THE NORTHERN VIRGINIA MINERAL CLUB INC

The Mineral Newsletter

Meeting: November 14 Time: 7:45 p.m.

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

Stilbite

Jalgaon District, Maharashtra, India

iRocks.com. Photo: Ron Lavinsky (via Wikipedia).

Volume 57, No. 9
November 2016
Explore our Website!

November Program:

Geo-images at NOVA

In this issue …

Deadline for Submissions

December 1

Please make your submission by the 1st of the month! Submissions received later might go into a later newsletter.

Mineral of the Month
Stilbite

by Sue Marcus

Bowties: pasta, fashion, and ***stilbite***! Although stilbite is usually found or collected as single crystals or as rounded masses of crystals, the bowtie or dumbbell shape is distinctive and sought by many of us. The cover photo shows intergrown stilbite crystals in the bowtie habit.

The name stilbite (derived from the Greek word for "shine") came from the mineral's pearly, mirrorlike luster. Although other names were used earlier, the French mineralogist Jean Claude de la Métherie conferred the name stilbite on this mineral species in 1797, and the name stuck.

But mineralogy has its "splitters" and "joiners," just as paleontology does. What used to be simple "stilbite" has become a series of calcium-dominant materials and sodium-dominant materials known, respectively, as "stilbite-Ca" and "stilbite-Na." The distinction probably came about due to increased analytical precision; in identifying hand specimens, "stilbite" (with no special element designation) is therefore probably wisest.

The Zeolite Group is large and includes stilbite. Most minerals in the group, including stilbite, formed at relatively low temperatures in volcanic rocks. The Deccan Traps—vast sheets of basalt in India—are noted sources of stilbite and other zeolites. These basalt flows date to 66 million years ago and are estimated to have had a volume of 123,000 cubic miles! Lots of collecting opportunities!

Individual stilbite crystals may be several inches long (rarely) and are flat and slightly narrower in the middle (slightly hourglass-shaped). The crystals may flare at the ends; thus, when they occur as a group, they form "bowties" or "wheat sheaves."

Along with the major Indian localities, stilbite is found in metamorphosed volcanic rocks in Scotland, Iceland, and Canada (Nova Scotia) and in younger volcanic rocks in Italy. In the United States, we can find stilbite in some of our nearby quarries, and there are famous localities in New Jersey, Oregon, and Washington state.

Northern Virginia Mineral Club members,

Please join our November speaker, Marissa Dudek, for dinner at the Olive Garden on November 14 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.

Stilbite is too soft for lapidary work. It doesn't seem to have any industrial or economic uses. The good news for collectors is that we can self-collect; and even when we buy specimens, they are usually affordable. But I expect you can pay as much as you want for the best pieces …

Technical details:

Chemical formula	$NaCa_4(Si_{27}Al_9)O_{72} \cdot 28(H_2O)$, with Ca before Na in some forms
Crystal form	Monoclinic, less frequently pseudo-orthorhombic
Hardness	3.5–4
Density	2.18–2.2 g/cm^3 (measured)
Color	Usually white, though can be beige, brown, pink, light green, and orange
Streak	White
Cleavage	Perfect on (010)
Fracture	Conchoidal to uneven
Luster	Pearly

References

Amethyst Galleries. 2016. The mineral stilbite.
Mindat.org. 2016. Stilbite.
Mindat.org. 2016. Zeolite Group.

Wikipedia. 2016. Deccan Traps.
Wikipedia. 2016. Stilbite.

Geologic Imagery by M.A.G.I.C.

November 14 Program

Marissa Dudek will give a presentation on her work with Northern Virginia Community College (NOVA) Professor Callan Bentley on a massive online repository of geologic imagery known as the Mid-Atlantic Geo-Image Collection (M.A.G.I.C.). The collection consists of gigapans (gigapixel panoramic images of outcrops created using a GigaPan robot); gigamacros (gigapixel panoramic images created using a Magnify2 robot); scanning electron micrographs (panoramic images of microscopic grains seen through a scanning electron microscope); and three-dimensional models (created using photogrammetry).

The collection also has about 1,500 gigapixel images, with an average size of about 1 gigapixel each; we also have almost 100 three-dimensional models. The materials in the ever-growing collections are free and available to everyone online for educational or research purposes.

Marissa is an undergraduate student at the Annandale campus of NOVA, is completing her associate's degrees in General Science and Social Science. She completed a field course in Alberta, Canada, and participated in a coordinated internship between NOVA and the U.S. Geological Survey. During the internship, she assisted a geochronologist, Ryan McAleer, with his research using 39Ar/40Ar radiometric dating.

Marissa serves as president of the NOVA Geology Club. She leads meetings and field trips for students and the surrounding community interested in geoscience. She is currently working as a learning assistant in a Historical Geology course at NOVA, in addition to her work with Professor Bentley on (M.A.G.I.C.).

Marissa will be transferring to James Madison University in spring 2017 to complete her bachelor's degree in Geology.

CLUB OFFICER ELECTIONS COMING UP!

It's that time of year again!

At the December club meeting, we will elect club officers for 2017. We need candidates for president, vice-president, secretary, and treasurer.

As chair of the nominating committee, I am asking club members to step forward to help. We need a mix of long-term club members and newer members in officer positions so we can both offer … *and* develop … the leadership we will need for the future. It goes without saying that former club officers are willing to mentor new officers as needed.

Self-nominations are welcome, as are nominations by friends! So please step up, folks!

Send all nominations to me at d8olite@fastmail.fm.

Wayne Sukow
Chair, Nominating Committee

The Prez Sez

by Bob Cooke

By the time you get this newsletter, we will be down to last-minute preparations for our 25th Annual Gem, Mineral, and Fossil Show.

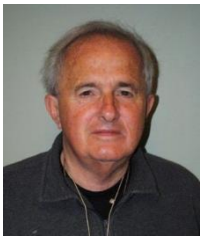
The needed materials and supplies are under control, but we still need more warm bodies. Please take a moment to visit our signup Webpage to volunteer your time (at http://signup.com/go/RzFiiS).

Failing that, just show up whenever you can on November 18–20 at the George Mason Hub. On Friday (5 to 9 p.m.) you can help with setup; on Saturday (10 a.m. to 6 p.m.) and Sunday (10 a.m. to 5 p.m.), you

can help run the show at the Entry Table, in the Kids' Room, or as a "floater."

I'd like to thank everyone who has contributed articles to make our newsletter the great publication that it is. Last month's meeting saw many club members recognized with awards from both the AFMS and EFMLS for outstanding articles. And Hutch Brown gets special thanks for his many hours of both desktop publishing and writing many articles. Thanks to everyone's efforts, *The Mineral Newsletter* received 3rd place awards in the Large Bulletin category from both the AFMS and the EFMLS.

On a financial note, I'm afraid that the club may have to revise its policy for providing paper copies of The Mineral Newsletter. Photocopying and mailing costs amount to approximately $40 per year for each person receiving the paper version. The club currently does not charge a fee for those who can't receive the newsletter by email. That may have to change in 2017. We'll discuss this in a future meeting and ask for your opinions.



October Meeting Minutes
October 24, 2016

by David MacLean, Secretary

President Bob Cooke called the meeting to order at 7:30 p.m. at the Long Branch Nature Center, Arlington, VA.

The minutes of the September 2016 club meeting were approved as published in *The Mineral Newsletter*. There was no treasurer's report.

The president recognized past Presidents Sue Marcus, Rick Reiber, Barry Remer, Rob Robinson, and Wayne Sukow.

The president recognized guest Brian Falk.

Old Business

The club's 25th Annual Gem, Mineral, and Fossil Show is coming up on November 19 and 20 at the Hub Ballroom at George Mason University. Tom Taaffe, the show chairman, said that help is needed for setup, operation, and takedown on Friday evening, November 18, and on the following Saturday and Sundayer, and takedown. Operations include admissions; the kids' Mini-mines (40 Scouts are scheduled to arrive at 10 a.m. on Sunday); and other activities.

The show also needs donations of attractive rocks less than a quarter pound in size for the kids' table, plus attractive hand specimens for door prizes and the auction at 1–2 p. m. on Sunday.

Tom distributed show admission discount cards and asked club members to pass them out.

Awards

The president presented award certificates for the 2016 BEAC newsletter contest (covering newsletters fro 2015):

AFMS Large Bulletins—Hutch Brown, 3rd Place, *The Mineral Newsletter*

AFMS Educational/Techical Articles—Sue Marcus, 2nd Place, "Mineral of the Month: Zircon"

EFMLS Large Bulletins—Hutch Brown, 3rd Place, *The Mineral Newsletter*

Educational/technical articles—

Sue Marcus, 3rd Place, "Mineral of the Month: Zircon"

Sheryl Sims, 9th Place, "Tribune Tower: A Tower That Rocks"

Alec Brenner, Honorable Mention, "Lab Notes: Mineral Identification (the Cool Way)"

EFMLS Nontechnical Articles—

Sue Marcus, 5th Place, "What's a Hole in the Ground?"

Hutch Brown, Honorable Mention, "James Hutton: Father of Geology"

Kathy Hrechka, Honorable Mention, "Natural History Museum in London: In Search of Smithsonite"

Written Features—

Sheryl Sims, Honorable Mention, "Mineralogy Is a Stitch!"

