THE NORTHERN VIRGINIA MINERAL CLUB INC

The Mineral Newsletter

Next meeting: September 1 (Labor Day) Time: 7:30 p.m.

Virtual Meeting Through Zoom Only



Dumortierite in clear quartz

Vaca Morta Quarry, Serra de Vereda, Boquira, Bahia, Brazil

Source: Mindat. Photo: Rob Lavinsky.

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September Meeting Program:

Youth Presentations

details on page 14

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Mineral of the Month
Dumortierite

by Sue Marcus

For our September newsletter, I thought we would learn about a mineral I've collected myself—dumortierite.

Discovery and Name

We owe the identification of dumortierite to the observations of Ferdinand Pierre Joseph Gonnard. Gonnard, a professor of mining engineering at the University of Lyon, France, wrote descriptions of minerals found in several French departments.

Evidently, Gonnard kept an eye out for rocks and minerals while traveling, for in 1879, he found an interesting rock in road fill on a road in the Garron Valley near Lyon. The following year, he visited the nearby quarry near the Beaunant aqueducts and saw the mineral on-site but couldn't yet identify it. Gonnard later described the new mineral in 1880 or 1881, naming it for his friend Eugene Dumortier.

Augustin Alexis Damour chemically analyzed the material and determined its chemical formula. The mineral's optical properties (pleochroism and polarization) helped distinguish it from previously known minerals like indicolite, a form of tourmaline. (Pleochroism occurs when a mineral's color changes as the angles or axes change with rotation of the mineral by hand. Polarization of light, by crossing a polarizing filter under a petrographic microscope, is an optical method used for mineral identification.)

After dumortierite was recognized as a new mineral with a composition different from those known previously, samples from New York and other places were reexamined and found to be dumortierite. When studies in the early 20th century determined that the mineral contained boron, its chemical formula was revised. As analytical techniques improve and dumortierite is reexamined, the formula continues to be refined.

I thought I had completed my research for this article when I saw a 2013 paper that established a dumortierite "supergroup." The scientists found dumortierite analogs, the analyses of which provided such detailed data that they created three dumortierite subgroups based on exceedingly detailed chemical differences. Due to the equipment required and the understanding needed to interpret these distinctions, almost all mineral collectors can remain comfortable with use of plain old "dumortierite" for the mineral.

Fall is almost here!

Northern Virginia Mineral Club members,

The next club meeting will be on **Monday, September 1, 7:30 p.m.** We won't have our usual meeting place on Labor Day, so the meeting will be online only through Zoom. We are not meeting for dinner beforehand.

See program details on page 14.



Clear quartz with acicular radial dumortierite inclusions. Vaca Morta Quarry, Serra de Vereda, Boquira, Bahia, Brazil. Source: Mindat. Photo: Dan Costian.

Geologic Environment

Boron is required for dumortierite formation. One source of boron comes from fluids that crystallize slowly into granitic pegmatites. Not all pegmatites form from boron-rich fluids, and some that do may not have the specific conditions needed to form dumortierite. As a result, dumortierite in pegmatites is uncommon.

The slow crystallization of pegmatites occurs during the later stages of chemical differentiation as the fluids cool. As temperature and pressure conditions change, different minerals crystallize, reducing the elements available for the remaining minerals to form. Dumortierite crystals that were included in later-formed quartz from Brazil are a lovely—and rare—example of this process.

Dumortierite also occurs in metamorphic rocks. Regional metamorphism of aluminum-rich rocks at high temperatures can result in dumortierite formation. The requisite boron is usually sourced in minute quantities from the rocks being metamorphosed. A variation of the metamorphic formation of dumortierite happens during contact metamorphism. When igneous rocks push through existing rocks, metamorphism often occurs in contact zones between the hot incoming igneous fluids and the cold surrounding rocks. Along the margins of this zone, the changes are called contact metamorphism. Most contact metamorphic zones don't contain dumortierite.

Other minerals form under similar conditions, particularly in metamorphic rocks. Look at the chemical formulas for these minerals:

- dumortierite [$Al(Al_2O)(Al_2O)_2(SiO_4)_3(BO_3)$];
- sillimanite [$Al_2(SiO_4)O$];
- andalusite [$Al_2(SiO_4)O$]; and
- kyanite [$Al_2(SiO_4)O$].

What similarities and differences do you see? Sillimanite, andalusite, and kyanite are polymorphs, meaning that they share the same chemistry, although their internal crystal structures are different. Dumortierite shares most elements with the other three minerals. The minerals can occur together, or at least nearby, if the conditions of formation change. For example, dumortierite usually requires higher pressures than the others during crystallization. Sillimanite and kyanite will form under the highest temperatures, and boron must be available for dumortierite to form.

Localities

United States

Multiple states have dumortierite localities. In addition to the localities listed below, small spots of questionable crystals were reported from Connecticut.

Maine. Small amounts of dumortierite have been found at an outcrop along a shoreline near Georgetown, ME. The locality is given on Mindat as "Five Islands," although that is a broad geographic area.

A cluster of bright blue dumortierite crystals, 1.2 centimeters (0.5 in) long, was reportedly found in a rock described as metamorphosed schist. The Mindat photo shows the host rock as mostly white quartz. More information is necessary to confirm the rock type, dumortierite crystals, and location.

Dumortierite was also reported from a U.S. Route 1 roadcut near Woolwich. The cut has weathered, so any remaining dumortierite will be difficult to find.

New York. Manhattan is an unusual locality for minerals, yet dumortierite crystals were collected from somewhere on 139th Street. The specimen shown on Mindat is 4.5 centimeters (1.8 in) long, with a patch of lovely pale blue translucent crystals as long as 0.5 centimeter (0.2 in). The crystals exhibit multiple fractures but no displacement. Schaller (1905) mentioned similarly deformed dumortierite crystals.

A slightly larger specimen (4.8 centimeters (1.9 in) long) came from the Bronx (135th Street and Mott Avenue). The area is now part of a major thoroughfare



Dumortierite on quartz. Manhattan, New York City, NY. Source: Mindat. Photo: Christopher O'Neill.



Sprays of dumortierite in feldspar. The Bronx, New York City, NY. Source: Mindat. Photo: Kelly Nash.

known as the Grand Concourse. The sample is composed of multiple lavender to almost black dumortierite sprays. Most of the crystals are opaque and possibly somewhat weathered, although a few show some translucency.

