THE NORTHERN VIRGINIA MINERAL CLUB INC

# The Mineral Newsletter

**Meeting: March 26 Time: 7:30 p.m.**

**Long Branch Nature Center, 625 South Carlin Springs Road, Arlington, VA**

## Adamite

**from Attiki, Greece**

*Smithsonian Mineral Gallery. Photo: Penland.*

**Volume 59, No. 3**
**March 2018**
Explore our website!

**March Meeting Program:**

Spring Club Auction

**Deadline for Submissions**

March 20

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

**In this issue …**

## *Mineral of the Month*
## Adamite

*by Sue Marcus*

Our March mineral, adamite, can be green like a shamrock, although it also comes in many other colors. Many of us are lucky enough to have an adamite or two in our collections.

The first specimens of adamite came from the Atacama region of Chile, which has produced many unique minerals. The French mineralogy professor Charles Friedel (1832–1899) described the original material in 1866, naming the mineral after Gilbert-Joseph Adam. Adam, a financial official in the French government, was an avid mineralogist and collector who provided the original samples to Friedel. Adam discovered the first specimens of several other minerals as well.

Since the original material was described, better sources have been found in Mexico. Many of us have pieces from the famous Ojuela Mine in Mapimi, Durango, Mexico, in our collections. These specimens are known for lustrous crystals in various shades of green on a rusty, crumbly limonitic matrix, displaying a contrast of colors and textures.

Interestingly, this locality is also the source of most of the beautiful purple-hued cobaltianadamite crystals. I don’t know of any specimens with both green and purple crystals on the same specimen.

Most adamite specimens from Durango fluoresce green in long- and shortwave ultraviolet light. White, yellow, and yellow-green fluorescence have also been reported. Phosphorescence, when present, is brief. Adamite from Durango forms “wheatsheaves” or bow ties and radiating crystals, similar to Indian stilbite.

Fine adamite specimens have also been extracted from the mines in Tsumeb, Namibia. These are generally deeper, darker green than the Mexican material.

Older classic localities include Lavrion, Greece, and Garonne, France. The Lavrion adamite (see the sample on the cover) is usually either clear or more aqua than the green to yellow-green Durango adamite. Also, the Lavrion matrix is different and lighter colored than the Durango matrix, and the Lavrion crystals are more likely to be tiny (micros), though exquisitely formed. Larger specimens of Lavrion adamite seem to usually

## Happy St. Patrick’s Day!

**Northern Virginia Mineral Club members,**

Please join your club officers for dinner at the Olive Garden on March 26 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 Ti Meredith, Vice-President, NVMC. Please RSVP to me at ti.meredith@aol.com.

*Adamite specimens (microminerals) from the Ojuela Mine, Durango, Mexico. Photos: Bob Cooke.*

**Top:** *Adamite from the Ojuela Mine, Durango, Mexico.*
**Bottom:** *Adamite from Gold Hill, UT. Photos: Bob Cooke.*

have botryoidal forms. The Garonne adamite assumes a broad range of colors, although specimens rarely exceed 1 centimeter in diameter.

More recently, excellent crystals have come from Dal'negorsk, Russia, and Nandan, China. Some of the Chinese specimens look like the ones from Durango, both in coloring and in limonite matrix; the Nandan specimens also fluoresce like those from the Ojuela Mine. Photographs of adamite from the Brenner Mine in Dal'negorsk, Russia, remind me of Kelly Mine smithsonite. The Mindat images show gorgeous botryoidal aqua masses flowing over their matrix.

The United States isn't known for stellar adamite specimens. The best U.S. crystals come from Gold Hill in Toole County, UT, west of Salt Lake City, near the Nevada border.

Adamite is a minor zinc ore. It forms in the secondary, oxidized cap of primary mineral deposits that are rich in zinc and arsenic. Iron and manganese oxides, along with quartz, are the hosts for adamite, which is usually associated with some combination of smithsonite, olivenite, hemimorphite, and calcite.

I have mentioned "splitters" and "joiners" in other articles about the Mineral of the Month. Splitters pop up in broad discussions of adamite, too. Iron in the usual adamite crystal lattice (structure) colors adamite green. Added copper may become significant enough to form the variety called cuprianadamite or cuproadamite ($(Zn,Cu)_2(AsO_4)(OH)$), but I don't know at what exact point the split comes. Add cobalt (cobaltianadamite—$(Zn,Co)_2(AsO_4)(OH)$)—and the crystals are lovely purple, particularly at their tips or terminations.

I won't go into all the other splits except to note that Mindat mentions manganoan adamite, nickeloan adamite, alumino adamite, and the adamite-olivenite series. Zinc substitutions in the lattice can change the mineral to a zinc arsenate—tarbuttite—rather than adamite (again, I can't identify the point of change).

Adamite is not a practical gemstone due to its relative softness. Crystals are also seldom large enough to be faceted. If there is a chance, someone will try, so adamite has been faceted. The largest cut stone I could find mentioned is 4.61 carats from Durango. All the photos of cut adamite that I could find showed translucent, not transparent, cut stones. Adamite cleaves easily, which would add to the challenges of faceting or creating cabochons.

*Note:* When researching this article, I learned that adamite has two meanings: one concerns the mineral and is used here; the other is for a religious sect. Not here!

*Adamite from the Ojuela Mine, Durango, Mexico.*
*Photo: Bob Cooke.*

Technical details (source mostly Mindat):

Chemical formula ......$Zn_2AsO_4OH$

Crystal form ...............Orthorhombic

Hardness ....................3.5

Density.......................4.32–4.48 g/cm$^3$ (measured)

Color ..........................Usually shades of green, from yellowish-green though pure green to blue-green; also yellow, white, colorless, purple, dull orange to brown, rarely red

Streak .........................Usually white; less frequently light green

Cleavage ....................One good cleavage

Fracture ......................Uneven to subconchoidal

Luster .........................Vitreous

### Sources


Barmarin, Gérard. 2010. Database of luminescent minerals.
Gemdat. 2018. Adamite.
Mindat. 2018. Adamite.
Mineral News. N.d. Adamite mineral data.
Minerals.net. 2018. The mineral adamite.
Wikipedia. 2016. Adamite.


## Club Member Rocks and Minerals Auction Coming Up!

### March 26 Program


Our March club meeting will feature our Fall Club Auction! Proceeds from the auction go into the Fred Schaefermeyer Scholarship Fund, which supports students in the field of geology.

The meeting will start promptly at 7:30 p.m. (*note:* this is 15 minutes earlier than usual). We will quickly move through the business part of the meeting so we can get to the fun!

Sellers, come early to help set up the room and your items. Each auction item should be described on an individual bid slip (see page 22 for the forms—just print out as many pages as you need). Information on the bid slip should include:

- item number (your initials or other unique code followed by a sequence number);
- description;
- from (locality); and
- starting bid amount (the lowest bid you will accept for sale—if not stated, minimum bid is $1).

Also, use the summary sheet on page 23 to list all of your items for sale so that the Treasurer can record the final sales price and give you your money after the auction.

Bring guests or invite nonmembers who might be interested in rocks and minerals! Although only current club members are allowed to sell, the meeting and auction are open to all.

Please consider volunteering. The auctioneers, accountants, and runners are all volunteers—so help us out here, folks!

Bring small bills, bid early and often, and help us move on to the next item. We need to be out of our meeting room by about 10 p.m.

**** Note Current Club Auction Rules ****

- Any member may offer up to 20 specimens or up to 4 flats for auction.
- Each flat is one auctionable item.
- The club gets 15 percent of the purchase price; the remainder goes to the seller.
- Anyone may donate items to the auction to fully benefit the club (no money goes back to the donor).
- The minimum bid is $1 on any item. The minimum increase is also $1. Bids higher than $20 increase by $5.
- We start with a silent auction to assess interest in each item for sale. So look carefully and start bidding. Items with multiple bids during the silent auction will be brought sooner to the actual (vocal) auction.

Winning bidders must pay for the item promptly, with cash or check.

*Malachite acquired by a lucky buyer.*

## The Prez Sez

*by Bob Cooke, President*

The February monthly meeting had a spirited and frank exchange of ideas on how the club should and should not spend its money. Some people felt this was a waste of time; others indicated it was long overdue. By the end of the meeting, we had agreed to delete appropriations for attending AFMS, EFMLS, and Wildacres from the budget—with the caveat that these topics can be raised later in the year for specific expenditures.

