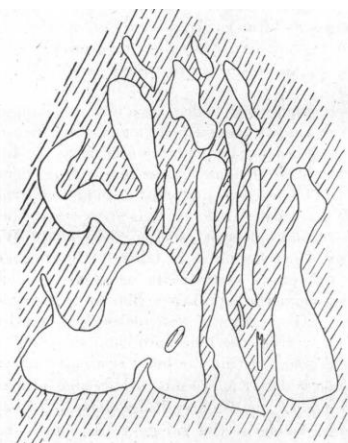


Figure 2—Sketch of irregular gold-bearing quartz bodies (white) in the Piedmont bedrock (schist, dashed area) at the Laird Prospect in Orange County, to the west of Fredericksburg, VA. Source: Pardee and Park (1942).

Some of that gold came from two mines in Fairfax County near the Potomac River (fig. 1, red arrow), now in McLean, VA. This is their story.

Geologic Setting

Figure 3 shows the approximate location of the two gold mines (yellow diamonds). One, operated in the 1890s, was on a slope overlooking Yellow Falls in the Potomac River. The slope rises to a ridge between two streams, Scotts Run to the east and Bullneck Run to the west. The other mine, along Bullneck Run (−77.21579, 38.96531 (WGS84)), operated in the early 1900s.

Figure 4 shows the geology of the area. The country rock is mostly the metamorphic Mather Gorge Formation, a suite of rocks that are early Cambrian or late Proterozoic in age (perhaps 525–575 million years old, marked **CZ** on the map). The gold ores for the Kirk Mines were embedded in phyllonite (**CZmp**), a schistose metamorphic rock.

The Mather Gorge Formation includes, near the Kirk Mines, bands of metagraywacke (the pink in figure 4, marked **CZmg**). The metagraywacke is folded into kinks, reflecting tremendous stress on the country rock

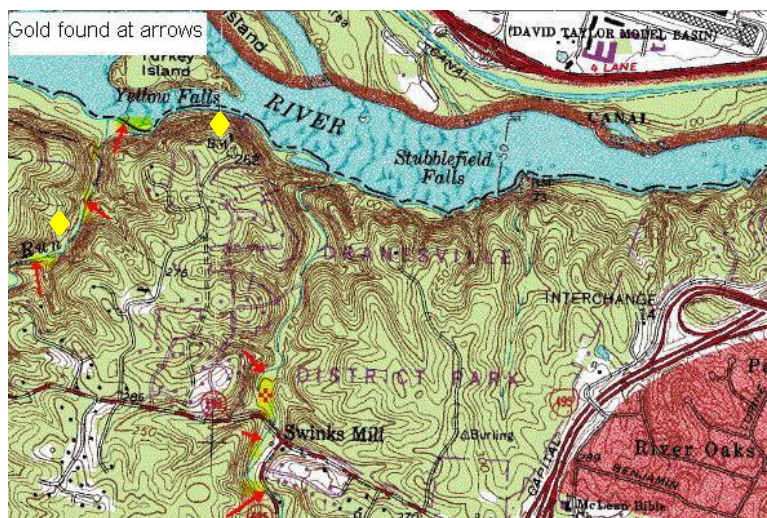


Figure 3—Map of the area near Swinks Mill in northern Fairfax County, VA. The geologist George Hamilton used red arrows to mark places where he found gold in Scotts Run near Swinks Mill and in Bullneck Run to the west. The yellow diamonds show the approximate locations of two gold mines (near Yellow Falls in the Potomac River and along Bullneck Run). Source: Saum (2012).

during a major mountain-building event (probably the Alleghanian Orogeny, which came much later and was much bigger than the Taconic Orogeny).

The mines are relatively near to intrusive lenses of amphibolite (the purple in figure 4, marked **Ca**), and massive intrusions of tonalite and gabbro lie not far to the east (off the map in figure 4). The intrusions are all part of what is called the Georgetown Intrusive Suite. The amphibolite intrusions are Cambrian in age, but the massive intrusions just to the east date to the later Ordovician Period (from about 488 million to 444 million years ago). They are about the same age as the zones of mineralization in Virginia's gold-pyrite belt, indicating similar origins.

All this allows for a tentative interpretation.