Schaller (1905, pp. 94-95) wrote a detailed report on dumortierite in the New York City environs. Undeveloped areas were probably more common when he was writing. He mentioned dumortierite found in Harlem, along with specimens from Madison Avenue, Kips Bay, and large swaths of the city that have been obliterated by development. Red granite in Harlem hosted dumortierite crystals that looked like hair clippings. At another Harlem site, a pegmatite was 0.9 meter (3 ft) wide with pockets along a 24-meter (80-ft) length. Sprays and fibers of dumortierite occurred in orthoclase in the pegmatite and less commonly as inclusions in muscovite. More than 25 specimens came from Brooklyn, where fibrous crystals up to 1 centimeter (0.4 in) thick were collected. Schorl (black tourmaline) was a common accessory mineral found with dumortierite.

California. The Dehesa dumortierite deposit in eastern ***San Diego County*** is the source of usually crystallized specimens of this mineral. Sprays of crystals reach at least 2 centimeters (0.8 in) in length, with multiple sprays in matrix specimens up to 11 centimeters (4.3 in) long. Although some dumortierite crystals from this locality are euhedral, all are firmly enclosed in matrix, so the terminations are difficult to discern. Colors range from deep purple through violet to tan and occasionally blue. Massive dumortierite was also found here. Specimens fluoresce blue under shortwave ultraviolet light.

Schaller (1905) found dumortierite here in a dike cutting granite. The dike was up to 12 meters (40 ft) thick and extended for about 305 meters (1,000 ft). It was zoned, with fine-grained quartz and sillimanite in the upper zone and coarse-grained quartz and dumortierite in the lower zone. Feldspar was notably absent in both zones. Titanium dioxide, in the form of rutile or titanite (sphene), occurred in the sillimanite zone, along with minor corundum.

The sillimanite zone was schistose in places, a texture absent from the dumortierite zone. Schaller reported the dumortierite as lavender to pink ("resembling … rubellite"). The lower zone was rich in dumortierite in some places but had none in other places. Sprays of dumortierite were detected under magnification. Schaller's analyses showed that dumortierite from this locality contained more titanium dioxide within the dumortierite crystal lattice, where it substituted for alumina. The upper zone may have formed, wholly or in part, before boron-rich fluids formed the lower zone.

In the far eastern part of California's ***Imperial County***, close to the Arizona border, dumortierite occurs in the Cargo Muchacho Mountains in Ogilby and in unnamed occurrences. Massive blue dumortierite as well as microscopic blue and mulberry-colored crystals of dumortierite in quartz have been found here. Specimens were up to at least 9 centimeters (3.4 in) in size. The purple shades of dumortierite may be due to titanium (see Schaller 1905).

Minor microscopic dumortierite crystals were collected at an unnamed borate-rich skarn in ***Fresno County***.

Nevada. The Champion Mine in ***Pershing County***, NV, should not be confused with a mine of the same name in California. The Champion Sillimanite Company operated both mines for minerals used in insulation products (famously in Champion spark plugs). The Nevada mine produced about 5,000 tons of dumortierite between 1925 and 1949. It was (and probably still is) the world's only mine for dumortierite.

There were reportedly 425 meters (1,400 ft) of development at the mine; whether this was the depth of mining or horizontal work could not be determined. The workings followed the lens of mineralization, which was 22 meters (75 ft) long.

Dumortierite replaced andalusite; both minerals were probably economically extractable. Boron in dumortierite was probably introduced from surrounding rhyolite during contact metamorphism. The dumortierite occurred in flat, radiating light pink crystals in matrix; as bright blue microscopic crystals; and as fibrous lavender to deep pink masses. The masses formed veinlets up to at least 19.4 centimeters (7.6 in) long.

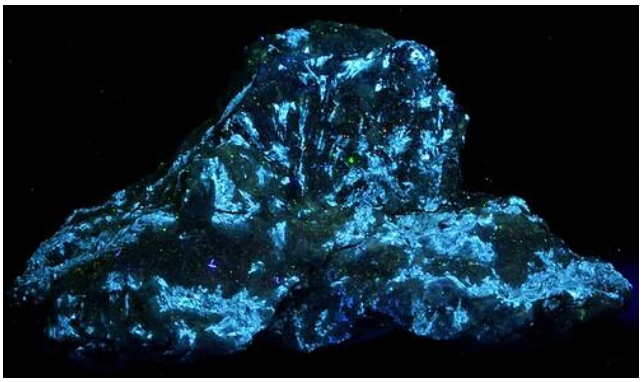
Dumortierite was also found in other places in Pershing County. Massive pinkish-lavender material occurred at Lincoln Hill. The quartz-rich sample pictured on Mindat is so large (5.5 centimeters (2.2 in)) that other specimens must have been found or may still occur there. One rock was unusual in that the dumortierite in it extends to the edges, as if it was part of a mineralized zone.

Lincoln Hill is part of the Rochester Mining District. Another Mindat photo shows a specimen from an unspecified locality in that district. The specimen has a 1-centimeter (0.4-in) band of radial sprays of pinkish-lavender to colorless dumortierite crystals in a matrix of black and yellow-green grains of unidentified minerals. This specimen looks quite different from the Lincoln Hill specimen described above.

Moving on to ***Clark County***, a beryllium-rich pegmatite yielded at least one specimen with a spray of dumortierite with thin, parallel crystals of dark blue dumortierite up to 1.7 centimeters (0.6 in) long in white microcline. Given the spotty though beryllium-rich areas in Nevada, more dumortierite occurrences are likely to be unearthed.

Arizona. Quartzsite, AZ, is best known to rockhounds for an annual show around the time of the huge Tucson mineral shows. The Quartzsite show has grown to several events, usually lower key—and with a lower price range—than what's found at Tucson, along with more lapidary material.

The Quartzite locality has minerals, including dumortierite. The occurrence is in the Dome Rock Mountains a few miles southwest of town. A photo posted on Mindat shows an unusual purple dumortierite exhibiting hairlike fibers on a micromount specimen. Other specimens from the locality show thin, fibrous, blue to purple crystals in matrix specimens that reach at least 2.5 centimeters (1 in) in size; the matrix specimens are a novelty but are unlikely to be useful for lapidary work and are unimpressive as specimens. (One posting on Mindat called the specimen "uninspiring.")



Dumortierite under shortwave ultraviolet light fluoresces blue. Dehesa, San Diego County, CA. Source: Mindat. Photo: Michael C. Roarke.

A single pinkish-purple specimen from the Granite Wash Mountains is identified as "dumortierite?" (with a question mark). A photo of the specimen shows thin, parallel crystals that fit the form of dumortierite. No additional information is given, including the specimen's size. It looks like it is at least a few centimeters long with a weathered upper surface, and it appears to be almost completely monomineralic. Where's the rock that was adjacent to it, almost assuredly the same material? There is likely more where it came from, though the precise location is a mystery.

