THE NORTHERN VIRGINIA MINERAL CLUB INC

The Mineral Newsletter

Next meeting: March 3 Time: 7:30 p.m.

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



Lion of Merelani

Tsavorite gemstone, Merelani Hills, Tanzania

Source: Smithsonian National Museum of Natural History.
Photo: Jeff Scovill, courtesy of Bridges Tsavorite.

Deadline for Submissions

March 20

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

Volume 65, No. 3
March 2024
Explore our website!

March Meeting Program:

Young Hobbyist Night

Details on page 4

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Gemstone of the Month

Tsavorite: The Lion of Merelani

by Hutch Brown

Editor's note: *Sue Marcus, who writes our Mineral of the Month articles, sent me photos showing the unveiling of the Lion of Merelani gemstone at the Smithsonian's Janet Annenberg Hooker Hall of Geology, Gems, and Minerals in April 2023. That inspired me to summarize the story for the newsletter based on the sources shown at the end.*

The Lion of Merelani is a tsavorite (pronounced SAY-voh-rite) gemstone from Tanzania that weighs 116.76 carats, has 177 facets, and is an intense green. It was donated to the Smithsonian Institution's National Museum of Natural History in memory of Campbell R. Bridges, the gemologist who discovered and named the mineral, a kind of garnet. Displayed in the museum's Janet Annenberg Hooker Hall of Geology, Gems, and Minerals since April 2023, it is the largest known tsavorite gemstone and the largest fine gemstone ever cut and polished in the United States.

Background

Campbell Bridges was a Scottish gemologist who spent most of his life in Africa. He discovered tsavorite in northeastern Tanzania in 1967. Tsavorite is a variety of grossular garnet; its green color comes from trace amounts of vanadium.

Like other garnets, the green variety formed when heat and pressure metamorphosed the country rock deep underground. Hundreds of millions of years old, the metamorphic rocks date to when eastern Africa was on the margins of a splintering supercontinent.

By mapping the same rocks across local deposits, Bridges was able to also find them in Kenya in 1970. There, he soon found green garnet crystals large and transparent enough to be fashioned into gemstones. He named the garnet tsavorite after Tsavo West National Park in Kenya.

Working with his son Bruce, Bridges continued mining tsavorite and other gems in Kenya until he was murdered by a gang of illegal miners in 2009. Bruce Bridges continued his father's mining company, Bridges Tsavorite.

Discovery and Cutting

Tsavorite's verdant hue makes it unusual for a garnet. Garnets comprise a group of silicate mineral crystals that have been used as gemstones since the Bronze Age roughly 5,000 years ago. Most garnets are prized for their rich red hues; the word "garnet" comes from *malum granatum* ("seed-rich apple"), the Latin word for pomegranate, a fruit with dark seeds resembling crimson crystals.

Happy St. Patrick's Day!

Northern Virginia Mineral Club members:

Our next club meeting will be in person at the Dunn Loring Fire Station, 2148 Gallows Road, on March 3, 7:30 p.m. Several junior club members will give presentations (see details on page 4). Please join them for dinner on March 3 at 5:30 p.m. at:

BJ's Restaurant & Brewhouse
8027 Leesburg Pike, Suite 100, Vienna, VA
Phone: 703-356-7305

Reservations are under Craig Moore, Vice President, NVMC. If you plan to attend, please email Craig at vicepresident@novamineral.club by noon on the day of the meeting.



A 2.45-carat tsavorite crystal from the Merelani Hills of Tanzania. This specimen is less than 1 percent the size of the Lion of Merelani. Source: Wikipedia; photo: Rob Lavinsky.



The 283.74-carat rough tsavorite crystal unearthed near Merelani, Tanzania, in 2017 became the largest tsavorite ever cut in the United States. Photo: Jeff Scovil, courtesy of Bridges Tsavorite.

In 2017, a rough tsavorite crystal weighing 283.74 carats was found in the Merelani Hills mining district of Tanzania. It was displayed at a gem show in Hong Kong, where Bruce Bridges purchased it and decided to have it cut into a fine gemstone as a tribute to his father.

Bridges hired award-winning gem cutter Victor Tuzlukov to cut the stone. Tuzlukov practiced on a 31.57-carat tsavorite, working up to 11 hours a day for 5 days on the smaller stone. The cutting of the larger tsavorite took about a month. The finished stone is more than twice as heavy as the Hope Diamond, which is also on display at the National Museum of Natural History.

Donation to the Smithsonian

Bridges briefly exhibited the stone in 2019 at the American Gem Trade Association show in Tucson, AZ. He named it the "Lion of Merelani" after the district in Tanzania where it was found. He then donated the stone to the Smithsonian's National Gem and Mineral Collection in 2022 in honor of his father. It went on display at the National Museum of Natural History in April 2023.

"This tsavorite is truly one of the most important colored gemstones to have been mined this decade," said Smithsonian mineralogist Jeffrey Post. "Things like this get people to stop and look."

Maybe you can see why.



Lion of Merelani. ***Top:*** *Smithsonian mineralogist Jeffrey Post holding the tsavorite gem before it went on display in April 2023.* ***Bottom:*** *The gemstone on display at the Smithsonian. Photos: Smithsonian Institution (top); Sue Marcus (bottom).*

Sources

Tamisiea, J. 2023. The exquisite Lion of Merelani. Smithsonian Magazine. 20 April.

Wikipedia. No date. Lion of Merelani.

Presentation Night Featuring Junior Club Members

March 3 Program

We have a fun March program to look forward to. Several club members who are 21 and younger have volunteered to take up to 10 minutes each to talk about something that interests them about our hobby. It promises to be a fun evening showcasing some of the extraordinary talent emerging in our club, and we hope to make it an annual event.

Our presenters for March will be:

- ***Mickey Johnson.*** Mickey, our field trip co-chair, will focus on the role of fictitious minerals in Marvel and Star Wars movies. He will speak about the use of these minerals in the films, including their "real-life inspirations" and "fascinating details" about them.
- ***Celia Zeibel.*** Celia, an NVMC member since about 2015, collects rocks ranging from meteorites to fluorescent minerals, but her favorite "combination of minerals" is azurite and malachite. A sophomore at Thomas Jefferson High School for Science and Technology, Celia aspires to become an astrogeologist. In her presentation on the geologic time periods of Mars, she will talk about the Crater Density Time Scale and the various geologic periods it covers; she will also speak about the Mineral Alteration Time Scale for Mars.
- ***Jason Krusling.*** Jason will describe a collecting trip he took with a friend in August. They crossed 8 states in 13 days, with stops at 13 collecting localities in 5 states. Highlights included Yooperlites/Petoskey stones in Michigan, Herkimer diamonds in New York, and wavellite on the NVMC trip in Pennsylvania last year.
- ***Maria Nopo.*** Maria, a high school sophomore in Maryland, has been interested in minerals since kindergarten and is considering studying geology in college. Her presentation is about the iron sulfide pyrite (FeS_2), sometimes mistaken for gold due to its yellowish color and metallic luster. Maria will describe its crystallographic forms and popular localities, and she will also give other interesting facts about pyrite.

Get Your Club Name Tag!

Every dues-paying member of our club is welcome to wear a name tag showing your name, the name of your community, and the club logo. It helps us get to know each other better at club events. President Jason Zeibel is in the process of ordering more name tags for club members. If you want one, just let Jason know at president@novamineral.club or sign up in person at the March meeting. The cost is $15 payable to NVMC.

Online Scam

by Hutch Brown, NVMC Editor



I recently received the message below, ostensibly from Jason Zeibel (our club president) asking me to make a payment on behalf of the club. I've been getting messages like this for years. If you ever get one yourself, check the sender's address: in this case, it was jamesy1464@viginmedia.com—a dead giveaway of a scam. Here's the message I got:

Hutch

Can you take care of an operating expense for us? Roger Haskins, is unable to complete it right away, please let me know if you can pay for it using Zelle, Wire Transfer, Cash App, or PayPal I will then send you the vendor's payment information for the method of payment that suits you the best, and I will process your refund as soon as the treasurer is available. Kindly acknowledge receiving this email and let know if you can handle this.