Throughout the discussions, I tried to encourage people to voice their opinions. But I must admit, I did a lousy job of maintaining control. Although our club's bylaws state that "Robert's Rules of Order shall govern all of the deliberative meetings of the officers and members of this club," I'm afraid this mandate was violated more than it was followed.

In the short period after the program for the meeting and before the nature center's 10 p.m. curfew, there is not much time to conduct a business meeting. We certainly do not have the luxury of extended debates and filibusters enjoyed by our elected Representatives and Senators. I often feel guilty about wasting your time in business meetings and consequently rush through some items without doing them justice.

In an attempt to keep February's meeting moving along, I cut off some discussions, probably precluded some people from voicing their concerns at all, and consequently may have jumped to an erroneous impression on the group's consensus. It was not my intention to do a "slam-dunk." I apologize.

I am also becoming aware that it is a significant error when I fail to summarize a decision into a "motion" that can be seconded and voted on to become a formal part of the minutes. Henry Martyn Robert would be quite offended by my behavior.

There has to be a better balance between efficiency and decorum. I would like to encourage all NVMC members to help me find that balance. Your assistance in proposing motions to formalize our conclusions would be a good step in that direction. If you have any other suggestions on how to improve the conduct of business meetings, please bring them forward. Thank you!

*Bob*

## Meeting Minutes
### February 26, 2017

*by David MacLean, Secretary*

President Bob Cooke called the meeting to order at 7:45 p.m. at the Long Branch Nature Center, Arlington, VA.

The minutes of the January 22, 2018, meeting were approved as published in *The Mineral Newsletter*. The president recognized past presidents Sue Marcus, Barry Remer, and Rick Reiber.

### Annual Budget

The president presented the proposed NVMC budget for 2018. The Fred Schaefermeyer Scholarship Fund, which is supported by NVMC's share of the sales at the biannual auction, has a balance of approximately $3,000.

After discussion, club members agreed not to set aside NVMC funds for people to represent the club at Wildacres and at the EFMLS and AFMS conventions. However, the board will consider individual member requests for NVMC support to attend any of the three events. The board will bring approved requests to the members for a vote. Anyone receiving NVMC support to attend a federation convention is expected to examine the issues, serve as club voice, and vote per club instructions. Anyone attending any of the three events with club support is expected to report back to the NVMC, preferably with a newsletter article.

NVMC name tags will be sold to members at $5 each, with a $5 subsidy from NVMC to cover the $10 cost.

### Announcements

The president announced that the club asked the geology departments at James Madison University, George Mason University, and Northern Virginia Community College for NVMC scholarship nominees.

The Delaware Mineralogical Society will have its annual club show on March 3–4 at the Wilmington campus of the University of Delaware.

The Gem, Lapidary and Mineral Society of Montgomery County will also have its annual show on March 3–4. The GLMSMC show will be at the Montgomery County Fairgrounds in Rockville, MD.

The Loudoun County Library president requested that the NVMC provide an exhibit or program on Virginia rocks and minerals sometime during June, July, or, August 2018 as part of its *Reading Rocks!* program.

The Micromineralogists of the National Capitol Area will host its Midatlantic Micromounters Conference on April 6–7 at the Holiday Inn, 6055 Richmond Highway (Route 1), Alexandria. For more information, see the article on the next page.

Linda Benedict, David MacLean, Steve Parker, and Lyra Zeibel won fossil or mineral specimen door prizes.

The program for the evening was a slide show and presentation by Casper Voogt called "Mineral Collecting in Kola, Russian Federation."

## Thin Section Field Day

*by John Weidner*

Polish a rock. Glue it to a microscope slide. Cut it off at about a thousandth of an inch. Then look at it through a polarizing microscope.

You are looking at a thin section, a research tool in geology for over a hundred years. It's a way to make amateurs like me say "Wow!"

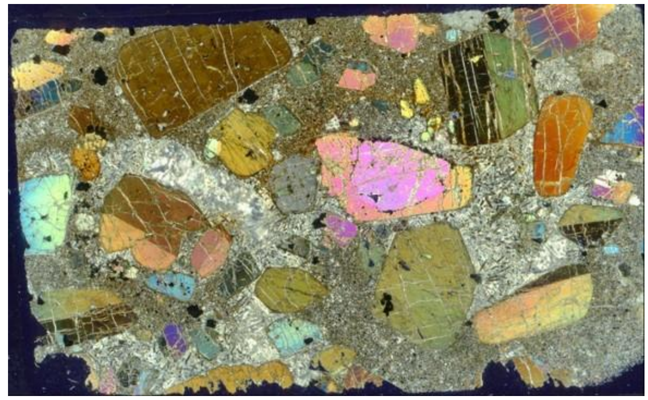
Like to look at some?

Come to the Thin Section Field Day at the Annandale Campus of Northern Virginia Community College (NOVA), March 24 and again on March 31, from 1 to 5 p.m. All ages are welcome!

NOVA is located a mile or so outside the Beltway at 8333 Little River Turnpike, Annandale, VA. From the Beltway, just take Little River Turnpike towards Fairfax.

As you come from the Beltway on Little River Turnpike, you will see the entrance to NOVA on the left. Drive past it and go left at the next light onto Wakefield Chapel Road. Go left at the third entrance (at the bottom of the hill). Then go left again into the bottom level of the parking garage. Parking is free at NOVA on weekends.

In the garage, drive up as far as possible, park, and walk out to the north. North is back toward Little River Turnpike; it is uphill.



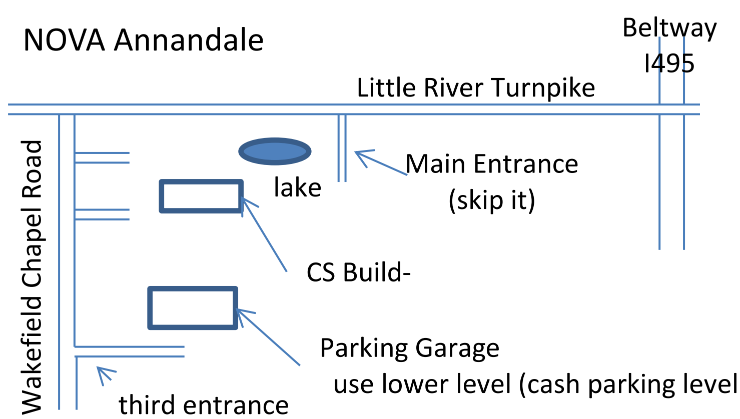
*Thin section of lamprophyre from northeastern Spain. Source: NOVA; photo—Paul Guyett (2014).*

If the garage is closed, then just park in the lot in front of the parking garage and come uphill past the parking garage.

The CS building is the only building truly north of the parking garage. It looks like a one-story building, but that's because you will be entering on the second level, which is where the geology lab is located. If you stop someone to ask, ask for the CS Building or the Science Building.

We will be set up in CS 217, which is in the northeast corner of the CS building. Follow the sounds of the happy mineralogists.

If you plan to come, please RSVP to me so we know how many people to prepare for. Email me at jfweidner42@gmail.com.



## Famous Gemologists and Why You Should Know About Them

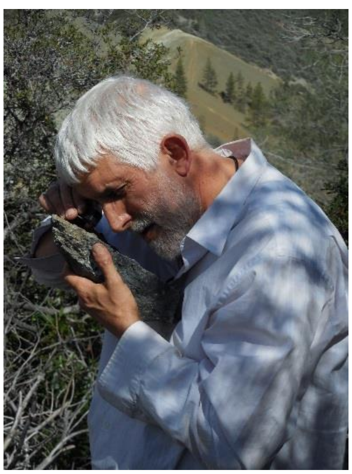
*By Edel Blake*

*Thanks to Sue Marcus for the reference!*

There is so much more to your diamond than beauty and sparkle. Gemology is the science of natural and artificial gemstones and gemstone materials, and people put in years of academic study to become a trained and qualified gemologist. Plenty of gemologists have made a huge impact on the jewelry industry—so here's what you need to know. … *Read more*.

***Save the Dates!***

## Annual Atlantic Micromounters' Conference Coming Up



The Micromineralogists of the National Capital Area, Inc., are holding their 45th Annual Atlantic Micromounters' Conference on April 6–7. Come enjoy mineral dealers, a micromineral auction, mineral giveaways, and more!