Sheryl Sims, Honorable Mention, "Cold Weather Fun"

Wayne Sukow, Honorable Mention, "The Prez Sez" (for April)

Sheryl Sims also got a certificate of appreciation for serving as a BEAC judge.

Announcements

The next club meeting will be on Monday, November 14 (note the change of date).

The NVMC/MNCA Holiday Party will be on Monday, December 19. The NVMC will provide the main course; volunteers are needed for other courses (see the list on page 8). Contact Sue Marcus, Pat Flavin, or Ti Meredith.

Sheryl Sims, who represented NVMC at the 2016 EFMLS convention on October 21–23, in Rochester, NY, submitted her report.

The EFMLS asks for donations of minerals and fossils with an auction value of $75 or more to support the EFMLS Foundation. Cheryl Neary and Carolyn Weinberger will receive the donations.

The EFMLS Ways and Means Committee raised $1,500 from the sale of a GIA microscope. Thank you, Gerry Cox!

The next EFMLS convention will be on October 21–22 October, 2017, in Bristol, CT.

Wildacres will be held on May 22–29, 2017, near Marion, NC. Bob Jones will speak.

Jim Conrad's article "Minerals in your Cellphone" was published in *Rock and Gem* magazine.

Display Table

Linda Benedict featured wirewrap jewelry made in wirewrapping class at Wildacres in September 2016.

Kathy Hrechka showed geology teaching boxes and promoted Conrad Smith's articles "Minerals in my Smartphone" and "Minerals used in Mobile Devices."

Scenes from the October club meeting … thanks to Sheryl Sims for the great photos!

October 24 Program, Professor Shelley Jaye

Short Geological History of Virginia

by David MacLean, Secretary

Professor Shelley Jaye of Northern Virginia Community College's Annandale Campus described the geological history of Virginia along Corridor H, from Strasburg, VA along Highway 48 to Mount Storm WV.

The story began with the Grenville Orogeny 1 billion years ago and ended with the Mississippian Period 300 million years ago, not including Alleghanian Orogeny 250 million years ago or the late Triassic rifting 200 million years ago.

Since the beginning of the Archean Eon or earlier, the Earth's crust has consisted of granitic plates and island arcs on top of denser basalt. The basalt and the continents are a series of plates that are driven by currents in the mantle.

The crust is riven by volcanic ridges, which are zones of spread. Oceanic basalt crust is subducted under either the continental plates or other basalt ocean plates. The continental plates are pushed together (orogeny) and later torn apart (rifting). The last 3 billion years has seen the assembly of continental plates into supercontinents and rifting of the supercontinents into smaller continents, which reassemble into supercontinents again.

The story of Virginia/West Virginia is a series of orogenies and riftings. The Grenville Orogeny found North America mostly south of the Equator, with its "East coast" facing south. The orogeny created a range of mountains like the Andes as part of the supercontinent of Rodinia. The Old Rag granite is a Grenville fragment. By the mid-Cambrian Period, the Iapetus Ocean was open, with a volcanic island arc to the southeast.

The Taconic Orogeny (during the Ordovician Period, 450–500 million years ago) brought a microcontinent to the North American "East coast." Sediments were eroded to the west.

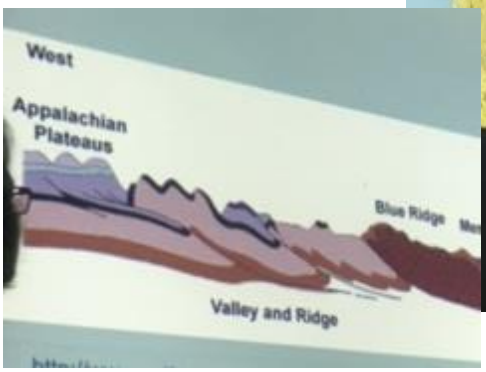
The Acadian Orogeny (during the Devonian Period, 400 million years ago) added the Avalon Terrane to create the eastern Piedmont region of Virginia. North America was part of Laurasia. Sediments filled the basin in West Virginia. There is evidence of glaciation in the mountains during the Devonian Period, even though North America was near the Equator. Large rocks dropped into sediments, with striations on these rocks, and mass transport of sediments at the time is attributed to rapid emptying of lakes.

The Alleghanian Orogeny (during the Pennsylvanian and Permian Periods, 300–250 million years ago) ended with the joining of North America and Africa to form the supercontinent Gondwana. About 250 million years ago, the third and greatest mass extinction occurred, with the disappearance of 94 percent of all sea animal species and 70 percent of all land animal species. High mountains covered Virginia except in the southwest. Coal swamps covered the West Virginia basin, Lower Michigan basin, and Illinois basin.

Beginning at the end of the Triassic Period (200 million years ago), rifting brought the sinking of eastern Virginia and accumulation of sediments and erosional flattening of the Appalachian Mountains. The Culpeper, Richmond, Farmville, and other basins collected Triassic and Jurassic sediments. Near Stevensburg, VA, there are dinosaur tracks in the siltstones. During the rifting, diabase intruded into the overlying rocks. Subsequent gentle uplift created the Valley and Ridge region of today.

Professor Jaye showed and described pictures of outcroppings of sedimentary rocks from each orogeny and rifting period, such as the Oriskany sandstone and Catoctin formation, along H Corridor.

You can get a pdf copy of the presentation from Bob Cooke at rdotcooke@verizon.net—or bring a thumb drive to the November meeting.



Club Show Coming Up!

November 19–20, 2016

by Tom Taaffe, Show Chair

The NVMC holds its 25th Annual Gem, Mineral, and Fossil Show on November 19 and 20 at George Mason University. The show site will again be the Hub's Ballroom. Setup is Friday evening, November 18, starting at 5:30 p.m.

SHOW VOLUNTEERS NEEDED !!

We will need a host of club volunteers over the course of both show days to perform tasks and fill positions. We encourage volunteers to sign up for shifts of at least 2 hours—more, if you can manage it. We are very grateful to all the volunteers who so generously helped out at past shows, and we hope that many of you return to help us again at the 2016 show.

We need volunteers for the tasks and activities summarized below. If you can volunteer or have any questions, please contact Tom Taaffe at rockcllectr@gmail.com or call me at 703-281-3767; you can also text me at 571-345-5310. In addition, you can volunteer by contacting NVMC President Bob Cooke at rdotcooke@verizon.net.

Friday Night Setup (A): Volunteers bring materials from the club's storage unit to the Hub, arriving by 5–5:30 p.m. Materials include exhibit cases, heavy-duty electrical cords, table coverings, and miscellaneous supplies; mineral specimens for the auction and for the Kids' Mini-mines, plus materials for the kids' activity room; and campus directional signs. This task typically requires 2 to 3 vehicles and their drivers, depending on the size of the vehicles. The club storage unit is conveniently a few miles from GMU.

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

Annual Gem, Mineral, and Fossil Show
Participating Dealers

Alan's Quality Minerals—Ewing, NJ

Arrowwood Minerals—Richard Ertel, Lexington, VA

John Culberson, Arlington, VA

Jon Ertman, Rockville, MD

Robert Farrar, Bowie, MD

The Garnet Group—Casper Voogt, Sterling, VA

Geosol Imports—Rob Evans, Hawley, PA

Hartstein Fossils—Newark, DE

Dave Hennessey, Woodbridge, VA

Jan Minerals—Jehan Sher, Stafford, VA

KBT Minerals & Fossils—Tom Taaffe, Vienna, VA

George Loud, Hilton Head Island, SC

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

The Prospector Shop—Marianne Cannon, Ligonier, PA

Barry Remer, Reston, VA

Mike Shoemaker, Manassas, VA

Wayne Sukow, Fairfax, VA

Yinan Wang, Arlington, VA

Williams Minerals—Rio, WV

Admission Desk: Volunteers greet show attendees, collect admission, and issue door prize tickets. You can sign up for slots on Saturday from 10 a.m. to 5:30 p.m. and Sunday from 10 a.m. to 3:30 p.m.

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

Silent Auction: Volunteers organize donated specimens, create bid slips, monitor 1 hour of the actual auction, collect winning bids, and distribute specimens. Hours are Sunday from 1 to 2 p.m. We usually need three to four volunteers.

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

Door Prize Announcer-Manager: A volunteer pulls hourly winning door prize tickets for kids as well as for adults, announces the winners, escorts winners to the door prize table, and supervises prize selection.

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

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

Annual Holiday Party

It's December and time to celebrate all that we've accomplished this year! After our successful annual mineral show, what better way to end the year than friends coming together for food, fossils, gems, and minerals? Club members and guests are invited to join the feast and fun on December 19 at 6:30 pm at our usual meeting place, Long Branch Nature Center.

Please tell Sue Marcus at akumaldreams@gmail.com how many people you will bring and what you might bring from the suggested list below.

If you'd like to participate in the gift exchange, please bring a hobby-related gift. The gift you bring should have a value of no more than $20 and no less than $5.

Thank you for helping to make our holiday party fun!

1 green salad
1 veggie plate
1 frito salad
1 pasta salad
1 can of nuts
3 platters of shrimp
2 platters of cheese
2 boxes of crackers or loaves of bread
2 plates of deviled eggs (24 halves each)
2 cakes
2 pies
3 plates of cookies
2 plates of brownies
2 plates of fudge/candy
1 jar pickles or similar.

