The Northern Virginia Mineral Club Inc

The Mineral Newsletter

Meeting: December 16 *(not our regular date!)* Time: 6:30 p.m.

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

Talc

from Vermont Verde Antique International Quarry
Rochester, Vermont

Source: Wikipedia Photo: Rob Lavinsky

Deadline for Submissions

December 20

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

Volume 60, No. 10
December 2019
Explore our website!

December Meeting:

Holiday Party!

(details on page 4)

In this issue …

Mineral of the Month
Talc

by Sue Marcus

What's the softest mineral on the Mohs hardness scale? I hope you thought of talc, our mineral of the month.

The name is attributed to Georgius Agricola (Latinized from Georg Pawer), purportedly derived from the Arabic word for "pure." I confess to little knowledge of languages (some may question my English proficiency), so I turned to Google translate, which gave me nothing resembling the written or spoken word talc.

Wikipedia acknowledges the origin of the term in medieval Arabic, used for both talc and mica. This makes sense, since Agricola used the term in 1546, drawing much of his knowledge from the medieval era (in nongeologic terms, that is).

Other sources suggest a derivation from Persian or Arabic to Middle French. Hearing a web-based Persian version of "talc" sounded familiar to me.

Talc is a metamorphic mineral formed from the alteration of serpentine, dolomite, and certain metamorphosed igneous rocks. Pure forms of talc are mined, with the product ground into powder. Add fragrance, and you get talcum powder! The softness of talc, along with its ability to hold fragrance, makes it useful as a baby powder.

Talc is also the basic ingredient of most solid makeup. I enjoy telling people that they have rocks

all over their faces. In addition to talc, solid makeup may contain other minerals, like iron oxide (rust!) for brown and tan shades, titanium (rutile) as a whitener, and mica for sparkles.

Soapstone and steatite are synonyms for impure talc. Soapstone is a significant source of carving stone. The impurities harden the extremely soft talc, making it more durable as a carving material than the pure

Merry Christmas!

Happy Hanukkah!

Club Elections Committee Report

The NVMC will elect club officers for 2020 at the December meeting before the Holiday Party. Nominated are:

President.....**YOUR NAME here!**
Vice President.....Ti Meredith
Secretary.....David MacLean
Treasurer .....Roger Haskins

What Happens Without a Club President?

We violate our bylaws, and our insurance might no longer cover us. We would be intentionally running the club improperly, which could not continue.

Do we dissolve the club? If so, our constitution states that the assets go to another nonprofit group with similar goals.

If not, what are the alternatives? Change the bylaws? When? Change them to what? According to our constitution and bylaws, the executive board must have 60 days to consider any proposed changes to the constitution or bylaws before putting them to a membership vote.

Talc crystals from Bahia, Brazil. Photo: Bob Cooke.

form, which would dent or scratch with a bump or the accidental swipe of a fingernail (human or pet). Ornaments have been carved from soapstone and steatite for millennia. A steatite quarry, with artifacts dating to the 4,500 years ago, has been found in Iran.

Ancient Egyptians glazed steatite objects to harden them. They glazed the objects by burying them in glazing compound or applying a glaze prior to firing them. Heating an object metamorphosed it to enstatite, a much harder mineral in the pyroxene group, creating finished works that endured for us to appreciate today.

More recently, in another hemisphere, skilled Canadian Inuit carvers have formed art from soapstone for generations. One source noted that soapstone has been carved in India for centuries, although current mining operations threaten tiger populations. Locals carve soapstone wherever it is found, from Minas Gerais in Brazil, to Zimbabwe, to China.

The physical and chemical properties of talc make it useful in different industries. By itself, talc is chemically inert, but its ability to absorb odors, grease, and liquids makes it useful in personal and industrial products.

The most obvious uses of talc are not the most commercially important ones. Talc's high thermal conductivity, low electrical conductivity, and high dielectric strength give it many commercial uses. Its primary use in the United States is in ceramics, mostly for the components of catalytic converters. Ceramics accounts for 22 percent of its domestic use, followed by paint and paper at 21 percent each. The cosmetics industry accounts for only 2 percent of U.S. talc consumption.

Talc is usually mined using conventional open-pit techniques. Relatively abundant worldwide, talc is a low-cost mineral commodity, so more expensive underground mining techniques are not warranted.

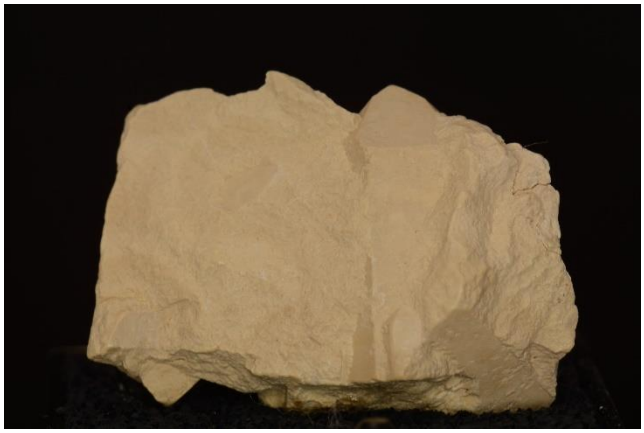
Talc is easily pulverized, and inhaling any kind of airborne particulates can be unhealthy. Like talc, asbestos is a metamorphic mineral, and the two minerals are sometimes found together, but the health risks from inhaling them are quite distinct. Inhaling asbestos can lead to asbestosis, a fatal lung disease. Inhaling too many mineral-laden particulates, whether talc, soot, or anything else, can lead to talcosis, silicosis, and other lung diseases. However, don't worry about handling talc or talcum powder.

Micromounters are more likely than the rest of us to have talc crystals in their collections. Talc is not rare, but talc crystals are. Small talc crystals are reported from Luzenac, France, and from Brosso, Lessolo, Italy.

Since talc is a secondary mineral, it readily forms pseudomorphs after other minerals, such as quartz, calcite, dolomite, and minerals of the pyroxene group. Talc pseudomorphs after quartz come from Bavaria, Germany; after dolomite, from the Respina Mine, Spain; and after enstatite, from Bamble, Norway.

This last variation is notable because people have heated talc to metamorphose it into enstatite so that carved objects are more durable. In nature, enstatite can turn into talc and become a talc pseudomorph.

Talc is seldom sold because it forms monomineralic rocks (made up of a single mineral). Talc might be included in collections as a novelty, as the world's



Talc pseudomorph after quartz, for the Erzgebirge, Germany. Photo: Bob Cooke.

softest mineral, or as a mineral that people can scratch with a fingernail. It will never be the focal point of any collection, but it can be a conversation piece.

China is by far the world's largest talc producer, followed by India and the United States. Vermont is notable to collectors because green talc crystals, like the specimen on the cover, were found at the Vermont Verde Antique Quarry in Rochester, VT. Other Vermont quarries have produced talc, though not in crystal form.

Talc occurs in the serpentines of quarries along the Pennsylvania/Maryland border and in similar belts in North Carolina. Reports of Texas talc surprised me—I don't think of metamorphic rocks when I think of Texas—although it is a Big State. The photos on Mindat don't motivate me to make Texas my top spot for collecting.

Montana produces more talc than any other state. Some Montana talc has attractive manganese dendrites for color contrast. Virginia has a soapstone deposit in Albemarle County. I'll see if we can do a field trip there, but don't expect to find crystals.

If a mineral can be cut as a gem, someone will try; so, yes, there is faceted talc. A photo on Classicgems.net shows an opaque, light-green faceted talc "gem," too soft to wear and probably difficult to put in a setting without crushing or scratching it. The accompanying description notes that talc's single perfect cleavage also makes it challenging to facet.

Some talc fluoresces orange-yellow under shortwave (ultraviolet) radiation and yellow under longwave radiation.