The featured speaker is Herwig Pelckmans (pictured), president of the Mineralogical Society of Antwerp, Belgium.

Herwig's travels and collecting trips have taken him and his family all over Europe and the United States and even to some countries in Africa and Asia. He loves to write mineralogical articles and give talks for mineral clubs. He is also promoting the use of the polarizing microscope and the spindle stage as inexpensive and reliable tools for mineral collectors who want to identify their unknowns in a scientific way.

Herwig retired from his job as an officer and a database administrator for the Belgian Army in 2013, and he soon realized that life is even more hectic when you are retired. He lives with his loving wife and three kids in the small town of Hasselt in Belgium.

Herwig's conference topics include (1) The Many Faces of Fluorite, (2) Belgium and Mineralogy, (3) Topaz and Friends, and (4) Schoep, from Fred Flintstone to Bob the Builder.

The conference will be at the Holiday Inn, 6055 Richmond Highway, Alexandria, VA. The $30 registration fee includes Saturday lunch (deli sandwiches, side dishes, beverages, and dessert). For more information and registration materials, please click dcmicrominerals.

## Club Members Volunteer at National Building Museum Event

*by Mike Kaas*

Discover "E" Family Day—"E" for engineering—was held on Saturday, February 17, at the National Building Museum in Washington, DC.

This was an all-day STEM educational outreach event. Club members Kathy Hrechka and Mike and Pat Kaas joined with other volunteers from several area minerals, professional, and trade organizations to guide nearly 900 mostly urban kids and their parents through two activities (see the photos on the next page).

In the "Mining for Minerals" activity, the kids used spaghetti forks to "mine" rock (actually tubs of birdseed) and uncover valuable minerals. Then they identified their finds by matching them on a chart showing photos of the minerals and examples of how they are used.

In the second activity, "Minerals in Your House," the kids examined large mineral samples to see how they are used in a cutaway model of a typical house. A handout designed much like a treasure hunt challenged kids and parents to explore their own homes to find things made from minerals. (Nearly everything in the home, with exceptions like wood, comes from either a mine or—like plastics—from an oilwell.)

The booth was sponsored by the American Institute of Mining, Metallurgical, and Petroleum Engineers. This booth was the only one representing the Earth and mineral sciences and engineering. The long lines of folks waiting to participate attested to its popularity. The volunteers had as much fun as the kids!

**Left:** *Kathy Hrechka with young miners who were really getting into "Mining for Minerals."*

**Right:** *Mike Kaas explaining "Minerals in Your House."*


*Pat Kaas with a young miner at work. "Minerals in Your House" in the foreground.*

*Matching the minerals she just mined.*

*Parents were learning, too.*

# Winter Sights Along Scotts Run in McLean, VA

*by Hutch Brown*

Scotts Run is one of the many small tributaries of the Potomac River upstream from Georgetown on the Virginia side of the river. Scotts Run is about the size of the creek outside the nature center where our club meets. It drains a popular Fairfax County park in McLean called Scotts Run Nature Preserve. The parking lots serving the park are often full on nice days.

On an icy February afternoon, I hiked the mile or so along the creek down to the Potomac Gorge for its spectacular views. Carved by the Potomac River, the gorge reaches from near Georgetown upstream to Great Falls. At Scotts Run, the sides of the gorge, punctuated by rocky outcrops, are up to 200 feet high.

The bedrock, exposed in the outcrops and in the creek bed itself, is part of the Mather Gorge Formation. The Mather Gorge comprises multiple mostly metamorphic rock types, including schist, migmatite, and metagraywacke. The Mather Gorge rocks formed from sediments in a deepsea trench between colliding tectonic plates. They are at least Cambrian and possibly Neoproterozoic in age, dating to about 485 million to 1 billion years ago.

At Scotts Run, the bedrock is phyllonite. Phyllonite forms from the metamorphism of fractured preexisting rock, in this case migmatite in a shear zone of north–south faults along the Potomac. Based on the degree of metamorphism (from least to most), phyllonite is intermediate between slate and schist.

*Phyllonite cliffs on Turkey Island across the Potomac River from near Scotts Run. The cliffs are about 50 feet high. Photo: Hutch Brown.*

The Scotts Run phyllonite looks like schist, with the same mica sheen, but it is much finer grained. The color ranges from medium gray to grayish green, and the platy orientation of the grains ("bedding") is plain.


**Left:** *The two most common Scotts Run rock types, quartz (here white) and phyllonite (showing its fine-grained bedding).*
**Right:** *Quartz nodes and veins stand out in phyllonite smoothed by Scotts Run floods. (Glasses for scale.) Photos: Hutch Brown.*

*The Scotts Run waterfall, mostly frozen into solid dihydrogen monoxide (ice). The waterfall is at least 10 feet high; the stream cascades from above in a series of rapids and smaller waterfalls. The water—here an ice sculpture—falls into a deep pool to the left that connects directly with the Potomac River. Note the bedding in the phyllonite bedrock, steeply uptilted from lower right to upper left. (The frozen foam is caused by dissolved organic carbon compounds, a form of water pollution discharged from private property upstream.) Photo: Hutch Brown.*

The Scotts Run phyllonite is riddled with quartz (mostly white) in lenses, nodes, and veins. The quartz formed through hydrothermal processes associated with rising magma caused by colliding tectonic plates. Scotts Run lies in the gold–pyrite belt of Virginia, and some of the quartz in the area is a host rock for gold, pyrite, silver, chalcopyrite, and other minerals. I have never found any, but prospectors once panned Scotts Run for gold and sank mining shafts in the area for gold ore.

As small as Scotts Run is, its erosive power is tiny compared to that of the Potomac River. The Potomac has downcut much faster and deeper than Scotts Run, which therefore enters the Potomac in a series of rapids ending in a spectacular waterfall, sometimes frozen in winter.

The ice sculpture adds another rock type to the scene: dihydrogen monoxide. Two of the rock types (quartz and ice) are common minerals.

## GeoWord of the Day

### cataclastic rock

Metamorphic rock formed from fractured preexisting rock (igneous, sedimentary, or metamorphic). The preexisting rock has been granulated, crushed, or milled in a process known as cataclasis. Cataclastic rocks are associated with fault zones and with breccias from extraterrestial impact events.

*Based on Wikipedia.*

*Safety Matters*

## Once Is Not Enough

*by Ellery Borow, EFMLS Safety Chair*

***Editor's note:*** *The article is adapted from* EFMLS Newsletter *(February 2013), p. 3.*

Once is not enough when it comes to safety matters. Most messages about safety must be mentioned repeatedly for most folks to take note of them.

It is common for me to explain and expound on matters of safety at any and every opportunity. The subject of hearing is near and dear to me because I enjoy listening to the world around me … and my hearing makes that listening possible.

A friend recently told me they'd lost part of their hearing, so why bother with hearing protection? Realizing that this gave me an opportunity to speak about one of my favorite subjects, I responded with glee.

Hearing loss generally progresses slowly over time. You can easily reduce the degree of additional loss by reducing the amount of extraneous or excessive sound entering your ears. You can protect what hearing you have by wearing some type of muffling device, such as ear plugs, ear valves, or ear muffs. At any point in the process of hearing loss, you can start using hearing protection and, through that simple action, protect what hearing you have.

Keeping what remains of your hearing can be as simple as wearing protection—and, yes, I am repeating myself. Refer to the title of this article.

Some folks have mentioned that wearing ear protection was uncomfortable. One of the keys to remedying uncomfortable or ineffective protective equipment is making sure you're using the right size equipment. Ear plugs, for instance, come in different sizes for different size ear canals. Some plugs come on short strings to drape around your neck when you don't need to protect your ears. Others come fitted on a headband to secure the ear plugs in place.

Most ear plugs are more effective if they are properly inserted in the ears. By all means, please read and follow the directions that come with your hearing protection equipment in order to get the most value for your money spent.

Eyeglass wearers often have problems wearing ear muff-type protectors. The eyeglass temple pieces often prevent a good sound seal of the muff to the ear. There are, however, muffs designed for eyeglass wearers. In other words, to be most effective and comfortable, the proper ear protection must be worn.

When in doubt about a decibel reduction rating for the hearing protectors or proper usage, please read the directions!

I'm not sure the message I offered my friend about hearing loss sank in. But I am going to keep offering it. I really don't want sound advice falling on deaf ears.