Come and enjoy!

Donations Needed for Kids' Mini-Mines!

The club could use some new minerals and/or fossils to replenish stocks for the Kids' Mini-Mines at our upcoming show at GMU. If you have extra "mine run" specimens of prehnite, amazonite, garnet, amethyst, fluorite, calcite, or any other attractive and interesting mineral, please share them with kids!

We are looking for small to medium-size specimens with some nice color or interesting crystal forms. Specimens should be not too fragile, no larger than about a quarter than a pound, and no smaller than a quarter. They should be interesting enough that novice collectors would like to add them to their collections.

Contact Tom Taaffe at 703-281-3767 or at rockcllctr@gmail.com. Or bring your specimens to the November meeting!

The Cobalt Pipeline

Thanks to Sue Marcus for the reference!

An article in *The Washington Post* (30 September 2016) traces the path from hand-dug mines in Congo to your phone or laptop.

The sun was rising over one of the richest mineral deposits on Earth, in one of the poorest countries, as Sidiki Mayamba got ready for work. … Read more.

AFMS News

New AFMS President

Editor's note: *Matt Charsky, a member of the NVMC, is the outgoing AFMS president, replaced by Ron Carman. Here is an abbreviated, lightly edited version of "A Word From the President" (from* A.F.M.S. Newsletter *[November 2016], p. 2).*

For the second time, I am taking this position, and again I have some big shoes to fill (no offense intended, Matt!).

I am a member of three clubs in the South Central Federation, and I enjoy collecting minerals (although I appreciate fossils and gemstones too) and visiting shows all over. In the coming year, I hope to attend each regional federation convention and become better acquainted with the folks in all seven federations.

One thing Matt encouraged during his presidency, and I do also, is for all our members, no matter where you live, to get involved with your clubs and federations. Every club has numerous jobs it needs to fill, and the willing volunteers who fill them are the backbone of the clubs and federations.

Also, if you see something that you think needs improving or could be done better, speak up and tell someone about it. And don't be afraid to do something to help improve things if needed. Here's looking forward to a great year, and I hope to meet many of you in person.

Ron

GeoWord of the Day

(from the American Geoscience Institute)

authigenic

Formed or generated in place. Examples include rock constituents and minerals that have not been transported or that crystallized where they are now found; and minerals that came into existence together with or after the rock that contains them. The term often refers to a mineral (such as quartz or feldspar) in sedimentary rock. Opposite of allogenic.

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

Humor

Geologist Finds Earth's Youngest Rock

Editor's note: *The piece is adapted from The Spoof! (25 December 2009).*

Often dated at more than 2 billion years old, rocks are considered to be the oldest parts of our planet. Geologists find them valuable indicators of the Earth's most ancient history.

Hubert Groth, an enterprising geologist with the Gerber Institute, decided to use his scientific skills to investigate rocks of more recent origin.

"This rock I discovered is no more than 5 days old," Groth said. "Further tests will reveal startling events from last Wednesday."

Initial tests indicate that the rock is faintly granular. It falls into the Silicate Group but also contains significant amounts of aluminum, iron, magnesium, potassium, and sodium.

"What I found most significant was the presence of calcium carbonate," said Groth.

Burton Periwinkle dismissed Groth's claims.

"Hubert was out at the construction site last Wednesday," said Periwinkle, "hopping about like a madman and shouting 'Eureka' at the top of his lungs. We were going to call the police, but he suddenly got quiet and ran away."

"From the analysis of the rock and the location of Groth's find," added Periwinkle, a bricklayer, "it's obvious he didn't find a rock. He found a lump of mortar."

Groth declined to respond to Periwinkle's allegations regarding the nature of the rock.

Mystery fragment found nearby.

2016 EFMLS CONFERENCE Why You Should Attend Federation Conventions

by Sheryl E. Sims

This year's annual meeting of the Eastern Federation of Mineral and Lapidary Societies took place in Rochester, NY, on October 21–23. I've been to several federation conventions, and I recommend making a point of attending at least one in the near future, if you haven't done so already.

Attending federation conventions lets you meet your federation officers and learn firsthand what they do and what the federation does for our respective clubs. Attending helps with communication between clubs and federation officers, giving you some one-on-one time with our very busy officers.

Convention Events

EFMLS conventions are not all work and no play. This year, the convention coincided with our host club's mineral show. The show was in a historic medieval-looking building called the Armory. The large venue allowed for easy browsing and shopping for minerals. There were also club members scattered around the space demonstrating soapstone carvings, sluicing, junior rockhound activities, and so forth.

Afterwards, we had a special tour of renowned rare-mineral collector William Pinch's private collection. The tour took place in his lovely home. Although it's hard to describe just how much we enjoyed seeing all of his wonderful minerals, it's safe to say that we were in "mineral heaven"! Bill has identified quite a number of unique minerals, and the Pinch Medal for the Advancement of Mineralogy was named after him. He also has an outstanding mineral library that he built in his home, consisting of thousands of mineral books in cases extending from wall to wall and floor to ceiling.

Top: Sheryl Sims (photo by Lani Fryauff). Above left: William Pinch and EFMLS members (photo by Sheryl Sims). Above right: Rare pinchite specimen, discovered by William Pinch (photo by Sheryl Sims).

Left: Past President Larry Heath and incoming President Dave Korzendorfer (photo by Sheryl Sims). Right: Matt Charsky with new EFMLS officers for 2017 (photo by Sheryl Sims).

The evening of the banquet was both fun and interesting. New federation officers were introduced to the attendees, with a warm round of applause for those finishing their terms. Our outgoing president was Larry Heath. New federation officers include Dave Korzendorfer (president); Barb Ringheiser (first vice-president); David Nock (second vice-president); Bev Eisenacher (secretary for a 2-year term); Andy Clemer (assistant treasurer); and Michelle Renee and Debbie Potter (nominating committee).

Special Recognition

In addition, Steve and Carolyn Weinberger received a special award for their many, many years of dedicated work on behalf of the federation and various mineral clubs. Matt Charsky presented them with a large framed print of the Dom Pedro aquamarine, signed by Smithsonian Curator Jeffrey Post. Matt called the award uniquely special—and his jokes were equally special!

The meeting was productive. The 2016–2017 budget was approved, and the EFMLS Bylaws and Operating Procedures were voted on and approved. Wildacres has been slated for May 22–29, 2017, and popular speaker/instructor Bob Jones will attend.

Matt Charsky (photo by Sheryl Sims).

EFMLS Ways and Means Chair Gerry Cox (photo by Sheryl Sims).

Special Efforts

Attending federation conventions lets you hear about some of the wonderful ways your fellow club members help the federation. For instance, EFMLS Ways and Means Committee Chair Geraldine Cox raised $1,500 for the lapidary program at Wildacres from the auction of a GIA microscope. Although many of us attend the various workshops at Wildacres, few of us recognize the hard work that club members such as Gerry Cox do on our behalf.

Federation Chair Betsy Oberheim reminded attendees to nominate people for the Each One Teach One Award. There is a great deal of talent within our clubs. We are encouraged to think about how we can use our special gifts, skills, and talents to benefit both our club and our communities. Please take note of those who do this and nominate them for the EFMLS Each One Teach One Award.

After dinner, the speaker for the evening was Christopher Albrecht. He was fantastic! Chris gave a presentation called "Amber: Window Into a Lost World." He was engaging and knowledgeable, and he gave an extremely interesting and interactive presentation. Best of all, I invited him to speak to our club, and he agreed! Chris lives in Rochester, but is willing to travel to Virginia to give a presentation. It was easy to see why Chris won the Sallie Mae National Teacher of the Year Award.

Minerals from William Pinch's collection, including dioptase with wulfenite (left) and kutnohorite (right) (photos by Sheryl Sims).

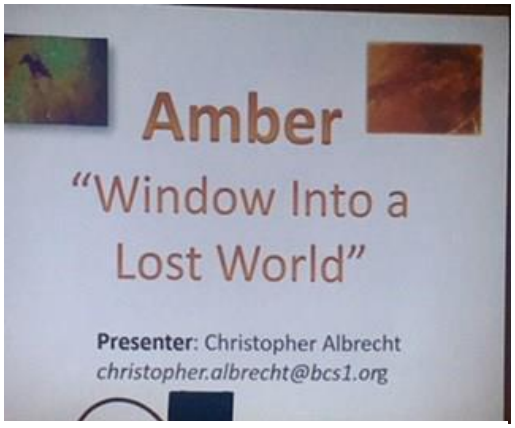
Newsletter Competition

At the Bulletin Editors Awards Competition, there were 117 entries in 11 categories. A total of 17 EFMLS clubs participated. I served as a judge, and we always hope for greater participation. We would especially like to see more participation from our junior rockhounds and members. Please encourage juniors to submit their creations for the contest, and please volunteer to serve as a judge! To no one's surprise, our club did well in the competition, and EFMLS overall did well in the AFMS competition.

Next year's EFMLS convention will be held in Bristol, CT, on October 21–22, hosted by the Bristol Gem and Mineral Club. Be sure to mark your calendars! Hopefully, next year we'll see your smiling faces next year at our EFMLS convention!