The gold ores for the Kirk Mines probably formed during or before the Taconic Orogeny beginning about 450 million years ago. The tremendous stress and pressure caused by the colliding tectonic plates cracked, folded, and altered the country rock. The friction melted the rock, sending plumes of magma rising toward the surface, intruding into rocks that would later become the Mather Gorge Formation. The intrusive magma then cooled deep underground into igneous rock.

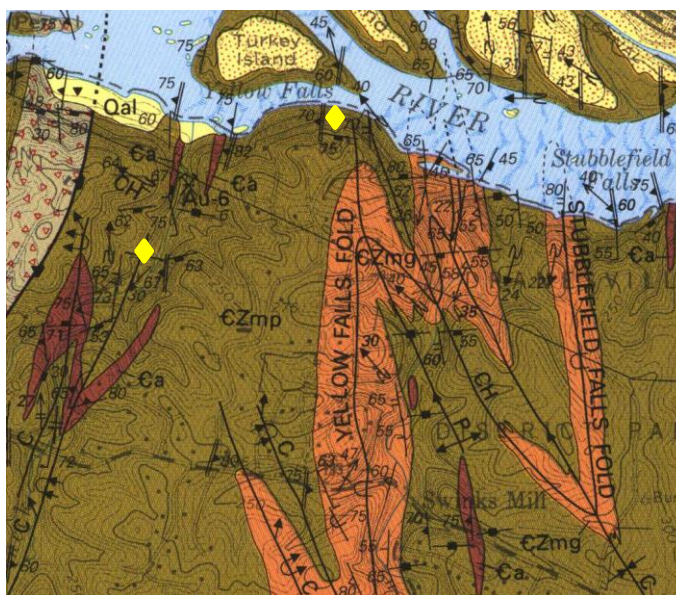


Figure 4—Detail from a geologic map showing the approximate locations of the Kirk Mines (yellow diamonds). Both mines are located in the Mather Gorge Formation of metamorphic rocks, in this case phyllonite (brown, marked **CZmp**). Both are relatively near to amphibolite lenses (purple, marked **Ca**), part of the Georgetown Intrusive Suite. Massive Georgetown igneous intrusions lie off the map to the east, including gabbro and tonalite. Folds in the metamorphic bedrock, in this case metagraywacke (pink, marked **CZmg**), indicate zones of tremendous tectonic stress. Source: Drake and Froehlich (1997).

Most of the metamorphism as well as most of the fracturing, shearing, and folding we see in the Piedmont today probably dates to the Alleghanian Orogeny. About 320 million years ago, proto-Africa collided with proto-North America, burying our entire area beneath the massive Alleghanian Mountains, as high as the Himalayas today.

However, tectonic forces before and during the Taconic Orogeny were also extremely powerful. The zones of rising magma were huge, and they sent superheated fluids through cracks in the country rock while enriching the fluids with gold and other minerals. The fluids filled voids in what would become the Mather Gorge phyllonite, and the minerals in the fluids precipitated out as gold-bearing quartz for the Kirk Mines.

Fairfax Gold Fever

But nobody knew that the gold was there. The first discovery of gold in the area came in 1861 during the Civil War, when Union soldiers washing pans in a creek near Great Falls in Maryland found grains of gold. When the war ended in 1865, the soldiers returned to the site and started prospecting for gold.

Across the Potomac River in Virginia, prospectors also started panning for gold in creeks ranging from Difficult Run below Great Falls to Pimmit Run near Chain Bridge in Arlington. They found enough gold in the 1870s to supply jewelry stores in Georgetown.

In the 1890s, an enterprising prospector on the Maryland side of the Potomac began exploring the Virginia side for veins of gold. William T.S. Kirk panned in creeks and sampled outcrops in an area along the Potomac from Scotts Run west to Difficult Run.

After discovering gold-bearing quartz veins that crossed under the Potomac, Kirk pinpointed two prom-

ising locations (fig. 3). One was on the slope overlooking the Potomac River upstream from Scotts Run; the other was where a vein of gold-bearing quartz crossed under Bullneck Run.

Kirk used field furnaces to verify the gold content, then got financial backing to form a mining company. His company sank small shafts and used a flume to bring water for sluicing, a type of placer mining familiar from California.

The placer ore contained gold-bearing pyrite and galena in the quartz host rock (fig. 5). Separating out the gold required expensive crushing machinery and a chemical process, and Kirk ran out of money. When he failed to attract more investors, he shut down operations in 1896 after only about 1 year.