No images of dumortierite from Clip, AZ, are posted on Mindat, but Schaller (1905) reported the mineral there. Schaller's description appears to match a specimen for sale by a French dealer, providing possible more recent confirmation of the occurrence. Schaller describes microscopic blue "prisms," presumably crystals, with quartz grains and green kyanite. The specimen shown on the dealer's website is described as "bright blue to green." The specimen examined by Schaller was found in a boulder, with the source of the rocks not ascertained.

New Mexico. The single photo of New Mexico dumortierite posted on Mindat is worth mentioning because it, like others, is probably an indication of more where it came from. There is no scale on the photo, although the rock shows radiating blades of gray-blue dumortierite that are probably more than 2.5 centimeters (1 in) in length, based on the University of New

Mexico Geology Museum mounting and label. Since the dumortierite sprays extend to the edge of the rock, adjacent rocks were probably similarly mineralized.

The location is not precise. It is given variously as Petaca, NM, and the Petaca Mining District; both are in Rio Arriba County. Pegmatites in this mining district contain rare earths, beryllium minerals like beryl and chrysoberyl, and muscovite. The latter was mined for stove windows and later for electrical uses.

Washington. An obscure dumortierite locality was reported by Schaller (1905), who stated that W.E. Ford first mentioned it. Ford gave the location as "North Fork of the Washougal River," which is now in the Gifford Pinchot National Forest. There are no towns nearby. Ford and apparently Schaller obtained samples to study. It would be interesting to rediscover the locality because dumortierite from there is unique. According to the mineralogists who saw and analyzed the samples, the dumortierite there formed "spherules;" when broken, the spherules presented radiating blue crystals. The spherules were minute, only 0.1 centimeter (0.04 in) in size, yet were sufficiently abundant to color the rock blue in small areas.

Schaller examined specimens under a microscope, possibly in thin sections, and saw that green mica replaced dumortierite. His analyses of the mica proved it to be muscovite.

Pyrite and leucoxene were plentiful in places. Leucoxene is a mixture of altered titanium-bearing minerals like rutile and anatase, although it can weather from other titanium minerals. Ford noted that the blue dumortierite sometimes occurred in a white matrix; the color contrast was "pleasing" when cut. This might make interesting lapidary material.

I could not find any images of specimens from this locality. Collecting for personal use might be allowed, although a free permit might be required.

A sample of massive dumortierite from the Dutch Miller Mine in Washington's Snoqualmie Mining District is an oddball. The locality is a copper prospect with a variety of sulfide minerals (galena, sphalerite, chalcopyrite, and so on), so the geologic setting is odd for dumortierite. Perhaps the geologic processes that formed dumortierite in the British Columbia deposit described below also formed dumortierite in the Dutch Miller prospect. The corresponding Mindat photo shows a 15-centimeter-long (6-in-long) chunk of pinkish-purple dumortierite that shows weathering and alteration in places. Since the dumortierite is massive and forms most of the specimen, it could be part of a larger zone of this material.

Schaller (1905) had samples from several U.S. dumortierite localities. His examination of them showed that feldspar was absent from material from Arizona (Clip), California (San Diego County), and Washington. His samples from these three states had accessory quartz and muscovite. In addition, samples from each state had a different accessory mineral with a shared chemical formula: kyanite (AZ); sillimanite (CA); and andalusite (WA).

Canada

Dumortierite is reported from only one site in Canada, but that large, geologically complex country is likely to have unreported localities. A large open pit copper mine on Vancouver Island, BC, produced primarily copper with associated gold, silver, molybdenum, and rhenium from 1971 to 1995. It was the lowest place on Earth for a while because much of the mine was below sea level.

Limited amounts of dumortierite occurred in the metamorphic rocks that hosted the ore. Blue to purple dumortierite was found on and in massive quartz. All the dumortierite was massive, coating some surfaces and forming veinlets in other specimens.

The mine was flooded with seawater in 1996 after mining ceased. The dumps and submarine disposal of tailings affected the biota of the inlet on which the mine was located. The people of Quatsino First Nation use the marine resources for subsistence; long-term damage caused by the mine is therefore controversial.

Brazil

When I decided to write about dumortierite, I was thinking of the lovely blue chunks I'd found myself in California. Then I saw the exquisite dumortierite crystals in quartz from Brazil. These beautiful specimens are most impressive when sprays of dumortierite crystals are frozen in colorless quartz. Some of the quartz forms euhedral crystals, with the dumortierite sprays in shades ranging from pale though bright blues.

The specimens with crystallized quartz shown on Mindat are up to 10.4 centimeters (4 in) in size, with similarly sized specimens of massive or finely crystallized coatings on quartzite matrix. An added bonus is



Clear quartz with dumortierite inclusions. Vaca Morta Quarry, Serra de Vereda, Boquira, Bahia, Brazil. Source: Mindat. Photo: Val Collins.

that dumortierite fluoresces blue under shortwave ultraviolet light. The sole source of this material seems to be the Vaca Morta Quarry northeast of Macaúbas, Bahia. (Vaca Morta means "dead cow.") The quarry exploits quartz-rich dumortierite, yielding both mineral samples and lapidary material. Micromounters might be interested in the dumortierite crystals.

Chile

Massive dumortierite mixed with quartz, possibly suitable for lapidary work, was found at La Higuera in Elqui Province. The specimens were collected at or near the small open pit El Tofo Mine.

Peru

One form of dumortierite is as fiber-thin, radial crystals. These radial sprays are like wavellite, but dumortierite sprays are blue to purple, whereas wavellite is green or yellow. Peru hosts these lovely dumortierite sprays, along with massive material that can be used for lapidary purposes. A quarry near Cucucha has produced dumortierite since Indigenous peoples controlled the area. Ancient peoples used the mineral to shape unidentified objects in and adjacent to tombs. Mindat photos show massive pieces of raw dumortierite 13 centimeters (5 in) long, suitable for lapidary use, along with sprays of radial crystals 4.7 centimeters (1.9 in) long.

France

The sole French locality for dumortierite shown on Mindat is also the type locality. The specimen shown on Mindat belonged to Gonnard, who named the mineral. It is not known whether this specimen is the holotype, the specimen used for the original description. The specimen consists of coarse quartz grains with an unidentified mineral forming grains in bands and partial bands. Schaller (1905) reported that the dumortierite occurred in pegmatite veinlets. A few wispy blue-gray dumortierite crystals radiate from small, widely spaced centers.

Another French locality, in nearby Brignais, was similar. Schaller wrote about this locality, stating that "bluish tourmaline and dumortierite have the vertical axis in common" in some cases. He also reported abundant pseudomorphs of muscovite after dumortierite. Since tourmaline and dumortierite occurred together, it would be useful to learn more about how dumortierite rather than tourmaline was determined to be the predecessor mineral.