Technical Details

Chemical formula ..... $Mg_3Si_4O_{10}(OH)_2)$

Crystal form ..... Monoclinic (most sources); triclinic (Mindat)

Hardness 1

Density:..... 2.7–2.8 g/cm^3

Color ..... Rare crystals may be clear; usually as opaque; commonly foliated white or light to dark green masses, sometimes brown or gray due to impurities; rarely pink

Streak ..... White

Cleavage ..... 1 perfect

Fracture .....Uneven

Luster.....Pearly, waxy

Sources

Amethyst Galleries. N.d. (no date). The mineral talc.
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Encyclopedia Britannica. N.d. Talc.
Mindat. N.d. Talc.
Minerals Education Coalition. N.d. Minerals database. Englewood, CO.
Revolvy.com. N.d. Talc.
U.S. Geological Survey. N.d. Talc and pyrophyllite statistics and information. National Minerals Information Center, Reston, VA.
Webmineral.com. N.d. Talc mineral data.
Wikipedia. N.d. List of English words of Arabic origin (T-Z).
Wikipedia. N.d. Talc.
Wiktionary. N.d. talc.

Holiday Party

December 16, 6:30–9:30 p.m.

The NVMC and the Micromineralogists of the National Capital Area are jointly hosting this year's meeting and holiday party at the Long Branch Nature Center (our usual club meeting place—***but not our usual date and time!***).

The NVMC and the MNCA will provide turkey, ham, and drinks for our holiday party. Please help round out our menu by bringing a side dish. We would appreciate salads, sides, desserts, and more.

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

https://www.signupgenius.com/go/20F094AADAF2AA46-northern1

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

Holly Perlick

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

President's Collected Thoughts

by Sue Marcus

Welcome to December, the month of festivities and our club elections! (Did you think I was forgetting the latter?)

We can look back on an annual show that topped previous records, with more attendees than ever. Every dealer I spoke with had positive things to say. We gained new members and pleased lots of kids and parents.

As I've written previously, it is ***your show***, and the club counts on the many volunteers who make it such a success!

While I'm in a grateful mood, I'd like to thank all of you for the honor of serving as president this year. Let's see what we accomplished:

- We agreed on club T-shirts and—after the excellent sales at the show—only have 10 left (out of the original 150 we purchased).
- Ti Meredith organized and hosted our first club picnic in a long time. All those who came had a great time!
- Jim Kostka managed giveaways of rocks for teachers at his home and at the picnic, much appreciated by all who received the materials.
- We cleaned out the club closet, a task that's been on the club to-do list for years. And we found …
- the club library, an artifact that many newer members didn't even know existed! The library is being cataloged by Holly Perlick so that members can borrow items.

Fieldtrips to the Vulcan Manassas Quarry have become more dependable, with opportunities offered to partner with other clubs, allowing for additional collecting opportunities.

There are so many people to thank—the officers: Ti Meredith for providing excellent speakers this year; Dave MacLean for recording our minutes and summarizing club programs; Roger Haskins for accounting, investing, and tracking our funds—and being a supportive husband.

Bob Cooke, our immediate past president, has been a valuable sounding board and source of sage advice. Germaine Broussard furnished refreshments at club meetings. Special thanks, as always, to Hutch Brown for his consistently informative and attractive newsletters. Tom Taaffe continues to produce mineral shows for our club that engage all ages and interests.

Many who are not specifically named have provided me with moral and morale support throughout the year. A tip o' my hardhat to you—thanks for being there for me!

Bob Cooke had said he'd be president in 2018 if I'd run in 2019. I agreed. I've encouraged others to run for president in 2020, so far without success. The club presidents, since 2010 have been Bob, Barry Remer, Rick Reiber, Wayne Sukow, and me. At our December meeting, we will have a brief business meeting before the party to elect officers.

I hope our club, now concluding its 65th year, will continue in good health. I look forward to seeing you at our party on December 16—don't forget to sign up to bring a dish and so that we know how many people are coming (see Holly Perlick's piece on page 4).

Sue

Meeting Minutes
November 18, 2019

by Hutch Brown on behalf of David MacLean, Secretary

President Sue Marcus called the meeting to order at 7:50 p.m.

Sue recognized guest (and new club member) Matt Crofcheck as well as past NVMC presidents in attendance, Bob Cooke and Barry Remer.

Sue reminded everyone that club T-shirts were available for sale at the meeting.

Door prize winners included Germaine Broussard, Almas Eftekhari, and Marie Johnston.

Upcoming Club Show

Show Chair Tom Taaffe outlined volunteer needs and parking details for the annual club show at George Mason University on November 23–24, with show setup on November 22. He reminded everyone that the annual show is a great opportunity for networking and learning about minerals because so many attend the event—about 1,200 people on average.

Tom paid tribute to Professor Julia Nord of George Mason University for cosponsoring the event for the past 21 years. He asked club members to personally thank her if they see her at the show.

Treasurer Roger Haskins announced that he would be at the admissions table for the show at the opening on Saturday and the closing on Sunday and that two cash boxes would be there.

Roger said that club T-shirts would be on sale at an adjacent table. A separate receipt book would be used for T-shirt sales; he asked that the size of each T-shirt sold and the amount received be recorded in the book. The money could go into either cash box.

Club Membership

Roger announced that the NVMC has a total of 38 paid club memberships, with 76 members. Roger asked members who still need to renew their annual memberships to complete the membership form. For EFMLS insurance purposes, we need the names of all family members covered by a family membership.

Holiday Party

Holly Perlick reminded everyone of the Holiday Party coming up on December 16 (for details, see page 4). She reminded folks to volunteer to bring a dish, and she asked that people RSVP early so that the right amount of food and drinks can be planned.

Even though the Holiday Party will be a joint event at the Long Branch Nature Center together with the Micromineralogists of the National Capital Area, parking has never been a problem.

Club Officer Elections

President Sue Marcus reminded everyone that club elections for 2020 are coming up at the December 16 meeting, before the Holiday Party. The current club officers for vice president, secretary, and treasurer have agreed to stand for reelection, but the club has no nominee for president. Without a president, the club cannot function, so somebody needs to step up!

Club Library

The NVMC has a club library with books stored at the Long Branch Nature Center. Although the library has fallen into disuse, the club used to have a librarian who would check books in and out.

Sue asked members to decide what to do with the library—whether to revive it or to shut it down and dispose of the books, some of which are probably classics (although none are rare).

Germaine Broussard volunteered to scan an existing partial list of library books and send the file to Holly Perlick. Holly volunteered to do a complete inventory of the library books. Based on the information, the club will decide what to do about the library at a future meeting. For now, the library will have a clip board with a signout sheet based on the honor system.

Club members were welcome to take the donated posters and magazines that were stored with the library books. Remaining magazines were to be made available at the club show.

Most of the meeting was devoted to a program on the geological origins of Maryland's Sugarloaf Mountain presented by Joe Marx (see the program summary beginning on page 11).

October Program Summary

Virginia Mineral Project: Preserving History One Mineral at a Time

Thomas N. Hale

by David MacLean, Secretary

At the NVMC meeting on October 28, Thomas Hale described the Virginia Mineral Project (VMP), which documents Virginia minerals and localities, including both old and active mines and quarries.

Thomas has worked for the Geoscience Museum at Virginia Tech curating a Virginia minerals display.

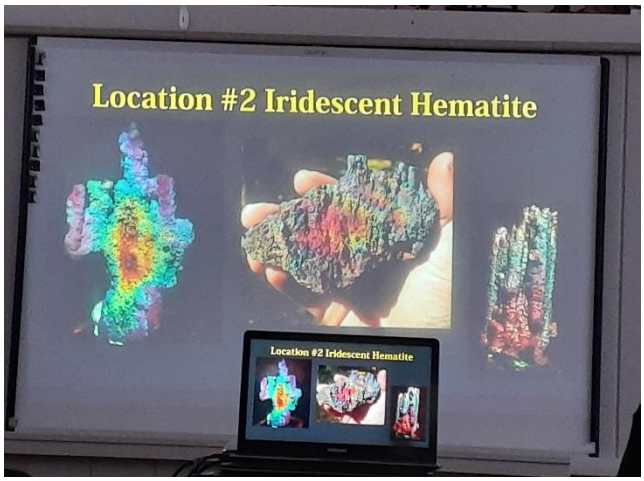
Thomas Hale introducing his presentation on the Virginia Mineral Project. Photo: Sue Marcus.