Best regards

Jason Zeibel



President's Message

by Jason Zeibel

Traditionally, March signifies the arrival of spring, with daffodils, irises, and warming weather. For the third month in a row, however, I write this column under some form of winter storm advisory for the local area.

Even though the weather may still be chilly, March does have a few fun holidays going for it. I covered St. Patrick's Day last year, so this time let me tell you about one of my daughter's favorite holidays: March 14. In our household, it is known as Pi-Day, the 14th day of the 3rd month (3.14). So we celebrate the numerical constant indelibly tied to the circle with Pizza-Pi, Apple-Pi (fig. 1), and maybe some Chocolate-Pi.

If you are looking for more reasons to celebrate the 14th of March, Pi-Day is also the birthday of one of the world's most renowned scientists, Dr. Albert Einstein, who was known to love a good piece of pie. If all this Pi-Day celebration doesn't get you excited, then rest assured—spring is coming soon. With the arrival of spring will come warmer weather and the enticement to get outside and go look for some new mineral treasures. So until Katy (our field trip co-chair) gets us organized to head out into the spring weather, get outside and take a new look at the rocks and minerals in your own backyard!

At our February 2025 club meeting, we virtually hosted Thomas Hale, who spoke about his mining-related adventures in southern Greenland. He referred to his studies as "political geology," reflecting the intersection of mining interests with the welfare of the indigenous population affected by mining activity. Though it would appear on the surface (pun intended) that developing a region's mineral wealth would bring prosperity, the opposite is frequently true. Thomas took us through the competing interests of mining, military facilities, tourism, fishing, archeology, and, of course—musk ox hunting!

I found it amazing that Greenland brought in only $11,000 in mineral royalties last year, given that the island has $3 billion worth of mineral resources. I also learned that the mineral tugtupite is Greenland's "national mineral." I bought a piece myself (fig. 2) some time ago for its unique tenebrescence (reversible color change upon exposure to light), not realizing its



Figure 1—*The president suggests that you celebrate Pi-Day (3.14) this year with a nice homemade Pi (like this Apple-Pi by Audra Zeibel).* *All photos: Jason Zeibel.*



Figure 2—*Tugtupite from the Kvanfjeld Mine in the Ilimaussaq Deposit in Greenland.*

cultural significance. Tugtupite fluoresces deep red under shortwave and vibrant orange under longwave ultraviolet light (fig. 3), and it can appear pink, white, or even blue in visible light. If you missed it, you can check out Thomas's presentation here.

We had a near-record number of folks at the February meeting, including four or five new people, most of whom joined the club! A big welcome to all who attended in person and online. We have an active, growing club, and it is wonderful to be a part of it.

The club received donations in February of a variety of items, many of which were available for club members to enjoy at the meeting (fig. 4). Others, including a collection of specimens worth several thousand dol-

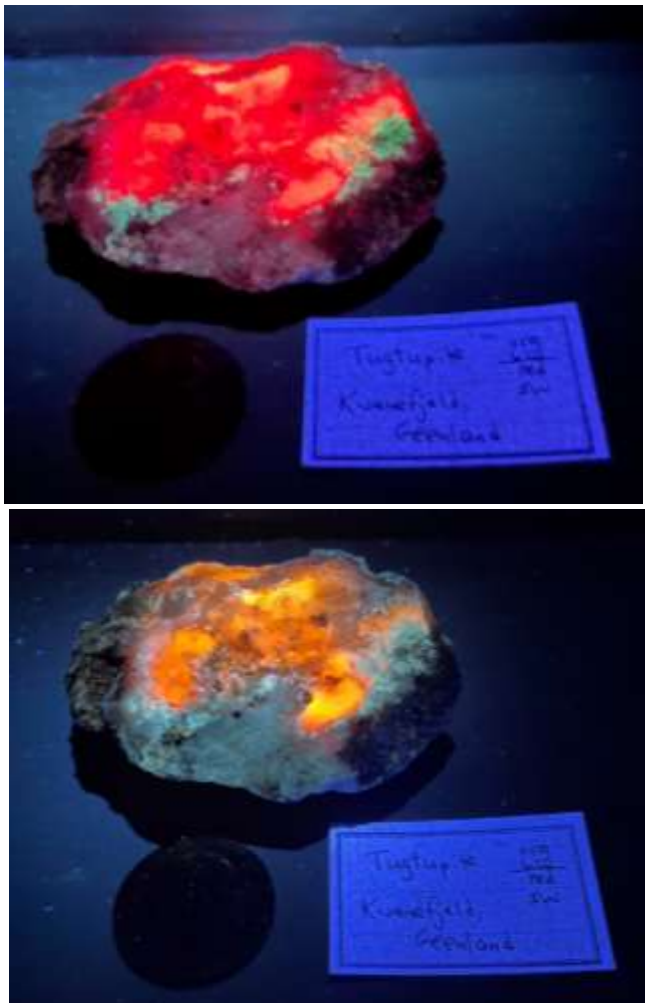


Figure 3—*Tugtupite from the Kvanfjeld Mine in the Ilimaussaq Deposit in Greenland showing its fluorescence under shortwave (top) and longwave (bottom) ultraviolet light.*

lars, will be auctioned off at the spring club auction and the club show in November. Proceeds from all donations go toward our club's scholarship fund and other endeavors to help advance the hobby in our community.

A very nice man came by at the start of the February meeting and dropped off two big boxes of pretty specimens; he left before I got a chance to thank him. So if you are out there, your donation is much appreciated!

I also had the opportunity to meet a lovely retiring doctor at his house in February and receive his donation of a huge slab with embedded fossils from Morocco that weighed nearly 50 pounds (fig. 5). This is quite the specimen, and I am sure it will have a place of honor



Figure 4—*Club members at the February meeting going through donations and give-away items brought by several people.*



Figure 5—*Large slab with embedded fossils from Morocco, given to our club by a generous donor. It will go on auction at our annual club show in November.*



Figure 6—*The town of Vik in southern Iceland lies directly in the path of runoff from the Mýrdalsjökull Glacier should the Katla Volcano erupt.*