Norway

Most Norwegian dumortierite occurs as isolated spots. An exception was collected near the Memuru Glacier on Store Memurutind, a mountain northwest of Oslo. This exception, measuring only 1 centimeter (0.4 in) in length, consisted of a lovely kyanite-blue-colored



Radiating fibrous rosettes of dumortierite. Cucucha, Canta Province, Lima, Peru. Source: Mindat. Photo: Marco Ballati.

group of translucent, terminated parallel crystals hosted in pegmatite.

Schaller (1905) reported small fibers of dumortierite in cordierite gneiss from Tvedestrand, a town in southeastern Norway. Other localities with dumortierite include the Holmen Pegmatite in Telemark and the Undeland 02 Feldspar Quarry in Agder.

Finland

One observant collector found three dumortierite specimens in a pegmatite near Luhtikylä. All three specimens are best viewed under a microscope. One photo on Mindat exhibits crystal faces, though with mostly poor terminations in the deep azure-blue dumortierite.

Poland

Schaller (1905) mentioned a dumortierite locality "near Schmiedeberg, Silesia" in eastern Germany, now the city of Kowary in Poland. He stated that green to greenish-blue fibers reached up to 5 centimeters (2 in) in length. Such long fibers suggest the likelihood of more dumortierite crystals in the area. The fibrous crystals were apparently inclusions in quartz. Crystalline sprays were also collected at the ancient Krucze Skały mine in Poland.

Austria

Dumortierite was found in small amounts at two localities in Lower Austria's Krems District. Microscopic crystals of dumortierite were collected from an altered pegmatite vein in a serpentinite quarry near Felling. Similar specimens were found at a granulite quarry near Meidling, where serpentinite also occurred. Small amounts of microscopic dumortierite locked in quartz were found at a quarry near Ebersdorf, in the Melk District of Lower Austria. The quarry extracted metamorphosed granitic rocks, with serpentinized rocks found there too.

The minerals found at these three localities, and possibly unreported at others, imply widespread metamorphism of rocks throughout the region. All of the dumortierite may have formed during the same tectonic event. A couple of blebs of poorly crystallized dumortierite in quartz were shown on Mindat from a roadcut in the Deutschlandsberg District; the geologic environment appears to be different at this locality.

Slovakia

Granular dumortierite was found with topaz, corundum, and andalusite in metamorphosed rocks near Kapka in the Carpathian Mountains. Although fist-sized samples occur there, they are not crystallized or particularly attractive.

Czech Republic

Dumortierite occurs at several sites in the Czech Republic. In Psáry, radiating sprays of purple-gray to blue-gray crystals were found on quartz-rich surfaces of meta-volcanic rocks. Matrix specimens covered with dumortierite up to 19.5 centimeters (7.7 in) in size were also found.

Microcrystals embedded in alkali feldspar occurred in pegmatite veins cutting metamorphic rocks. This locality near Horni Bory might be an active quarry, so additional specimens could be identified.

Well-formed raspberry-colored crystals were found at an abandoned quarry near Kutná Hora. One specimen of celestine-blue translucent crystals up to 0.5 centimeter (0.2 in) in size, including at least one terminated crystal, was recovered at a site near Miskovice. The quarry at this location now appears to be entirely grassed over on a Mindat photo. Single specimens with only small blebs of subhedral, poorly crystallized dumortierite were found in pegmatites from other localities.

Schaller (1905) reported dumortierite in decomposed host rocks (probably pegmatites) from "Iinligan, near Chodan, and Schobrowitz, near Carlsbad, in Bohemia, and in clayey sandstone at Oberbris, near Pilsen, in Bohemia." Bohemia, part of Germany when Schaller was writing, is now in the Czech Republic. Pilsen is now Plzeň, Schobrowitz is Všeborovice, and Carlsbad is Karlovy Vary.

Italy

Micromount collectors in Italy seem to be an unusually observant group. Most of the minerals I've researched for these articles have photos of microscopic Italian specimens posted on Mindat, and dumortierite is no exception.

Italian dumortierite is not particularly attractive. It has been reported from several localities, although only specimens from Sondolo in Lombardy are macroscopic and large enough to show their deep azure color and cleavage or parting. These crystal fragments grew to at least 1.6 centimeters (0.6 in) in size.

Pegmatites often occur in regional clusters that geologists call fields or swarms. Near the town of Cuzzago in the Piedmont region, a field of pegmatite veins hosts dumortierite, sillimanite, and rutile, along with the rare earth minerals monazite-(Ce) and the allanite group. A lone dumortierite specimen from the pegmatite field is pictured on Mindat, but it is an interesting one. Curved narrow but distinct, red-purple crystals cross the 9-centimeter (3.5-in) pegmatite matrix in bands. The crystals appear to be fractured. Folding after their formation probably contorted them.

Mozambique

Dumortierite occurs in two forms in two places in Mozambique. At Mazowe, lovely massive blue specimens were collected. Chunks shown on Mindat range up to 10.4 centimeters (4 in) in size, well-suited for lapidary use. At Cabora Bassa Dam, beautiful radial sprays of dumortierite were found. The crystals are less than 0.4 centimeter (0.16 in) across and look like tiny asters.

Madagascar

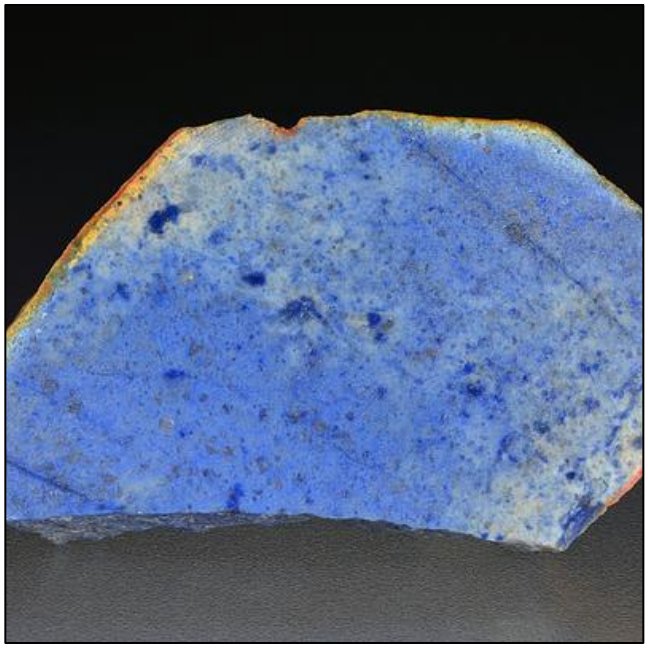
A field of pegmatites occurs south and east of the Madagascar city of Antsirabe. Several of these Malagasy pegmatites have produced dumortierite. In the Sahatany Pegmatite Field, fibrous dumortierite was collected from the Ibity Massif. At an unspecified locality in the Sahatany Pegmatite Field, dark blue euhedral dumortierite crystals encased in white quartz extend to at least 3 centimeters (1.2 in) in specimens reaching 7 centimeters (2.6 in) in size.