Renewed Operations

In 1921, Kirk's grandson George acquired the land that his grandfather had mined for gold along Bullneck Run. George Kirk was a mining engineer who worked for the Virginia Gold Mining and Milling Company, and he sold the Bullneck property to the company.

The company funneled creek water into a hose and used hydraulic pressure to wash gravel from slopes overlooking the stream, a technique used in California. The gold-bearing gravels were then washed in sluice boxes that trapped heavier materials, including gold and black sands. After sorting out the gold, miners transported the tailings downstream and deposited them along the Potomac River.

The hydraulic mining and sluicing began in 1922 and lasted for about a year. Kirk wanted to sink a shaft to extract ore in the rock but lacked the needed investors. The company ceased operations and sold the property in November 1923.



Gold nugget found in Virginia's gold-pyrite belt. Panning for gold in Fairfax County's streams yielded small nuggets like this in the 1870s–1890s, enough to encourage prospecting. Source: Raregoldnuggets.com (2017).



Figure 5—*Auriferous pyrite on quartz (left, from the San Antonio Mine, Catamarca, Argentina) and auriferous galena on quartz (right, from Doan's Lead Mine, New Galena, PA). The Kirk Mines extracted similar gold-bearing pyrite and galena. Sources: Mindat (2018a); Mindat (2018b), photo: M.R. Heintzelman (2012).*

Depression-Era Operations

In 1934, the price of gold rose by 69 percent to \$35 per ounce, and wages were low due to high unemployment during the Great Depression. Encouraged by favorable economic conditions, George Kirk reacquired the site of the Bullneck mine and helped to form a company called Virginia Mines, Inc. According to Wright and Meintzer (1979), the owner was C.F. Eagle, who got a \$20,000 federal grant to construct a mill.

In 1936, the company reopened the Bullneck mine. According to Goetz (1982), it drove a 180-foot adit into a hillside south of Bullneck Run and also began processing ore left over from the 1922–23 operations. Wright and Meintzer (1979) reported the sinking of a shaft to intercept a vein 100 feet underground.

According to Wright and Meintzer (1979), the ore was gold-bearing pyrite, with silver (from galena) as a secondary commodity. What miners call the gangue (valueless material containing the ore) included not only quartz but also bornite, chalcopyrite, chlorite, feldspar, galena, sericite, and talc.

The mine reached an ore vein 7-1/2 feet thick. Blasted out of the rock, the ore was winched out of the mine in buckets and dumped into carts, then carried on rails a few hundred feet to an onsite processing plant, where it was crushed. The mine produced 10 to 15 tons of ore per day, with about 6 to 10 ounces of gold-bearing pyrite per ton, according to Wright and Meintzer (1979).

The crushed ore was then sent to New Jersey, where an expensive flotation method was used to separate the gold from the pyrite. For ore showing clean particles of gold, a different method was used to separate out the gold: mercury was applied to form an alloy. The amalgam was then heated to vaporize the mercury and leave pure gold.

The pyritic ore was variable in grade. Although some yielded as much as \$155 worth of gold per ton (more than \$2,000 in today's dollars), the ore averaged only about \$20 per ton. That was not enough to meet expenses after startup costs, and the Kirk Mine shut down in 1940, according to Goetz (1982); Wright and Meintzer reported the mine's closing as early as 1937.

The processing mill and other structures were sold for lumber and scrap metal. In 1974, the Virginia Department of Mines, Minerals, and Energy surveyed the site and found caved-in pits and the ruins of the old plant. According to Wright and Meintzer (1979), "With the



Gold panning in Virginia's gold-pyrite belt at Lake Anna State Park, Spotsylvania County. Source: Petrosky (2013).

number of rockhounds who have been in the mine, there is probably very little ore left."

The entire area was then developed for housing. The only exception was an enclave on lower Scotts Run, shown in figure 3 as Dranesville District Park but now known as the Scotts Run Nature Preserve.

Gold Near the Kirk Mines

Gold prospecting in Fairfax County goes back for more than 150 years. Virginia's gold-pyrite belt bisects the county (fig. 1), crossing under the Potomac River and continuing into Maryland near Great Falls. Gold panning was once common in Pimmit Run, Difficult Run, and other tributaries of the Potomac.

