THE NORTHERN VIRGINIA MINERAL CLUB INC

The Mineral Newsletter

Holiday Party: December 2 Time: 6:30 p.m.

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



Minerals of the Month

The whole list—a great resource!

Photos: *Top—wulfenite, Red Cloud Mine, AZ. Right—vivianite, Morococala Mine, Bolivia. Bottom—galena on pyrite, Brushy Creek Mine, MO.*

Volume 64, No. 10
December 2024
Explore our website!

December Meeting:

Holiday Party

Details on page 7

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Mineral of the Month

Minerals of the Month, 2016-24

Our newsletter has led with an article about a select mineral in most issues since 2016. Almost all were researched and written by Sue Marcus, an avid mineral collector, NVMC member, and USGS retiree.

The collection has become a valuable resource, with more than a hundred entries, so here's the list in alphabetical order. By looking up the month of the NVMC newsletter posted online, you can find the mineral writeup.

A to C

Adamite ..... March 2018
Amblygonite ..... Jan/Feb 2023
Anglesite ..... February 2019
Arsenopyrite ..... November 2018
Atacamite ..... June 2023
Axinite ..... October 2021
Babingtonite ..... April 2022
Barite ..... January 2019
Boleite ..... February 2024
Bornite ..... September 2018
Bournonite ..... April 2024
Brucite ..... September 2022
Bustamite ..... March 2023
Calcite ..... January 2020
Carrollite ..... January 2024
Cassiterite ..... April 2019
Cerussite ..... November 2017
Chalcedony ..... January 2016
Chrysoberyl ..... February 2021
Chrysocolla ..... May 2019
Cinnabar ..... October 2018
Colemanite ..... March 2020
Creedite ..... November 2023
Cuprite ..... October 2024

D to G

Datolite ..... November 2019
Diaspore ..... December 2022
Dioptase ..... December 2018
Duftite ..... November 2024
Elbaite ..... March 2021
Epistilbite ..... June 2024
Erythrite ..... June 2019
Euclase ..... November 2022
Franklinite ..... September 2024
Galena ..... September 2019



Merry Christmas!

Happy Hanukkah!

Northern Virginia Mineral Club members,

Happy holidays! We will hold our annual holiday party at the Dunn Loring Fire Station (our usual meeting place) on **December 2, 6:30 p.m.**

See details on page 7.

H to N

Halite ..... January 2021
Hematite ..... October 2019
Hubnerite ..... May 2022
Jamesonite ..... January 2022
Kyanite ..... May 2021
Lazulite ..... June 2020
Legrandite ..... March 2022
Lepidolite ..... February 2020
Linarite ..... February 2022
Malachite ..... March 2019
Muscovite ..... June 2018

O to R

Okenite ..... May 2023
Orpiment ..... April 2020
Palygorskite ..... September 2023
Prehnite ..... April 2021
Purpurite ..... June 2022
Pyrargyrite ..... October 2022
Pyromorphite ..... February 2018
Pyrrhotite ..... January 2018
Rhodochrosite ..... October 2020
Rhodonite ..... December 2017
Rutile ..... November 2021

S to T

Scheelite ..... October 2017
Scolecite ..... November 2020

Scorodite.....June 2016
Semseyite.....March 2024
Shattuckite.....December 2021
Siderite.....May 2017
Smithsonite.....March 2017
Sperrylite.....June 2017
Spessartine.....October 2016
Sphalerite.....September 2017
Spodumene.....September 2016
Staurolite.....June 2021
Stibnite.....May 2016
Stilbite.....November 2016
Sturmanite.....May 2024
Sulfur.....April 2016
Sylvanite.....March 2016
Talc.....December 2019
Tennantite.....December 2016
Titanite/sphene.....December 2023
Topaz.....May 2018
Torbernite.....September 2020

V to Z

Vanadinite.....February 2016
Vivianite.....April 2023
Wulfenite.....February 2017
Xenotime.....May 2020
Zincite.....January 2017

Giant Emerald From Brazil

by Hutch Brown

Editor's note: *The piece is based on a story in* The Washington Post *on 25 October 2024.*

The Carnaíba Mine in northeastern Brazil holds one of the world's largest emerald deposits. The mine has produced five giant emeralds weighing hundreds of pounds each. However, the stones are generally cloudier and therefore less valuable than emeralds from Colombia or Zambia.

One specimen, known as the Bahia Emerald, comprises a block of black schist and green crystals extracted from the mine in 2001. Ranging up to 840 pounds (sources vary), the specimen is valued at up to $1 billion—but could be worth far less.

The uncertainty stems in part from its contested status. After extraction from the mine, the Bahia Emerald found its way under shady circumstances to the United States, where "a small consortium of fortune seekers" is trying to establish ownership.





Opposing the claimants is the state of Brazil, which contends that the stone was mined illegally and smuggled out of the country. Having seen the loss of more than 900 cultural relics to traffickers, Brazil asked the United States 9 years ago to help it recover the Bahia Emerald.

"We want to send a signal that we will go after Brazil's national property wherever it is found," said a Brazilian government lawyer, "and hold to account international traffickers, so they'll think twice before committing a crime so brazen."

The case is now before the U.S. District Court for the District of Columbia, which will decide who owns the stone and whether it should be returned to Brazil for display in a museum. Read more here.



President's Message

by Jason Zeibel

Happy December to all NVMC members and friends! I hope you are all ready for the holiday season.

For our family, this time of year always seems to come quickly and fly by. There is so much preparation for—well, everything. Then suddenly you sit down, and it is January.

This year, join me in trying to enjoy the preparation as much as the actual holidays. When you put up holiday decorations, let yourself indulge in the nostalgia. Think back to a time when you did this with family and friends.

I hope that if you can make it to our NVMC holiday party, you can join me in thinking back to previous club holiday parties with your mineral-collecting family.

Geology Merit Badge

I had the pleasure of hosting 17 Scouts in my garage classroom on a lovely fall afternoon for a Geology Merit Badge class (fig. 1).

The Geology Merit Badge began as the Mining Merit Badge in 1911, only a year after the 1910 start of the Boy Scouts of America. The Mining Merit Badge was one of the first group of 30 merit badges for Scouts. In 1937, it became the Rocks & Minerals Merit Badge; in 1953, the name changed again, this time to Geology Merit Badge. In 2023, it was the 34th most popular of the 138 merit badges offered by Scouting America (the new official name of the Boy Scouts of America). If you take out merit badges such as First Aid and Swimming, required for certain Scout ranks, the Geology Merit Badge is the 20th most popular merit badge.

For my class, I was fortunate to bring in our own Kathy Hrechka as guest lecturer. Kathy has taught this class many times before and has a good rapport with the Scouts. Her sample kits and hands-on exercises were a big hit. After 3 hours of learning about mineral hardness and chemical composition—not to mention which mineral is contained in the creamy Oreo filling (ilmenite)—the Scouts all received their Geology Merit Badge.