If I may respectfully suggest, please reread that last line—it's a good one.

*AFMS News*

## Identifying and Mentoring Members for Club Leader Positions

*by Bob Rush, CFMS Membership Committee Chair*

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

Recent surveys of the various member clubs of the California Federation of Mineralogical Societies showed that one of the most pressing problems they face is identifying and mentoring candidates for leadership positions.

One means of solving the problem is having enough trained and willing candidates. The trick is to have an ongoing dialog about these positions. That includes spelling out the positions' responsibilities, the time commitment involved, and the personal rewards.

An agenda item for club meetings might be to present information about leadership positions. The presentation should not exceed 5 to 7 minutes. The presenter would ideally be a current member in that position. The positions chosen for discussion should be the ones most likely to be open for the next year's elections.

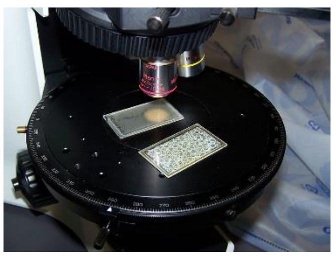
Such presentations would elevate the importance of leadership positions in the minds of club members, creating more interest in maintaining club continuity. The presentations would help educate members and reduce their anxiety about volunteering for leadership positions.

A presentation might be structured as follows:

1. Primary responsibilities of the position (based on the club bylaws).
2. Incidental responsibilities (based on club documents or personal experience).
3. Typical time commitments per week/month.
4. Special skills or training required or desired.
5. Personal rewards of serving in the position.
6. Questions/discussion.

*Save the dates!*

## Field Trip Opportunities



### Thin Section Field Day

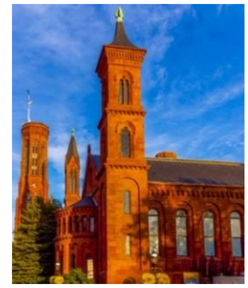
***March 24 and March 31, 1–5 p.m.*** ***Northern Virginia Community College, Annandale Campus.*** Polish a rock. Glue it to a microscope slide. Cut it off at about a thousandth of an inch. Look at it through a polarizing microscope. You are looking at a thin section, a research tool in geology for over a hundred years, and a way to make amateurs like me say, "Wow!" All ages welcome. More information to follow. If you plan to come, please contact John Weidner at jfweidner42@gmail.com.

### Northern Virginia Community College *Geology Field Trips*

NOVA's Annandale campus offers 1-day weekend courses—essentially, field trips—related to our hobby. You can get more information at the Field Studies in Geology—GOL 135 Website.

#### *Paleozoic Geology of Virginia/West Virginia*

***April 7, 7 a.m.–9 p.m.*** This field trip will let you explore the late Silurian and Devonian geology of western Virginia and West Virginia, considering ancient depositional settings (tropical marine reefs, lagoons, shelves, deep basins, and terrestrial flood plains) and fossils, as well as later deformation (faulting and folding) associated with the Valley and Ridge Province.



#### *Building Stones of the National Mall, Washington, DC*

***April 14, 9 a.m.–6:30 p.m.*** We will visit over 20 sites on the Washington Mall, examining the geologic history and architecture, including the rocks used to construct the federal buildings and monuments.


#### *Cretaceous Geology of Maryland and Fossil Hunt*

***April 15, 10 a.m.–6 p.m.*** Well-known dinosaur expert and paleontologist Dr. Peter M. Kranz will lead this fun outdoor expedition to nearby fossil sites, where you can discover many exciting fossils to take home.

### Audubon Naturalist Society *Geology Field Trips*

The ANS offers classes and nature programs, including short field trips. You can get more information and register at the ANS website.

#### *Geology at the National Zoo*

***March 10, 1–4 p.m.*** The cost of this field trip, led by Joe Marx, is $36 for nonmembers. We will examine metamorphosed seafloor sediments and a large fault zone on a hike of about 2 miles, using a loop of paved trails from the Zoo entrance at Connecticut Avenue to Rock Creek to Klingle Road. The walk will be neither rocky nor muddy, but some parts will be rather steep. The pace set on geology field trips is faster than our usual "naturalist's shuffle."

#### *Geology of Holmes Run Gorge*

***March 17, noon–4 p.m.*** The cost of this field trip, led by Joe Marx, is $34 for nonmembers. Holmes Run, a relatively large upland watercourse in Alexandria, has sliced through multiple geological layers down to the bedrock on which they rest. We will walk about 3 miles on good trails and mostly level ground through the Holmes Run Gorge, examining outcrops of granite, schist, and partially formed sedimentary rock. The discussion will focus on the ancient origins of the various rock types we see and on changes that have happened within the gorge in historic time. An added bonus will be a miniature magnolia bog!

***The Rocks Beneath Our Feet***

# Mountain Lake: A Geologic Puzzle

***Part 3***

*by Hutch Brown*

***Editor's note:*** *The article completes a three-part series on the geology of Virginia's Mountain Lake. The previous parts are in the [January]() and [February]() 2018 issues.*

Mountain Lake is the backdrop for a large resort in southwestern Virginia. At an elevation of 3,875 feet, the lake is about half a mile long and a sixth of a mile wide. It has a surface area of about 50 acres and a depth of up to 110 feet.

The small lake was dubbed Salt Pond by early settlers for a nearby salt lick used by livestock. A resort developer acquired the site in 1857 and renamed it Mountain Lake. The stone lodge, built in 1936, was featured in the 1987 movie *Dirty Dancing*.

In 2008, the lake mysteriously disappeared, and it is still almost empty. Although the resort remains in operation, its foremost attraction is now gone.

But why is Mountain Lake even there? The region was never glaciated; it contains no other natural lakes. Mountain Lake is an anomaly—a geologic puzzle.

*Mountain Lake was full when the movie* Dirty Dancing *was filmed there in 1986 (top). The lake emptied in 2008 and never refilled. By 2015, a mountain meadow was forming in the lakebed (bottom). Sources: Top—N.a. (2011); bottom—Halter (2015).*

## Sandstone Dam

Lake bottom sediments have revealed that Mountain Lake is about 6,000 years old. The lake is located in a saddle between ridges, with a spring feeding its southern end. When the lake is full, it can overtop the natural dam at its northern end, spilling into an outlet called Pond Drain (fig. 1).

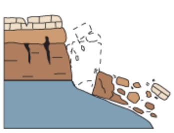

**Figure 1—***A spring feeds Mountain Lake at its southern end. Bordered by ridges, the lake has a natural dam at its northern end and an outlet called Pond Drain. Source: USGS via Grymes (2017).*

The natural dam is made up of boulders from the Tuscarora Formation, a sandstone made up of pure quartz sands so well consolidated that the sandstone resembles quartzite. Highly resistant to erosion, the Tuscarora sandstone forms caps on the ridges above Mountain Lake. Over time, weathering has broken up the rocky slopes, and sharply chiseled sandstone boulders have traveled downhill to dot the northern shores of Mountain Lake (fig. 2).

How did they get there? Theories abound.

Softer rock, a formation known as Juniata, underlies the Tuscarora sandstone. The Juniata Formation contains less well-consolidated sandstone along with graywacke (intermediate between sandstone and shale). One theory is that Pond Drain eroded through the softer underlying Juniata rocks, creating a canyon with

**Figure 2—*****Top:*** *Sandstone blocks at the northern end of Mountain Lake when the lake was full.* ***Bottom:*** *The natural dam for Mountain Lake, visible in September 2016 when the lake was almost empty. Sources: Top—Radford University (2014), photo: R. Whisonant; bottom—Grymes (2017).*



overhanging Tuscarora sandstone. The sandstone finally broke off and tumbled downhill in a landslide, damming Pond Drain and forming Mountain Lake.

Another theory is a landslide caused by an earthquake. Giles County, where Mountain Lake is located, is in one of only two seismic zones in Virginia (the other is near Richmond, the state capital). The largest earthquake in Virginia history, with a magnitude of about 6.0 on the Richter scale, rocked Giles County in 1897. Mountain Lake is well within the Giles County Seismic Zone, and small tremors are common in the region (usually too light to be felt).

So a severe earthquake in the area is certainly possible. An earthquake about 6,000 years ago might have caused sandstone blocks loosened by weathering (or undermined by Pond Drain) to tumble downhill over what is now the outlet of Mountain Lake. A great rockslide might have ensued, carrying tons of earth and other debris into the valley below, damming the stream and forming Mountain Lake.