Massive dumortierite has been found in the Mangatabohangy area of the Amoron'i Mania region. One 8.5-centimeter (3.3-in) bright blue specimen shown on Mindat appears to exhibit either poorly crystallized fibers or slickensides.

Botswana

Two interesting dumortierite specimens from Botswana are shown on Mindat, but where the specimens originated is unclear. The likely locality is somewhere in the Tsodilo Hills near the Namibian border. In fact, one of the specimens was labeled as coming from Namibia, although the caption states that it is probably from the Tsodilo Hills. The other specimen is definitely from the Tsodilo Hills.

Both specimens feature bowtie sprays of lovely blue macroscopic dumortierite crystals on matrix but not encased in it. One caption notes the matrix as quartzite.



Polished slice of dumortierite. Mazowe, Changara District, Tete Province, Madagascar. Source: Mindat. Photo: Bruce Cairncross.

The Tsodilo Hills are a UNESCO World Heritage Site due to their rock art and spiritual significance to the local people, so mineral collecting is probably not permitted.

Namibia

Fine, massive blue dumortierite has been found on a farm on the northern edge of Namibia's Erongo Mountains. The dumortierite looks suitable for lapidary purposes. Since aquamarine and topaz are also reported from the site, the geologic setting is probably one or more pegmatites.

Other Countries

Schaller (1905, p. 94) reported minor amounts of dumortierite in Argentina. Other countries with reported dumortierite localities include Germany (Ratsteinbruch in Saxony); Japan (the Tsukigata Mine in Koriyama City and Hime River in Itoigawa City); Scotland (Bishopton Tunnel in Renfrewshire); South Africa (N'Rougas Suid Farm in Northern Cape); Sweden (Svaniträsk in Norbotten County); and Sri Lanka. Massive dumortierite or coatings were found at most of these localities.

The Sri Lanka occurrence was described in an academic paper, although the specimens are solely of research interest. The dumortierite was hosted in a pegmatite.

Rims of a teal-colored fibrous mineral surrounding a white mineral are being offered for sale as dumortierite from Sumatra, Indonesia. Other than commercial websites, I could not readily find any information on dumortierite in Indonesia.

Uses

Dumortierite can be used to make high-temperature ceramics, such as ovenware, spark plugs, and possible items used in space technology. However, dumortierite doesn't occur in quantities that are economic to mine. The Champion Mine in Nevada was the only known mine opened specifically for dumortierite. It produced dumortierite, but not in sufficient quantities to sustain full-time operations.

The mineral is now used for lapidary purposes—and is enjoyed by mineral collectors too.

Gems

Dumortierite is a lovely blue gemstone. Because the mineral is relatively hard, it can stand being worn as jewelry. It is usually fashioned into opaque cabochons and beads. As a faceted stone, dumortierite can resemble tanzanite, although dumortierite is harder; less often, it can resemble sapphire, even though dumortierite is softer.

Occasionally, dumortierite can be worked into more unique gems. Colorless clear quartz with included dumortierite crystals from Brazil makes attractive faceted or cabbed stones. A stunning teardrop-shaped, transparent deep blue dumortierite is shown on Mindat (see upper right). Other faceted stones can sometimes be found—and purchased—online.

Madagascar seems to be the source for all faceted dumortierite.

Prices (2025)

Most dumortierite is sold as polished material in the form of eggs, cabochons, and jewelry. (I found all prices online on July 31, 2025.) Polished 10-centimeter (4-inch) free-standing pieces from Madagascar cost about $40 on one website, with cabochons costing more than $50. A 2.5-centimeter (1-inch) mineral specimen of blue dumortierite fibers with quartz from



Dumortierite gemstone. Itremo Massif, Ambatofinandrahana District, Amoron'i Mania Madagascar. Source: Mindat. Photo: Dr. Wing Tak Lui.

Brazil cost only $29, though to me it was not an attractive specimen. Another site offered dumortierite keepsake boxes at $75 and up, along with animals painted onto dumortierite cabs for less than $10 and sports-themed dumortierite key chains for less than $5.

All of the crystals of dumortierite in quartz are small. A specimen of dumortierite in quartz from Brazil was offered on eBay for $10; its size (less than 1 centimeter (0.4 in)) may appeal to thumbnail collectors. A very attractive specimen of dumortierite crystals in a clear quartz crystal (from Brazil, of course) was offered for sale at $40; it is 0.9 centimeters (0.4 in) in size—gorgeous, if small. Another specimen was listed for $92; it's a nice complete quartz crystal, 5.4 centimeters (2.5 in) high, with blue included dumortierite. I couldn't determine the quality of the dumortierite or quartz form the online images.

Collectors interested in buying dumortierite crystal specimens should be careful to note the size of the specimen. I can report my own experiences of purchasing specimens based on lovely photos and then finding them much, much smaller than I'd expected. They were accurately described by the sellers but magnified in the beautiful marketing photos.

More options can be found on the Brazilian Google site, for example eBay in Brazil. Major high-end U.S. dealers occasionally offer dumortierite for sale, but I



Clear quartz crystals coated with acicular needles of dumortierite. Vaca Morta Quarry, Serra de Vereda, Boquira, Bahia, Brazil.
Source: Mindat. Photo: Demetrius Pohl.

couldn't find any that were available as of August 1, 2025.

Many online sites are selling various dumortierite objects, with or without quartz, for the supposed metaphysical properties of dumortierite. I try to stick to science in these columns, so I'll leave the metaphysics to others. Heck, I had enough trouble with regular physics!

Technical Details

Chemical formula..... $AlAl_6BSi_3O_{18}$ (International Mineralogical Association; $Al(Al_2O)(Al_2O)_2(SiO_4)_3(BO_3)$ (Mindat)

Crystal form..... Orthorhombic

Hardness..... 7-8

Specific gravity..... 3.21-3.41

Color ..... Colorless, blue, bluish-green. lavender

Streak ..... White

Cleavage..... 1 perfect, 2 imperfect

Luster ..... Vitreous, matte (dull)

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President's Message

by Jason Zeibel

And just like that, another summer season has come and gone. In theory, summer is the time when things slow down and kids relax at the pool, spending carefree days playing with friends and family. In our household, we turned the game up a bit as we jumped from whitewater rafting, to sailing in the Florida Keys, to time on North Carolina's Outer Banks, to Scout summer camp in Maryland, to band camp in the Shenandoah Valley. Throw in an economics class, a woodworking class on working with epoxy resin, and an Eagle Scout project, and it made for quite a summer!