Figure 1—*NVMC's own Kathy Hrechka teaches a garage full of Scouts as they work towards their Geology Merit Badge. The event was hosted in the garage of club president Jason Zeibel. A total of 17 scouts earned the Geology Merit Badge. All photos: Jason Zeibel.*

Mineral Donations

I frequently get emails from people who see our website and want to donate rock and mineral collections that they have inherited or no longer want. I always try to go and pick up whatever it is and then do my best to pass it on to someone who needs or wants it.

Sometimes these items end up in our club auctions or in the silent auction for our annual show. Other specimens end up in the show's Kids' Room as giveaways.

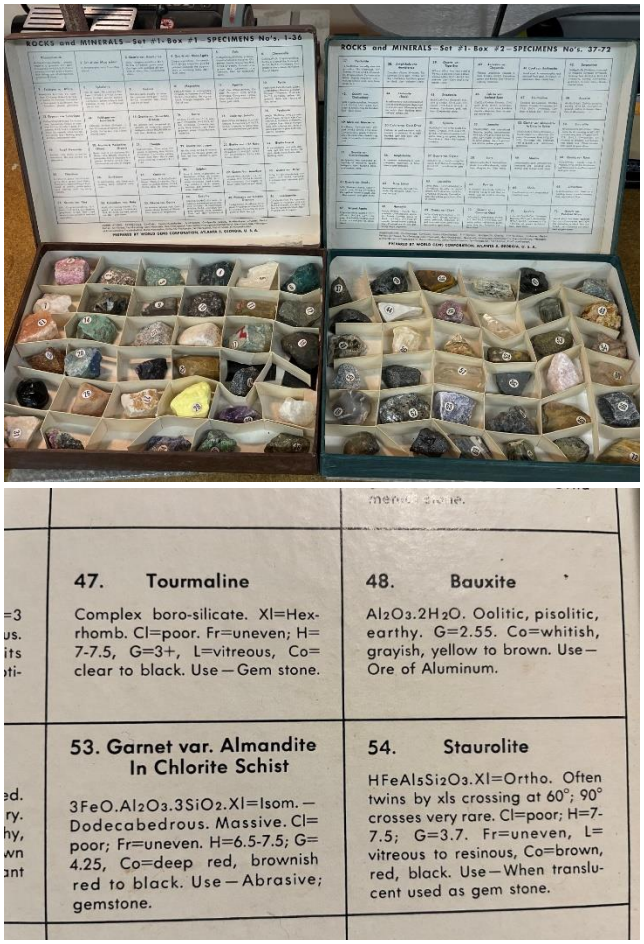


Figure 2—*A two-part set of rocks and minerals to support educational activities, received as a donation by NVMC President Jason Zeibel. The lid shows technical information for each numbered specimen.*

I would say that the majority of them by weight wind up as yard art in my backyard. There are frequently lots of river rocks and random pieces of milky quartz.

In November, however, I picked up a very interesting set of minerals assembled in the early 1960s. According to the label, the collection was "distributed" by Colonial Films of 71 Walton St., NW, Atlanta, GA. A realtor's office is at that address today, and I could find no current company with the moniker Colonial Films.

The set contains 72 mineral specimens in two boxes of 36 each. Each specimen has a numbered small white dot. The technical information for each specimen is listed inside the lid, including chemical formula, crystal structure, hardness, streak, and uses. I can't help but wonder whether a similar set would be put together



Figure 3—*NVMC's own Kathy Hrechka gave a presentation at the November club meeting on prospecting at Arkansas's Crater of Diamonds State Park. Here she shows off a small diamond specimen she acquired.*

today with the same level of care and technical detail. If so, I'm sure it would be quite pricey.

Crater of Diamonds

NVMC Vice President Craig Moore was able to persuade Kathy Hrechka, in addition to teaching merit badges, to grace our club with a detailed presentation about diamond prospecting at Crater of Diamonds State Park in Arkansas (fig. 3).

I was struck by how small the area of diamond-bearing soil is in the park. Eighty acres sounds like a lot, but it really isn't.

The geologic mapping of the lamproite host rock was far more extensive than I'd known. If this mine had been in some other country, I bet that the entire host rock would have been long ago extracted and processed by some commercial entity. The fact that this mine location exists for all of us to enjoy and explore is truly amazing. My daughter Celia is already trying to convince me to plan a future vacation in Arkansas. Of course, the beautiful quartz crystals that come from there are a nice bonus.

November Field Trip

Celia and I also had the opportunity to join our club Field Trip Co-Chairs Katy and Mickey Johnson and a number of other club members for a geology walk on upper Accotink Creek in Fairfax City (fig. 4) (see the article on page 10). The area has been under near-drought conditions, so the creek was a trickle, although several deep pools required appropriate footwear to explore (fig. 4, top).

We were treated to Roger Haskins, Sue Marcus, and Hutch Brown interpreting the local geology for the assembled participants. Then we wandered along the creek bed examining rocks and minerals, which fell mainly into two categories.

In the largest category were the many quartz specimens we saw, mostly milky quartz tinted from nearly white through red to brown, depending on how much iron oxidation appeared on surfaces and how much iron, aluminum, and other impurities were incorporated into the mineral structure.

In the second category were metamorphic rocks that originated in sedimentary layers laid down hundreds of millions of years ago over tens of millions of years. Many of these rocks contained various amounts of mica, garnet, magnetite, and other minerals, and they often crumbled when handled. They were largely on the way to becoming the clays that lined the streambed.

A heartfelt thanks goes out to all involved in setting up and executing this field trip!

Holiday Party Coming Up

On December 2, we will have our annual holiday party together with our friends from the Micromineralogists of the National Capital Area (see the box on the next page).

The December meeting is also traditionally the time for our club's annual elections. The current slate of



Figure 4—*NVMC geology walk at upper Accotink Creek.* ***Top:*** *Field Trip Co-Chair Katy Johnson ankle deep in the field trip experience.* ***Center:*** *Jason Zeibel and his daughter Celia on the leaf-strewn creek bed.* ***Bottom:*** *Specimens collected by Jason and Celia.*

elected club officers (president, vice president, secretary, and treasurer) has decided to stand again for a third year in office. Obviously, anyone who is interested in challenging us is welcome to do so (see the following article for more information).

Should I be reelected, I will be happy to spend one more year as your president. I have decided, though, that 2025 will be my final year as president for the time being. I work for the Army, and in the Army it is standard practice for positions not to exceed 3 years. Otherwise, an organization can stagnate, failing to incorporate new ideas and viewpoints. So consider this my 1-year warning.

It has been a great ride so far, and I certainly hope that 2025 will be rewarding as well. I am sincerely hopeful that we have reached a level of sustainability that will keep the club prospering long past my presidency. Start thinking now whether you feel the call to lead our organization! I'm happy to have someone shadow me in 2025 to learn the ropes.

Please continue to keep an eye out for good speakers and send a corresponding note to Craig Moore, who has the difficult job of coordinating speaker schedules. If you have a topic that you are excited about and feel motivated to present on it, then let Craig know!