But some scientists discount the possibility of a landslide. The slopes overlooking Pond Drain lack the residual canyonlike features you would expect to see if sandstone cliffs had collapsed, toppling into the creek. In fact, the slopes at the northern end of the lake appear to be too low and gentle to have supported a massive rockslide, even one induced by an earthquake.

However, the boulders might have slipped downhill on their own through processes that geologists call "slide" and "creep," facilitated by freezes and thaws since the Pleistocene Era. Indeed, you can see Tuscarora sandstone boulders on the slopes over Mountain Lake today (fig. 3). They might well have crept slowly downhill.

Whether fast or slow, the result appears to have been the same: a natural dam, plainly visible (fig. 2). "Mass wasting" of the sandstone slopes over Pond Drain seems to have created the dam for Mountain Lake.

## Natural Lake Processes

A natural dam would explain how the lake formed. But it would not explain why—6,000 years later—the lake is still there.

**Figure 3—***A massive block of Tuscarora sandstone uphill from the trail around the northern end of Mountain Lake. Photo: Hutch Brown.*

In mountainous areas, landslides often dam rivers and streams to form lakes. But the lakes rarely last for more than a few hundred years.

Typically, the inflow stream fills the lake to the brim, and the lake then spills over its natural dam. The outflow then gradually wears a channel through the dam, eroding it away and draining the lake.

At the same time, the inflow stream brings in sediments that settle on the lakebed, gradually reducing its depth. Runoff from the surrounding slopes washes in more sediments, filling in the lake margins.

Such processes gradually turn the lake into a marshy pond, then a bog, and finally a meadow. Pioneer trees like willows and poplars sprout, rebuilding the soils. In time, the site again becomes a mature bottomland forest drained by the original stream.

But that never happened to Mountain Lake. Why not? How has the lake persisted for thousands of years?

## Fluctuating Lake Levels

The answer seems to be that Mountain Lake leaks.

Christopher Gist, a colonial surveyor, passed through the area in 1751 and left the first written account of Mountain Lake. He described a small lake, along with "a fine Meadow" with "six fine Springs in it."

When the lake is full, there is no meadow, so Gist probably saw the lake at a stage when it was only partly full. The springs were probably in the shallow southern part of the lakebed, an area that is underwater when the lake is full (fig. 4).

In 1768, the first homesteaders arrived. They found a spring and a meadow but no lake at all. In fact, the absence of any lake raised doubts about the accuracy of Gist's records. By 1770, however, the lake was back, more or less as Gist had described it.

Since recordkeeping began at Mountain Lake, lake levels have fluctuated, sometimes abruptly. In recent history, the lake has usually been full. In the spring of 1959, however, the lake fell to 60 percent of its capacity. An earthquake then shook the area, and the lake had completely refilled by summer.

Some dry periods have been longer than others. Lake sediments show that Mountain Lake has stayed completely dry for long enough to become a bog or meadow six separate times in the past: 100, 400, 900, 1,200, 1,800, and 4,200 years ago. At least once, the lakebed stayed dry for decades—long enough for a 30-year-old pine to grow.

Ultimately, however, the lake has always refilled. Mountain Lake has usually been full enough to sustain thriving populations of fish and other aquatic species, just like any other lake.

So why do the lake levels fluctuate?

## Lakewater Intakes

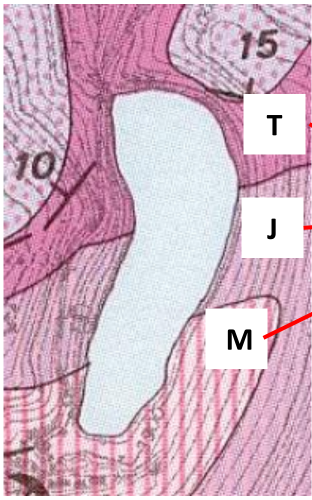
The hydrology of Mountain Lake is poorly understood. Nobody fully understands where the water goes from Mountain Lake—or even where it comes from.

Some water intake sources are obvious, particularly the inlet spring at the lake's southern end. Dozens of seeps and springs also feed the lake from the surrounding slopes; when the lake is dry, they feed the creek that meanders across the lakebed (fig. 4).

Springs in the lakebed itself, including the "six fine Springs" described by Christopher Gist, feed the lake from underwater when the lake is full. The reason is that Mountain Lake lies on what geologists call a "breached anticline" (fig. 5). Three different kinds of bedrock underlie the lake in parallel bands: in the north, Tuscarora sandstone (the same rock as in the dam); in the south, Martinsburg shale, source of the inlet spring; and in the center, the relatively soft and permeable Juniata sandstone or graywacke.

The Martinsburg shale is the oldest, so it lies in the middle of the anticline. A limb of the Juniata lies over it, with a limb of the Tuscarora on top (fig. 5).

**Figure 4—***A spring feeds Mountain Lake at its southern end. Engorged by seeps and rivulets, the stream steadily grows, meandering through the dry lakebed to feed the remnant pond at the lake's northern end. Source: MLC (2013).*



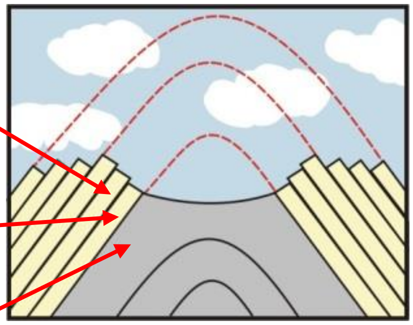



**Figure 5—***Geologic map of the Mountain Lake anticline (left); and a typical breached anticline cross-section (above). Blue = Mountain Lake; pink stripes = Martinsburg shale (***M***); lavender = Juniata sandstone (***J***); dark pink = Tuscarora sandstone (***T***). Sources: Radford University (2014); Bentley (2010).*

Shale is fine grained and relatively impervious, so rainwater tends to seep through the coarser overlying Juniata and Tuscarora Formations and come out as springs and streams on the Martinsburg shale, feeding the lake—for example through the lake's inlet spring at its southern end. Where the Juniata sandstone contacts the Martinsburg shale, ground water pours straight into the lake in a line of underwater springs.

But nobody fully understands where all the inflows are, how they work, and how they might change in volume and location over time. For example, regional drought can affect lake levels, as it apparently did when the surface area of Mountain Lake fell by half during a regional drought in 1998–2002.

But drought alone cannot explain the cycles of wet and dry in Mountain Lake. Rainfall was ample in Giles County after the regional drought ended in 2003, yet Mountain Lake still went dry in 2008.

## Lakewater Outflows

A major piece of the puzzle is the outflows for Mountain Lake. They are unusual, and they help to explain the lake's persistence.

Pond Drain is the obvious outflow for Mountain Lake (fig. 1). When the lake is full, it can spill into a channel over the dam into Pond Drain. The outlet is near a small lodge at the northern end of the lake (fig. 6).

But the surface outlet channel is usually dry. Pond Drain usually originates from underground sources about half a mile below the lake.

One explanation is that the natural dam for Mountain Lake leaks underground into Pond Drain (fig. 6). The matrix for the dam—sandstone rocks and boulders—has joints and interstices, making it naturally porous, with many potential outflow channels for the lake. Instead of flowing over the dam and wearing through it, the lake can find its way through or under the dam. It can flow through unseen channels buried in the dam, emerging from the seeps and springs that feed Pond Drain downhill from the lake.

Earthquakes can affect lake levels, and tremors are common in the area. If a tremor is strong enough, it can shift the rocks and boulders in the dam, opening or closing underground channels. That can change the outflow volumes, raising or lowering the water level in the lake.

The "leaky dam" theory seems to gain support from lake bottom studies. Researchers surveying the floor of Mountain Lake discovered what they called "pipes"—large holes—in the deepest part of the lake, near the dam (fig. 7). After Mountain Lake emptied in 2008, researchers found that the exposed pipes carry water out of the lake. In effect, they are drain pipes.