Now we are just days away from the start of school, when the cadence of events quickens. So I hope that everyone in the club had a wonderful summer, found some new treasures, and is recharged for a rapid sprint through the remainder of 2025!

If you recall all the way back in June, we had a wonderful presentation on trilobites by our own Casper Voogt. Casper took us through the long history of trilobites, how to differentiate them, and where their fossils can be found today. Then we had an amazing opportunity to collect trilobite fossils that weekend (see the article on page 16); such opportunities are one of the real benefits of our club. A big thank you to Casper and to our field trip chairs, Katy and Mickey Johnson. If you missed that one, you can still make one of our upcoming field trips!

To start the summer, our family went with the girls' Scout troop on a whitewater rafting trip on the New River in West Virginia. I have been amused by the name New River ever since learning as a kid that it is one of the world's oldest rivers, having flowed through the Appalachian Mountains for at least 65 million years. Many geologists and a USGS survey actually estimate that the New River formed closer to 300 million years ago based on the age of the underlying rock and plate tectonics, dating to the Alleghanian Orogeny and formation of the supercontinent Pangaea.

The New River cut its bed at a time when the land sloped to the northwest. As the Appalachians gradually rose around the river, the New River wore away the bedrock at the same rate as the mountains formed, leaving behind towering cliffs and prominences that



The Zeibel family (left) whitewater rafting on the New River with the girls' Scout troop. All photos: Jason Zeibel.

now hover hundreds of feet above the river. At Narrows, VA, the New River Gorge is nearly 1,500 feet deep, separating East River Mountain from Peters Mountain.

The New River runs from the Appalachian highlands in North Carolina through the eastern side of the Appalachian Plateau in Virginia and West Virginia before joining the Kanawha River near Charleston, WV. It is unusual in that it flows poleward rather than southeasterly (like most rivers in our area), traveling from south to north in the region. In the geologic past, the New River was much longer, and the river we have today is a remnant. Geologists call the original longer river the Teays. The last advance of Pleistocene continental ice buried most of the river. As the glaciers retreated, the waters of the New River were diverted into the present-day Ohio and Kanawha Rivers, both created by glaciers.

The origin of the name for the New River is uncertain. Mountain legend suggests that the name came from the local indigenous people, who referred to the water in the river as "new waters" due to their purity and potability. Another story tells of Captain Byrd, who was

hired to build a road from the James River to Abingdon, VA, in 1764. Byrd used a 1755 map created by Joshua Fry and Peter Jefferson (father of Thomas Jefferson), which did not show the river, so Byrd noted it as the "New River."

Either way, the New River Gorge is quite an amazing place, containing one of America's newest (pun intended) national parks, so designated in 2020. The park is very popular with outdoor adventure seekers for rock climbing, hiking, bungee jumping, and, of course, whitewater rafting!

I'm still hoping to have some of our younger members take advantage of the club's educational travel offer! Any member currently enrolled in an educational program (from elementary school through graduate work) can apply for a grant of up to $400 towards travel and/or registration for a national-level geology seminar or show, such as Wildacres or the annual Tucson show. Anyone interested in applying should write a paragraph on why they want to go and submit it to the club officers. If approved, the student would give a presentation to the club on their experience at the event. This is a great opportunity to help students defray the costs of one of our hobby's best experiences.

Our family hosted the annual club picnic again this year in early August. It was an unusually nice day with relatively low humidity, and over 30 people showed up. In addition to some delicious burgers and hotdogs cooked by yours truly, there was a generous buffet of offerings brought by club members. (A special shoutout to the yummy alfajores!)

On the mineral side, we had two tents with lots of minerals free for the taking, as well as some swapping and sales. I think everyone left happy with new treasures and a full belly. A few club members even enjoyed a nice swim.

I continue to encourage volunteering for club officer positions for 2026. Please give it serious consideration. As the club grows, we must try to spread out club duties among club members. Please come talk to me or send me an email if you are at all interested in becoming an elected club officer (president, vice president, secretary, or treasurer) or having a support position for 2026. Elections are coming up in December!

A few business items of note. The September meeting will be Zoom only! It is on Labor Day evening and our meeting location is not available that day, so do not show up at the Dunn Loring Fire Station on Labor Day. I will send an email out with the Zoom link a few days before the meeting. If you don't get it, send me a note at president@novamineralclub.org.





Club members enjoying the food and drinks at our annual club picnic in August, hosted again this year by the Zeibel family.

That doesn't mean that we won't have a fun and interesting meeting! You can look forward to a couple of our younger folks talking about topics in geology they find interesting. We will also open it up for a "what interesting hobby-related things did you do this summer?" and a Rock-n-Talk show-and-tell. Finally, we will have an initial discussion about the upcoming November club show. There will be some changes this year, and we want to make sure everyone is tracking.



Rocks, fossils, and minerals on display and available for free or for swapping at our annual club picnic in August, hosted by the Zeibel family.

We will definitely be back in person for the October meeting, which will feature our semiannual NVMC club auction, so start gathering any specimens that you are ready to offer up to other club members.

In the meantime, get outside and enjoy the last few weeks of heat and humidity while looking at our dynamic local geology! You could even think about a late-season trip down the old "New River"!

Jason

Youth Presentations
September Program

Our club meeting on **September 1** will be remote (by Zoom) because it will be Labor Day and our normal meeting place won't be available. Please join us on Zoom! President Jason Zeibel will send an invitation.

Some of our younger club members will give short presentations. In her discussion of the geologic time periods of Mars, Celia Zeibel 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. Another presenter will be Linus Koepcke: "Beyond the Seven Crystal Systems."

During Rock-n-Talk, folks will have an opportunity to share finds and adventures related to our hobby over the summer. We will also catch up on summer field trips and the club picnic in August.

In addition, we will discuss our upcoming gem, mineral, and fossil show on November 22-23. We had a successful show last year, so let's build on what we learned. Show Chair Tom Taaffe will lead the discussion; see his article on page 17. We will need volunteers to play the various roles required for a successful show.





Scenes from our NVMC summer picnic at the Zeibel family home in August. Photos: Jason Zeibel.



Club Meeting Summary
June 2

by Almas Eftekhari, Secretary

President Jason Zeibel opened the meeting by asking visitors to introduce themselves. After introductions, he thanked a generous donor for dropping off some specimens for the club.