Jason

2025 Club Officer Elections

Our December 2 holiday party will start with a short business meeting to elect club officers for 2025. We have many club officers (see the list on the last page of this newsletter), but only four positions are elected each year:

- The ***President*** presides over club meetings and helps to coordinate club activities, ranging from auctions and the annual club show to field trips and the club newsletter.
- The ***Vice President*** assists the president and coordinates programs and speakers for the monthly club meetings.
- The ***Secretary*** summarizes what happens at club meetings, including any presentations, and sends the summary to the editor for the club newsletter.
- The ***Treasurer*** collects club dues, keeps records of club members, and handles all club financial transactions.

Jason Zeibel, Craig Moore, Almas Eftekhari, and Roger Haskins have agreed to stand again as elected club officers. If you would like to put your name into the hat for any of the four positions, please do so!

We also have a number of unelected club officers, including vacant positions for Communication and Greeter/Door Prizes. Please consider volunteering for these or any other club officer position that opens up.

In the past, club members have volunteered for positions they invented themselves, such as Photographer; we once had a position for Hospitality (supplying drinks and snacks at meetings). If you see an unfilled role you want to play, please volunteer!

If you might be interested in running or volunteering for any club office—or just finding out more—please contact Jason Zeibel at president@novamineralclub.org or Craig Moore at vicepresident@novamineralclub.org.

Holiday Party
December 2, 6:30–8:30 p.m.

The NVMC and the Micromineralogists of the National Capital Area are jointly hosting a holiday party this year, continuing a seasonal tradition. EFMLS President Bill Stephens will join us to bestow the regional adult membership award on our club and to say a few words about EFMLS.

We're holding the party at the Dunn Loring Fire Station, 2148 Gallows Road, Dunn Loring, VA. The clubs will furnish the main course(s) and drinks; we ask you to bring a side dish or dessert.

For anyone interested, we'll do our traditional gift exchange. If you want to participate, please bring a wrapped gift valued at up to $20 and related to geology, rocks, fossils, or minerals. Consider labeling it accordingly (as fossil, mineral, fluorescent mineral, and so on).



Meeting Overview
November 4

by Almas Eftekhari, Secretary

President Jason Zeibel kicked off our hybrid (both virtual and in-person) club meeting at about 7:45 p.m. Four visitors introduced themselves and named their favorite minerals or fossils.

Business Meeting

Jason announced that the NVMC now has a Facebook group and asked members to join. The group is for posting club events and other happenings. Jason hopes to have an Instagram account for the club soon.

The club is working with science teachers at Fairfax elementary schools to help students learn about rocks, minerals, and geology. We will encourage a teacher to come tell us about the partnership, perhaps at our holiday party on December 2.

For our holiday party, the NVMC will arrange for locally catered food; drinks will come from the Micromineralogists of the National Capital Area (MNCA), who will be joining us. We will also have a voluntary gift exchange (see details on page 7).

Our holiday party will start with a short business meeting for electing club officers in 2025 (see the article on page 7). Jason and Vice President Craig Moore are willing to serve for one final year, so both will stand for reelection.

In the spring, we will hold a Young Collector Night. Members under 21 will be invited to speak for 15-20 minutes about a mineral or locality of their choice.

Show Chair Tom Taaffe spoke at length about the club show coming up on November 23-24. He asked club members to review the various roles they can play (described in the November newsletter) to help make the show a success and to use signup genius (links were in the newsletter) to volunteer. Signup blocks are generally in 2-hour periods, but 1 hour of volunteering gets you into the show for free.

Jason and Tom strongly encouraged members to volunteer for the Kids' Room, where the most help was needed. Working in the Kids' Room is always rewarding, and we will have new quizzes this year. You don't necessarily work directly with kids; other tasks are also required.

We also needed people to announce door prizes and help the winners pick a prize. If you're at the show, you can always help by identifying yourself to dealers as a club member and asking whether they need a bathroom break or any other assistance.

Tom and Jason both noted that we needed donations of specimens for the silent auction, for door prizes, and for the Kids' Room. If you have extra rocks, minerals, or fossils, please consider donating for next year! For the Kids' Room, we're always looking for small specimens that are pretty and educational and that aren't dangerous for kids.

Tom was going to mail out ads for the show, and he passed out flyers that members could use to advertise on social media themselves.

Jason asked any club member not getting his emails to let him know.

Field Trip Co-Chair Mickey Johnson announced the next field trip, a geology walk on upper Accotink Creek on November 9 (see the article on page 10). It's a great spot for kids and for friends to join in, with educational opportunities and a beautiful autumn walk. Guests are always welcome on geology walks!

Presentation

Jason introduced club member Kathy Hrechka, the speaker for the evening. He thanked Kathy for twice joining his Scout troop to teach geology.

Craig then officially introduced Kathy, a longstanding member of clubs in our area and the newsletter editor for the MNCA. Kathy's career as a flight attendant allowed her to travel the world and visit a lot of mineral and geology sites.

Kathy's presentation focused on her collecting trip on Mother's Day in 2022 at Crater of Diamonds State













Park in Murfreesboro, AR. The best time to collect, she said, is after a heavy rain. She flew into Little Rock, AR, bringing collecting tools and then renting a bucket and wagon onsite.

The farmer John W. Huddleston first found diamonds at the site in 1906. A mining company acquired the farm and prospected for diamonds there. The company found the Uncle Sam Diamond: at more than 40 carats, it is the largest diamond ever unearthed in the United States. Faceted, it is now on display at the Smithsonian Museum of Natural History. In 1972, Crater of Diamonds became a state park; more than 70,000 diamonds have been found by visitors since then!

The diamonds were contained in lamproite, a volcanic rock originating in the Earth's mantle. An eruption linked to ancient tectonic events left diamond-bearing lamproite across what is now Crater of Diamonds State Park. Lamproite is chemically different from the diamond-bearing kimberlite of Africa. The Arkansas diamonds are mostly clear but come in a variety of colors, including yellow, brown, and even black.

Kathy brought sifters and other equipment with her to the meeting, which she showed to everyone. Despite hours of searching at the park, she didn't find any diamonds herself. She went to a local shop and used a "silver pick" (money) to obtain a small diamond so she didn't have to leave empty-handed.

If anyone wants Kathy's slides, they can reach out to Jason and get them.

November Field Trip

Upper Accotink Creek

by Katy Johnson, Field Trip Co-Chair

On November 9, more than 20 club members, Fairfax Master Naturalists, and community members joined an NVMC field trip to explore the geology of upper Accotink Creek. We met in Country Club Hills Common Park in the suburbs of Fairfax City on a beautiful though chilly fall morning. Field trip leaders Roger Haskins, Sue Marcus, and Hutch Brown started by showing us the field trip site on the USGS geologic map for the Fairfax Quadrangle. They explained the general geology of the area and the rock formations and types we would see.



Then everyone filed down to Accotink Creek, which was low due to drought. The area was covered with autumn leaves, making the bedrock and gravel bars hard to see—but we managed.



Finds included lots of quartz in various hues, along with weathered brown bedrock and greenish-gray metamorphic rocks, possibly including quartzite, schist, phyllite, and metasiltstone. Some thinly foliated (finely layered) greenish-gray rocks contained tiny crystals of black magnetite or reddish garnet.