He is updating the 1990 book *Minerals of Virginia* by R.V. Dietrich while leading the VMP.

The VMP mantra is "collect, preserve, and educate." Objectives include:

- preserving and updating publications such as *Minerals of Virginia* and *Virginia Minerals*;
- building relationships with mineral clubs, universities and colleges, and museums;
- collecting stories, interviews, color photos, and documents of minerals, collection sites, and collectors;
- promoting the curation, preservation, and photo documentation of Virginia mineral specimens;
- promoting Virginia mineral displays by clubs, schools, colleges, universities, and other organizations; and
- creating opportunities for students and others to learn about Virginia minerals.

Thomas gave examples, such as interviewing a man who has done research on gold and gold mines in Virginia for 30 years; organizing the Virginia Tech collection so that students can use it to prepare for the SOL exams; and making the University of Richmond collection more user friendly. Today, cell phone cameras produce color photos of better quality than regular cameras did in the 1980s.



Iridescent hematite collected by Thomas Hale in Bath County, VA. Photo: Sue Marcus.

Virginia has 75 "classic" mineral localities. VMP is documenting and illustrating them with color photos, giving their current status, visitor experiences, and minerals found there. Cooperation from clubs, individual collectors, colleges and universities, and museums is essential.

Unfortunately, information on many mineral locations has been lost. Significant mineral specimens have been discarded, have lost their documentation, or have "disappeared" into private collections or institutional archives not available to the public.

Thomas showed color photos of both collecting sites and mineral specimens in Virginia. He makes it a habit to show the specimens he collects in their onsite matrix as well as in various stages of cleaning and preparation. The collecting sites and specimens he showed as part of his program included:

- Saltville: doubly terminated quartz crystals;
- Chestnut Ridge, Bath County: iridescent hematite, also found at the Willis Mountain kyanite mine;
- Scufflin Acres, Farmville: amethyst and black amethyst at a pay-to-collect site;
- Halston River in southwestern Virginia: strontianite and calcite in pockets; and

For example …

Here's the kind of documentation that the Virginia Mineral Project could provide.

George Loud gave a talk 10 to 15 years ago on the Theodora Copper Mine near Herndon in western Fairfax County. (Lawrence R. Bernstein describes the mine and smelter and gives a list of the minerals there in *Minerals of the Washington, DC Area* (1980). A public record from 1880 also contains a comment about the mine.)

George visited the mine site when it was being covered over by condominiums. He took specimens from a small pile of diabase containing copper mineral films and micaceous hematite. A construction company employee told George that he entered the mine tunnels and took photographs that might be at company headquarters in New Jersey.

Making the photos available would be part of documenting Virginia mining history. Color photos of attractive mineral specimens from the Theodora Mine would be of interest. In 1880, only black-and-white photography existed.

- Dale Quarry, Chester County (in the Richmond area): pegmatite with a record green beryl in matrix and as field trimmed.

Thomas gave tips for working with property owners and quarry managers to obtain permission to collect. He recommended developing a relationship and always showing appreciation through small gifts and thank you gestures. He also suggested always knowing what you are looking for.

You can find more information at virginiamineralproject@gmail.com and on the VMP's Facebook.

Houston Museum Features an Image From NVMC Newsletter

by Hutch Brown, Editor

Some months ago, Linda Leon of the Houston Museum of Natural Science in Houston, TX, asked me for permission to use an image that appeared in our newsletter (below). The image was of amethyst geodes in an article by Grant Colip in the April 2018 issue of *The Mineral Newsletter*. As a recipient of an NVMC scholarship, Grant had reported on visiting the Wanda Mine in Argentina ("Traveler's Delight: Amethyst Treasure").

Ms. Leon wanted to use Grant's photo to help illustrate her 2019 Docent Tour of Cullen Gem Hall and the Lester and Sue Smith Gem Vault at the Houston museum. She chose the image because it shows how silica precipitated out from bubbles in ancient lava flows, first as chalcedony, then as iron-bearing quartz crystals. Irradiated by radioactive minerals in the surrounding basalt, the innermost crystals turned into amethyst (purple quartz).

We contacted Grant, who graciously gave permission for the museum to use his photo. The museum credited both Grant and our club!

Kimberley Diamond Now on Display!

Editor's note: *Thanks to Sue Marcus for the reference!*

The Smithsonian National Museum of Natural History has a new yellow diamond on display in the Janet Hooker Hall of Geology, Gems and Minerals. The museum received the 55.08-carat diamond from a generous private donor.

GeoWord of the Day

(from the American Geoscience Institute)

deglaciation

The uncovering of a land area from beneath a glacier or ice sheet by the withdrawal of ice due to shrinkage by melting or calving of icebergs. As used in Great Britain, the term is restricted to a process that occurred in the past, in contrast to *deglacierization*. Also, the result of deglaciation.

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

Our 2019 Club Show

by Sue Marcus, President

The photos bring back memories of this year's 28th annual mineral show on November 23–24, presented by the Northern Virginia Mineral Club and sponsored by the George Mason University Department of Atmospheric, Oceanic, and Earth Sciences.

Tom Taaffe and Bob Cooke organized a show designed to please everyone. There were about 20 dealers selling minerals, fossils, jewelry, gems, and more.

Diane Nesmeyer treated us to her garnet display, and Jeff Guerber delighted us with his meteorites. Bob Clemenzie and Dave MacLean brought micromounts and the scopes for seeing them.

Barbara Sky demonstrated gem tree making on Sunday afternoon. The Kids' Room was packed with cheerful and active children (and happy parents) every time I looked in—with Linda and Tom Benedict, Germaine Broussard, Jim Kostka, and Ti Meredith, along with Celia, Lyra, and Jason Zeibel, helping out. Tom, Jim, and other volunteers helped keep the chaos manageable.

At the admissions table, Carolyn Cooke, Almas Eftekhari, Roger Haskins, Barbara Sky, and I welcomed newcomers and old friends. Almas did such a great job modeling the club T-shirts that we almost sold out!

Germaine Brossard and Bill Oakley helped with setup and takedown, aided by Tom Burke on Friday. As always, Dr. Julia Nord of GMU made it possible to have the show at the university, and she arranged the parking, shuttle service, and security, too.

Photos: Cheryl Sims and Sue Marcus.

Bench Tip: Bezel Closer

Brad Smith

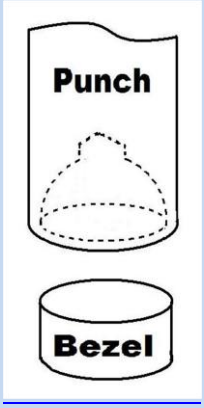
A bezel closer is a steel punch that makes quick work out of pushing the metal down over a round stone and burnishing it. The working end is a concave cavity that fits over your bezel or prong setting and is pushed and twisted to capture the stone. Sets can be purchased but are expensive and contain many sizes you will probably never use. If all you need is one or two sizes, here's how you can make them yourself.

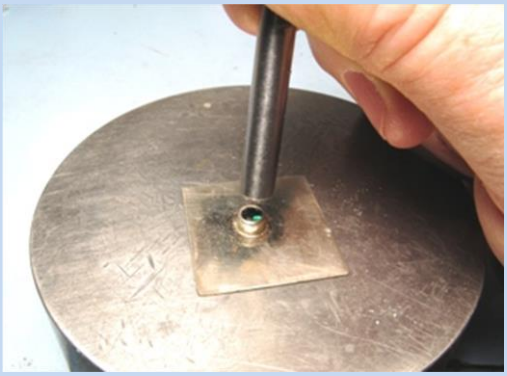
Find a good-quality round steel rod a little larger in diameter than your bezel cup or prong setting. Cut a 5-inch length. File both ends flat. Locate the center of one end, center punch a divot, and drill a small pilot hole about 5 millimeters deep. Remember to use a little oil as lubricant when cutting steel.