Jason noted that Casper Voogt would be leading a club field trip on Saturday, June 7, to collect trilobite fossils in West Virginia. He also announced that our traditional summer club picnic will be on August 10 this year. Jason asked folks to bring lots of specimens for a rock swap, adding that he would send out an email with details about the rock swap and about food and relaxing with friends by the pool.

Jason reminded everyone that the club is now sponsoring scholarships for those in school, from kindergarten through graduate school. Folks can apply for a $400 stipend to travel to any hobby-related event. In exchange, they will give a presentation to the club on their experiences.

A club hoodie will be soon for sale to club members. The design will hopefully debut in August at the club picnic, with hoodies for sale by the October club meeting. Also, another name tag ordering opportunity will be coming soon if you haven't gotten one already.

Jason reminded folks that elections for club officers (president, vice president, secretary, and treasurer) will be coming up at the December club meeting. Please be thinking about possibly serving as a club officer.

Jason gave a shoutout to Jake Broughton for serving as our new AV coordinator and to Tom Taaffe, our longtime club show chair. Jason reminded folks to save the weekend before Thanksgiving to help out with our annual club show (see the article on page 17 for details).

Field Trip Co-Coordinator Katy Johnson announced that the field trip this weekend is at capacity due to limited parking but that folks could still be added to the wait list. The next field trip will be on July 25-26 to the Smithfield Mine and Franklin Museum in New Jersey, the fluorite capital of the world.

We are also planning a geology walk along Holmes Run in Alexandria, where we hope to find exposures of both igneous and metamorphic bedrock. The timing will depend on the availability of field trip leaders.

In September or October, we will join the Lynchburg club for another trip to Willis Mountain in Virginia to collect kyanite. Katy is also trying to get to a place we haven't been to before for one more trip before the end of the year.

Jason thanked Katy and Mickey for being such great field trip coordinators for the club. Vice President Craig Moore added his thanks to them both for leading the recent field trip to the National Limestone Quarry in Pennsylvania.

Craig introduced our speaker Casper Voogt, who serves our club (and others as well) as webmaster. Casper is also a mineral dealer who routinely has tables at our annual club show. He has been a great resource for the club by telling us about exotic and exciting collecting localities he's visited around the world.

Casper delivered a presentation on trilobites, explaining their importance to geology and paleontology. For example, trilobite fossils are used for dating their matrix materials; and trilobites in New York are identical to ones in Morocco, proving that the continents were once linked.

Casper passed around a specimen from the Devonian Period (about 420-359 million years ago), and he went over the anatomical differences among the species. He discussed different kinds of trilobite eyes and how they have inspired technology used today ("trilobite eye technology"). Trilobites can get up to 30 inches long—Casper saw one that big in Portugal. He showed slides of specimens he's found, especially near Capo Bridge, WV.

After Casper's talk, Jason invited a fossil show-and-tell, with Casper sticking around to help people identify their specimens. Jason reminded us that if we have specimens we don't want, we can bring them to the club auction coming up in the fall—or donate them to the club for door prizes.

Jason also reminded everyone about summer break, with no meetings in July and August. In addition, we won't have our in-person meeting place on Labor Day in September, so we will have a Zoom-only meeting that day. We expect to have junior presenters at September's meeting.

If you're coming to the picnic at Jason's house in September, wait for his email to get the details, including his address.

Trilobite Hunting in West Virginia

by Mickey Johnson, Field Trip Co-Coordinator
(photos by Katy Johnson and Craig Moore)

On June 8, our club went to a wonderful site in West Virginia where rain had recently washed out the precious fossils that we came to look for. The leader of our trip, fossil expert Casper Voogt, helped us identify the trilobites we found.

This fossil site, home to the wonderful trilobites, was located on a hill that was once the floor of an ocean where many creatures lived, died, and produced fossils.

The calcified trilobites we found were mostly incomplete but still produced amazing shiny black display pieces for our collections. Overall, we had an amazing experience, and everyone went home happy with full buckets.

















Club Show Coming Up!

November 22-23, 2025

by Tom Taaffe, Show Chair

The NVMC is holding our 33rd Annual Gem, Mineral, and Fossil Show this fall at George Mason University (GMU) in Fairfax, VA. The show will be on November 22-23 and take place in Dewberry Hall, Johnson Center Building, on GMU's Fairfax campus. This event has ongoing sponsorship by GMU's Department of Atmospheric, Oceanic and Earth Sciences; we introduce a new GMU liaison in the person of Dr. Jules Goldspiel, an assistant professor in the department.

Show hours will be from 10 a.m. to 6 p.m. on Saturday, November 22, and from 10 a.m. to 4 p.m. on Sunday, November 23. Admission will be $6 for adults, $4 for seniors (65-plus years old), and $3 for teens (13-17 years old). Admission is free for children 12 and under who are accompanied by a parent. Admission is free for GMU students, faculty, and staff with ID. Scouts in uniform get free admission as well.

Show volunteers needed!!

Staffing the Show

We expect to use **Signup Genius** to recruit volunteers and assign show tasks. Please be on the lookout for that sometime in September. What follows are ways that NVMC members can help with this year's show.

First, we need club volunteers to help with **Friday night setup** on November 21. It starts with volunteers bringing items from the club's storage unit to GMU's Johnson Center. Volunteers help set up the Kids' Activity Room and perform other tasks, such as helping build exhibit cases. Volunteers are also needed to put directional signs around campus to point showgoers to designated show parking in GMU's Lot A. Other volunteers help dealers at the loading dock unload their goods, a process that needs to go smoothly.

You can also volunteer to help during actual show hours on **Saturday and Sunday**. For example, we always need volunteers for the **Kids' Activity Room**. This job entails administering quizzes and rock-related puzzles, and awarding free specimens to kids who earn them. It also includes fielding questions and helping with mineral and fossil identification. The Kids' Activity Room can get a little crazy at times, but it's lots of fun and very worthwhile. Feel free to contact John Weidner at jfweidner@gmail.com if you have questions.





Scenes from our annual club show in November 2023. All photos: Tom Taaffe.

We always need volunteer help at the **admissions table**. If several club members take a shift or two, it makes the process less chaotic and more efficient. If you are interested in helping, please contact Roger Haskins at treasurer@novamineral.club to let him know.

When the show ends on Sunday, we will need volunteers to help with **teardown**. We need volunteers to help pack up the Kids' Activity Room and gather all



Door prizes at our annual club show in November 2023.

the club equipment and gear. This includes disassembling exhibit cases and club banners and retrieving campus directional signs. We will need many helping hands and more than one vehicle to bring it all back to our nearby storage unit.