A great big thank you to our field trip leaders! They did an amazing job of highlighting a community creek and teaching us about our local geology. Quick facts: the metasiltstone, phyllite, and schist that make up the local bedrock, which is more than half a billion years old, were metamorphosed during the first phase of the Appalachian Orogeny about 470 million years ago.



Enjoy the photos, and be on the lookout in next month's newsletter for an article on the geology of upper Accotink Creek!



The Rocks Beneath Our Feet

Virginia's Gold-Pyrite Belt, Part 2: Prospecting for Gold

by Hutch Brown

Editor's note: *This is a revised version of articles that appeared in* The Mineral Newsletter *in October/November 2018. Part 1 was in the November 2024 issue.*

Prospectors once panned and mined for gold from Maryland to Alabama. In Virginia, the gold-bearing rock was concentrated in a band ranging from Fairfax County's Kirk Mines southwest to mines in Appomattox County (fig. 1). Known as the Gold-Pyrite Belt, the rock produced pyrite, valuable for its iron content, in addition to gold. You can still find traces of gold and pyrite in streams within the Gold-Pyrite Belt.

The belt lies in the western part of Virginia's Piedmont Province. What geologists call the country rock (the native bedrock) in the Piedmont is largely metamorphic, but it also has massive igneous intrusions. The intrusions are clues to the origins of the gold and pyrite once mined in our area.

Half a billion years ago, the igneous intrusions were zones of rising magma deep underground. The magma drove superheated fluids rich in dissolved minerals into cavities in the country rock. When the liquids cooled, they left veins and bodies of quartz. Where the superheated fluids contained sulfides and metals, gold and pyrite sometimes precipitated out with the quartz, leaving valuable ores.

But how exactly did the hydrothermal processes work? How did quartz become a host rock for gold? For that matter, what *is* a host rock?

Quartz Host Rock

A host rock is not an ore but rather a rock that contains an element or mineral in sufficient quantities to mine for profit. Quartz is a common host rock for gold.

Figure 1 shows a gold nugget from one of the earliest gold mines in Virginia. The Whitehall Lode in Spotsylvania County, discovered in 1806, was mined from 1848 to 1884, producing about $13.7 million worth of gold in today's dollars. Veins of quartz in the Whitehall Lode yielded native (pure) gold as well as gold-containing pyrite and galena.

The Whitehall Lode, like other lodes in the Gold-Pyrite Belt, was embedded in metamorphic bedrock, in

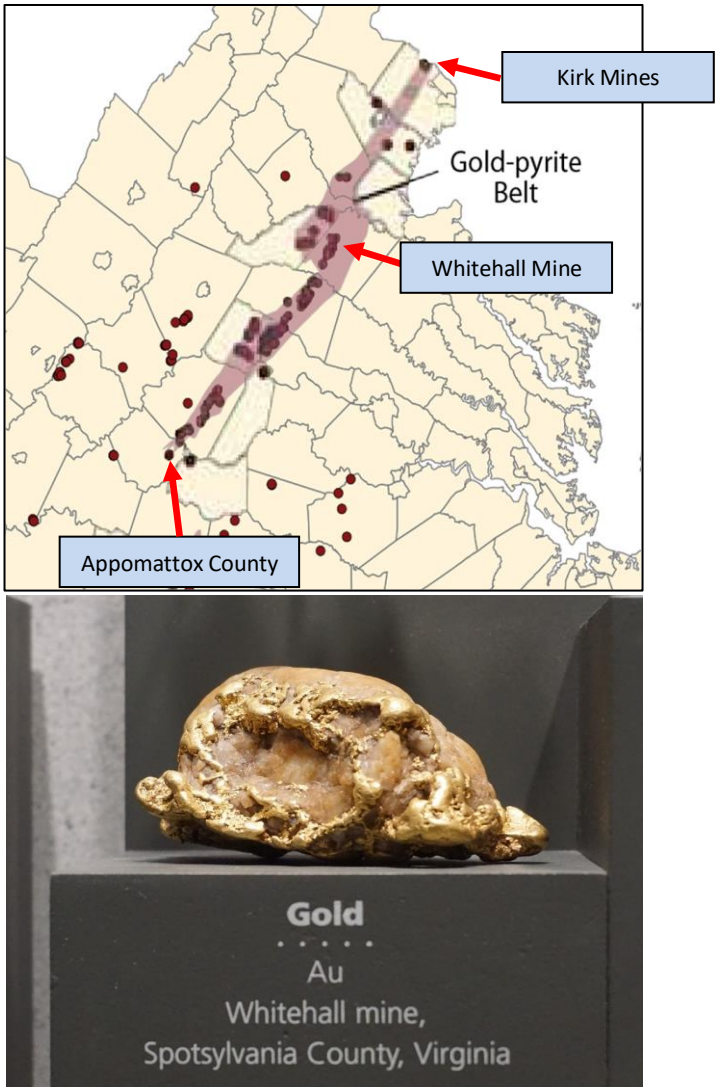


Figure 1—*Gold in Virginia.* ***Top:*** *The Gold-Pyrite Belt in north-central Virginia (shaded area). Purple dots = gold mines and prospects. Source: Sweet (2007).* ***Bottom:*** *Gold nugget from the Whitehall Mine, on display at the Smithsonian National Museum of Natural History. Source: Minerals.net (2015); photo—Hershel Friedman.*

this case the Chopawamsic Formation southwest of Fredericksburg, VA. The Chopawamsic comprises ancient metasedimentary and metavolcanic rocks, such as schists and greenstones. Like most Piedmont bedrock in our area, the Chopawamsic formed in a volcanic island arc known as the Taconian (or Taconic) Terrane. The Taconian Terrane has a complex geologic history of multiple orogenies (mountain-building events), including collision and consolidation with at least one other small land mass in the proto-Atlantic Ocean.

About 474-450 million years ago, the Taconian Terrane collided with proto-North America, sliding over the continental margin and remaining attached. The colliding land masses pushed up a mountain range known as the Taconian Mountains. After the mountains weathered away, their roots formed the bedrock for much of today's Piedmont Province.

Rising Magma

The approaching Taconian Terrane and the ensuing collision with proto-North America generated tremendous geologic activity. Magma from deep in the Earth's mantle rose to the surface, erupting in volcanoes and spilling over in lava flows. The resulting basalts and rhyolites are still evident in the metavolcanic rocks found today in parts of the Piedmont.

But much of the rising magma cooled and solidified deep underground, forming dikes, sills, and plutons of intrusive igneous rock (fig. 2). The buried magma cooled only slowly, forming coarse-grained granitoids like granite, diorite, and tonalite.

Weathering has exposed the igneous intrusions, which punctuate the metamorphic bedrock in the Piedmont today. The intrusions include enormous plutons; in large parts of the Piedmont in southern Virginia, for example, the country rock is predominately granite and gneiss.

The same is true for parts of northern Virginia. The area has many small igneous intrusions, but some are huge. Figure 3 shows a cross-section of bedrock types along the Potomac River from Bullneck Run (circled), which lies in the Gold-Pyrite Belt, to Turkey Run (circled) on the George Washington Parkway near Washington, DC. The map suggests that the metamorphic bedrock—ranging from the Mather Gorge phyllonite (**CZmp**) at Bullneck Run to the Sykesville sedimentary melange (**Cs**) at Turkey Run—is bordered by igneous intrusions (the Georgetown Intrusive Suite, made up mainly of tonalites, **Ogb** and **Ogh**).