Select a ball bur a bit smaller than the steel rod but slightly larger than the bezel. Enlarge the pilot hole to a full hemispherical cavity. Test for proper fit with your bezel. The bezel should first contact the cavity about a third of the way in. When the size is correct, polish the cavity using Zam on a length of chopstick in your flexshaft. If the tool is not polished, it will leave scratches on your bezel or prongs.

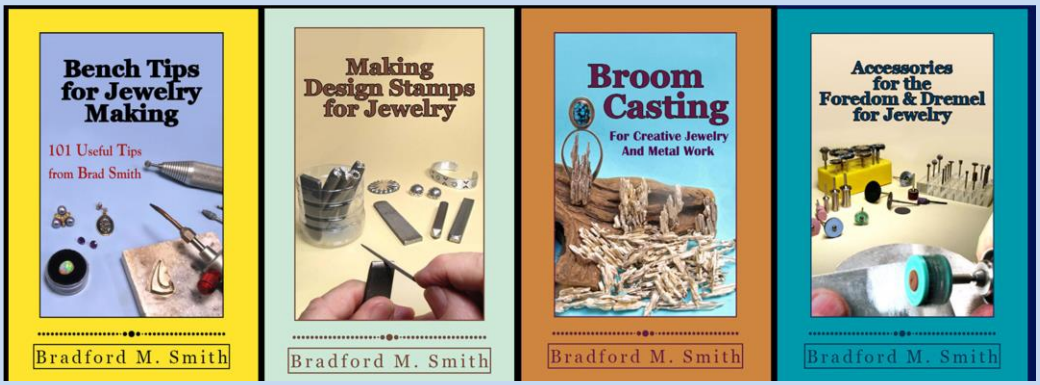
When using the tool, the first step is to capture the stone correctly. I usually work by hand and push the punch straight down over the bezel or prongs. This causes the metal to start bending over the stone. Next, I inspect with a lens to be sure the stone is staying level. I repeat this until the stone is seated on its bearing and can't move anymore.

Next, you want to force the metal down onto the stone uniformly all the way around. Although this can be done by hand, I often gently tap the punch with a hammer. Finally, burnish the bezel by twisting the punch around.





See Brad's jewelry books at
amazon.com/author/bradfordsmith



November Program Summary

Making Sugarloaf

Joe Marx

by Hutch Brown, Editor

Editor's note: *Having written on Sugarloaf Mountain for our newsletter myself, I diverged somewhat from the order of the presentation for clarity, and I added the illustrations at right. The other illustrations are all from the program.*

At the NVMC meeting on November 18, Joe Marx explained the origins of Sugarloaf Mountain. The "mountain" is an isolated pair of ridges in the Piedmont near Frederick, MD (fig. 1). Though made up of metamorphic rock, Sugarloaf Mountain aligns with the "hinge zone" of the sedimentary Triassic basins at the foot of Catoctin Mountain, where the Blue Ridge physiographic province begins (figs. 1, 2). Many club members have been to Sugarloaf Mountain or know it as a seeming outlier of the Blue Ridge, much higher than the surrounding Piedmont terrain.

Mr. Marx, a resident of Falls Church, VA, taught physical and historical geology for 15 years at Northern Virginia Community College, from which he is now retired. He still leads field trips to areas of local geological interest for the college as well as for the Audubon Naturalist Society (ANS). In addition, he teaches continuing-education courses in geology, chemistry, and forest ecology for ANS.

Marine Origins

Sugarloaf Mountain is a monadnock, a morphological term for an isolated large outcrop. Figure 1 suggests its ovoid shape, with a larger ridge to the east, a smaller ridge to the west, and a slight hollow (basin) in between.

A simplified geologic map of the area (fig. 2) shows the Sugarloaf bedrock (dark pink, arrow) and two adjacent formations, the Urbana (pink) and Ijamsville (dark gray). All three formations are metamorphic and Cambrian in age (about 500–545 million years old). All three originated from sediments laid down in offshore marine environments.

The Sugarloaf rock is mainly a hard white quartzite. Quartzite (metamorphosed quartz sandstone) differs considerably from massive white quartz. Massive quartz melts out of cooling metamorphic rock (including quartzite), filling cracks, joints, and voids with a solid white crystalline rock. By contrast,

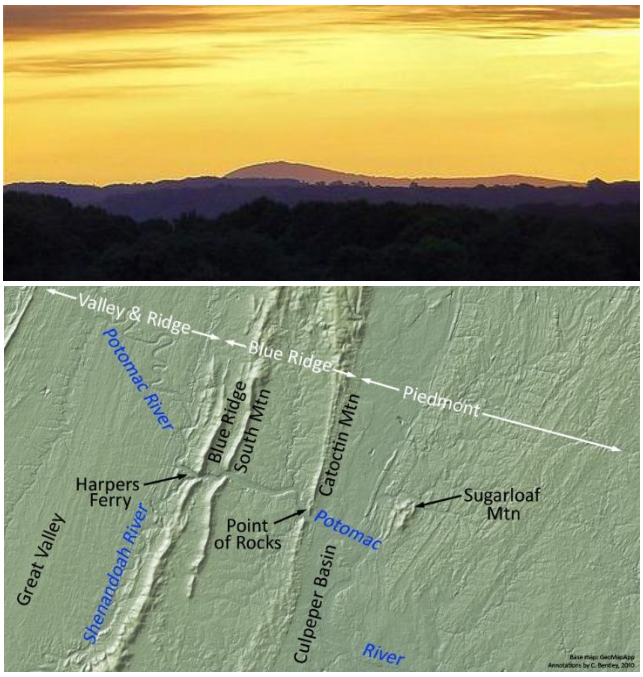


Figure 1—*Sugarloaf Mountain looms over the surrounding Piedmont countryside in southern Maryland.* ***Top:*** *View from the north at sunset.* ***Bottom:*** *Annotated physiographic map of the area. Sources: Wikipedia (2019), top; Bentley (2010), bottom.*

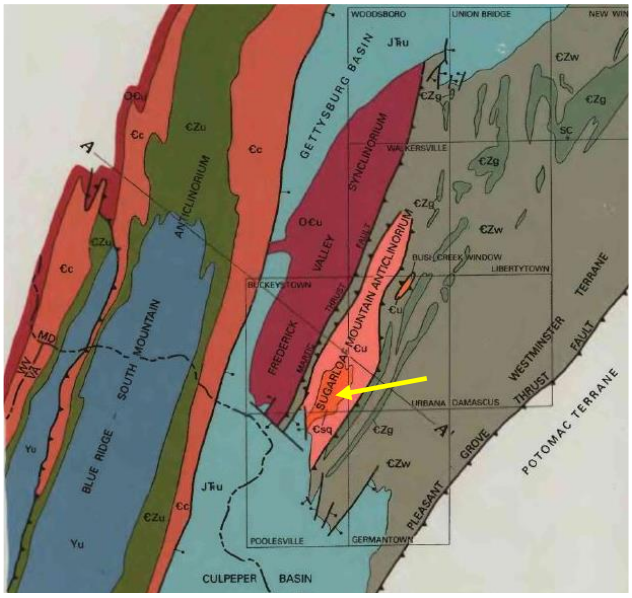


Figure 2—*Simplified geologic map of the area near Sugarloaf Mountain (arrow), including (from left to right) the Blue Ridge anticlinorium (brown/green/dark blue), the Culpeper/Gettysburg Triassic basins (light blue), the Frederick synclinorium (burgundy), the Sugarloaf anticlinorium (pink), and the Westminster Terrane (gray). Dark pink = Sugarloaf quartzite; pink = Urbana Formation; dark gray = Ijamsville Formation; burgundy = Ordovician/Cambrian carbonates; light blue = Jurassic/Triassic sedimentary rocks. Source: Marx (2019).*

Rocks on or near Sugarloaf Mountain include Sugarloaf quartzite (top) and Urbana metasiltstone (right). Source: Marx (2019).

quartzite contains layers and breaks into regular blocks, as the photo above shows (top). Unlike quartz, quartzite has visible grains and a sugary appearance up close.