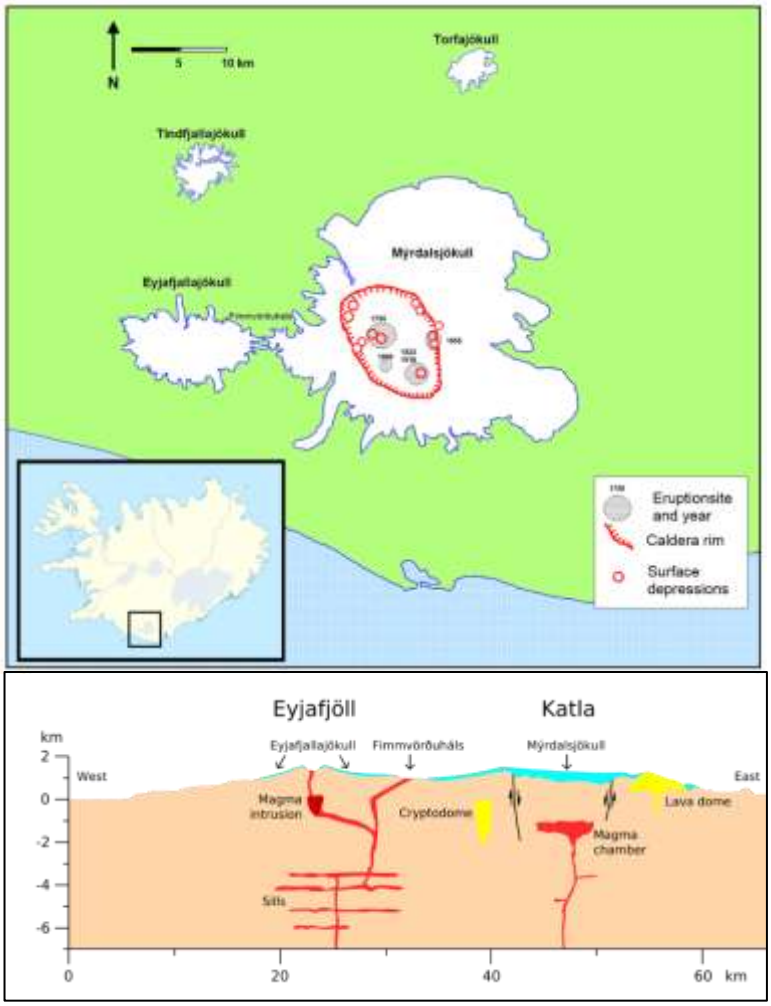


Figure 7—*Glacier and volcanoes near Vik in southern Iceland.* ***Top:*** *Caldera rim (red line) and previous eruptions (gray) of the Katla Volcano from 1755 to 1999.* ***Bottom:*** *Schematic cross-section of the Eyjafjallajökull and Katla Volcanoes showing magma intrusions (red), rhyolite domes and cryptodome (yellow), and glaciers (blue). Sources: Guðmundsson, M.T. [and others] (2007), Geothermal activity in the subglacial Katla caldera, Iceland, 1999–2005, studied with radar altimetry (Annals of Glaciology 45) (top); Wikipedia (bottom).*

in someone's fossil collection after the auction at this year's club show!

I wanted to write a little more about our family's travels to Iceland at the New Year. We stopped in the town of Vik (Vík í Mýrdal) at the southern tip of Iceland (fig. 6). Vik, home to about 500 people, lies directly south of the Mýrdalsjökull Glacier, which sits on top of the Katla Volcano (fig. 7). Since the 12th century, Katla has erupted on average every 40-50 years; the last eruption was in 1918. When Katla erupts, the Mýrdalsjökull Glacier will quickly melt, resulting in a flash flood of rock, ice, and water pouring downhill towards Vik. In the 1918 eruption, the floodwater volume was estimated at over 3.5 Million cubic feet per second—more than the outflow of the Amazon, Nile, Yangtze, and Mississippi Rivers combined.

Katla sits next to the smaller Eyjafjallajökull Volcano, which gained notoriety in April 2010 when ash from its eruption caused havoc with trans-Atlantic air travel. After the eruption of Eyjafjallajökull, Katla has had increased seismic activity, most notably in 2011 and 2016. According to Wikipedia, the heightened activity is closely monitored by the Icelandic Meteorological Office. Vik has warning sirens and evacuation routes posted around town in case of an eruption.

Aside from the Katla Volcano, Vik is most famous for the nearby Reynisfjara beach (fig. 8). Reynisfjara's unique geology includes black sand, basalt columns, and rock formations significant in local folklore. According to local legends, the basalt columns, known as Reynisdrangar, are two Icelandic trolls who were attempting to drag a ship from the sea when daylight broke, turning them into stone. According to Geology-Science, the black sand is composed of tiny fragments of lava that froze and shattered when the molten rock hit the cold ocean water, giving the beach its otherworldly appearance. The black sand is made up mainly





Figure 8—*The Zeibel family on the Reynisfjara black sand beach (above) and at the black columnar basalt columns that form the black sand (right). The beach is one of the most famous black sand beaches in the world. Three rock pillars just offshore (two are shown above) are known as Langsamur, Landdrangur, and Skessudrangar.*

of basalt containing pyroxenes, olivine, and plagioclase feldspar. Secondary minerals include iron-rich magnetite and ilmenite as well as volcanic glasses such as obsidian, pumice, and tephra.

According to IMDB.com, Reynisfjara was the setting for many movies and TV shows, including "Game of Thrones," "Star Wars Rogue One," "Star Trek Into Darkness," and the hit Netflix series "Vikings." Reynisfjara, while stunning, is also one of Iceland's most dangerous natural sites due to the unpredictable sneaker waves. These powerful waves can appear suddenly, reaching much farther up the shore than expected. You see a big warning sign in many languages as you walk onto the black sand beach, but it didn't stop the adventurous Zeibel family.

After spending time on the beach, we headed into Vik for dinner and a show. The show that we took in was, of course, geologically themed. Iceland is home to the world's only Lava Show, which uses real lava (fig. 9). The staff takes tephra from the 1918 Katla volcanic



Figure 9—*In Vik's Lava Show, staff melts tephra from the 1918 eruption of the Katla Volcano to show its properties to the audience.*



Figure 10—*Celia Zeibel donned protective equipment in preparation for handling lava from the Katla Volcano. The lava comes out at about 1100 °C.*

eruption and melts it in a steel blast furnace. The viscous lava is then poured out in the room, to the delight of the audience. As it came down the chute, the molten rock raised the temperature of the whole room. Then, as the lava cooled into obsidianlike volcanic glass, the staff manipulated it much like in traditional glassblowing. They created long stringy droplike structures known as Pele's tears and blew bubbles in the molten rock. It was quite a show!

Afterwards, we were treated to a backstage tour to see the furnace. My daughter Celia put on all the protective gear that the staff uses to manipulate the molten lava (fig. 10).

After a few days in the shadow of the Katla Volcano and Mýrdalsjökull Glacier, my daughter Lyra was happy to move on to locations not at risk of being washed away within minutes. Vik is truly one of the world's unique geological locations, and I hope you get a chance to see it before Katla wakes up again!

A few business items of note: for one, we are ordering club name tags for anyone who wants one. The order will be placed right after the March meeting, so if you want one, send me a note (to president@novamineral.club) or sign up in person at the March meeting. The cost is $15 payable to NVMC. We are also looking to purchase 10 to 12 exhibit cases to allow club members to display parts of their collections at our annual show in November. If you know of some good display cases, please let me know. We hope to order them by early summer.

We have a fun program to look forward to in March. Vice President Craig Moore is organizing our first (hopefully annual) young hobbyist presentation night. Several young enthusiasts have volunteered to give short presentations on a hobby-related theme, showcasing some of the talent emerging in our organization. We are planning on taking them all out to dinner ahead of time, so please try to join us if possible! See page 2 for details.

Until then, happy rockhounding—and don't forget to have some Pi(e) on March 14!

Jason



Meeting Summary
February 3

by Almas Eftekhari, Secretary

We had a great turnout, with about 40 people online and in person. President Jason Zeibel kicked things off with a short business meeting.

Dues-paying club members are entitled to order name tags for $15. If you want a name tag, please contact Jason at president@novamineral.club and give him your name and the community where you live. Both will appear on your badge.

Vice President Craig Moore announced plans for a presentation night featuring junior club members (21 and under) on March 3, including taking them out to dinner beforehand. See details on pages 2 and 4. Craig also announced that the annual spring club auction will be in April or May, depending on speaker schedules.

Jason reminded members about the GLMSMC show on March 15-16 in Rockville, MD (see page 8 for details). For our own club show this year, we're planning on getting new display cases so more members can feature their aesthetic and educational displays.

Field Trip Co-Chair Katy Johnson announced plans to have a field trip in almost every month this year. She's working on some ideas—stayed tuned!

Several new members introduced themselves. Kevin Gormley, an NVMC member about 30 years ago, brought boxes of specimens, books, and tools for donation to the club. Louis Sokol is a retired geologist and chemist who works at the Hanson Park Nature Center in Loudoun County, where he teaches kids and others about minerals. He just moved to Ashburn. Kathleen "Kate" Luisa of Arlington collects rocks for adding to her pond. Tom Cox of Manassas, who has a lapidary lab in his basement, got into rock collecting through his parents; his father cut gemstones, but he hadn't collected in 40 years and just started again. He lives by a stream that's full of cool rocks that he collects.