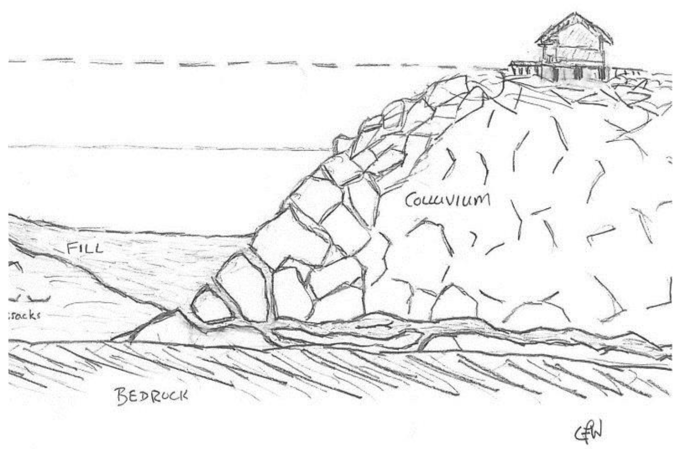



**Figure 6—***Artist's rendition of the Mountain Lake drainage system. The upper line is the water level when the lake is full, with a surface outlet near a structure at the northern end of the lake. The lower line indicates the water level in June 2013, when the lake was partly full. The dam (colluvium) has leaky joints and interstices between its sandstone rocks and boulders, forming outflow channels for the lake. Source: MLC (2013).*

## Fracture in the Lakebed

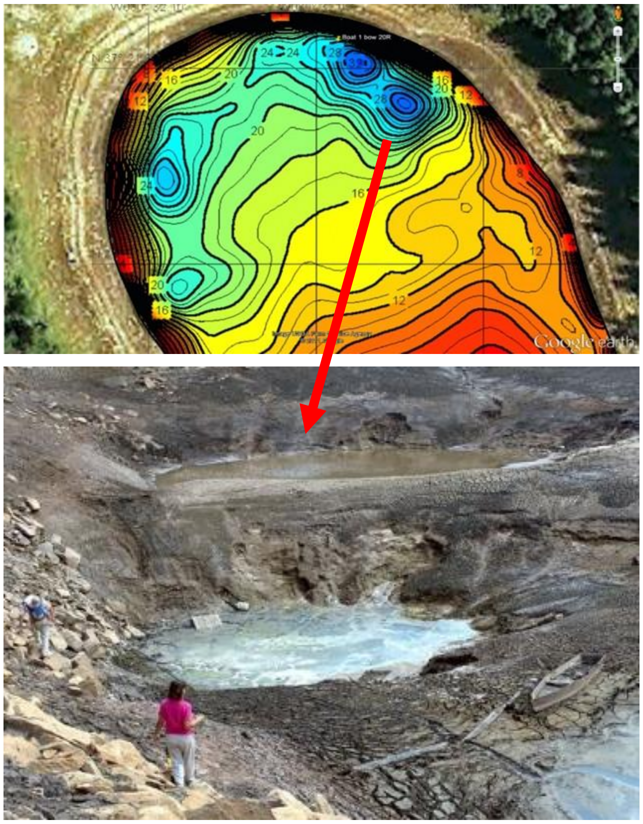


**Figure 7—*Top:*** *Bathymetric map of drain pipes (blue) in the lakebed at the northern end of Mountain Lake.* ***Bottom:*** *Visitors at the base of the dam viewing the deepest drain pipes after the lake emptied in 2008. Sources: Top—Radford University (2011); bottom—Cobb (2017), photo: Richard Cobb (September 2008).*

But where the drain pipes lead—where the water goes—is anything but clear.

Researchers have estimated the total volume of inflow into Mountain Lake based on the amount of precipitation in the lake's relatively small watershed. They discovered that the volume of water entering the lake was substantially greater than the volume of water in Pond Drain. Moreover, dyes dropped into the drain pipes in the floor of Mountain Lake could not be definitively detected downstream in Pond Drain.

Apparently, some of the water draining through the floor of Mountain Lake—maybe all of it—is not going into Pond Drain. So where is it going?

No one knows for sure.

The dam might leak—but not necessarily into Pond Drain. Or maybe the dam leaks into Pond Drain but the drain pipes in the lakebed lead somewhere else.

The two deepest drain pipes in the lakebed, the ones at the northeastern end of the lake (fig. 7), appear to be aligned with a fracture in the lakebed. The fracture is a recently discovered "regional lineation feature associated with the lake" (Cawley and others 2001).

The orientation of the fracture—and the alignment of the two drain pipes (fig. 7)—is from southeast to northwest. That is exactly the opposite of what you might expect, because almost every other geologic feature in the mid-Atlantic region is oriented from southwest to northeast.

The reason is simple. About 320 million years ago, the proto-African continent crashed into proto-North America from the southeast (fig. 8). The resulting mountain-building event, known as the Alleghanian Orogeny, peeled off rock formations, pushing them to the northwest in a series of great thrust faults. The massive folding and faulting produced a series of landforms and geologic features that are oriented from southwest to northeast, just like the ancient Alleghanian Mountains themselves (fig. 8).

The same thing goes for the Mountain Lake anticline (fig. 5). All three bedrock formations—the Martinsburg, Juniata, and Tuscarora—are aligned from southwest to northeast, as is the larger anticline itself.


**Figure 8—***The Alleghanian Orogeny, about 300 million years ago. The yellow arrow shows the direction of plate movement as proto-Africa (Gondwana) rides up over proto-North America (Laurentia), forming the Alleghanian Mountains. The mountains have the same orientation (from southwest to northeast) as most landforms in our area today. Source: Harwood (2014).*

Yet the “regional lineation feature” detected by researchers—the fracture in the lakebed—cuts diagonally across the lakebed formations. It also aligns with the lakebed contours and with the two deepest drain pipes (fig. 9, top). The crack is perpendicular to the nearest thrust fault (the Narrows Fault to the northeast), and it aligns with Pond Drain and with the curious saddle between the twin peaks of Salt Pond Mountain (fig. 9, bottom).

The fracture also aligns with the thrust of the Alleghanian Orogeny from southeast to northwest (fig. 8). That is no coincidence, because the tremendous force of the mountain-building event itself appears to have caused the fracture, leaving a vertical crack in the rock that cuts across the Mountain Lake anticline and into the New River drainage beyond (fig. 9, bottom).

The crack in the rock does much to explain the topography near Mountain Lake:

- Rivers and streams tend to follow faults and fissures in the rock. Pond Drain finds and follows the fracture in the bedrock down its valley, beginning in the bed of Mountain Lake itself (fig. 9).
- Indeed, the stream across the dry lakebed today finds and follows the same fissure at the northern end of the lake, leading it across and through the deepest drain pipes.
- The fracture is a weakness in the bedrock, making it prone to erosion. It explains the contours of the lakebed, including the drain pipes. It also explains the saddle in the middle of Salt Pond Mountain (fig. 9, bottom), where the Tuscarora sandstone has eroded away between twin peaks, exposing the underlying Juniata Formation.

## Lake Hydrology

The “regional lineation feature” also helps to explain the hydrology of Mountain Lake.

North of Mountain Lake, Pond Drain has worn through the overlying bedrock down to the underlying Tuscarora sandstone (**SC** in figure 9, bottom). The erosion-resistant Tuscarora rock is exposed to the northeast of Mountain Lake. Pond Drain has failed to wear through it—*except* in the lakebed of Mountain Lake itself.

In the lakebed, the drain pipes reach into the underlying Juniata rocks, which are much softer than the overlying Tuscarora sandstone. Pond Drain might have exploited the “regional lineation feature”—the vertical fracture in the bedrock, beginning in the lakebed itself (fig. 9, top)—to tunnel under the Tuscarora sandstone through the softer Juniata rocks. That would have created underground outflows for the lake.