The Sugarloaf quartzite is interbedded with softer sericitic quartzite (formed from sands with muddy layers); slate (formed from lenses of mud); and phyllite (metamorphosed slate). The parent materials originated in barrier islands with seaside sandy deposits, much like Assateague Island in our area today.

Overlying the Sugarloaf quartzite are the Urbana rocks: dark gray to green sericitic-chloritic phyllite as well as metasiltstone and quartzite. Such interbedded sediments tend to form on continental shelfs.

Overlying the Urbana rocks is the Ijamsville Formation, made up of phyllite and phyllitic slate interbedded with metasiltstone and metagraywacke. The muddy, silty, and sandy parent materials originated on a continental slope. The graywacke materials (silts and sands), for example, formed from what geologists call turbidites, great undersea landslides resulting in well-graded sedimentary beds.

Accordingly, the Sugarloaf, Urbana, and Ijamsville rocks originated in different offshore environments: nearshore (Sugarloaf), continental shelf (Urbana), and continental slope (Ijamsville). The Urbana sediments formed over the Sugarloaf rocks, and tectonic forces later pushed the Ijamsville rocks over both.

Iapetan Rifting

Geologists sometimes describe the tectonic story of our area as "rift to drift"—from the Precambrian breakup of a supercontinent to the drifting apart of continents today as the Atlantic Ocean widens.

Rodinia broke up about 570 million years ago as Gondwana (containing parts of what are now Africa, India, and South America) rifted away from Laurentia (proto-North America), forming the Iapetus Ocean. The granitoid rocks of the Blue Ridge (fig. 3), visible today in Old Rag, formed the outer continental edge.

Winds and waters deposited a thin layer of eroded sands and gravels that became the Swift Run Formation (fig. 3). Continental rifting brought volcanic activity and enormous lava flows; scientists have distinguished 14 separate flows. The resulting basalts covered the Swift Run rocks, becoming the metamorphic Catoctin greenstone you can find today in the Blue Ridge physiographic province.

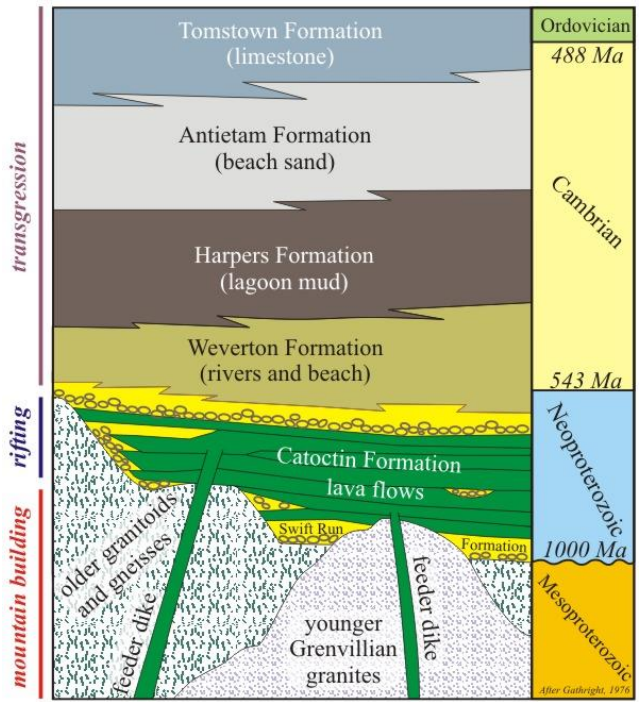


Figure 3—*Except for the granitic basement rocks, the rocks of the Blue Ridge Province formed from materials laid down during and after Precambrian rifting as Laurentia (proto-North America) split away from Gondwana (containing parts of Africa, India, and South America today), forming the Iapetus Ocean. Source: Bentley (2014).*

As the new ocean formed, it gradually submerged the continental margins (fig. 4). Rising and falling sea levels resulted in nearshore and offshore sedimentary deposits. The sands that became Weverton quartzite were covered by the silts and muds that turned into Harpers phyllite (fig. 3), which in turn gave way to more sands, the origins of Antietam quartzite. Offshore marine sediments then formed the thick beds of Tomstown carbonates (fig. 3), exposed in the Shenandoah Valley today.

The Weverton and Harpers rocks are about the same age and composition as the Sugarloaf and Urbana rocks (Cambrian quartzites and phyllites), suggesting common origins. The Catoctin, Weverton, Harpers, and Antietam rocks are now uptilted to form the outer edge of the Blue Ridge Province, an enormous anticlinorium (geologic hump) dozens of miles across in places. The Blue Ridge rocks are separated from the Sugarloaf and Urbana rocks (which form a smaller parallel anticlinorium) by a synclinorium (geologic swale) of carbonate and underlying rocks (fig. 2).

Mountain Building

A pair of mountain-building events, what geologists call orogenies, pushed the rock formations into the positions we see today.

When the supercontinent of Rodinia broke up, pieces of Laurentia rifted away to form microcontinents in the Iapetus Ocean. By about 450 million years ago, the Iapetus was closing again and Laurentia was colliding with the microcontinents, which were preceded by a volcanic island arc (fig. 4). The collision, known as the Taconic Orogeny, pushed the rocks on the continental margins inward and upward while fusing new land masses onto the continent, including the Westminster and Potomac Terranes (fig. 2, shades of gray). The tremendous heat and pressure from the colliding land masses initiated processes of metamorphism in the bedrock.

Metamorphism resumed during an even greater mountain-building event. The Alleghanian Orogeny began about 300 million years ago as the Iapetus Ocean completely closed. Gondwana collided with Laurentia to form a new supercontinent, Pangaea. In the process, Gondwana rode up over the heavier continental margins of Laurentia, forming mountains as high as the Himalayas are today.

Figure 5 shows a sand model of a tectonic collision from the American Museum of Natural History in New York City. A squeezing apparatus inside a fish tank uses layers of sand to replicate the "imbrication" (overlapping of rock layers) that occurs during an orogeny. The tremendous pressure folds and crumples the layers into uptilted and overturned tongues and "flakes," a term for great rock layers that break into slabs and slide over each other.

During the Taconic Orogeny (450–435 million years ago), the Laurentian continental plate dove under the

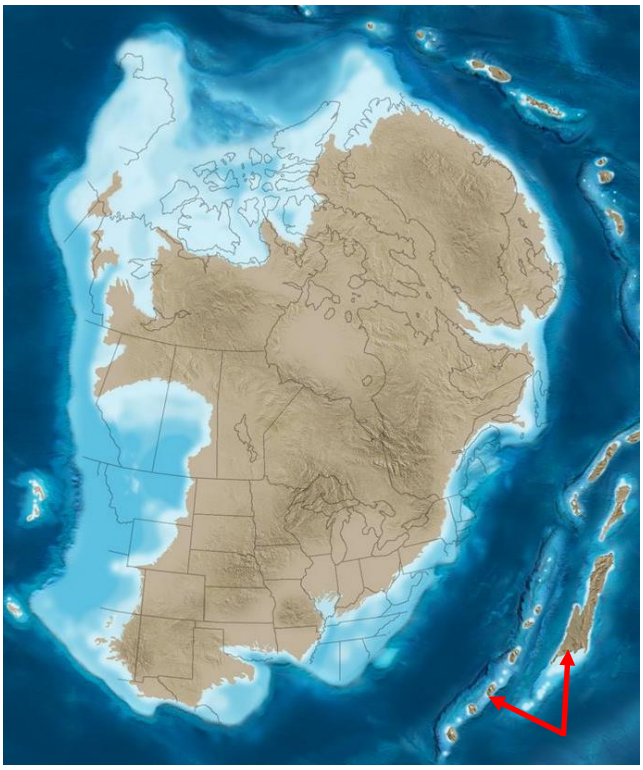


Figure 4—*Artist's rendition of Laurentia about 510 million years ago on a collision course with microcontinents preceded by a volcanic island arc (arrows). Source: Marx (2019).*