To see videos that I took of the 2016 EFMLS convention, Rochester Mineral Show, William Pinch's private collection, and Shelley Jay's presentation on Corridor H, please visit our club website at www.novaminerlclub.org.

– Sheryl



Christopher Albrecht (photos by Sheryl Sims).

EFMLS friends, old and new (photo by Sheryl Sims).

Earth's Oldest Known Material: 4.4 Billion Years

by Deborah Netburn

Editor's note: *The piece is adapted from* Crack 'n Cab *(newsletter of the Gem & Mineral Society of Syracuse, NY), March 2014, p. 5. It originally appeared in the* Los Angeles Times *(2/25/14).*

The oldest known material on Earth is a tiny bit of zircon crystal that has remained intact for 4.4 billion years. The ancient remnant may change the way we think about how our planet first formed.

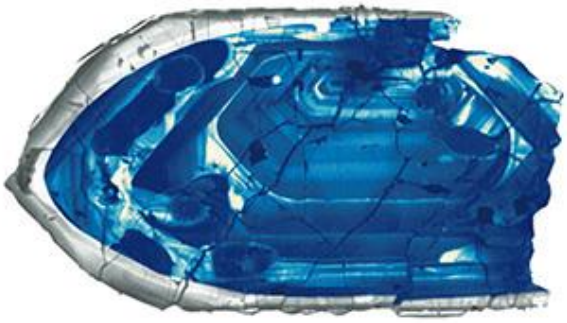
The crystal is the size of a small grain of sand, just barely visible to the human eye. It was discovered on a remote sheep farm in Western Australia, which happens to sit on one of the most stable parts of our planet.

"The Earth's tectonic processes are constantly destroying rocks," said John Valley, a professor of geoscience at the University of Wisconsin in Madison, who discovered and dated the crystal. "This may be the one place where the oldest material has been preserved."

The crystal is so much older than anyone expected that Valley and his team have had to date it twice. They published their first paper about this grain of zircon in 2001. At that time, they determined that it was 4.4 billion years old by measuring how many of the uranium atoms in the rock had decayed into lead.

Geologists have long used this technique, known as the uranium lead system, to date rocks. But because nobody had ever found anything on Earth this old, the initial findings were questioned. Maybe, some said, the lead atoms had moved around in the zircon, making it seem like there was more lead and giving the scientists an inaccurate date.

The Jack Hills of Australia, where a 4.4-billion-year-old grain of zircon was found. Photo: John Valley, University of Wisconsin–Madison.



Cathodoluminescence image of a 400-µm grain of zircon. Photo: John Valley, University of Wisconsin–Madison.

But Valley and his colleagues published a paper in *Nature Geoscience* that proves the zircon is as old as they say. They used a new method called atom probe tomography to see individual atoms of lead in the sample and tell whether they had moved. They found that the lead atoms do indeed move around over time, but on such a small scale that the movement would not interfere with the overall dating process.

"We have a zircon that is 4.4 billion years old," Valley said.

This small piece of ancient rock has big implications for how and when the Earth's crust started to form.

Like the rest of the solar system, scientists say, Earth formed about 4.567 billion years ago. One theory suggests that in the frenzy of those early days 4.5 billion to 4.4 billion years ago, Earth was struck by an object the size of Mars. The impact altered Earth's tilt and caused a chunk of the planet to vaporize into space. (Some of that dust later became the moon).

The blow also caused the rest of Earth to be covered in a hot magma ocean. This is called the Hadean Period.

Scientists are not sure how long the Hadean Period lasted, but this ancient piece of zircon suggests that the Earth's crust had started to cool and form by 4.4 billion years ago.

The Rocks Beneath Our Feet

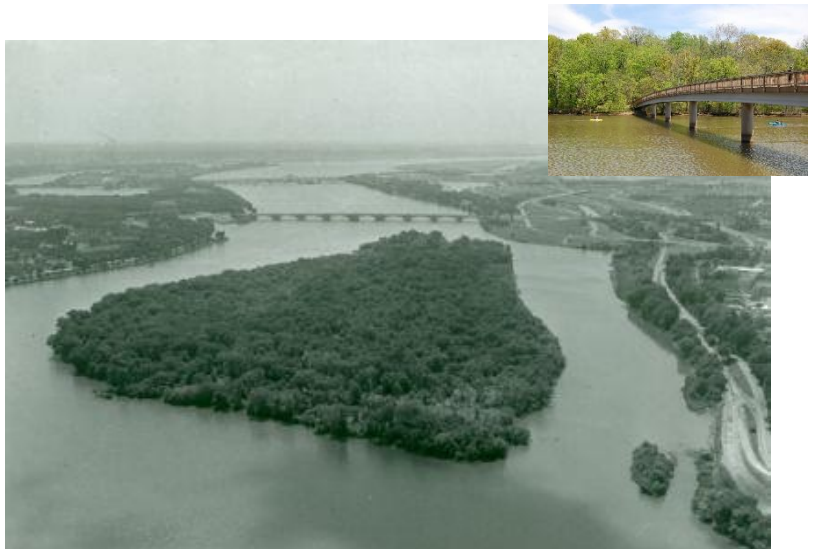
Theodore Roosevelt Island: The Bedrock

by Hutch Brown

Editor's note: *This is the first in a three-part series on the geology of Theodore Roosevelt Island. The second and third parts, respectively, are on the river and its sedimentary deposits.*

A jewel in the National Park System it might never be, but Theodore Roosevelt Island is well worth a visit, if you haven't been there already. It is centrally located in our area and easily accessible, with well-groomed trails and boardwalks leading through an array of local ecosystems within short distances—mature upland forest as well as swamp and marsh.

(In case you ever wondered, a swamp is a flooded forest, whereas a marsh is a flooded grassland—an easy way to remember.)



Theodore Roosevelt Island in 1950, from the north looking south. Today, a footbridge leads to the island from the Virginia side of the Potomac (on the right), across a channel known colloquially as Little River. Source: National Park Service.

The island has a rich history. The Nacotchtank people, who called the island Analostan, had at least one village there. By the late 1790s, Analostan supported forest, gardens, and farmfields surrounding a summer home built by a wealthy Georgetown businessman, John Mason (fig. 1). Mason built a causeway from the Virginia side of the Potomac River to the northeastern point of the island; a tree-lined road led from north to south down the middle of the upland plateau to the house at the island's highest point (44 feet) and then down to its southern tip. Well-heeled visitors raved about the verdant settings, sweeping river views, and decorous parties thrown by the Masons.

Today, much of the island is wetland; the idea of farming it seems strange. But the island was originally smaller and drier than today, underlain by the same crystalline bedrock that underlies much of Arlington County in Virginia (fig. 2).

Where did the bedrock come from?

Buried Fault Line

The core of the island is metamorphic rock classified as Sykesville Formation, thought to have originated

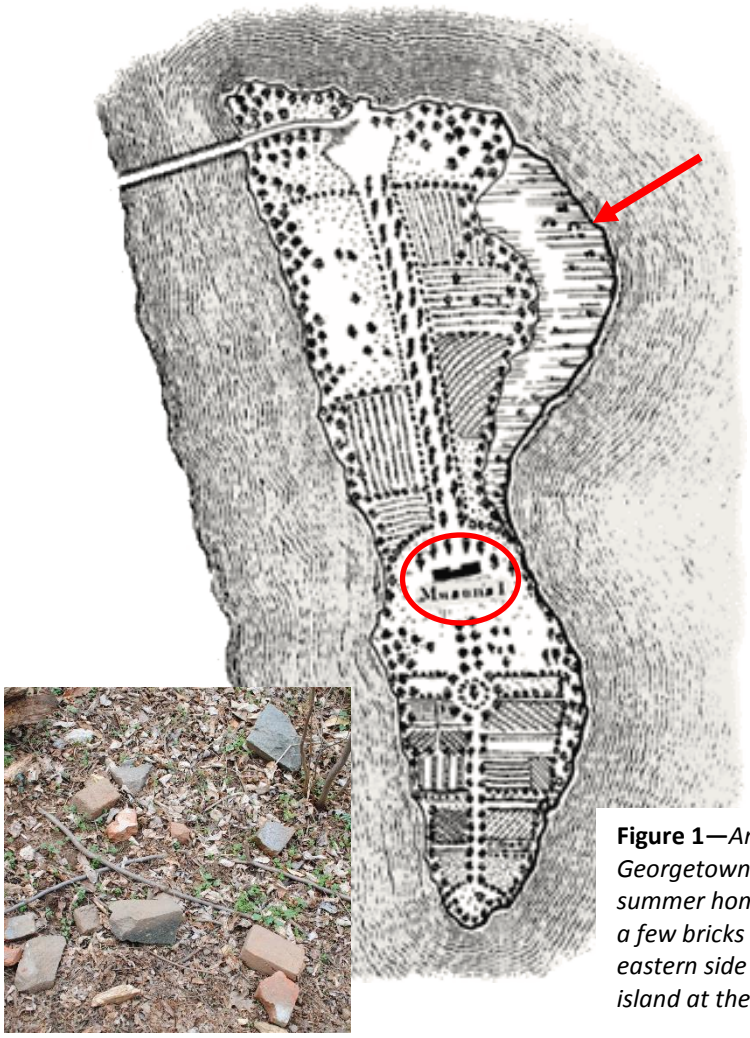


Figure 1—*Analostan Island in about 1800, when it was owned by the Georgetown businessman John Mason, who farmed the island and had a summer home at its highest point (circled). All that remains of the house are a few bricks and building stones (left). The island had a swamp on its northeastern side (arrow) but lacked today's marsh, tidal creek, and additional island at the southern tip. Source: Gunston Hall (n.d.); photo: Hutch Brown.*