In fact, the mines and prospects in Virginia's entire Gold-Pyrite Belt are all relatively close to outcrops of igneous rock. And that is no coincidence.

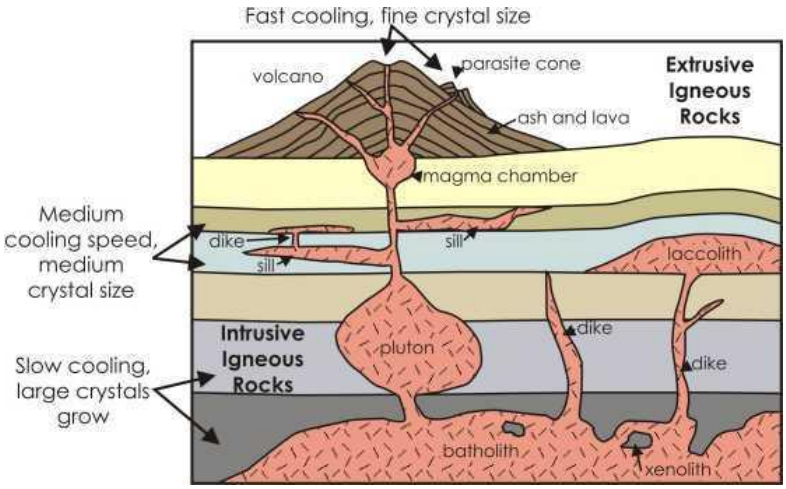


Figure 2—*Schematic depiction of how igneous rock forms. Where rising magma erupts in volcanoes, it rapidly cools into fine-grained extrusive igneous rock like basalt and rhyolite. Where the magma cools underground, it forms dikes, sills, plutons, and other bodies of intrusive igneous rock. The slowly cooling magma forms relatively large crystals in granite, gabbro, and other coarse-grained igneous rocks. Source: N.a. (2012).*

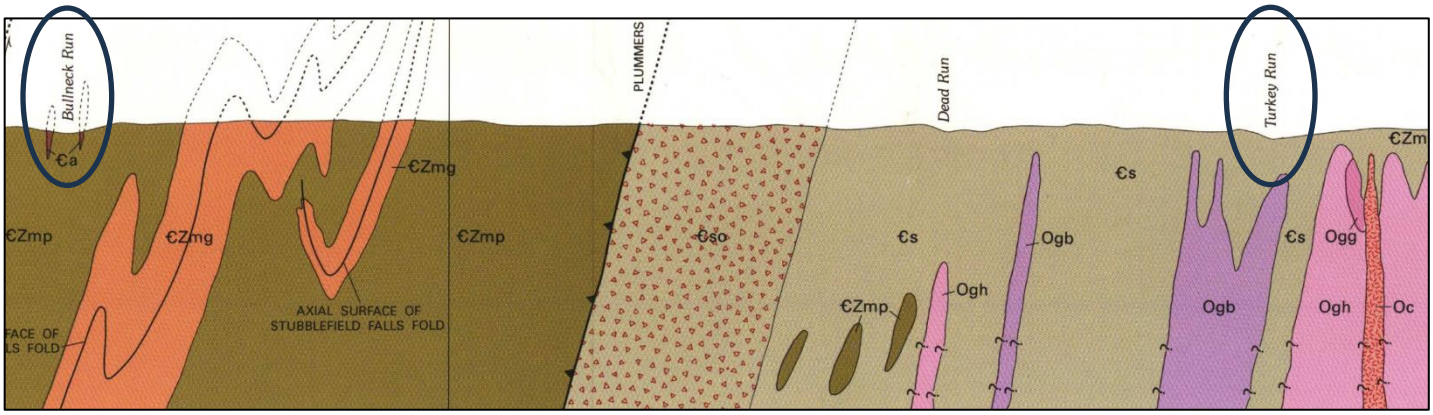


Figure 3—*Cross-section detail from a geologic map of the Falls Church Quadrangle. Circled are Bullneck Run, site of a gold mine active in the early 1900s, and Turkey Run near Interstate 495.* **CZmp** *= Mather Gorge phyllonite;* **Ca** *= amphibolite;* **CZmg** *= Mather Gorge metagraywacke;* **Cso** *= Sykesville Formation with 50%+ phyllonite ostoliths;* **Cs** *= Sykesville sedimentary melange;* **Ogh/Ogb** *= Georgetown tonalites;* **Ogg** *= Georgetown gabbro;* **Oc** *= Clarendon granite. (***C** *= Cambrian,* **Z** *= Proterozoic,* **O** *= Ordovician.) Source: Drake and Froelich (1997).*

Hydrothermal Processes

Gold deposits can form in geologic environments ranging from shallow sedimentary rock to deeply buried metamorphic rock; all are near igneous rock, whether extrusive or intrusive. The Gold-Pyrite Belt in our area formed in deeply buried metamorphic rock affected by magma rising from the Earth's mantle many miles underground (fig. 4, red circle).

The metamorphic country rock contained not only water but also plenty of quartz, the second most common mineral on Earth (after feldspar). Quartz has a relatively low melting point, as does gold. Tremendous heat from the rising magma melted gold as well as quartz and other minerals in the country rock; the melt then dissolved in water drawn from the country rock as well as from the magma itself.

The superheated fluids then rose through the country rock, forming convection currents as cooler fluids rushed in to replace them. In some places, the superheated fluids altered the adjacent country rock by contact, infusing it with gold and minerals. The superheated mineral solutions also forced their way into faults and other openings in the country rock.

As the liquids cooled, the minerals precipitated out, including quartz-forming silicas. Gold precipitated out of cooling fluids together with quartz, which formed a host rock for it. Where the fluids contained sulfides and iron-associated metals, they deposited pyrite, and other minerals in the country rock, typically in connection with quartz. In addition to gold and pyrite, minerals found in the Gold-Pyrite Belt (usually in small quantities) include garnet, galena, sphalerite, pyrrhotite, chalcopyrite, tourmaline, and more.