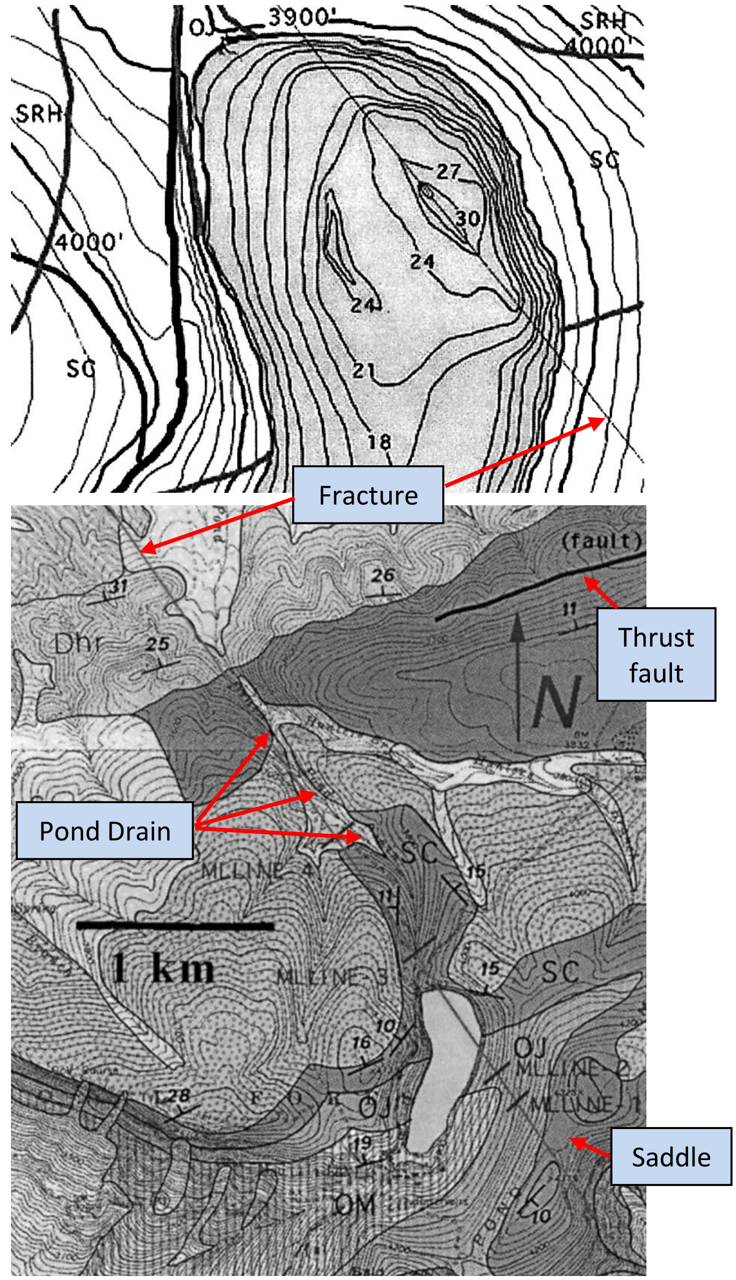



**Figure 9—*Top:*** *A fracture in the lakebed aligns with the lakebed’s contours, including the two deepest drain pipes.* ***Bottom:*** *The fracture cuts across the Tuscarora (***SC***) and Juniata (***OJ***) Formations and is perpendicular to the Narrows Thrust Fault to the northeast. The fracture aligns with Pond Drain and with the saddle between the peaks of Salt Pond Mountain. Source: Cawley and others (2001).*

So where do they lead?

One clue might be the underlying geology: southwestern Virginia is rich in limestone caves. Some studies have suggested that limestone layers in or under the Martinsburg Formation might have dissolved in ground water, forming caverns and collapsing the overlying layers of Martinsburg shale and Juniata sandstone. If so, then Mountain Lake might be connected to a labyrinth of underground streams and reservoirs. The system might ebb and flow, using Mountain Lake as an intake and outlet. That would explain the fluctuating lake levels.

But a connection to a system of limestone caves seems unlikely. The Martinsburg Formation does indeed overlie limestone and dolomite, but the Juniata and Martinsburg Formations together are almost 2,000 feet thick near Mountain Lake. Moreover, the limestone components of the Martinsburg are thin and deeply buried. The "karst impacts" of limestone—such as cavern formation and roof collapse—would be unlikely to affect the area near Mountain Lake.

Yet the pipes in the Juniata bedrock are obviously there (fig. 7). Periodic and unpredictable changes in the structure and blockage of the underground channels—possibly linked to earthquakes—almost certainly govern the outflow volumes from Mountain Lake. The outflow volumes in turn govern lake levels, except when inflows decline during a drought.

## Mountain Lake's Persistence

The drain pipes themselves help to explain why Mountain Lake never filled in. In fact, the lake might actually be growing!

The drainage for Mountain Lake is mainly through its floor and dam. The lake rarely overtops its dam enough to send a surface outflow into Pond Drain. So the surface outflow channel never had a chance to wear through and collapse the dam. The dam remains an intact and even imposing structure (fig. 2).

The other natural mechanism for lake succession is infill through sedimentation. But the lakewater turnover is heavy, and the multiple points of inflow and outflow generate underwater cross-currents. The currents in turn wash sediments out the drains. Channels in the dam might also take some of the outwash.

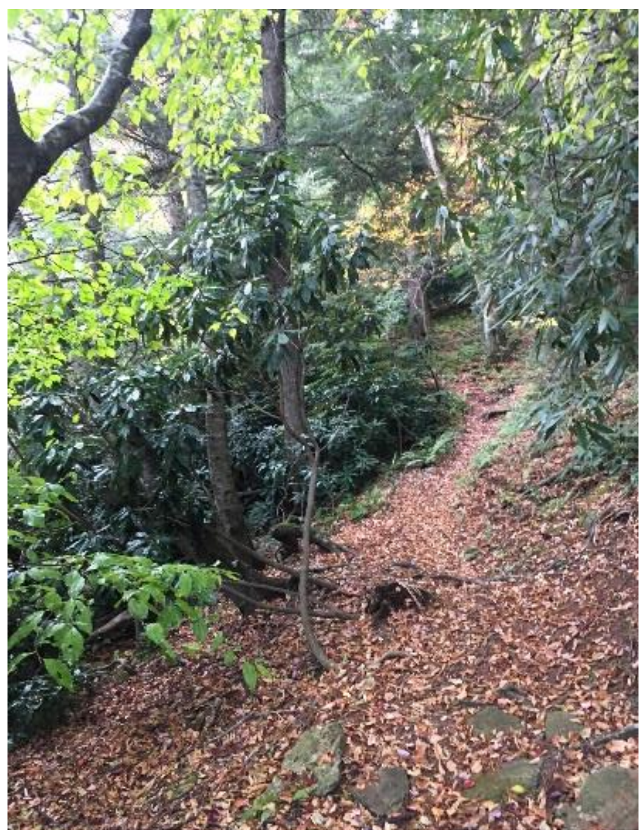
When the lake is empty, the forces of erosion can actually expand the lakebed. Wind and water wear at the exposed sides of the lake and scour its exposed floor. Precipitation can be heavy at Mountain Lake, and the creek that meanders across the dry lakebed collects stormwater and meltwater runoff and washes it out the drains. The creek also further erodes the fracture in the lakebed, maintaining and expanding the drain pipes. Every time the lake goes dry, erosion might be widening and deepening the lake.

As a result, Mountain Lake has persisted for thousands of years. It shows no signs of lake succession, such as filling in at the edges or wearing through the dam.

## An Enduring Mystery

Empty or not, the lake is well worth a visit. Where else can you hike around a lakebed over three different kinds of bedrock in less than a mile? It's worth it just to see whether you can pick out where one rock formation ends and another begins.

One sign is the thickening evergreen vegetation where you cross from Martinsburg shale onto Juniata sandstone: the soil becomes more acidic, which the evergreens love. You might come to curse the rhododendron thickets you traverse, but you will certainly admire the large old eastern hemlocks.



*Rhododendron thickets growing over Juniata bedrock on the trail around Mountain Lake. Photo: Hutch Brown.*

The evergreen thickets all but vanish where you come out on the other side of the lake onto the Martinsburg shale again. It's a good example of how geology and forest ecology interconnect.

Or you can take an easy hike up a fire road to the top of Salt Pond Mountain and stand on the Eastern Continental Divide. To the southeast, the streams feed the James River on its way to Chesapeake Bay; to the northwest, Pond Drain feeds a tributary of the New River, part of the Ohio River system. You are in a special place shaped by more than half a billion years of tectonic activity!

And whether or not the lake is full, you will see a unique feature in the landscape. Mountain Lake has no equivalent anywhere else in the Southern Appalachians—some say in the world.

So take the time and enjoy! ⛏

## Acknowledgment

The author thanks NVMC member Sue Marcus for reviewing and improving the article. Any errors are the author's alone.

*The author's wife standing on the Eastern Continental Divide, the highest part of Salt Pond Mountain (Bald Knob, at an elevation of 4,365 feet). The caprock is Tuscarora sandstone; the James River watershed is in the background. Photo: Hutch Brown.*

## Sources


Bentley, C. 2010. Deducing my first anticline. Mountain Beltway. 27 September.