Craig introduced our speaker, Thomas Hale, who delivered a remote presentation on southwestern Greenland's mineral resources, the Invittuut Cryolite Mine, and political geology. Thomas is working on his Ph.D. at the University of Delaware after receiving his master's degree from the Elliott School of International Affairs at George Washington University and his bachelor's degree from Virginia Tech. He founded a nonprofit organization for K-12 education on the importance of mining.



Minerals from Greenland. ***Top:*** *Tugtupite from Ilimaussaq.* ***Bottom:*** *Cryolite from Ivittuut. Sources: Mindat (top), Rob Lavinsky; Wikipedia (bottom), Didier Descouens.*

Thomas emphasized the need for minerals to run windmills and electric vehicles in an age of climate change. In Greenland, the province of Gadar is the main interest for mining companies. As the ice melts due to climate change, new mining opportunities are opening up. Deposits long abandoned for mining are of renewed interest.

Outsiders are not allowed to collect minerals from Greenland but must buy specimens from Greenlanders. The "national mineral" of Greenland is tugtupite,

a pink-and-white mineral that makes attractive jewelry. It's famous for fluorescing in colors from orange to red.

One of Greenland's newest mines is for gold. Graphite mining in Greenland is important for electric batteries, making graphite even more important than lithium.

Aluminum ore was the reason for the Ivittuut Cryolite Mine, now abandoned. The deposit was discovered in 1799, with mining taking place from 1854 to 1987. During World War II, the mine's aluminum deliveries were key to U.S. aircraft construction. Cryolite was eventually synthesized from fluorite, reducing the importance of the mine. Specimens and artifacts from the shuttered Ivittuut Mining Museum are in storage, and Thomas is working with the Greenland government to find a way to display and study the materials. We can learn much from the Invittuut mining history.

Thomas works with nature and resource institutes to help mitigate conflicts among stakeholders in the area, including hunters, fishermen, mining companies, researchers, tourists, and archeologists. For example, if mining releases poisonous substances into the fjord, fishing is affected, one of the complex questions involved in political geology.

Jason brought a sample of white tugtupite to show off its fluorescence. The meeting closed with the announcement of door prizes!

GeoWord of the Day

(from the American Geoscience Institute)

soil

All unconsolidated materials above bedrock. This is the meaning of the term as used by early geologists and in some recent geologic reports. It is the common usage among engineering geologists (see, for example, compaction; soil mechanics). In recent years, the synonym regolith has come into widespread geological use.

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

Bench Tip
Raising a Cabochon

Brad Smith

When a cabochon sits too low in a bezel, the bezel hides a lot of the stone. The solution is to either sand down the bezel height or boost up the stone. If you choose to raise it up, what is the best material to use?

I was taught to use fine sawdust but now think that might be a problem when used in rings. Rings frequently get wet, causing the sawdust to swell and push the stone against the bezel. When the sawdust dries out, the stone becomes a little loose.

I now prefer to insert a flat sheet to boost up my stones. It can be a scrap of metal or plastic from product packaging or old credit cards. In either case, just cut a piece to loosely fit into the bezel and drop in the stone with some dental floss to check its height.



Smart Solutions for Your Jewelry Making Problems
amazon.com/author/bradfordsmith



Field Trips Coming Up!

by Katy Johnson, NVMC Field Trip Co-Chair

The NVMC is looking forward to an exciting field trip season, with—we hope—at least one outing each month. Dates have not yet been set, but we do have a few trips in the works.

Our first trip of the year will likely be to Flag Ponds Park in Maryland. From the Flag Ponds website:

> Flag Ponds Nature Park is a 500-acre nature park that extends along the shoreline of the Chesapeake Bay in Calvert County, Maryland. Millions of years ago, sharks, whales, crocodiles, and other creatures inhabited the water and shores of the area. Though long extinct, their fossils are still preserved and can be found along the park's shoreline. The park also preserves an original shanty which houses fishermen in the early 20th century and features exhibits on the region's maritime heritage.
>
> A short half-mile hike brings you to the sandy beach or you may take longer trail routes that allow you to experience the beauty of the park and explore the extensive forests protecting the Chesapeake Bay shoreline. Additionally, there are observation platforms at two ponds and on the Chesapeake Bay and a visitor's center with wildlife displays.

Flag Ponds Park does allow metal detecting.



We also hope to revisit National Limestone Quarry and its sister quarry at Mount Pleasant Mills. In addition, we hope to collect again at Willis Mountain.

Local trips will possibly include Rocky Gorge, where Accotink Creek crosses the Fall Line in Springfield. We're also planning a tour of George Mason University's mineral collection before our friend Dr. Julia Nord retires.

Please take this survey on field trip opportunities and reach out to us at fieldtrips@novamineral.club if you know of any great places to visit.

You might want to check out the Clifton Institute's driving tour of Piedmont geology on March 22.



The Gem Scoop: A Good Idea Built to Last

by Jennifer Haley, AFMS historian

Editor's note: *The article is adapted from* AFMS Newsletter *78(1) (February 2025), p. 3.*

In April 1961, Ernest Estwing of the Estwing Manufacturing Company in Rockford, IL, maker of world-famous rock hammers, introduced an invention he marketed as the Gem Scoop. Back in the day, the scoop sold for $7.50. Today, an updated version sells for up to $65!

It's fun to note the thought that went into creating the scoop that so many have carried with us. The idea came from three of Ernest's rockhounding friends from different parts of the country who each wanted a particular type of tool to help them on field trips.

One friend from Arizona wished for a tool to use for chasing away snakes and for grabbing specimens from under cholla (a bristly cactus) and other precarious spots. An Idaho friend wanted a good climbing tool. Another friend wished for a scoop to help him retrieve specimens from the gravels of Lake Superior. All three friends thought that a long-handled canelike tool would be what they needed.

After listening to his friends in 1960, Ernest spent the winter inventing and manufacturing the scoop. He created his Gem Scoop as the ideal tool for collectors in every part of the country.

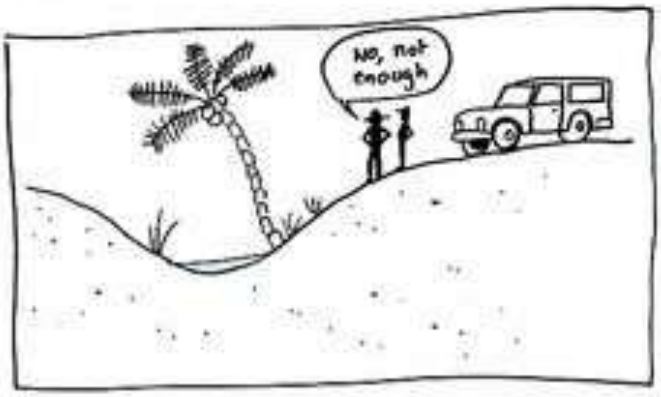
The scoop is a great tool for many uses. Skindivers and beachcombers can use it to search for rocks, shells, clams, and sea glass. You can use it to rake through sand and gravel and to pick up things without hurting your back, and it makes a good hiking stick for going up and down slopes while collecting. My guess is that you can even use it as a handy back scratcher on a camping trip.