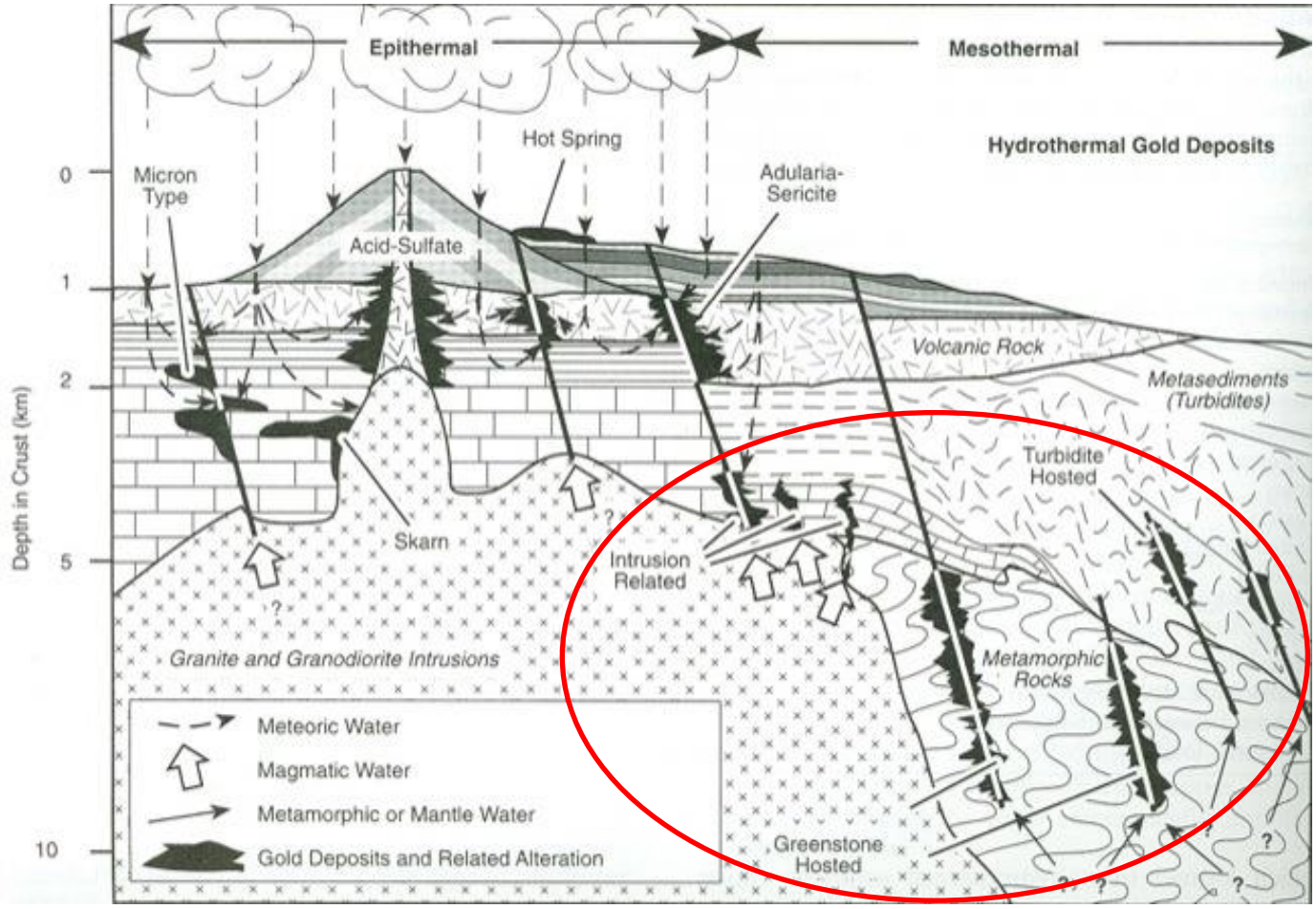


Figure 4—*Schematic illustration of geologic environments in which hydrothermal gold deposits form. Arrows = various sources of the water involved in the hydrothermal processes (surface water, groundwater, magma, and water from rocks and the mantle); black = gold/quartz deposits and contact alteration of the country rock; red circle = hydrothermal processes likely at play in forming the Gold-Pyrite Belt in the Virginia Piedmont.* Source: *Kesler and Simon (1994).*

In short, tectonic events drove hydrothermal processes that infused gold- and pyrite-bearing quartz into the Piedmont country rock. Erosion has since exposed both the buried metamorphic rock and the igneous intrusions, including quartz. Eroded from the lighter host rock, gold flakes and kernels washed into streams.

So who discovered the gold and what happened next?

Gold Prospecting

The earliest known report of gold in Virginia 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 Fall Line zone. The rock probably came from the Gold-Pyrite Belt upstream, to the west of what is now Fredericksburg.

Gold mining in Virginia began in 1804 and lasted until 1947. In all, the state produced about 100,000 troy ounces of gold, worth more than $200 million at today's prices. (By comparison, Nevada produced more than 4 million ounces of gold in 2023 alone.)

In northern Virginia, the first discovery of gold came in 1861 during the Civil War, when Union soldiers who had prospected for gold out West found grains of gold while washing pans in a creek near Great Falls in Maryland. 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 Mather Gorge to Pimmit Run near Chain Bridge in Arlington. They found enough gold in the 1870s to supply jewelry stores in Georgetown.

Fairfax Gold

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

After discovering gold-bearing quartz veins that crossed under the Potomac from Maryland, Kirk pinpointed two promising locations for establishing gold mines (fig. 5, yellow diamonds). He placed one mine 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. Kirk placed his other mine along Bullneck Run (–77.21579, 38.96531 (WGS84)).

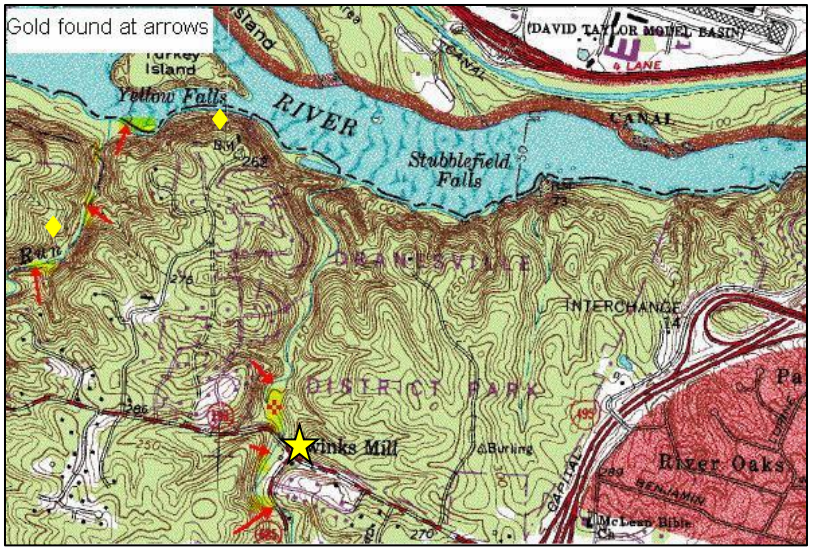


Figure 5—*Map of the area near Swinks Mill (yellow star) in northern Fairfax County, part of the Gold-Pyrite Belt in Virginia. The geologist George Hamilton used red arrows to mark places where he found gold in Scotts Run near Swinks Mill and in Bullneck Run to the west. The yellow diamonds show the approximate locations of the two Kirk Mines. Source: Saum (2012).*

But the quartz in Fairfax County was never rich in gold. The Kirk Mines operated off and on from the 1890s to the 1930s but seldom at a profit, and the processing mill and other structures were finally 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 processing plant. According to Wright and Meintzer (1979), "With the number of rockhounds who have been in the mine, there is probably very little ore left."

In the 1970s, the entire area was developed for high-end housing. The only exception was an enclave on Scotts Run, shown in figure 4 as Dranesville District Park and now known as Scotts Run Nature Preserve.