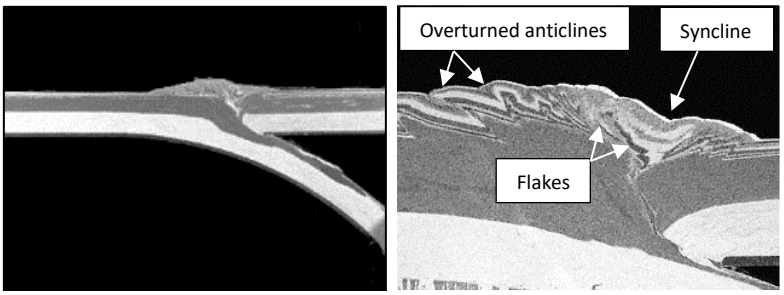


Figure 5—*Sand model of a mountain-building event in our area, with the Laurentian continental plate diving under a lighter arriving land mass. The model shows how the colliding rock layers crumple like a rug being pushed together, with thrust faults forming synclines and overturned anticlines as well as "flakes." Source: Marx (2019).*

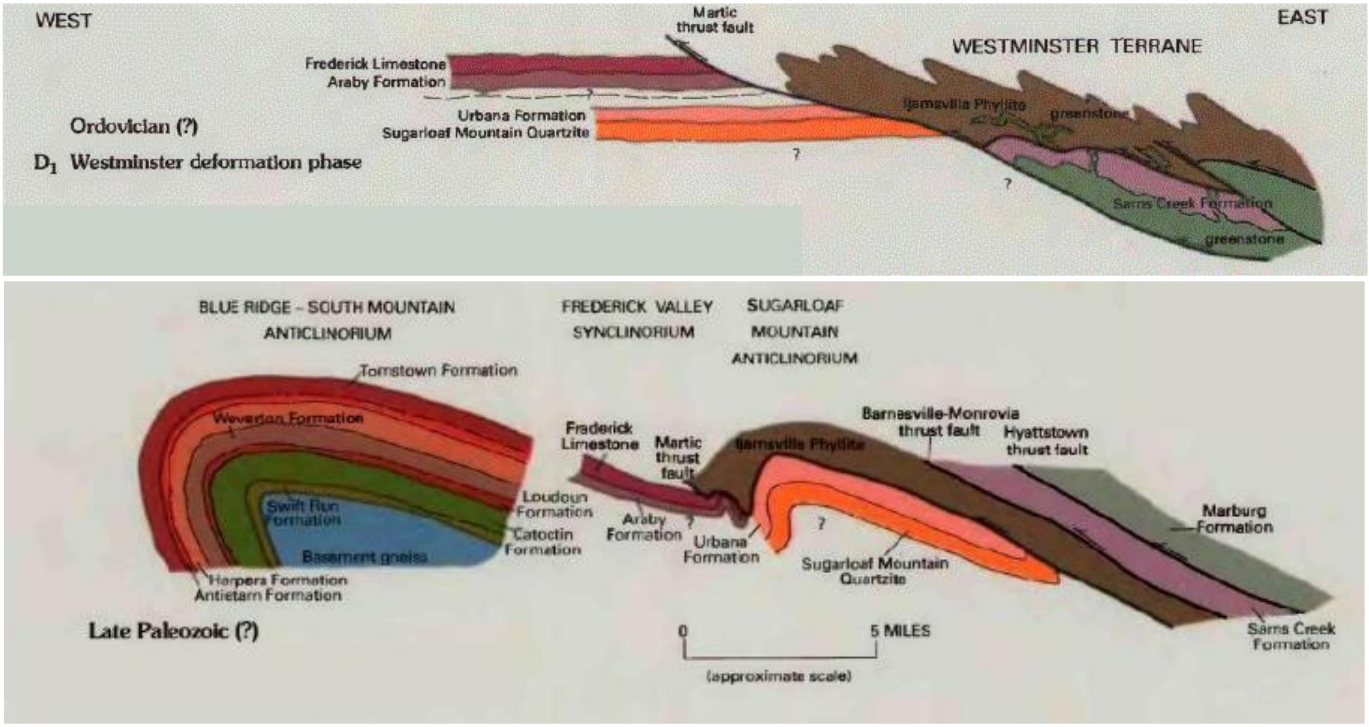


Figure 6—*Simplified geologic models of the rock layer movements and relationships during the Taconic Orogeny (top) and the Alleghanian Orogeny (bottom). During the Taconic Orogeny, the Westminster Terrane crumpled into tongues and flakes of rock while riding up over the rock layers on the continental margin on a thrust fault, the Martic Fault. During the Alleghanian Orogeny, the preexisting continental rocks folded into the Sugarloaf anticlinorium to the east and the adjacent Frederick synclinorium and Blue Ridge anticlinorium to the west. Source: Marx (2019).*

lighter Taconic land masses. The Taconic terrane rode up over the rock layers on the continental margins, including the Sugarloaf and Urbana rocks (fig. 6, top). The Martic Fault demarcated the new suture line between the preexisting continental rocks and the rocks of the Westminster Terrane (fig. 6, top, brown).

The process continued during the subsequent Alleghanian Orogeny (300–275 million years ago), only on a greater scale. From the east, Gondwana pushed members of the Westminster Terrane to the west on great thrust faults (fig. 6, bottom). The westernmost member of the Westminster Terrane, the Ijamsville Formation (fig. 6, bottom, brown), now completely covered the Urbana and Sugarloaf rocks. All three rock layers upfolded together to form an anticline.

The Ijamsville rocks extended westwards to the edge of the now deformed Frederick carbonate rocks along the Martic Fault (fig. 6, bottom, burgundy). Under pressure from the advancing Gondwana plate to the east, the Frederick carbonates and the underlying Araby Formation of sandstones and slates downfolded into a syncline (fig. 6, bottom).

The same tectonic forces upfolded the Blue Ridge rock layers to the west into a giant overturned anticline (or anticlinorium—see the sidebar below). The upthrust granitoids and the overlying layers of Catoctin greenstone, Weverton quartzite, Harpers phyllite, and other rocks formed the heart of an enormous Alleghanian Mountain chain.

The Alleghanian Mountains were in the middle of the new supercontinent of Pangaea. On a geologic scale, erosion is relatively rapid: when mountain building stops, even the highest mountains weather away within about 10 million years. By about 250 million years ago, the Alleghanian Mountains were gone, leaving a flat and featureless plain.

What Is an Anticline? A Syncline?

An ***anticline*** is an upfold and a ***syncline*** is a downfold in rock layers pushed together by tectonic forces. An ***anticlinorium*** is a large anticline with smaller folds and a ***synclinorium*** is its counterpart. In an ***overturned anticline***, older rock layers overlie younger ones (fig. 5).

About 220 million years ago, Pangaea began to break up. Rifting in our area opened the incipient North Atlantic Ocean as a long thin sea, much like the Red Sea today.

Isostatic Adjustments

Rifting ended in our area about 180 million years ago. As the continents drifted apart and the Atlantic Ocean continued to widen, the North American continent gained new sedimentary margins, including the Coastal Plain and continental shelf we see today.

About 5 million years ago, uplift began again in our area due to isostatic adjustments. Reaching from the Piedmont to the Allegheny Plateau, the uplift is due to the aftereffects of Alleghanian mountain building.

During mountain building, brittle crustal rock builds up on the puttylike rock in the Earth's mantle (fig. 7). As the crustal materials pile up, forming mountains tens of thousands of feet high, the overlying weight displaces plastic mantle materials underneath. Much like an iceberg, only part of the mountain range is exposed: 90 percent of the material is underground.

As the mountain range erodes away, its weight decreases and the underlying mantle materials respond by rebounding, a process called isostasy. Whereas erosion is rapid and continuous, isostasy is slow and episodic. It affects our area today, even though mountain building stopped about 275 million years ago. Ongoing gentle uplift is exposing the Sugarloaf quartzite at the core of the Sugarloaf anticlinorium as the more erosion-prone overlying Ijamsville and Urbana layers weather away.