But the gold ores in Fairfax County were never rich. The Kirk Mines operated off and on from the 1890s to the 1930s but seldom at a profit. Sustained mining operations never proved feasible in Fairfax County.

So most of the gold-bearing rock is still in the ground, still being weathered away by streams. That includes the two streams near the defunct Kirk Mines—Bullneck Run and Scotts Run. Both streams flow over bedrock containing pyrite and gold (the Mather Gorge phyllonite), and you can still find traces of gold in both creek beds if you are patient and lucky enough (fig. 3).

The Scotts Run Nature Preserve reaches from Swinks Mill at Georgetown Pike north to Stubblefield Falls (fig. 3), a large area of rapids in the Potomac River. The county forbids gold panning in the nature preserve itself, but you can pan for gold upstream at Swinks Mill and beyond.

I have never panned for gold, but I have been to the Scotts Run preserve and scouted access to Scotts Run upstream. For the first hundred yards or so upstream from the park, the access is good, but farther upstream private land makes access difficult. If you're interested in panning Scotts Run, figure 3 is misleading, in part because the park itself won't allow it.

Bullneck Run drains a development of lavish private homes overlooking the Potomac gorge and the Bullneck creek valley, including the second old mine site. The floodplain itself is county land open to public use, including panning for gold, but access is difficult.

I tried to find the mouth of Bullneck Run by walking upstream along the Potomac River from Scotts Run. There is no maintained trail, and a spur of phyllonite down to the river eventually stopped me. I found the spur too difficult to climb, but the sheer phyllonite cliffs on Turkey Island (fig. 3) were a joy to behold.

The first Kirk Mine was somewhere on the cliffs above me on the Virginia side, but I saw no traces of it. I saw no signs of mine tailings along the river either. Floods over the past century might have washed them away.

You can find easy access to Bullneck Run and good trails well upstream from the second Kirk Mine. The floodplain is county land and little used, so it is open to gold panning. The trails stop well short of the second Kirk Mine, so access that way is difficult too.

You can get to Scotts Run from the parking lot at the Scotts Run Nature Preserve, and you can find how-to information on gold panning [here](#).

Acknowledgments

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Sources

- Drake, Jr., A.A.; Froehlich, A.J. 1997. Geologic map of the Falls Church Quadrangle. GQ-1734. Reston, VA: U.S. Geological Survey.
- 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.
- Fish, H.B.; Green, F. 1979. [Striking a rich vein of fun in search for gold](#). Washington Post.
- Goetz, W.A. 1982. Fairfax gold fever. Bethesda, MD.

Lonsdale, J.T. 1927. Geology of the gold-pyrite belt of the northeastern Piedmont. Charlottesville, VA: University of Virginia Press.

Mindat.org. 2017. [Whitehall Mines, gold-pyrite belt, Spotsylvania County, Virginia, USA](#).

Mindat.org. 2018a. [Auriferous pyrite](#).

Mindat.org. 2018b. [Auriferous galena](#).

Pardee, J.T.; Park, Jr., C.F. 1948. [Gold deposits of the southern Piedmont](#). Geol. Surv. Prof. Pap. 213.

Washington, DC: Government Printing Office.

Petrosky, J. 2013. [Which Virginia state park had a goldmine?](#) Blog: I Love Virginia State Parks.

March 20. Virginia Department of Conservation and Recreation.

Raregoldnuggets.com. 2017. [Gold prospecting in Virginia](#).

Reed, Jr., J.C.; Reed, J.C. 1969. [Gold veins near Great Falls, MD](#). Geol. Surv. Bull. 1286.

Saum, D. 2012. [Prospecting for gold near Washington, DC](#): Swinks Mill map.

Sweet, P. 1971. [Gold mines and prospects in Virginia](#). *Virginia Minerals* 17(3): 25–36.

Sweet, P. 2007. Gold. Charlottesville, VA: Virginia Division of Minerals and Geology.

Wright, N.A.; Meintzer, R.E. 1979 (1972). [Bull Neck Mine](#). U.S. Geological Survey Mineral Resource Data System. Reston, VA.

Bench Tip

Just Say No to Optivisors

Brad Smith

I was having my annual vision check and the light-bulb went on: Why not have my reading glasses made with bifocals that would magnify the same as an optivisor? So I asked the ophthalmologist if he could add around +2.00 diopters into bifocals.