Panning for Gold

As figure 4 suggests, you can still find traces of gold in both Scotts Run and Bullneck Run if you are patient and lucky enough. However, the county forbids gold panning in Scotts Run Nature Preserve.

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

Other Potomac tributaries in Virginia's Gold-Pyrite Belt range from Difficult Run below Mather Gorge to Pimmit Run in Arlington, and they almost certainly contain traces of both gold and pyrite. But most lands along the Potomac are managed by the National Park Service as nature preserves, which preclude any sort of resource extraction.

Virginia's Story of Gold

Gold deposition in Virginia is a story beginning with gold, iron, and other metals borne to Earth by showers of meteors and asteroids about 4.3 billion years ago, then lodging in Earth's mantle. The story continues with magma rising from the mantle due to colliding tectonic plates about half a billion years ago. The resulting magma plumes drove superheated fluids containing dissolved minerals into cavities in the country rock, depositing quartz rich in gold and pyrite in a belt of rock just west of the Fall Line zone in the Piedmont.

Gold was discovered and mined in parts of Virginia in the 19th and early 20th centuries, including Fairfax County. Gold was never abundant in northern Virginia, but panning for gold remains feasible in some local streams. Panning could yield grains of gold for those curious enough to obtain the equipment and patient enough to learn and practice the technique. You can find how-to information on gold panning here.

One potentially promising location is Scotts Run, open to public use on the floodplain upstream from Swinks Mill. You can get to Swinks Mill from the parking lot at Scotts Run Nature Preserve. Rivers in Virginia's Gold-Pyrite Belt include the Rappahannock and the James; a bit of information on panning for gold in both is here. In addition, Lake Anna State Park in Spotsylvania County has offered ranger-guided panning, though not since 2022.

Acknowledgment

Thanks to Roger Haskins and Sue Marcus for furnishing materials and reviewing an earlier version of the article. Any errors are mine.

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

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The Rocks Beneath Our Feet

Columbia River Flood Basalts

by Hutch Brown

On my way to visit family in Idaho last August, I passed through the city of Spokane in eastern Washington. I took the opportunity to see Spokane's Riverfront Park, site of the 1974 World's Fair (Expo '74). The Spokane River, a tributary of the Columbia River, flows through the park. Adjacent Huntington Park, an addendum to Riverfront Park, features spectacular Spokane Falls (fig. 1, top).

Though partially broken by a dam and hydroelectric facility, the falls were impressive, even with the river at summertime lows. While admiring the view, I took a close look at the bedrock and recognized beds of basalt (fig. 1, bottom). I wondered where the basalt came from, so I looked it up—and it's a remarkable story.

Pleistocene Floods

Most bedrock in our own area is half a billion years old or more. Not so in the vast Columbia River basin (fig. 2), which reaches from the Pacific coast through Idaho into Montana. The basin was shaped by two relatively recent geologic events—"the world's largest floods of water on top of one of the world's largest floods of lava," according to a professor of geology at Eastern Washington University (Corrigan 2001).

The world's largest floodwaters came during the Pleistocene Epoch (from about 2.6 million to 11,700 years ago). Towards the end of the Pleistocene (about 15,000-13,000 years ago), a lobe of the Cordilleran Ice Sheet (fig. 2, white) repeatedly dammed Clark Fork, a major Columbia River tributary in Montana. What geologists call Glacial Lake Missoula—2,000 feet deep and the size of Lakes Erie and Ontario combined—formed behind the ice dam in western Montana (fig. 2). Whenever the ice dam burst—which happened about 40 times over a 2,000-year period—a volume of water equivalent to 60 Amazon Rivers poured downstream at 30-50 miles per hour. Spreading out across huge areas of Washington and Oregon (fig. 2, blue), the floods created "channeled scablands" across much of the Columbia basin—landscapes with such features as dry falls, dry flood channels, and enormous ice-rafted boulders.



Figure 1—*Part of Spokane Falls in the city of Spokane, WA.* ***Top:*** *The falls below the hydroelectric dam.* ***Bottom:*** *Basalt bordering the falls. Photos: Hutch Brown.*

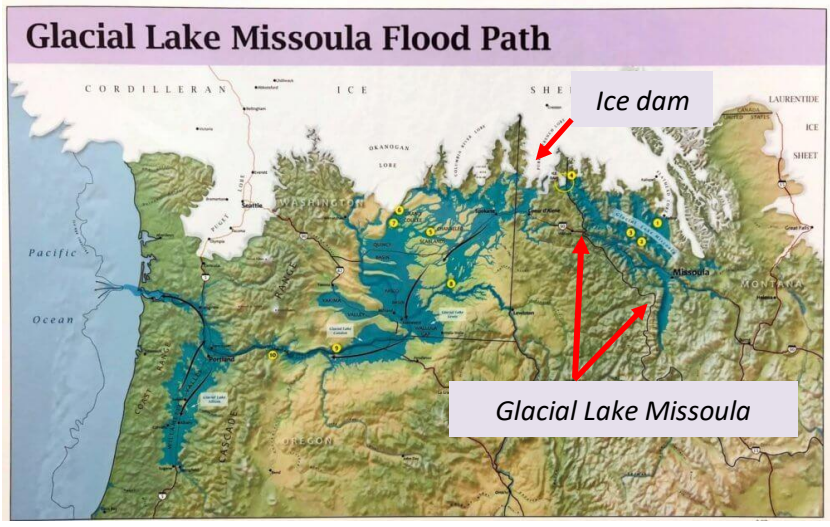


Figure 2—*Glacial Lake Missoula and the areas it flooded (blue) whenever its ice dam broke. Source: MNHC (n.d.).*

Miocene Lava Floods

The lake's flood path across the Columbia basin formed long before the Cordilleran Ice Sheet. The basin emerged during the Miocene Epoch (about 23-5.3 million years ago), a time when—in our own area—the foundations were being laid for today's trove of Miocene marine fossils at Maryland's Calvert Cliffs.

Some geologists believe that what shaped the Columbia basin was the hotspot of doming magma that now underlies Yellowstone National Park. A similar hotspot created the Hawaiian Islands as the Pacific Plate moved over it in the Pacific Ocean (see the April 2024 issue of this newsletter). The hotspot beneath the North American Plate seems to move eastward as the plate gradually slides to the west. Today, the hotspot's great magma chamber produces the hydrothermal activity that attracts tourists to Yellowstone.

Within the last 2 million years, the chamber generated three massive eruptions hundreds or even thousands of times greater than the 1980 eruption of Mount St. Helens in Washington state. About 15 million years ago, that same magma chamber underlay the southwestern corner of Idaho. Some geologists believe that the hotspot is responsible for great lava flows in southeastern Washington and northeastern Oregon during the late Miocene, about 17-6 million years ago.

The eruptions did not build cinder cones like Mount St. Helens, Mount Vesuvius, and other volcanoes along converging tectonic plates. Instead, the inland eruptions produced floods of lava from a subterranean magma dome through "swarms" of dikes with vents (fig. 3, blue lines). The lavas flooded vast parts of the inland Northwest (fig. 3, yellow), hardening into basalts known as the Columbia River Basalt Group. The flood basalts derived from more than 300 individual lava flows, a rare phenomenon in Earth history (the Siberian Traps, the Deccan Traps of India, and Catoctin greenstone in our own area are much older instances).