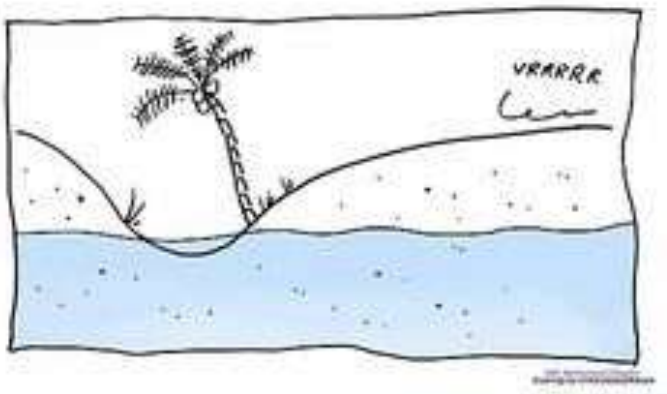
The original tool was 36 inches long, which you can also buy new today. The same size tool comes in a compact design that folds up for easier traveling. There's also a 42-inch version that comes as either a solid cane or a folding tool.

Prospecting and lapidary supply companies sell the scoop either under its original name, Gem Scoop, or as Treasure Scoop.









Earthquake Swarm on Greek Isle of Santorini: About to Erupt?

by Stephanie Pappas, LiveScience

Editor's note: *In January/February, hundreds of small earthquakes on Santorini put most of the island's permanent population of about 20,000 to flight. This is an abridged version of an online report in early February.*

Experts and civic leaders met at the Greek Climate Crisis and Civil Protection Ministry on January 29 to discuss the uptick in seismic activity on Santorini, an island in the Aegean Sea that curves around a flooded volcanic caldera.

Seismic activity has gently stirred the island over the past few weeks. A seismic station on Santorini run by the Aristotle University of Thessaloniki detected at least 39 small earthquakes, mostly magnitude 3.5 or less, on January 31.

The island got its current shape via the Minoan eruption in 1600 B.C.—one of the largest volcanic eruptions in human history. It might have inspired tales of the lost city of Atlantis, which was said to have sunk under the sea.

Scientists don't expect the current unrest to lead to such a dramatic outburst.



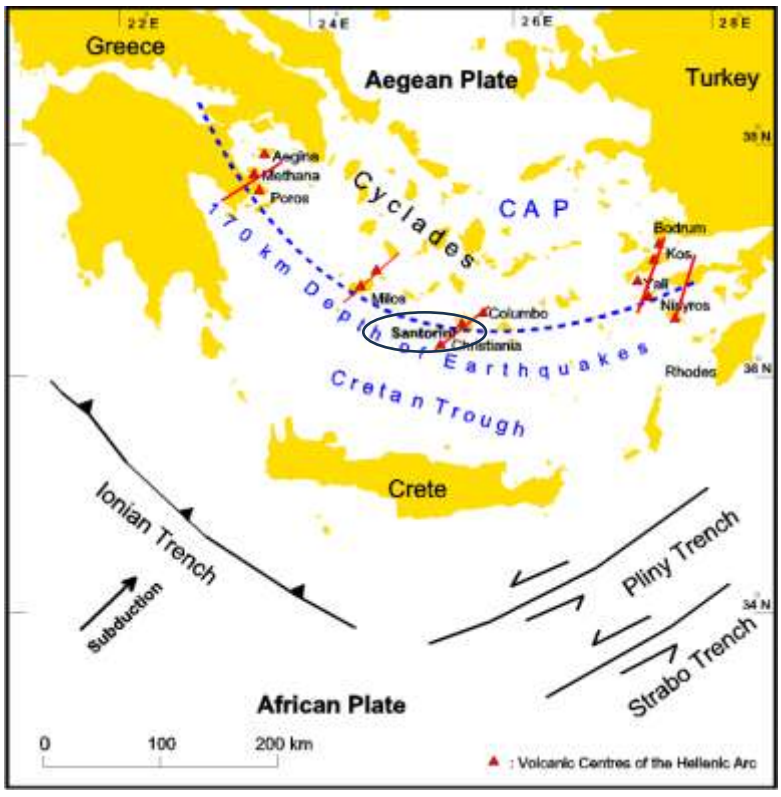
View of caldera from Oia, Santorini. Photo: Hutch Brown.

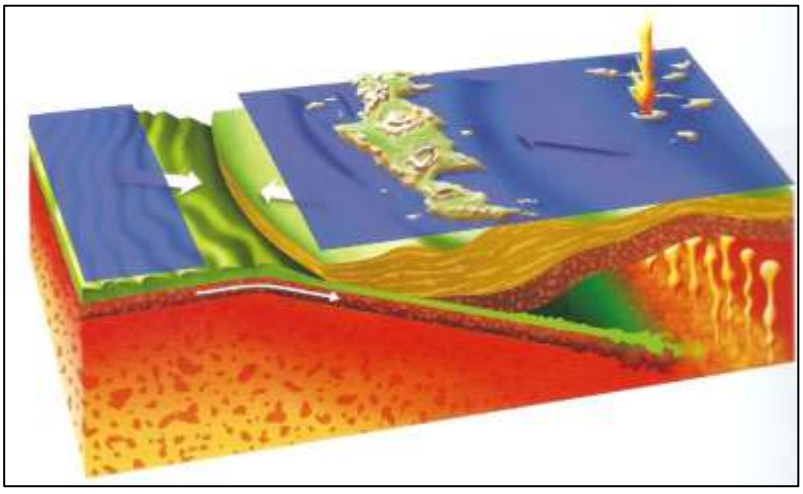
"What we must realize is that the Santorini volcano produces very large explosions every 20,000 years," said Efthymios Lekkas, seismologist and head of the scientific monitoring committee for the Hellenic Volcanic Arc. "It's been 3,000 years since the last explosion, so we have a very long time ahead of us before we face a big explosion."

Sources

CretanBeaches. 2018. How Crete was formed.

Pfeiffer, T. 2004. Geology of Santorini. Volcano Discovery.





How Santorini's volcano forms. ***Top:*** *The heavier African Plate (left) dives under the lighter Aegean Sea Plate. A deep-sea trench forms at the leading edge of subduction southwest of Crete (center). As the African plate descends, it grinds against the overlying Aegean Sea Plate. The heat and pressure mount until the melting rock rises as magma and erupts north of Crete.* ***Left:*** *The erupting magma creates a line of volcanic islands in the shape of an arc (blue dotted line). Santorini is circled. Red arrows show direction of plate movement. Sources: CretanBeaches (2018), Pfeiffer (2004).*

All That Glitters …

Editor's note: *In his autobiographical account* Roughing It, *Mark Twain tells the story of prospecting for silver with three partners during the 1862 mining boom in Nevada. Of the four, the only experienced miner was a "Mr. Ballou." Sneaking away from his partners, Twain finds what he thinks is a silver specimen before stumbling across a lode of gold.*

By and by, in the bed of a shallow rivulet, I found a deposit of shining yellow scales, and my breath almost forsook me! A gold mine, and in my simplicity I had been content with vulgar silver! … I set about scooping [up the gold], and for an hour I toiled down the windings of the stream and robbed its bed.

But at last the descending sun warned me to give up the quest, and I turned homeward laden with wealth.

As I walked along I could not help smiling at the thought of my being so excited over my fragment of silver when a nobler metal was almost under my nose. In this little time the former had so fallen in my estimation that once or twice I was on the point of throwing it away.

The boys were as hungry as usual, but I could eat nothing. Neither could I talk. I was full of dreams and far away. Their conversation interrupted the flow of my fancy somewhat, and annoyed me a little, too. I despised the sordid and commonplace things they talked about.

But as they proceeded, it began to amuse me. It grew to be rare fun to hear them planning their poor little economies and sighing over possible privations and distresses when a gold mine, all our own, lay within sight of the cabin and I could point it out at any moment. …

"Gentlemen," said I, "I don't say anything—I haven't been around, you know, and of course don't know anything—but all I ask of you is to cast your eye on that, for instance, and tell me what you think of it!"

And I tossed my treasure before them.

There was an eager scramble for it, and a closing of heads together over it under the candle-light. Then old Ballou said:

"Think of it? I think it is nothing but a lot of granite rubbish and nasty glittering mica that isn't worth ten cents an acre!"