The Upshot: Ongoing Uplift

As figure 6 (top) shows, the Sugarloaf rocks were originally covered by several rock layers with sedimentary origins, including Urbana phyllite, Araby sandstone, and Frederick limestone. The Taconic deformation began pushing the Ijamsville rocks of the Westminster Terrane over the Urbana and Sugarloaf rocks along the Martic thrust fault.

The Alleghanian deformation reactivated the Martic Fault, pushing the Ijamsville, Araby, and Frederick rocks farther inland. It uptilted the Urbana and Sugarloaf rocks and did the same to the Blue Ridge rocks to the west while also pushing them farther inland.

In the deformation process, the orogenies and subsequent erosion broke the connections between rock layers of the same age (Cambrian/Ordovician) and composition. Geologists now believe that the Sugarloaf quartzite in the Piedmont is the same rock as the Weverton quartzite in the Blue Ridge; that the Urbana phyllite is the same rock as the Harpers phyllite; and that the Tomstown limestones/dolomites, thousands of feet thick and well exposed in the Shenandoah Valley, are the same rock as the Frederick carbonates.

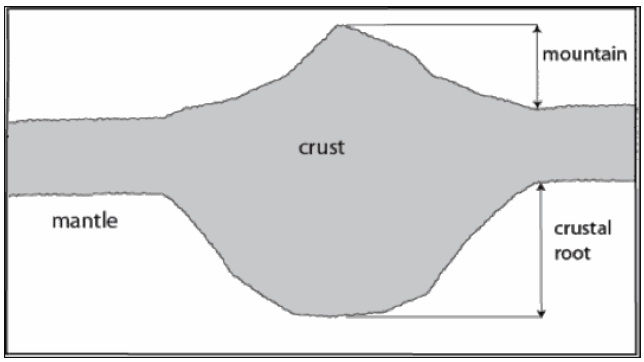


Figure 7—*Mountain building associated with accumulations of crustal materials over the plastic mantle rock. As the overlying mountains erode, the mantle rebounds, leading to the isostatic uplift we see in our area today—and the growing exposure of Sugarloaf Mountain. Source: Marx (2019).*

The Sugarloaf quartzite is hard and erosion resistant. Gentle uplift caused by isostatic adjustments in the last 5 million years is likely to continue to expose the quartzite in Sugarloaf Mountain as overlying rocks weather away, just as it will continue to expose the erosion-resistant granitoids of the Blue Ridge Mountains to the west. So long as isostasy exceeds erosion, the ridges of both Sugarloaf and the Blue Ridge will continue their slow rise in elevation above the surrounding landscapes.

And that's why Sugarloaf Mountain is there.

Acknowledgment

Thanks to Sue Marcus for her careful review and helpful comments and corrections.

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Safety Matters

All It Takes Is One

by Ellery Borow, AFMS Safety Chair

Editor's note: *The article is adapted from* A.F.M.S. Newsletter *(February/March 2019), p. 1.*

In this litigious day and age, all it takes is one action, one member, or one disrespectful event to cause a property owner to boot a club from a collecting site. The best solution is for the problem not to arise in the first place.

Prevention is a great thing, but there are limitations to what you can accomplish. Club members can be coached, encouraged, guided, and otherwise instructed in the ways and means of being good rockhounds and remaining in the good graces of property owners. However, accidents can happen despite the best of efforts. Worse is intentional disregard of a property owner's wishes.

What does a club do if a member willfully and repeatedly disregards a property owner's wishes? It can be a very touchy issue to give a member the boot for disrespectful behavior at a collecting site.

One way of making the expulsion process easier is to have club rules, regulations, and bylaws that give clear reasons for expelling a member whose disrespectful collecting methods reflect badly on the club. No set of rules, regulations, or bylaws can cover every scenario, but it can be specific enough to make clear that certain behaviors are unacceptable. Then a group of people rather than a single individual should agree on removing a member from the club rolls. Having specific expulsion guidelines makes it easier to point to the rules and say, "Sorry, but we just cannot accept such misbehavior in any club activity."

An even worse situation occurs when a club is booted from a collecting site due to the activities of nonclub members. If that happens, what can a club do?

A good starting point is to stress to a property owner that the disrespectful collector was NOT a member of the club and does not represent the respectful nature of club members. A good document to use in making such the case is the AFMS Code of Ethics. Indeed, most items in the code are based on being safe and respectful!

Even more helpful would be to also have your own regional federation and local club guidelines on respecting property owner rights and wishes. It helps to take a calm, measured, and patient approach in discussing such matters with property owners.

Your safety matters, so please keep in mind that respect plays an important part in safety. Respect for your personal limits, property owner limits, and codes of ethics all play a part in being and staying safe.

Help Santa Choose Wisely This Year

by Betsy Oberheim, EFMLS Juniors Chair

Editor's note: *The article is adapted from* EFMLS News *(January 2019), p. 3.*

With all the toys promoted and overpromoted by commercials on TV, kids are bombarded with what they can have to play with! They must have what everyone else has, and of course it must be electronic.

What did you play with as a child? I know Nature was my favorite playmate ... my brother was second!!

But today it seems presents must be wrapped, cost a lot, and be interactive. It's sad that very few kids would want a microscope, telescope, even a butterfly net.

But if you gave them something that encourages interacting with the natural world, you are opening a whole new world to them. Another wonderful gift is a trip to a museum, zoo, or park. Give of yourself, your experience, your interests—and your gift will be remembered much longer than a new electronic game.

Have a wonderful holiday! Enjoy the children in your world, and give them a rock!!!

How To Become a Rockhound

Buy a bag of marbles. Place one marble in place of every rock you collect.

When you have lost all your marbles, you are a rockhound.

Book Review

John McPhee, *In Suspect Terrain*

by Hutch Brown

One of my Christmas presents last year was a compendium of five geology books by John McPhee titled *Annals of the Former World* (1998). It won the Pulitzer Prize for General Nonfiction in 1999.

In the collection, the book most relevant to our area is *In Suspect Terrain* (1983). I first read the book long ago but understood little.

Fortunately, our hobby has afforded me with a basic knowledge of our area's geology, including an inkling (understanding goes too far) of such concepts as orogeny, terrane, and thrust fault. With even a tenuous grasp of such basics, you can enjoy McPhee.

And if a meaning escapes you, McPhee will usually offer his own elegant explanation, here for syncline:

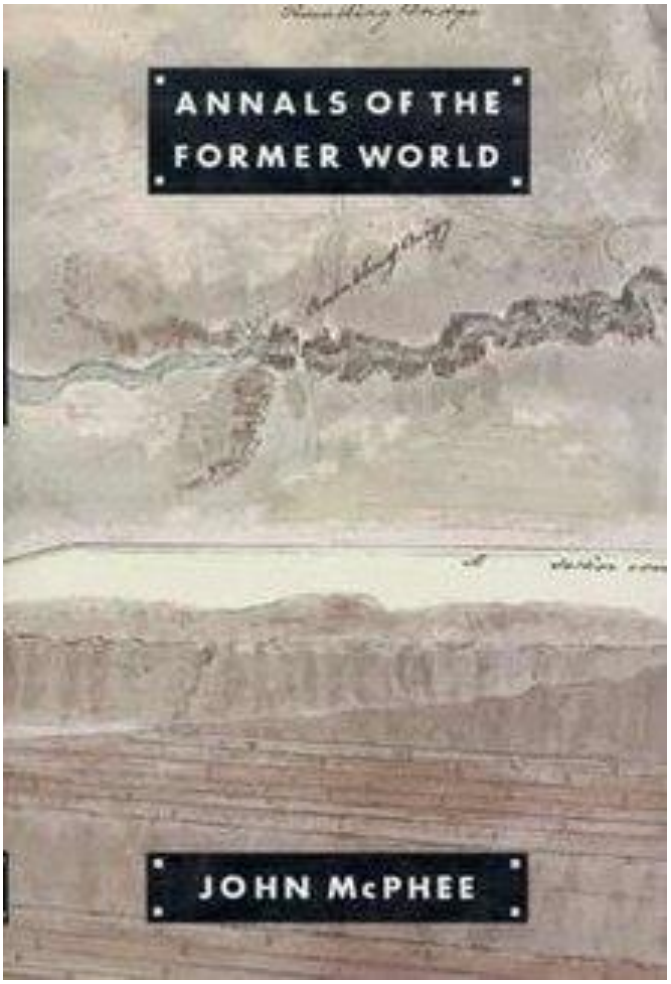
> *When rock is compressed and folded, the folds are anticlines and synclines. They are much like the components of the letter S. Roll an S forward on its nose and you have to the left a syncline and to the right an anticline. Each is a part of the other.*