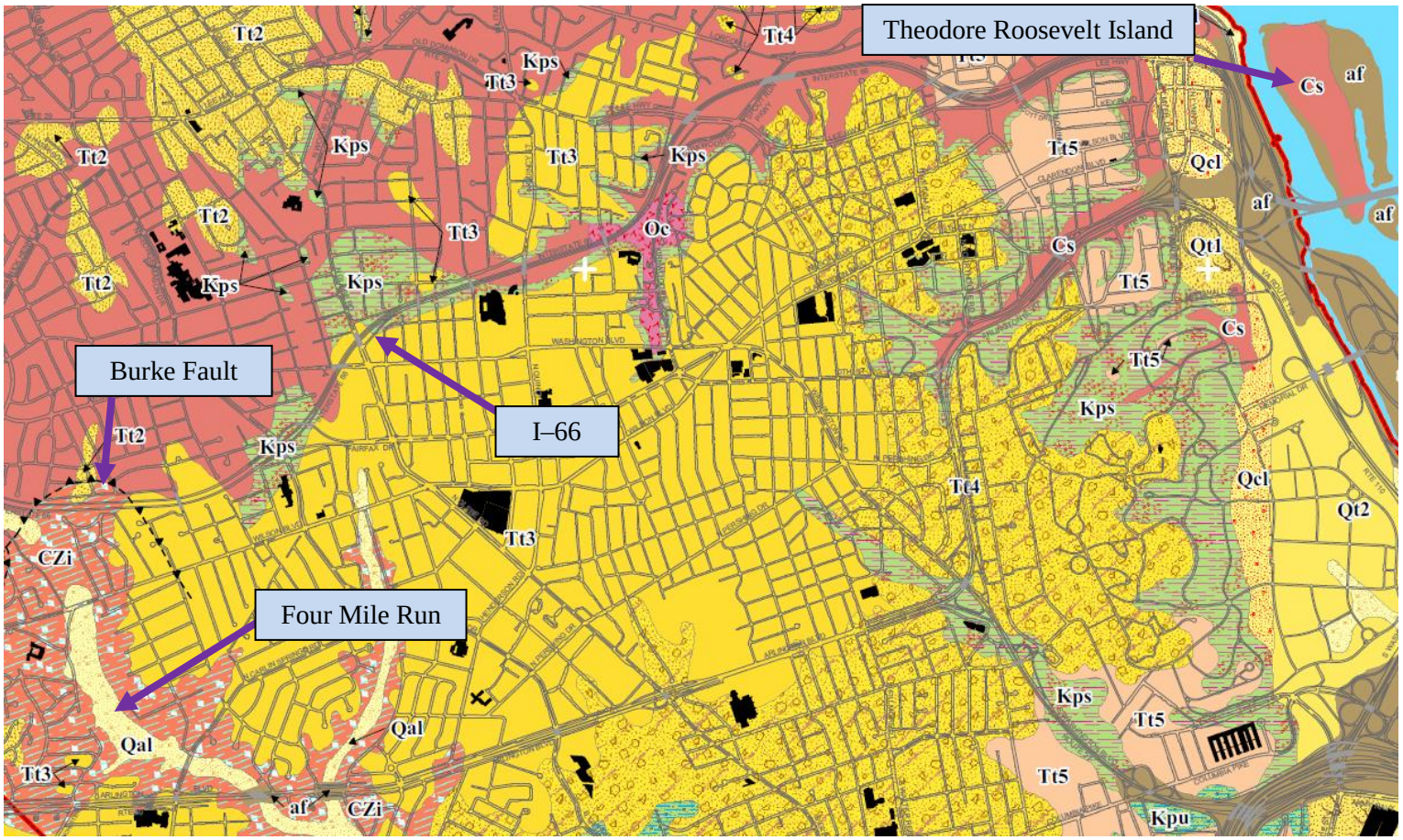


Figure 2—*Map detail showing the geology of central Arlington County in Virginia. Dark pink = Cambrian bedrock (Sykesville Formation,* **Cs***); pink w/gray flecks (lower left corner) = Cambrian/Proterozoic bedrock (Indian Run sedimentary melange,* **CZi***); green = Cretaceous sediments (Potomac Formation,* **Kpu/Kps***); deep yellows/light pink = Tertiary terrace deposits (***Tt2/3/4/5***); buff/light yellows = Quaternary deposits (***Qal/Qcl/Qt1/2***); brown = artificial fill (***af***); black = structures. Source: Frost and Ernest (1999).*

in the Cambrian Period (from about 545 million to 505 million years ago). The Sykesville is a metasedimentary melange (metamorphosed mixture of sediments) similar to the Indian Run sedimentary melange exposed by Four Mile Run near the nature center where our club meets. In fact, the two formations were originally thought to be the same (Drake 1985).

A geologic map of Arlington County shows Theodore Roosevelt Island at the southern edge of the Sykesville Formation, which underlies most of North Arlington (the dark pink in figure 2). The map reflects disparate geologic events separated by hundreds of millions of years.

The Indian Run sedimentary melange (the gray-flecked pink in figure 2, **CZi**) is separated from the Sykesville Formation (**Cs**) by the Burke Fault. The two formations, each half a billion years or more in age, were put in place during the Alleghanian Orogeny, a mountain-building event resulting from the collision of proto-Africa with proto-North America about 320 million years ago. The Sykesville slightly overlies the Indian Run, as we shall see.

Overlying both Cambrian formations in turn are sediments from the Cretaceous Period (from about 144 million to 66 million years ago) and the Tertiary Period (from about 66 million to 1.6 million years ago)—respectively, green and yellow on the map. The sediments cover most of South Arlington.

About 230 million years ago, as Africa broke away from North America, the bedrock dipped toward the widening Atlantic Ocean. Where east-flowing rivers in North America reached the tidal zone, they slowed and released their sediments, creating a widening and deepening coastal plain. You can see the process in miniature today along the Potomac River, from Great Falls to Theodore Roosevelt Island.

The sediments demarcate the Fall Line zone and the beginning of the Coastal Plain; Interstate Highway 66 roughly follows the Coastal Plain's northern edge in Arlington County (fig. 2). On the Coastal Plain, younger Tertiary sediments (yellow) overlie older Cretaceous sediments (green).

Except where exposed by erosion, the sediments now cover the Cambrian bedrock, obscuring most of the boundary between the Sykesville and Indian Run formations (fig. 2). Hence so much yellow and green on the geologic map of central Arlington—and hence the truncated Burke Fault line on the map.

The Sykesville Formation

The Sykesville rock is medium in grain size and medium gray in color. The matrix is mostly quartz, muscovite, feldspar, and biotite, with a much higher proportion of quartz than in the Indian Run rock (Drake 1985). Fisher (2010) has identified parts of it as a garnet-bearing schist, and you can find garnetiferous rock on the island (though no schist that I have seen except for rock brought in for building).

The Sykesville contains large pieces of quartz and other rocks (what geologists call olistoliths—from ancient Greek words meaning "slip stones"). Some of the olistoliths (though not on Roosevelt Island) are big enough to appear on geologic maps. They include migmatite, phyllonite, metagraywacke, and other rocks from the adjacent Mather Gorge Formation to the northwest. Large olistolith exposures are mainly upriver near Mather Gorge; the olistoliths on Roosevelt Island, though common, are small.

The olistoliths prove that the Sykesville is younger than the Mather Gorge Formation. The Mather Gorge, like the Indian Run rock, is thought to be early Cambrian or Proterozoic in age; accordingly, both formations usually show up on geologic maps as **CZ** ("C" for Cambrian and "Z" for Proterozoic, reflecting the uncertainty).

Though widely considered to be Cambrian in age, the Sykesville could be older. A huge intrusion into the Sykesville called the Occoquan granite has a known age—about 472 million years—so the Sykesville has to be at least that old. Recent research suggests a maximum age of from 600 million to 1 billion years (Fisher 2010). Accordingly, Callan (2015) describes the Sykesville's depositional age as unknown.

So how did the Sykesville form?

Sykesville exposures on Theodore Roosevelt Island. Note the embedded rocks (olistoliths) in the photo at top and the granularity of the quartz-rich matrix around the quartz olistolith (bottom left) and around the tiny garnet crystal (bottom right), both circled. In places, bedding is visible (top). Photos: Hutch Brown.

Terranes

The Sykesville rock is part of three formations that make up the Potomac Terrane (fig. 3). The other two are the Mather Gorge and Laurel Formations; the Laurel, like the Sykesville, is a metasedimentary melange. It is mapped only north of the Potomac River (in Maryland and beyond), although it might also be buried under Coastal Plain sediments to the south (Johnston 1964). In Virginia, the Mather Gorge lies to the west and the Sykesville to the east, bordered by the Indian Run sedimentary melange and other formations even farther east (Drake 1985).