"WE'VE GOT IT!"

So vanished my dream. So melted my wealth away. So toppled my airy castle to the earth and left me stricken and forlorn.

Moralizing, I observed, then, that "all that glitters is not gold."

Mr. Ballou said I could go further than that, and lay it up among my treasures of knowledge, that nothing that glitters is gold.

So I learned then, once for all, that gold in its native state is but dull, unornamental stuff, and that only low-born metals excite the admiration of the ignorant with an ostentatious glitter.

However, like the rest of the world, I still go on underrating men of gold and glorifying men of mica. Commonplace human nature cannot rise above that.

The Rocks Beneath Our Feet

Virginia's Natural Bridge—Part 1

by Hutch Brown

Editor's note: *This is part 1 of a revised version of an article that appeared in this newsletter in January 2015.*

More than 200 feet tall and 90 feet wide, Virginia's Natural Bridge is stunning (fig. 1). I last visited the bridge with my family in 2014, and we were all impressed. Before getting down to the trail under Natural Bridge, you take a major road over it: that's how massive it is—a functioning bridge for traffic!

As a child, I visited Natural Bridge with my parents, and I remember wondering how a creek could have tunneled through solid rock. Some said it was part of a divine miracle, the biblical Great Flood.

Cultural Context

American Indians in Virginia had their own stories about Natural Bridge, but the bridge wasn't known to Europeans until a colonial governor sent an expedition to explore western Virginia in 1742. The expedition traveled up a stream called Cedar Creek and found it flowing under a natural rock bridge.

The discovery fascinated Europeans. Along with Niagara Falls, Natural Bridge became known as a natural wonder of the New World. People came from all over to see it, and it fired the Romantic imagination.

Romanticism was a literary and cultural movement that originated in Germany around 1800. Romanticism was a reaction to the Enlightenment of the 18th century, which focused on science and reason. Instead of reason, Romanticism cultivated spirituality and took its inspiration from wild places in nature.

Many artists painted Natural Bridge (fig. 2). You can see a Romantic-era engraving of Natural Bridge at Monticello, Thomas Jefferson's home. Jefferson himself bought Natural Bridge in 1774, and he once called it "the most sublime of nature's works."

For the Romantics, sublime nature had the power to evoke awe, wonder—even terror. In the Romantic imagination, the sublime passed rational understanding and could be grasped only through emotional or spiritual experience. As an instance of sublime nature, Natural Bridge was an enduring mystery of the universe that fascinated and puzzled amateur naturalists like Jefferson, who never did figure it out.



Figure 1—*Natural Bridge in Rockbridge County, VA. For scale, note the people on the trail along Cedar Creek, which flows under the bridge. Photo: Bentley (2013).*



Figure 2—Natural Bridge *(1852), a painting by the Hudson School artist Frederic Edwin Church. Virginia's Natural Bridge fired the imagination of Romantic-era artists. Source: Wikipedia.*

Sedimentary Bedrock

So what created Natural Bridge?

Let's start from the beginning—and the beginning is always the bedrock. Two types of bedrock make up Natural Bridge, one overlying the other.

The bottom layer forms the base of the arch. It's limestone (fig. 3), part of a rock formation called Chapultepec. The Chepultepec limestone is grayish-white and very fine-grained.

The Chapultepec underlies a formation called Beekmantown, which comprises the arch. The Beekmantown is dolomite, and it's just as grayish-white and fine-grained as the limestone under it. Because the arch erodes into the stream bed below, you can find both types of bedrock side by side in the stream. I couldn't tell any difference, but the dolomite is said to contain "minor amounts of light gray translucent chert" (Spencer 1968), though I noticed none.

There isn't much chemical difference either: limestone is calcium carbonate ($CaCO_3$) and dolomite is calcium/magnesium carbonate ($CaMg(CO_3)_2$). Dolomite forms when magnesium ions replace some of the calcium ions in limestone.

The geologic map for the area shows that the carbonate bedrock in and around Natural Bridge ranges from lower Cambrian to upper Ordovician in age; it formed about 500-470 million years ago (fig. 4, pink). It is surrounded by the older Conococheague Formation, Cambrian in age (fig. 4, orange). All three rock formations—Beekmantown, Chepultepec, and Conococheague—originated from sediments in offshore seas: from bits of ancient sea life along with calcite precipitated from seawater.

Beekmantown dolomite forms the highest elevations in the area, including Buck Hill, the area's high point. Buck Hill is about 1,700 feet in elevation and Cedar Creek about 1,000 feet, so the area is quite hilly. Though hilly, it is part of the Great Appalachian Valley extending from Vermont south to Alabama.

Physiographically, Natural Bridge is part of the Valley and Ridge Province just west of the Blue Ridge (fig. 5). The Valley and Ridge is made up entirely of sedimentary rock; its valleys have the most erodible bedrock, limestones and dolomites. The erosion-resistant ridges comprise younger rocks formed from sediments that eroded on dry land. Geologists call them clastic rocks, meaning that they originated from bits of pre-existing rock. Clastic rocks range from mudstone to shale, siltstone, sandstone, and more.



Figure 3—*Limestone bedrock at the base of Natural Bridge. Photo: Hutch Brown.*

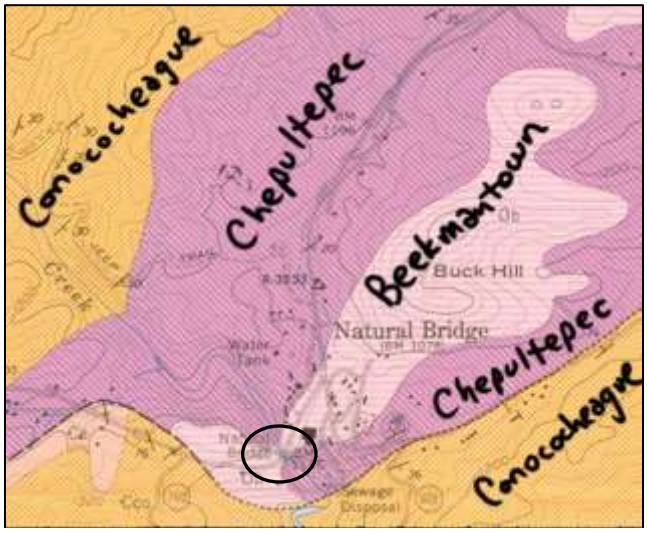


Figure 4—*Detail from a geologic map showing bedrock types near Natural Bridge (circled). Beekmantown dolomite (pink) overlies Chepultepec limestone (rose), which in turn overlies the older Conococheague Formation (orange). Source: Bentley (2013).*

None of the sedimentary rocks were originally there. The oldest rocks in our area aren't sedimentary but igneous. Geologists call the oldest rocks Grenville granitoids, meaning granites and similar rocks (such as tonalite) as well as metamorphic rock (gneiss) derived from granitic rock. The Grenville rocks, more than a billion years old, still underlie much of our area but crop out only in the Blue Ridge, such as in Old Rag granite (fig. 6).

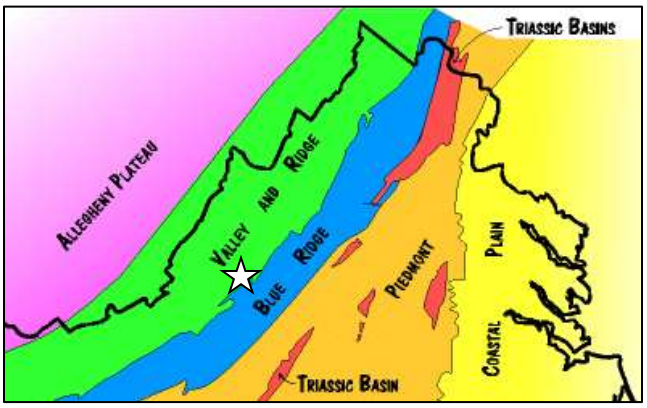


Figure 5—*The five physiographic provinces in Virginia. The white star shows the approximate location of Natural Bridge in the Valley and Ridge Province. Source: Fichter and Baedke (1999).*



Figure 6—*Autumn view from Old Rag in the Blue Ridge, with granite in the foreground. Photo: Hutch Brown.*

The sedimentary rocks of the Valley and Ridge are much younger. Where did they come from?