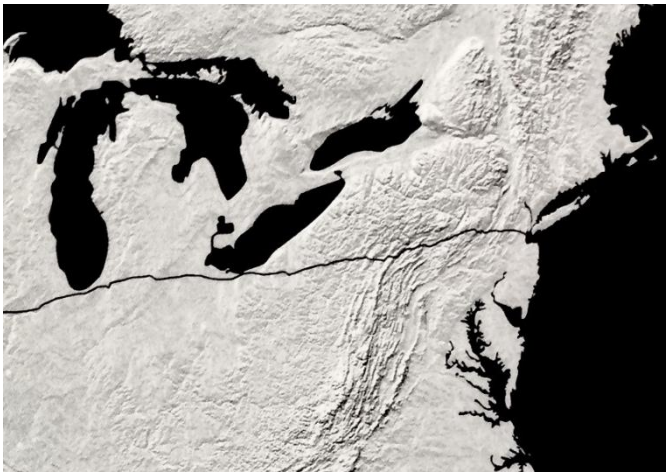
The subject matter is complex, but McPhee makes it accessible through his clear prose and engaging style.

McPhee, born in 1931, pursued a career as a journalist and college-level teacher of writing. He also wrote more than 20 acclaimed books on topics ranging from environmentalism to farmers' markets. Every book (I have read several) illuminates his topics through his own impressive store of knowledge.

In Suspect Terrain is the story of a road trip that McPhee took with USGS paleontologist Anita Harris on Interstate Highway 80 from New York City into the American heartland near Lake Michigan. On the way, McPhee shadows, interviews, and quotes Harris, who "does geology" (as she puts it) as they go.

"Doing geology" includes stopping at roadcuts to collect and identify rocks and describe geological features. It includes drawing inferences about the underlying geology on a local or regional scale. It includes portraying landscapes and geologies over vast periods of time, from the Cambrian Period more than half a billion years ago to the period of advancing and retreating ice sheets that we live in today. From the shallow tropical lagoons of former inland seas to the





Interstate Highway 80 traverses the Appalachians on its way from New York to Chicago, the route followed by John McPhee and USGS paleontologist Anita Hill, who "did geology" along the way. McPhee tells the story in one part of his five-book series, Annals of the Former World *(1998), on the geology of different parts of the United States. Interstate 80 is a throughline for the book series.*

George Inniss, Delaware Water Gap *(1859). McPhee uses the painting to illustrate his discussion of the history and geology of the area traversed by the Delaware River in western New Jersey, part of the Valley and Ridge physiographic province.*

towering Pleistocene glaciers, every period left traces on the land. The book tells how.

McPhee also recounts Anita Harris's illustrious career in paleontology. Harris specialized in the fossils of conodonts, minute eel-like marine creatures that lived from about 530 million to 200 million years ago. From color changes in the fossils due to heat and pressure, she found a reliable and inexpensive way of determining whether a rock formation contains commercially exploitable petroleum.

From there, Harris might have had a lucrative career in the oil-and-gas industry, but she liked government work. One of her stock phrases was "good enough for government work," an ironic tribute to the effectiveness of government, including her own life's work.

For Harris, "doing geology" includes discussing the evolution of the Earth sciences. In the early 1980s, when McPhee's book was first published, the science of plate tectonics was less than 20 years old—and still very much in doubt. Harris was a skeptic (or "devil's advocate," as she calls herself in the book), accepting parts of it but arguing that "the plate tectonics boys" had taken things too far.

For example, Harris rejected inferences about the tectonic origins of the Piedmont and Coastal Plain bedrock as sheer speculation—the "suspect terrain" of the title. She insisted on obtaining empirical evidence before coming to any such conclusions by "doing geology" with boots on the ground.

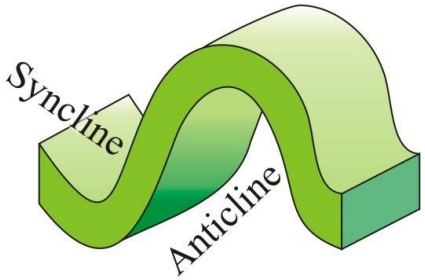
Harris accepted the glacial origins of rocks and landforms in the Northeast and Midwest because she had "done the geology" and seen the evidence for herself, much of it described in the book. McPhee recounts the origins of the corresponding Ice Age science in 19th-century Europe, wryly noting that it initially met with the same fierce resistance as did plate tectonics in the 20th century. He thereby subtly alludes to where he stands in the debate.

Because glaciers never reached our area, the most relevant part of the book for me is the first. McPhee describes western New Jersey landscapes and features with counterparts in our area, such as the Blue Ridge Mountains and Shenandoah Valley. "Geology repeats itself," notes Anita Harris in the book.

The Delaware River bisects Kittatinny Mountain in New Jersey at the spectacular Delaware Water Gap—which, according to Harris, holds the key to understanding the entire Appalachians. In our area, analogues to the Delaware Water Gap include the double water gap of the Potomac River through the Blue Ridge Mountains near Harpers Ferry, WV, and the water gap through Catoctin Mountain at Point of Rocks, MD. Direct counterparts of Kittatinny Mountain include Salt Pond Mountain in southwestern Virginia (at Mountain Lake, near Blacksburg) and Seneca Rocks in West Virginia, near where a branch of the Potomac River pierces a ridge capped by the same tough white Silurian sandstone that caps Kittatinny Mountain.

Geology repeats itself.

In Suspect Terrain is a masterpiece of geology. Written in plain English, it holds your interest, applies to our area, and explains a lot more than you'd ever expect. The complex subject matter takes time to digest, but for people in our hobby who are interested in geology, the book is probably close to ideal.



December 2019—Upcoming Events in Our Area/Region (see details below)

Sun	Mon	Tue	Wed	Thu	Fri	Sat
1	2	3	4	5	6	7 Mineral sale, Lutherville, MD; show, NY
8 Show, Patchogue, NY	9 GMLSMC meeting	10	11	12	13	14 MSDC Holiday Party
15	16 NVMC/ MNCA Holiday Party	17	18	19	20	21 Winter begins
22 Hanukkah begins	23	24	25 Christmas	26	27	28
29	30	31 New Year's Eve				

Event Details

7: Lutherville-Timonium, MD—Minerals, Fossils, Beads & Jewelry Sale; Sat 10–4:30; Holiday Inn Hotel, 9615 Deereco Rd (I-83, exit 17, Padonia Rd).

7–8: Patchogue, NY—Annual show; Suffolk Gem and Mineral Club; Sat/Sun 10–5; Our Lady of Mt Carmel Auditorium, 495 N Ocean Ave; adults $6, kids 12 and under free; info: Elaine Casani, lavenderlady@optonline.net.

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

14: Washington, DC—Holiday Party; Mineralogical Society of the District of Columbia; 5 pm; private location.

16: Arlington, VA—Holiday Party; Northern Virginia Mineral Club/Micromineralogists of the National Capital Area; 6:30–9:30; Long Branch Nature Center, 625 S Carlin Springs Rd.

A block of talc (December Mineral of the Month). Source: Wiktionary.

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THE NORTHERN VIRGINIA MINERAL CLUB INC
Crystals are the flowers of the Mineral Kingdom

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Mineral of the Month: Talc

PLEASE VISIT OUR WEBSITE AT:
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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;
$20 individual, $25 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.*

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