By "terrane," geologists usually mean blocks of rock bounded by faults; the blocks can include multiple formations. The three formations in the Potomac Terrane (Sykesville, Laurel, and Mather Gorge) were probably emplaced on the proto-North American continent at about the same time, though in different geologic environments.

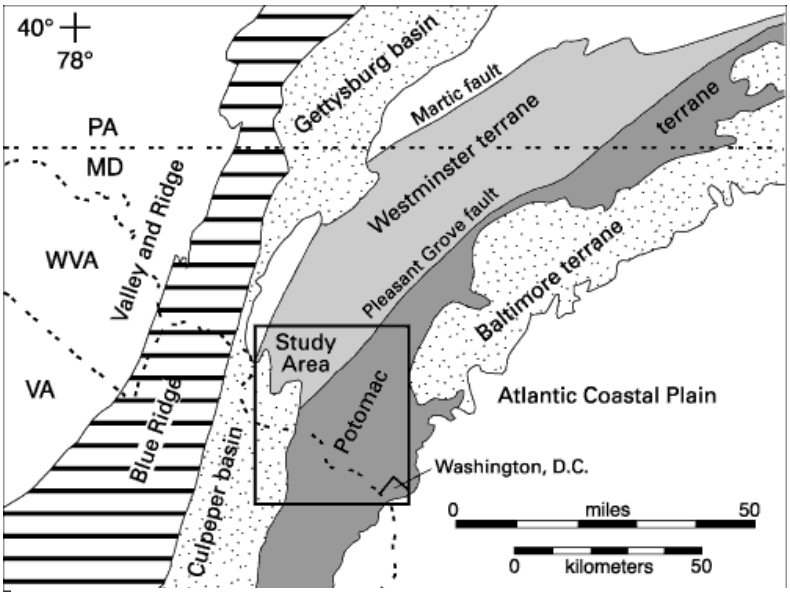


Figure 3—*Map of the Piedmont terranes in our area, including the Potomac Terrane (dark gray). These terranes abut the Triassic basins at the foot of the Blue Ridge. Note the location of Washington, DC, on the eastern edge of the Potomac Terrane. Source: Kunk and others (2014).*

And that gets to another meaning of the term "terrane": The Potomac Terrane originated in a much larger piece of the Earth's crust that geologists also call a terrane.

Such terranes are free-floating pieces of the Earth's crust, just like continents. Picture the Earth as a raw egg, with its liquid interior. Now imagine that the shell has cracked; pieces of various sizes are floating around on the liquid interior, some of them tiny.

These "shell bits," even the tiny ones, are propelled by enormous heat and energy from within the Earth's interior. When they collide, the bits of crust are large enough to generate tremendous force. They form ramps in subduction zones that dive into the Earth's interior. The ramps let one crustal mass slide up over the other as they collide. The tremendous heat and pressure caused by the collision deforms the materials caught in between, sometimes raising newly formed metamorphic rock onto dry land and covering it with overlying rock layers that form mountains.

The entire Piedmont bedrock in our area is made up of the ancient Taconic Terrane, which collided with proto-North America, riding up over the continental bedrock and lodging there (fig. 4). The collision formed mountains that are long since gone, although their sediment caps are still with us. For example, the tough sandstone that caps Massanutten Mountain in the Shenandoah Valley derived from the last remnants of the Taconic Mountains that formed beginning about 450 million years ago when the Taconic Terrane collided with proto-North America (fig. 4). The terrane also laid down the underlying bands of rock that make up the Piedmont today, including the Potomac Terrane and its Sykesville component.

Watery Origins

So the Sykesville Formation originated on another continent of sorts, albeit a much smaller one.

The Taconic Terrane has a complex history; it formed from separate oceanic plates that collided in the proto-Atlantic Ocean long before reaching proto-North America. A microcontinent slammed into one or more lines of volcanic islands; the combined land

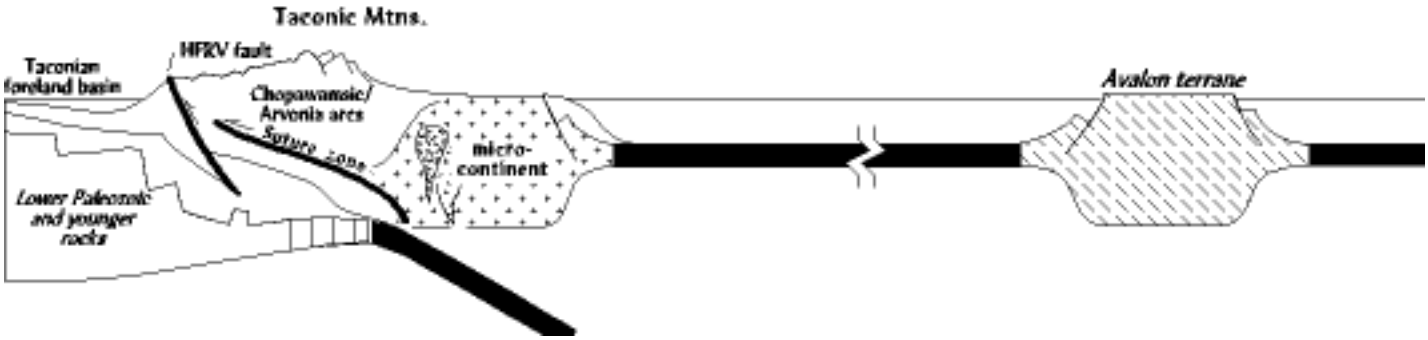


Figure 4—*The Taconic Orogeny, about 450–435 million years ago. The Taconic Terrane slams into proto-North America (far left), which forms a subduction zone (black bar) that acts as a ramp, letting the terrane slide up over the continent. Remnants of the Chopawamsic/Arvonia island arcs (which collided with each other long before to form the leading edge of the Taconic Terrane) are pushed up into the Taconic Mountains along the Haysville-Fries-Rockfish Valley (HFRV) thrust fault, creating a foreland basin ahead of the rising mountain range. The collision establishes a suture zone between the terrane and the underlying continental rock. A second terrane, the Avalon, follows behind the Taconic Terrane, colliding with proto-North America tens of millions of years later. (The black bands represent ocean crust.) Source: Fichter and Baedke (1999).*

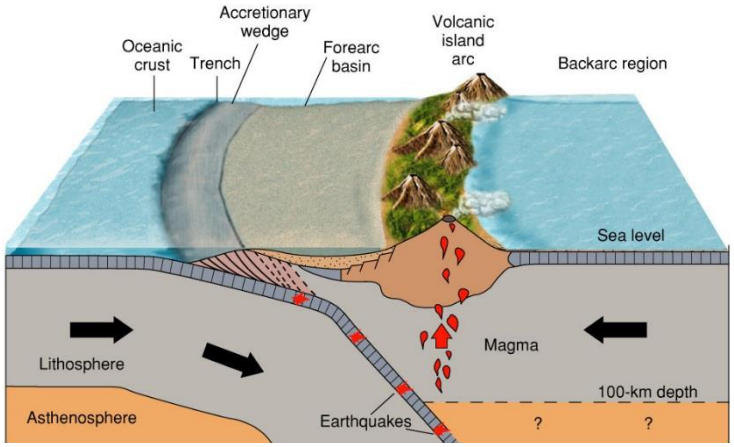


Figure 5—*Formation of a volcanic island arc. Where oceanic plates collide, one dives under the other in a subduction zone. The tremendous heat and friction cause earthquakes and melt the lithosphere, sending plumes of magma up to the surface, where they erupt in volcanoes. Where the plates converge, they form a trench that gradually fills with materials scraped from the plates and eroded from the island arc. Source: A.M. (2013).*

Figure 6—*Sykesville rock on Theodore Roosevelt Island. Note the bedding planes from lower left to upper right, parallel with the dark flat olistoliths. Photo: Hutch Brown.*

mass then proceeded toward proto-North America, ultimately colliding with the continent (fig. 4).

Geologists are reasonably certain that the Sykesville rock formed in an undersea trench associated with the Taconic Terrane or its antecedents (fig. 4). Where oceanic plates converge, one plate dives under the other in a subduction zone (fig. 5). The resulting heat and friction melt the lithosphere, sending plumes of magma to the surface, where they form a line of volcanic islands in the shape of an arc. The converging plates form an oceanic trench that gradually fills with materials accreted from the plunging plate and eroded from the volcanic islands.

Most of the materials accumulating in the trench are sand and silt, although earthquakes can send sizable rocks and boulders plunging into the trench in undersea landslides. Over time, the materials thicken and harden into sedimentary rock. Granular layering in the Sykesville Formation (fig. 6) suggests that it originally formed in this way—in a deep-sea trench.

So how did the Sykesville turn into metamorphic rock? And how did it get to where it is today—more than a hundred miles inland?

Landfall and Uplift

Metamorphism resulted from the mountain-building event known as the Taconic Orogeny (fig. 4). Half a billion years ago, our area was covered by shallow seas, and the continental bedrock in our area was the Grenville granite now exposed only in the Blue Ridge. The Piedmont and Coastal Plain did not exist.