Tectonic Forces

The answer is based on the theory of plate tectonics (derived from Latin *tectonicus*, "pertaining to building"). As figure 7 shows, the Earth is covered by rocky plates (the lithosphere) floating on a sea of viscous magma (the asthenosphere) in the Earth's mantle. Convection currents in the mantle drive the plates into collisions, only to later break them apart.

In a tectonic collision, the heavier plate slides under the lighter plate and melts into the mantle (fig. 7). The rising magma forms a line of volcanoes (a volcanic island arc like the Aleutians in the North Pacific), followed by mountain building later on. In a tectonic breakup, one plate rifts away from the other along old suture lines, resulting in volcanic eruptions in the thinning crust, followed by a gradually expanding ocean.

The oldest rocks in our area (Grenville granitoids like Old Rag) originated more than a billion years ago when proto-Africa collided with proto-North America to help form the supercontinent Rodinia. By about 700 million years ago, Rodinia was breaking up. Proto-Africa rifted away from proto-North America to form the Iapetus Ocean, predecessor of the Atlantic.

As the Iapetus formed, marine sediments covered the proto-North-American continental margin in layers that became thousands of feet deep. The sheer weight of the accumulating sediments compacted them into

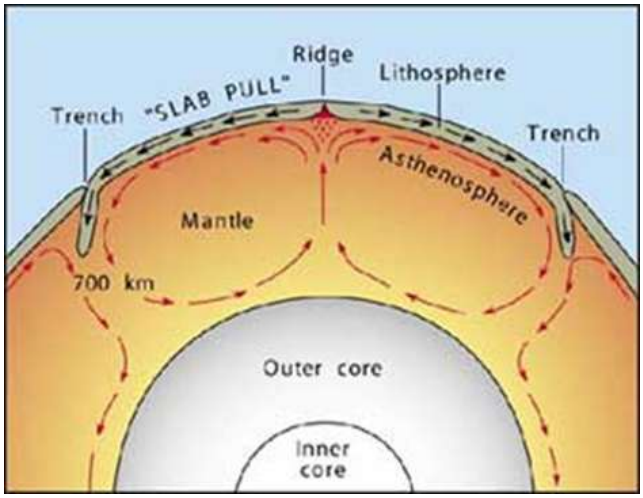


Figure 7—*Plate tectonics model. Convection currents within the Earth's mantle drive plates against each other, with heavier plates diving under lighter ones and melting into the mantle. Source: Fichter and Baedke (1999).*

solid rock, including the Chapultepec limestone and Beekmantown dolomite of the Valley and Ridge.

By about 500 million years ago, tectonic forces were closing the Iapetus Ocean as a volcanic island arc approached proto-North America. About 474 million years ago, what geologists call the Taconian (or Taconic) Terrane collided with the continental margin, precipitating a great mountain-building event called the Taconian (or Taconic) Orogeny.

As the Taconian Terrane approached, it formed shallow seas because it came in at an angle and the continental margin was so jagged (fig. 8). For millions of



Figure 8—*The Taconian Terrane approaches proto-North America at an angle, protecting remnant shallow seas during the collision. Carbonate rocks continue to accumulate on seafloors. Source: Fichter and Baedke (1999).*

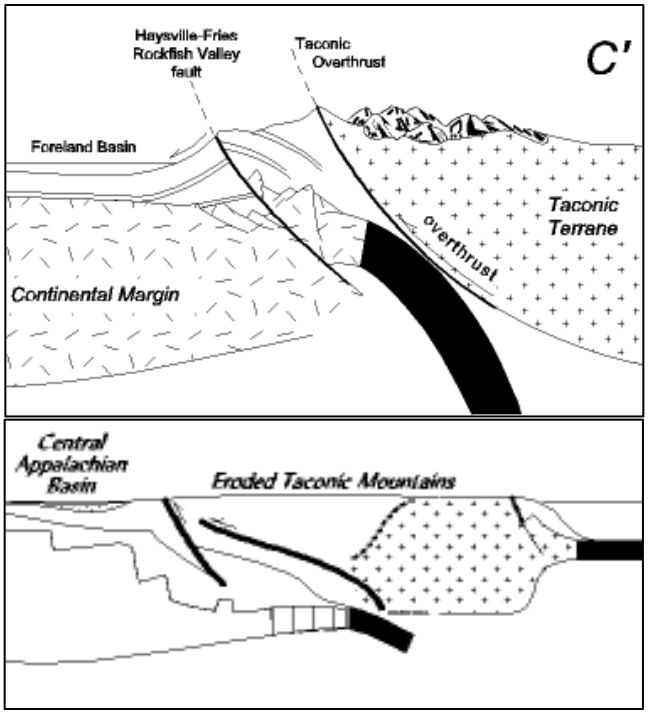


Figure 9—*Taconian Orogeny and aftermath.* ***Top:*** *Shallow seas in the foreland basin place new carbonate sediments on top of older ones, followed by clastic sediments eroded from the Taconian Mountains.* ***Bottom:*** *Erosion of the Taconian Mountains fills the foreland basins, leaving clastic rocks on top of carbonates. Sedimentary rocks now comprise the Valley and Ridge, whereas the roots of the Taconian Terrane make up the Piedmont. Source: Fichter and Baedke (1999).*

years, the terrane protected remnant seas while carbonate rocks continued to accumulate on offshore seafloors.

The Taconian Orogeny lasted from about 474 million to about 450 million years ago. As it slid up over the continental margin, the Taconian Terrane raised mountains in what geologists call the hinterland (from German *Hinterland*, "rear area") of the collision. At the same time, the great weight of the rising mountains depressed the continental bedrock ahead of the collision. Geologists call such depressions foreland basins; they are common in tectonic collisions, typically forming shallow inland seas (fig. 9, top).

The upshot was a series of large shallow seas forming ahead of the rising Taconian Mountains for tens of millions of years. The seas added the final carbonate layers to the Beekmantown Formation. Then younger formations of limestone and dolomite covered the older ones in the foreland basins.

The Taconian Mountains eroded away within a few tens of million years (fig. 9, bottom). Clastic sediments from the eroding mountains filled the foreland basins with rocks like shale and siltstone. Quartz is much more erosion-resistant than most rocks, so the final sediments that eroded from the Taconian Mountains were deep layers of quartz sands. In time, they hardened into sandstones overlying the older clastic rocks.

The Taconian Orogeny thus laid the foundations for two of the physiographic provinces in our area (fig. 9, bottom): the Piedmont and the Valley and Ridge. The metamorphic roots of the Taconian Terrane became the Piedmont, whereas carbonate rocks from ancient seafloors and clastic rocks from the eroded Taconian Mountains became the Valley and Ridge.

The sedimentary rocks of the Valley and Ridge were initially in relatively flat layers forming a vertical column of rock thousands of feet thick:

- At the bottom of the column were limestone and dolomite formations from offshore seas before the Taconian Orogeny.
- On top of the offshore rocks were more limestone and dolomite formations from shallow seas in foreland basins during the Taconian Orogeny.

- On top of the carbonates was a thick layer of clastic rocks (shales and siltstones) from the eroding Taconian Mountains. That layer (up to 1,800 feet thick) is called the Martinsville Formation.
- On the very top came layers of sandstone. The white Tuscarora sandstone (so dense that it resembles quartzite) caps ridges across the Valley and Ridge, from Massanutten Mountain in Virginia to Seneca Rocks in West Virginia.