The great lava floods poured across the Columbia basin and down the channel of what is now the Columbia River into the sea. The eruptions ultimately covered an area of 63,000 square miles with nearly 42,000 cubic miles of lava. The area is so large, with basalts that are so thick, that geologists classify it as the Columbia River Flood Basalt Province (fig. 3).

The Columbia River basalt unit at Spokane Falls is called Grande Ronde basalt, named for a river in Oregon (fig. 4). According to the geologic map for Spokane County (Johnson and others 1998), the Grande Ronde lavas erupted from vents in Idaho, passed through eastern Washington, then followed the course of today's Columbia River all the way to the Pacific Ocean.

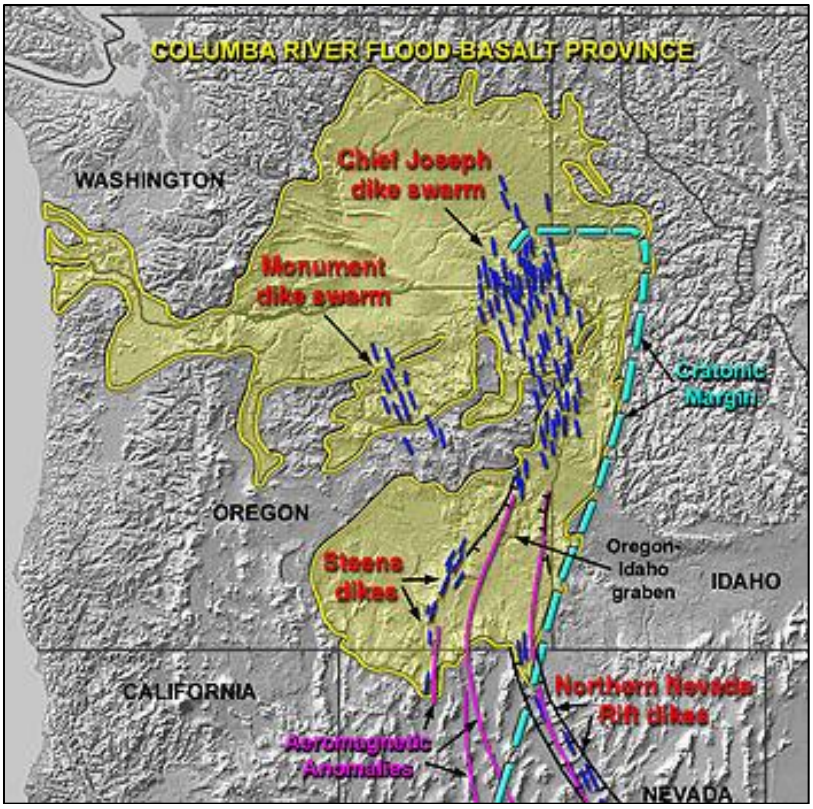


Figure 3—*The Columbia River Flood Basalt Province (yellow), formed from lava floods produced by a subterranean magma dome through swarms of dikes (blue). The Spokane Falls basalt originated from lava erupting from the Chief Joseph Dike Swarm (center right). Source: Wikipedia (Victor Camp and Martin Ross).*



Figure 4—*Grande Ronde River. Note the steplike layers of basalt on the right. Source: Oregon State Archives.*

Geologic Features

The geologic map for Spokane (Johnson and others 1998) describes the Grande Ronde basalt as typically 50-80 feet thick and "composed of dark-brown glass, plagioclase, pyroxene, minor olivine, and abundant disseminated magnetite and/or ilmenite."

The region's many canyons and coulees (dry flood channels) often have slopes with steplike layers of basalt (fig. 4). Successive lava flows caused the stairstep stacking, which gave rise to the terms "trap rock" and "traps" (such as the Deccan Traps). The term reportedly derives from Swedish *trappa*, "stairway." Trap rock is the commercial term for any fine-grained, nongranitic igneous rock, including both basalt and diabase. A major commercial use is as crushed rock for roadbuilding and housing construction.

Lava often forms distinctive hexagonal columns as it cools into basalt. Although the bedrock at Spokane Falls produced no well-formed columns, it is recognizable as basalt in part from its angular cracking and columnar shapes (fig. 5, red arrows).

The shapes have a physical cause. The Miocene flood lavas spread out evenly at about the same depth, cooling from the surface down. As the rock cooled, it cracked at the surface to relieve stress. Cracking in a hexagonal pattern (with regular 120-degree angles) relieves the maximum stress per unit of crack. (You can see it in drying mud: the same hexagonal patterns are common in mudstones from ancient lakes and lagoons.) After the cracking began in the cooling lava, the vertical stress gradients in the rock kept the cracks going down through the flow, forming hexagonal columns that can be extremely long.

Basin Formation

The great traps of the inland Northwest paved the way for the Pleistocene floods by shaping the Columbia basin. The subterranean magma chamber underlying the region during the Miocene drained its contents through massive lava flows over millions of years. As the emptying dome slowly subsided, so did the overlying surface of the land, forming the vast basin we see today. The Columbia River flood basalts thus set the stage for the great Pleistocene floodwaters to come.

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Figure 5—*Basalt bedrock at Spokane Falls. Note the evenly spaced cracks and joints, the angular shapes, and the incipient columns (red arrows). Photo: Hutch Brown.*

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

Sun	Mon	Tue	Wed	Thu	Fri	Sat
1	2 Joint club holiday party	3	4 MSDC holiday party	5	6 Show, Swannanoa, NC	7 Show, Swannanoa, NC
8 Show, Swannanoa, NC	9	10	11	12	13	14
15	16 GLMSMC holiday party	17	18	19	20	21
22	23	24	25 Christmas	26	27 Winter begins	28
29	30	31				

Event Details

2: Fairfax, VA—Joint holiday party (Northern Virginia Mineral Club/Micromineralogists of the National Capitol Area); details on page 7.

4: Washington, DC—Holiday party (Mineralogical Society of the District of Columbia); info: http://mineralogicalsocietyofdc.org/.

6-8: Swannanoa, NC—Show; Mountain Area Gem and Mineral Association; Land of the Sky Shrine Club, 39 Spring Cove Rd; Fri 9-6, Sat 9-6, Sun 10-4; admission free; info: Richard Jacquot, 828-779-4501, rickjacquot@gmail.com; www.AmericanRockhound.com.

16: Rockville, MD—Holiday party (Gem, Lapidary, and Mineral Society of Montgomery County); info: https://www.glmsmc.com/.



November NVMC field trip to Country Club Hills Common Park. Participants are discussing the geology of upper Accotink Creek before going down to see the metamorphic bedrock and quartz-rich alluvium along the creek. Photo: Jason Zeibel.

The Northern Virginia Mineral Club, Inc.

Visitors are always welcome at our club meetings!

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

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

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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 (except possibly January and September) at the Dunn Loring Fire Station, 2148 Gallows Road, Dunn Loring, VA.* (No meeting in July or August.)

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

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