The first sign of the Taconic Terrane approaching from the east would have been plumes of ash rising from volcanoes. Ahead of the volcanoes was the oceanic trench, the leading edge of the terrane (fig. 5). The trench might have contained the Sykesville sedimentary rock, although the Sykesville might have already been lifted onto dry land as part of an earlier collision between components of the Taconic Terrane (fig. 4). But if the Sykesville was in the oceanic trench, then the colliding land masses would have pushed it, together with other pieces of the Potomac Terrane, up the ramplike continental subduction zone onto the proto-North American continent (fig. 4).

In any case, the Sykesville and associated rocks were then buried under the mountains that formed over the continental basement rock. Had the Sykesville not underlain the Taconic Mountains, it would have weathered away and disappeared long ago, together with the mountains.

The tremendous friction of the colliding land masses and the enormous pressure of the overlying rock would have superheated and melted the Sykesville Formation, transforming it into the metasedimentary melange we see today. In the process, the Sykesville might have absorbed pieces of the older Mather Gorge rock, just as intrusive dikes of basalt often contain pieces of the older rock they intrude. Or the

Mather Gorge olistoliths might have weathered away and fallen into the oceanic trench long before, to be buried in the Sykesville sediments.

The Taconic Orogeny carried enough force to graft the terrane onto the proto-North American continent. A second terrane, the Avalon, arrived about 380 million years ago, adding another wedge of metamorphic rock to the proto-North American continent, sutured onto the Taconic bedrock.

But the biggest mountain-building event was yet to come.

The Great Rock Train

About 320 million years ago, the proto-Atlantic Ocean completely closed as the proto-African continent slammed into proto-North America (fig. 7). The collision formed mountains as high as the Himalayas today. The proto-African continent rode up over proto-North America, stripping off layers of underlying rock and pushing them on great, nearly horizontal thrust faults to the west.

A great rock train resulted as rock layers peeled off from the continental bedrock, one by one, and moved westward. At the head of the train were sedimentary rocks that came to rest in the Valley and Ridge Province, forming a series of folds that geologists call synclines and anticlines; picture a rug being pushed together. The Valley and Ridge rocks included remnants of the Taconic Mountains, partly in the form of the massive syncline (a fold with upturned edges) of Massanutten Mountain in the Shenandoah Valley.

Following right behind were detached sheets of rock from the original continental bedrock, the Grenville granite, more than a billion years old. Partially altered by tremendous heat and stress, these granitoids and their associated basalts and overlying sediments were thrust to the west and ultimately upward behind the Bull Run Fault (where Bull Run Mountain lies today in Virginia).

The rocks formed a giant anticline (a fold with downturned edges). Breeched at the top by erosion and weathered away, the anticline became today's Blue Ridge Mountains. The Blue Ridge rocks have metamorphic layers on their eastern and western edges, including Catoctin greenstone, Weverton quartzite, Harpers phyllite, and Antietam quartzite.

Coming behind the Blue Ridge rocks were great sheets of terrane rock. First came the Taconic, transported behind the Blue Ridge upthrust and coming to rest in what we now call the Piedmont (fig. 7). Next came sheets from the Avalon (or Acadian) Terrane, which today underlie the Coastal Plain. In figure 7, the curved fault lines with arrows demarcate sheets of metamorphic rock detached and pushed up over other sheets in a series of sharply angled upthrusts. In figure 8, for example, note how the Sykesville "overlies" the Indian Run sedimentary melange along the nearly vertical Burke Fault in Falls Church, VA.

Island Bedrock

And so the Sykesville came to rest in our area, together with the other rocks of the Potomac Terrane. Tectonic forces associated with the Alleghanian

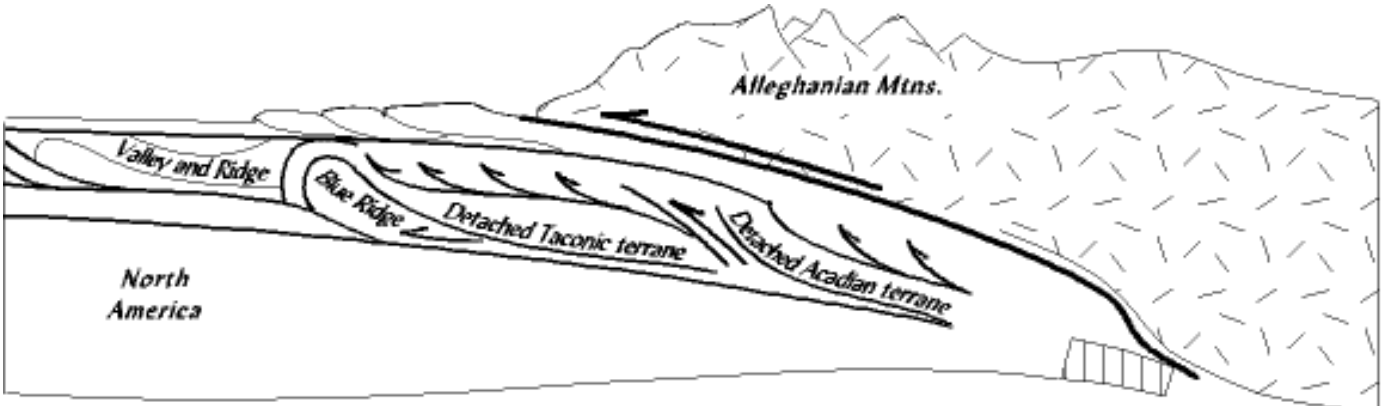


Figure 7—*The Alleghanian Orogeny, about 320–280 million years ago. As proto-Africa rides up over proto-North America, massive thrust faulting pushes the underlying bedrock westward. Flat sedimentary rocks are pushed and folded in the Valley and Ridge; the Blue Ridge granitoids and associated metamorphic rocks emerge in a massive upfold behind the Bull Run Fault; and great sheets from the Taconic and Avalon Terranes move in a series of thrust faults to where they are today in the Piedmont and beneath the Coastal Plain. The overlying Alleghanian Mountains were as high as the Himalayas today. Source: Fichter and Baedke (1999).*

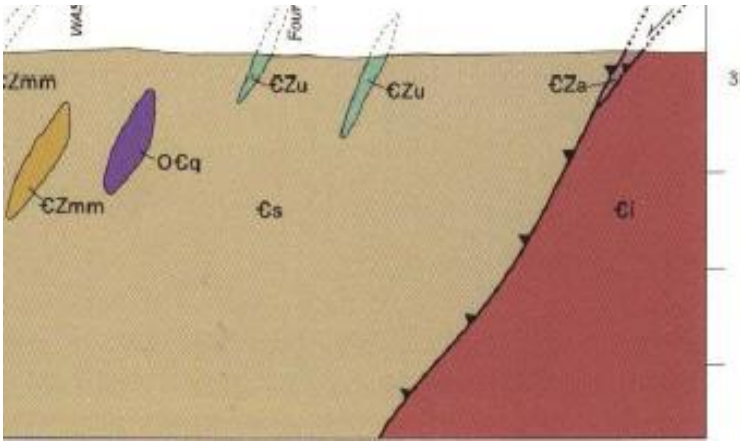


Figure 8—*Map detail of the Sykesville Formation (gray-brown,* **Cs***) and Indian Run sedimentary melange (burgundy,* **Ci***) divided by the Burke Fault (line with saw teeth) in Falls Church, VA. The line indicates the sharply angled thrust fault where the Sykesville rode up over the Indian Run rock during the Alleghanian Orogeny. Note the olistoliths, large enough to map. Source: Drake and Froelich (1997).*

mountain-building event moved the entire Potomac Terrane tremendous distances (fig. 9). The Sykesville might have started near the same longitude as what is now Virginia Beach, only to end up on the edge of Washington, DC—dozens of miles to the west.

For tens of millions of years, the Potomac Terrane was covered by enormous mountains made up of rock from Africa. Gradually, the mountains weathered away; their sediments washed to the west, filling the great inland seas.

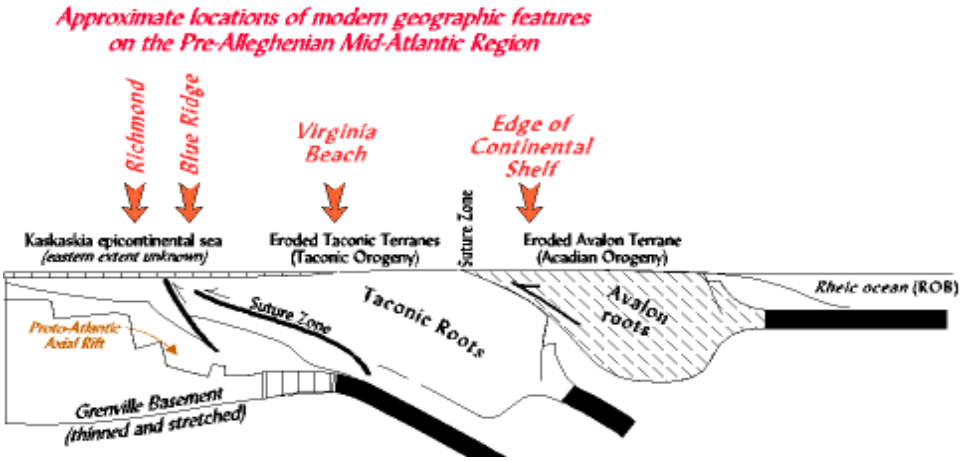


Figure 9—*A period of tectonic calm followed the Taconic and Avalonian mountain-building events. Both terranes were sutured onto the continent; the mountains eroded away, leaving a plain gently draining into an inland sea (the Kaskasia, upper left). The subsequent Alleghanian Orogeny compressed and folded the terranes and jumbled their formations, pushing them into their present locations far to the west. Source: Fichter and Baedke (1999).*

Weathering eventually exposed the Taconic roots of the Piedmont, leaving no trace of Africa. As the continents separated again, forming the Atlantic Ocean, rivers began flowing eastward. The rivers etched patterns in the Sykesville bedrock, including the low spine of what is now Theodore Roosevelt Island.