By the end of the Taconian Orogeny, the building blocks of the Valley and Ridge were all in place. But they were all stacked on top of each other in a huge column of rock.

That's not what we see today. The geologic map for the area of Natural Bridge (fig. 3) shows carbonate formations like Conococheague, Chepultepec, and Beekmantown lying side by side, with no clastic formations anywhere nearby. Instead of flat carbonate rocks buried beneath flat clastic rocks, we see nothing but carbonates at Natural Bridge—and they are anything but flat (fig. 10).

How did that happen? What uptilted the rocks and moved them to where we see them today?

Next: *How the Alleghanian Orogeny emplaced the carbonate rocks of the Valley and Ridge, setting the stage for the karst landscape surrounding Natural Bridge.*



Figure 10—*Chepultepec limestone bedrock at Natural Bridge uptilted by tectonic forces. Photos: Hutch Brown.*

Sources

Bentley, C. 2012. Blue Ridge Thrust Fault field trip. Mountain Beltway blog. 11 April.

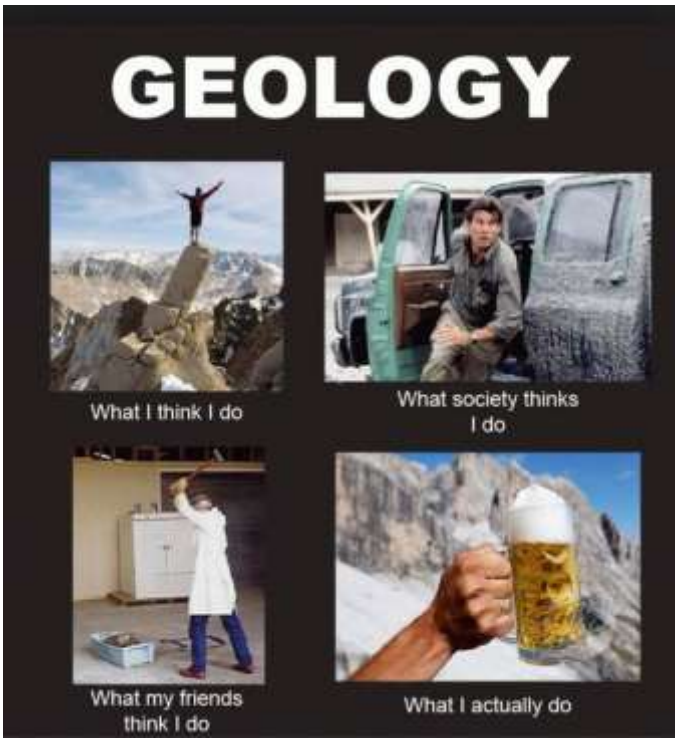
Bentley, C. 2013. Natural Bridge, Virginia. Mountain Beltway blog. 22 August.

Bentley, C. 2020. Historical geology: A free online textbook for historical geology courses.

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.

Spencer, E.W. 1968. Geology of the Natural Bridge, Sugarloaf Mountain, Buchanan, and Arnold Valley Quadrangles, Virginia. Rep. of Investig. 13. Charlottesville, VA: Virginia Division of Mineral Resources.

Wilkes, G.P.; Spencer, E.W. [and others]. 2007. Geology of Rockbridge County, Virginia. Virginia Div. of Min. Res. Pub. 170. Charlottesville, VA: Virginia Division of Mineral Resources.



March 2025—Upcoming Events in Our Area/Region (see details below)

Sun	Mon	Tue	Wed	Thu	Fri	Sat
						1 Shows, Wilmington, DE; Raleigh, NC
2 Shows, Wilmington, DE; Raleigh, NC	3 **NVMC mtg**	4	5 MSDC mtg	6	7 Show, Richboro, PA	8 Show, Richboro, PA
9 **Daylight savings begins**	10 GLMSMC mtg	11	12	13	14	15 Shows, GLMSMC; Gastonia, NC
16 Shows, GLMSMC; Gastonia, NC	17 **St. Patrick's Day**	18	19	20 **Spring begins**	21 Show, Swannanoa, NC	22 Show, Swannanoa, NC
23 Show, Swannanoa, NC	24	25	26 MNCA mtg	27	28 Show: Raleigh, NC	29 Shows: Raleigh, NC; Plymouth Mtg, PA
30 Shows: Raleigh, NC; Plymouth Mtg, PA	31					

Event Details

1-2: Wilmington, DE—Annual show; Delaware Mineralogical Society; Sat 11-5, Sun 11-4; DoubleTree, 4727 Concord Pike (Rt 202); seniors (60+) $5, adults (18-59) $6, Juniors (12–17) $3; info: Dianne Soccio, rockincatmom23@gmail.com; www.DMSrocks.org.

1-2: Raleigh, NC—Rocks, Minerals, Crystals, Gem, Jewelry & Bead show; Raleigh Fairground, 4285 Trinity Rd; Sat 10-6, Sun 10-5; free; info: Ash, 919-257-8915, www.jewelpassageshows.com.

3: Arlington, VA—Northern Virginia Mineral Club; info: https://www.novamineralclub.org/.

5: Washington, DC—Mineralogical Society of D.C.; info: http://www.mineralogicalsocietyofdc.org/.

8-9: Richboro, PA—Annual show; Leidy Microscopic Society; Advent Lutheran Church, 45 Worthington Mill Rd; Fri 12-6, Sat 9-6; visitors $5 Fri, $10 Sat (includes lunch); info: www.leidymicroscopical.com.

10: Gaithersburg, MD—Gem, Lapidary, and Mineral Society of Montgomery County, MD; info: https://glmsmc.com/index.shtml.

15-16: Gastonia, NC—Annual show; Gaston Gem and Mineral Club; Gastonia Farmers Market, 410 E Long Ave; Sat 10-6, Sun 10-4; free; info: gastongemclub.weebly.com.

15-16: Gaithersburg, MD—Annual show; Gem, Lapidary, and Mineral Society of Montgomery County, MD; Montgomery County Fairgrounds, Bldg 6, 16 Chestnut St; Sat 10-6, Sun 11-5; $7 ages 12+; info: www.glmsmc.com.

21-23: Swannanoa, NC—Show; Mountain Area Gem and Mineral Association; Land of the Sky Shrine Club, 39 Spring Cove Rd; Fri 9-6, Sat 9-6, Sun 10-4; free; info: www.AmericanRockhound.com.

26: Arlington, VA—Micromineralogists of the National Capital Area; info: http://www.dcmicrominerals.org/.

28-30: Raleigh, NC—Annual show; Tar Heel Gem & Mineral Club; Kerr Scott Bldg, NC Fairgrounds, 4285 Trinity Rd, Gate 9; Fri 3-7, Sat 10-6, Sun 10-5; 13+ $3; info: Cyndy Hummel, 919-779-6220, mchummel@mindspring.com, www.tarheelclub.org/.

29-30: Plymouth Meeting, PA—Annual show; Philadelphia Mineralogical Society and The Delaware Valley Paleontological Society; Lu Temple, 5140 Butler Pike; Sat 10-5, Sun 10-4; $7 adults, $1 kids 12 and under; info: dklieger@verizon.net, www.phillyrocks.org.

The Northern Virginia Mineral Club, Inc.

Visitors are always welcome at our club meetings!

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

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

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Bring your dues to the next meeting.

Dues: Due by January 1 of each year; $20 individual, $25 family, $6 junior (under 16, sponsored by an adult club member).

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Meetings: At 7:30 p.m. on the first Monday of each month at the Dunn Loring Fire Station, 2148 Gallows Road, Dunn Loring, VA.* (No meeting in July or August.)

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

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