Cawley, J.C.; Parker, B.C.; Perren, L.J. 2001. New observations of the geomorphology and origins of Mountain Lake, Virginia. Earth Surface Processes and Landforms 26: 429–440.

Cobb, R. 2017. Mountain Lake shrinking.

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.

Grymes, C.A. 2017. Virginia places: Watersheds—Mountain Lake. Geography of Virginia (GGS380). Fairfax, VA: George Mason University

Halter, C. 2015. The lake vanishes: A dirty dance of hubris and geology. Silica Magazine. 6 October.

Lesure, F.G.; Williams, B.B.; Dunn, Jr., M.L. 1982. Mill Creek, Mountain Lake, and Peters Mountain wilderness study areas, Craig and Giles County, Virginia, and Monroe County, West Virginia. Geol. Surv. Bull. 1510. Washington, DC: U.S. Government Printing Office.

McDowell, R.C.; Schultz, A.P. 1990. Structural and stratigraphic framework of the Giles County area. USGS Bull. 1839–E,F. Washington, DC: Government Printing Office.

Mills, H.H. 1988. Surficial geology and geomorphology of the Mountain Lake area, Giles County, Virginia. USGS Prof. Pap. 1469. Washington, DC: Government Printing Office.

MLC (Mountain Lake Conservancy). 2013. What's in bloom at Mountain Lake Biological Station. 18 June.

Mountain Lake Lodge. 2017. Our history. Pembroke, VA.

N.a. (no author). 2011. Geocaching: Mountain Lake.

Plummer, C.C.; McGeary, D. 2008. Physical geology. 7th ed. Dubuque, IA: Wm. C. Brown Publishers.

Radford University. 2011. Mountain Lake hydrogeology research fall 2011. Radford, VA.

Radford University. 2014. Valley and Ridge physiography: Scenic tour of the Valley and Ridge (part 4)—Mountain Lake. Radford, VA.

Schultz, A.P.; Stanley, C.B.; Gathright, II, T.M. [and others]. 1986. Geologic map of Giles County, Virginia. Pub. 69. Richmond, VA: Virginia Department of Mines, Minerals, and Energy.

Tennant, D. 2009. Mystery of two natural lakes in Virginia. The Virginian-Pilot. 3 May.

# March 2018—Upcoming Events of Interest in Our Area/Region (see details below)

| Sun | Mon | Tue | Wed | Thu | Fri | Sat |
|---|---|---|---|---|---|---|
| | | | | 1 | 2 | 3 Show: Wilmington, DE |
| 4 Show: Wilmington, DE | 5 | 6 | 7 MSDC mtg, Washington, DC | 8 | 9 Mineral auction, Oella, MD | 10 **ANS field trip** |
| 11 **Daylight savings time begins** | 12 GLMSMC mtg, Rockville, MD | 13 | 14 | 15 | 16 | 17 Show; **ANS field trip** **St. Patrick's Day** |
| 18 Show: GLMSMC | 19 | 20 **Spring begins** | 21 | 22 | 23 | 24 Shows: PA **Thin Section Field Day** |
| 25 Shows: Chambersbg, Plymth Mtg, Wysox, PA | 26 **NVMC mtg, Arlington, VA** | 27 | 28 MNCA mtg, Arlington, VA | 29 | 30 | 31 **Thin Section Field Day** |

## Event Details

**3–4: Wilmington, DE—**55th Annual Earth Science Gem and Mineral Show; Delaware Mineralogical Society, Inc.; Arsht Conference Center, 2800 Pennsylvania Ave; Sat 10–5, Sun 11–5; includes conference with several speakers; adults $6, seniors $5, kids 12–16 $4, kids up to 11 free with adult; info: www.delminsociety.net or Elaine Kipp, 410-392-6826, kippekipp@msn.com.

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

**9: Oella, MD—**Almost Spring Auction; Chesapeake Gem & Mineral Society; Westchester Community Ctr, 2414 Westchester Ave; Fri 7:30 p (viewing @ 7); Info: www.chesapeakegemandmineral.org.

**10: Geology at the National Zoo—**Audubon Naturalist Society field trip; 1–4 pm; info, reg: ANS website.

**12: Rockville, MD—**Monthly meeting; Gem, Lapidary, and Mineral Society of Montgomery County; 7:30–10; Rockville Senior Center, 1150 Carnation Drive.

**17: Geology of Holmes Run Gorge, Alexandria, VA—**Audubon Naturalist Society field trip; noon–4 pm; info, reg: ANS website.

**17–18: Gaithersburg, MD—**54th Annual Show; Gem, Lapidary & Mineral Society of Montgomery County; Montgomery County Fairgrounds, 16 Chestnut St; Sat 10–6, Sun 11–5; ages 12+ $6; kids 11 and younger free.

**24: Annandale, VA—**Northern Virginia Community College, learn about thin sections; 1–5 p.m.; RSVP: John Weidner at jfweidner42@gmail.com.

**24–25: Wysox, PA—**49th Annual Gem & Mineral Show; Che-Hanna Rock & Mineral Club; Wysox Vol. Fire Co. Social Hall, 111 Lake Rd; Sat 9–5, Sun 10–4; info: www.chehannrocks.com.

**24–25: Chambersburg, PA—**40th Annual Show; Franklin County Rock and Mineral Club; Hamilton Heights Elementary School, 1589 Johnson Rd; Sat 10–5, Sun 10–4; adults $5, children under 12 free; info: Matt Elden, 717-331-0526 or fcrmc1978@gmail.com.

**24–25: Plymouth Meeting, PA**—Mineral Treasures and Fossils Fair; Philadelphia Mineralogical Society, Delaware Valley Paleontological Society; Lulu Temple, 5140 Butler Pike; Sat 10–5, Sun 10–4; adults $5, kids under 12 $1; info: www.phillyrocks.org, Cheryl Leibold, cleibold@verizon.net.

**26: Arlington, VA—**Monthly meeting; Northern Virginia Mineral Club; 4th Monday of the month, 7:45–10; Long Branch Nature Center, 625 S Carlin Springs Rd.

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

**31: Annandale, VA—**Northern Virginia Community College, learn about thin sections; 1–5 p.m.; RSVP: John Weidner at jfweidner42@gmail.com.

## AUCTION BID SLIP
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Starting bid amount:_______________________
*Bidders: You need to bid on this item if you want it to be auctioned! Place bid below.*
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Starting bid amount:_______________________
*Bidders: You need to bid on this item if you want it to be auctioned! Place bid below.*
NAME/BID
_____________________________________
_____________________________________
_____________________________________
_____________________________________
_____________________________________
_____________________________________
_____________________________________

## AUCTION BID SLIP
ITEM # ______________________________
DESCRIPTION_________________________
FROM _______________________________
Starting bid amount:_______________________
*Bidders: You need to bid on this item if you want it to be auctioned! Place bid below.*
NAME/BID
_____________________________________
_____________________________________
_____________________________________
_____________________________________
_____________________________________
_____________________________________
_____________________________________

SUMMARY SHEET FOR AUCTION ITEMS SUBMITTED BY________________________________

| Initials | Item # | Description | Minimum bid | Final sale price |
|---|---|---|---|---|
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Hutch Brown, Editor
4814 N. 3rd Street
Arlington, VA 22203

**Mineral of the Month: Adamite**

## 2018 Club Officers and Others

President: Bob Cooke
rdotcooke@gmail.com
Vice-President: Ti Meredith
ti.meredith@aol.com
Secretary: David MacLean
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Treasurer: Roger Haskins
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Field Trip Chair: Ted Carver
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Greeter/Door Prizes: Ti Meredith
ti.meredith@aol.com

PLEASE VISIT OUR WEBSITE AT:

http://www.novamineralclub.org

# The Northern Virginia Mineral Club

**Visitors are always welcome at our club meetings!**

Please send your newsletter articles to:
hutchbrown41@gmail.com

**RENEW YOUR MEMBERSHIP!**

**SEND YOUR DUES TO:**
Roger Haskins, Treasurer, NVMC
4411 Marsala Glen Way, Fairfax, VA 22033-3136

**OR**

Bring your dues to the next meeting.

**Dues:** Due by January 1 of each year; $15 individual, $20 family, $6 junior (under 16, sponsored by an adult member).

**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.*