He checked with his supervisor and came back all excited. They all agreed that was a great idea. He even used a special device to measure how far I hold a jewelry piece from my eye so he could get the focal distance exactly right.

So no more sweaty, bulky optivisors!

See Brad's jewelry books at
[amazon.com/author/bradfordsmith](https://www.amazon.com/author/bradfordsmith)

November 2018—Upcoming Events in Our Area/Region (see details below)

Sun	Mon	Tue	Wed	Thu	Fri	Sat
				1	2	3
4 Daylight savings time ends	5 GLMSMC mtg, Rockville, MD	6 Election Day	7 MSDC mtg, Washington, DC	8	9	10 Sale/swap: Richmond, VA
11 Veterans Day	12 NVMC mtg, Arlington	13	14 MNCA mtg, Arlington, VA	15	16 NVMC/GMU Show setup	17 NVMC/GMU Show
18 NVMC/GMU Show	19	21	22	23 Thanks-giving Day	24 Show: Salem, VA	25 Show: Salem, VA
25 Show: Salem, VA	26	27	28	29	30	

Event Details

3-4: Oaks, PA—49th Annual Gemarama; Tuscarora Lapidary Society; Sat 10–6; Sun 10–5; Hall D, Greater Philadelphia EXPO Center, 100 Station Avenue; \$6 adults, \$1 children under 12; Scouts in uniform w/Scoutmaster free.

7: Washington, DC—Monthly meeting; Mineralogical Society of the District of Columbia; 7:45–10; Smithsonian Natural History Museum, Constitution Avenue lobby.

9: Rockville, MD—Monthly meeting; Gem, Lapidary, and Mineral Society of Montgomery County; 7:30–10; Rockville Senior Ctr, 1150 Carnation Dr.

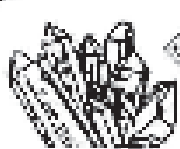
10: Richmond, VA—27th Annual Richmond Gem & Mineral Society Rock Sale and Swap; 9–3; Ridge Baptist Church Meeting Hall, 1515 East Ridge Road; info: Andy Dietz, dietziv@yahoo.com.

12: Arlington, VA—Monthly meeting; Northern Virginia Mineral Club; 7:45–10; Long Branch Nature Center, 625 S Carlin Springs Rd.

14: Arlington, VA—Monthly meeting; Micromineralogists of the National Capital Area; 7:45–10; Long Branch Nature Center, 625 S Carlin Springs Rd.

17–18: Fairfax, VA—27th Annual Gem, Mineral, and Fossil Show; cosponsors: Northern Virginia Mineral Club & George Mason University's Department of Atmospheric, Oceanic, and Earth Sciences; George Mason University, HUB Ballroom, Rte 123 & Braddock Rd, Parking Lot A (designated walking route & courtesy shuttle); 20+ dealers, minerals, fossils, gems, crystals, jewelry, and more; Sat 10–6, Sun 10–4; adults \$6, seniors \$4, teens (13–17) \$3, 12 and under free, Scouts in uniform & GMU students w/ID free; info: <https://www.novam Mineral Club.org/events/2018-show>.

23–25: Salem, VA—39th Annual Roanoke Valley Mineral & Gem Society Show; Roanoke Valley Mineral and Gem Society; Fri 2–7, Sat 10–6, Sun 12–5; Salem Civic Center, 1001 Boulevard; adults \$5, children 14 and under free with adult.



27th Annual GEM, MINERAL AND FOSSIL SHOW

Presented by The Northern Virginia Club, Inc.

www.novamineralclub.org

Sponsored by the Dept. of Atmospheric, Oceanic and Earth Sciences at GMU

Date: November 17 & 18, 2018

Place: The Hub Ballroom
George Mason University Campus
Braddock Rd. & Route 123, Fairfax, VA

Hours: Saturday 10am-6pm, Sunday 10am-4pm

Admission: Adults: \$6, Seniors: \$4, Teens (13-17): \$3
Children 12 & under, Scouts in uniform,
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**Mineral of
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Arsenopyrite**

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The Northern Virginia Mineral Club

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sponsored by an adult member).

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

Meetings: At 7:45 p.m. on the fourth Monday of each month (except May and December)* at **Long Branch Nature Center**, 625 Carlin Springs Road, Arlington, VA. (No meeting in July or August.)

**Changes are announced in the newsletter; we follow the snow schedule of Arlington County schools.*

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