But that is another story.

Next issue: How did bedrock lying in the middle of a supercontinent draining to the west become an island in a river flowing to the east?

Acknowledgment

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

Sources

Callan, B. 2015. The Sykesville Formation, in six new GigaPans. Mountain Beltway, AGU Blogosphere.

Drake, A.A., Jr. 1985. Tectonic implications of the Indian Run formation—A newly recognized sedimentary melange in the northern Virginia Piedmont. USGS Prof. Pap. 1324. Reston, VA: U.S. Geological Survey.

Drake, A.A., Jr.; Froelich, A.J. 1997. Geologic map of the Falls Church quadrangle, Fairfax and Arlington Counties and the city of Falls Church and Montgomery County, Maryland. GQ–1734. Reston, VA: U.S. Geological Survey.

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

Fisher, S. 2010. Investigation of the age and origin of the Sykesville Formation in Maryland. Thesis. GEOL 394. University of Maryland. College Park,

Fleming, A.H.; Drake, A.A., Jr.; McCartan, L. 1994. Geologic map of the Washington West Quadrangle, District of Columbia, Montgomery and Prince Georges Counties, Maryland, and Arlington and Fairfax Counties, Virginia. Reston, VA: U.S. Geological Survey.

Frost, W.; Ernest, T. 1999. Simplified geologic map of Arlington County, Virginia,

and vicinity. Arlington County, VA.

Gunston Hall. N.d. George Mason landholdings: Analostan Island. Mason Neck, VA.

Kunk, M.; Wintsch, R.; Southworth, S.; [and others]. 2004. Multiple Paleozoic Metamorphic Histories, Fabrics, and Faulting in the Westminster and Potomac Terranes, Central Appalachian Piedmont, Northern Virginia and southern Maryland. In: Geology of the National Capital Area—Field trip guidebook. Field trip 5. USGS Circ. 1264. Reston, VA: U.S. Geological Survey.

Johnston, P.M. 1964. Geology and ground-water resources of Washington, D.C., and vicinity. Geol. Surv. Water-Supply Pap. 1776. Reston, VA: U.S. Geological Survey.

M., A. 2013. Finding Nemo: A tectonic tour. Blog.

O'Connor, R; Dolinsky, P.D.; Vela, D.; [and others]. 2007. Historic American Landscapes Survey: Theodore Roosevelt Island. HALS no. DC–12. Washington, DC: National Park Service.

USGS (U.S. Geological Survey). 1993. Sykesville Formation. Reston, VA.

USGS (U.S. Geological Survey). N.d. Topographic map: Theodore Roosevelt Island, District of Columbia. Reston, VA.

Williams, G.P. 1977. Washington D.C.'s vanishing springs and waterways. Geol. Surv. Circ. 752. Reston, VA: U.S. Geological Survey.

Mind Games

by Sheryl E. Sims

Based on Idaho Museum of Natural History, Pocatello, ID.

From the list on the right, select the correct word for each rock-related definition below.

a. _____: The process by which clastic sediment is lithified by precipitation of mineral cement, such as calcite cement, among the grains of the sediment.

b. _____: Tighter packing of sedimentary grains causing weak lithification and a decrease in porosity, usually from the weight of overlying sediment.

c. _____: The settling of materials out of a transporting medium.

d. _____: The processes that loosen sediment and move it from one place to another on Earth's surface. Agents of erosion include water, ice, wind, and gravity.

e. _____: The processes by which sediment is converted into sedimentary rock. These processes include cementation and compaction.

f _____: Molten rock, generally a silicate melt with suspended crystals and dissolved gases.

g. _____: To go from a solid state to a liquid state.

h. _____: Alteration of the minerals and textures of a rock by changes in temperature and pressure, and/or by a gain or loss of chemical components.

i. _____: The force per unit of area exerted upon something, such as on a surface.

j. _____: Material (such as gravel, sand, mud, and lime) that is transported and deposited by wind, water, ice, or gravity; material that is precipitated from solution; deposits of organic origin (such as coal and coral reefs).

k. _____: The processes that carry sediment or other materials away from their point of origin. Transporting media include wind, water, and mantle convection currents

l. _____: A structurally high area in the crust, produced by movements that raise the rocks, as in a broad dome or arch.

Uplift	Magma	Sediment
Compaction	Erosion	Lithification
Melting	Cementation	Pressure
Transportation	Deposition	Metamorphism

Answers:

a. Cementation; b. Compaction; c. Deposition;
d. Erosion; e. Lithification; f. Magma; g. Melting;
h. Metamorphism; i. Pressure; j. Sediment;
k. Transportation; l. Uplift

November 2016—Upcoming Events in Our Area/Region (see details below)

Sun	Mon	Tue	Wed	Thu	Fri	Sat
		1	2 MSDC mtg, Washington, DC	3	4	5 Show: Oaks, PA
6 Show: Oaks, PA	7	8 **Election Day**	9	10	11 **Veterans Day**	12 Shows: Mountville, PA, Melbourne, FL
13 Show: Melbourne, FL	14 NVMC mtg; GLMSMC mtg	15	16	17	18 **NVMC Show setup**	19 **NVMC Show, Fairfax, VA**
20 **NVMC Show, Fairfax, VA**	21	22	23	24 **Thanksgiving Day**	25	26
27	28	29	30 MNCA mtg, Arlington, VA			

Event Details

2: Washington, DC—Monthly meeting; Mineralogical Society of the District of Columbia; 1st Wednesday of the month, 7:45–10; Smithsonian Natural History Museum, Constitution Avenue lobby.

5–6: Oaks, PA—Gemarama 2016, 47th Annual Fine Gem, Jewelry and Mineral Show; Tuscarora Lapidary Society; Sat 10–6, Sun, 10–5; HALL C, Greater Philadelphia EXPO Center; info: www.lapidary.org.

12: Mountville, PA—Annual Fossil and Mineral Show; Lancaster County Fossil & Mineral Club; Trinity United Church, 450 W Main St; info: Christopher Haefner <silverfordinc@yahoo.com>

12–13: Melbourne, FL—43rd Annual Parade of Gems; Canaveral Mineral & Gem Society; Melbourne Auditorium, 625 East Hibiscus Blvd; 10–5; $5 donation; info: Don McLamb, fdjmc@aol.com.

14: 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.

14: Rockville, MD—Monthly meeting; Gem, Lapidary, and Mineral Society of Montgomery County; 2nd Monday of the month, 7:30–10; Rockville Senior Center, 1150 Carnation Drive.

19–20: Fairfax, VA—25th Annual Gem, Mineral, and Fossil Show; cosponsors: Northern Virginia Mineral Club & George Mason University's Department of Atmospheric, Oceanic, and Earth Sciences; George Mason University, The Hub Ballroom, Rte 123 & Braddock Rd; Sat 10–6, Sun 10–4; adults $6, seniors $4, teens (13–17) $3, 12 and under free, Scouts in uniform & students w/ID free; info: http://www.novamc.org/events/2016-show

23: Arlington, VA—Monthly meeting; Micromineralogists of the National Capital Area; 4th Wednesday of the month, 7:45–10; Long Branch Nature Center, 625 S Carlin Springs Rd.

THE NORTHERN VIRGINIA MINERAL CLUB INC

Crystals are the flowers of the Mineral Kingdom

Mineral of the Month: Stilbite

2016 Club Officers and Others

President: Bob Cooke
rdotcooke@verizon.net
Vice-President: Ti Meredith
ti.meredith@aol.com
Secretary: David MacLean
dbmaclean@maclean-fogg.com
Treasurer: Rick Reiber
mathfun34@yahoo.com
Field Trip Chair: Ted Carver
jtcarve@msn.com
Webmaster: Casper Voogt
casper.voogt@plethoradesign.com
Club Historian: Kathy Hrechka
kshrechka@msn.com
Communications: Vacant
Photographer: Sheryl Sims
sesims4@cox.net
Editor: Hutch Brown
hutchbrown41@gmail.com
Show Chair: Tom Taaffe
rockcllectr@gmail.com
Greeter/Door Prizes: Ti Meredith
ti.meredith@aol.com

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

The Northern Virginia Mineral Club

You can send your newsletter articles to:

news.nvmc@gmail.com

Visitors are always welcome at our club meetings!

RENEW YOUR MEMBERSHIP!

SEND YOUR DUES TO:
Rick Reiber, Treasurer, NVMC
PO Box 9851, Alexandria, VA 22304

OR

Bring your dues to the next meeting.

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).

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

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 22204. (No meeting in July or August.)

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