Donating Specimens for Kids

You can further contribute to the show by donating mineral and fossil specimens for our kids' mines in the Kids' Activity Room. The specimens should be suitable for children, nothing too big or small (1-3 inches in size and about 1-4 ounces in weight). The specimens should be somewhat interesting and somewhat attractive and hopefully have some educational value. No junk please.

Donated specimens should not be toxic, sharp, splintery, or otherwise dangerous. They would also be best in their natural unpolished state. Specimens from nearby localities are great choices, such as prehnite, amazonite, amethyst, and garnet.

Specimens for Door Prizes/Silent Auction

We typically announce and award door prizes to both kids and adults every hour of the show on Saturday and twice more early on Sunday morning. (Door prize drawings end after Sunday's Silent Auction begins.) We depend on club member contributions for both door prizes and the Silent Auction.

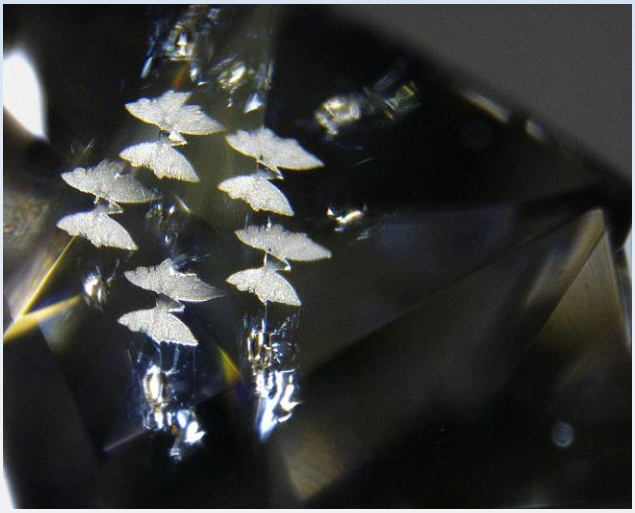
If you have specimens to donate that are suitable for either purpose, please bring them to an in-person club meeting (at the Dunn Loring Fire Station) and hand them directly to a club officer. If that is impractical, please contact one of the two club members who will be organizing the Silent Auction and door prizes, Craig Moore at crrocks77@icloud.com or Jeff Guerber at jeff@guerber.net. You can also contact Show Chair Tom Taaffe at rockcllctr@gmail.com.

Exhibit Cases

Club President Jason Zeibel is hoping that our 2025 show can accommodate a few more exhibits. If you are interested in designing and providing an exhibit, please contact Jason at jzeibel@gmail.com or Tom Taaffe at rockcllctr@gmail.com and let us know of your interest and what your subject matter would be.

Gemological Institute of America

The Gemological Institute of America (GIA) has many resources for mineral collectors, lapidarists, and rockhounds—a wealth of free information you can use. You can start by perusing the GIA's free online quarterly newsletters or by going to its large public Facebook site, which you are welcome to join. The GIA also offers classes (for a fee) and has an online store that sells books and beautiful posters.



"Butterfly" inclusions in a diamond. Source: GIA, Gems & Gemology (61(1)); photo: Yash Jhaveri and Bijal Shah ©GIA.

Minerals and Type Localities: What Countries Have the Most?

In June of this year, the Mineralogical Society of the District of Columbia (thank you, John Weidner!) circulated the latest newsletter from a Pennsylvania-based organization called the Leidy Microscopical Society. The missive included lists of mineral types and type localities compiled by the society's president, Eric Brosius. He made the lists based on Mindat information, in turn based on official type locality designations by the International Mineral Association's Commission on New Minerals and Mineral Names.

The commission has been designating new minerals since 1987. Many familiar minerals going back to antiquity are not listed for type locality: quartz and feldspar, for example, have no type localities, nor do diamond, corundum, topaz, and many other minerals.

Nevertheless, for what it's worth, here are some of the results. (Note that the United States is in the top two in both categories.)

Valid Type Localities: Top 10 Countries

1. Russia (943)
2. United States (933)
3. Germany (411)
4. Italy (404)
5. Canada (266)
6. China (212)
7. Australia (194)
8. Japan (164)
9. Czech Republic (159)
10. Chile (153)

Valid Minerals: Top 10 Countries

1. United States (2,868)
2. Russia (2,787)
3. Germany (1,971)
4. Italy (1,905)
5. Canada (1,764)
6. Australia (1,566)
7. China (1,548)
8. Japan (1,438)
9. Czech Republic (1,426)
10. France (1,403)

Save the Date

Desautels Micromount Symposium

The Baltimore Mineral Society

69th Paul Desautels Memorial Micromount Symposium

October 17-19, 2025

Natural History Society of Maryland, 6908 Belair Rd, Baltimore, MD 21206

Friday, October 17

7 p.m. Registration, coffee, and treats

8 p.m. Fellowship with other micromounters and informal programs given by participants

Short talks and slide shows to be announced

Saturday, October 18

9 a.m. Symposium opens: trading, giveaway tables, mineral sales

10 a.m. Silent auction

12 noon Light lunch (provided)

2 p.m. Voice auction

3 p.m. **Micromounters' Hall of Fame induction**

Conducted by Quintin Wight, Ron Gibbs, and Dr. David Roe

Announcement of next year's honorees

Favorite Minerals from 50 Years of Collecting

Presented by Ron Gibbs

5 p.m. Dinner (at local restaurants on your own)

7:30 p.m. **Mineral Rings: A Personal Fascination**

Presented by Frank Ruehlicke

Sunday, October 19

9 a.m. Trading, giveaways, conversation

11 a.m. **Backyard Tales of Discovery: The Pursuit of Microminerals Across Devon, which Revealed 500 Years of Chemistry**

Presented by Dr. David Roe

12 noon Symposium concludes

Wildacres in May 2025: Workshop Report

by Helen Serras-Herman, EFMLS Wildacres Committee Chair

Editor's note: *The biannual EFMLS Wildacres workshops in the Blue Ridge Mountains of North Carolina are opportunities for fun and learning in a lovely and lively setting. This report from last May, abridged and adapted, is taken from* EFMLS News *(June 2025), pp. 4-8.*

We had a very successful EFMLS Wildacres workshop on May 12-18. Forty-seven people participated, including 12 staff and 35 students, the most in recent years. We mailed registration packets to participants 3 weeks in advance with directions to Wildacres and the agenda for each day.

Arriving at Wildacres

We arrived on Monday afternoon in pouring rain and a heavy fog after detouring around a road closure on the Blue Ridge Parkway. Along the way, we saw devastation from last year's floods in the wake of Hurricane Helene, including eroded roads, damaged homes, and many fallen trees.

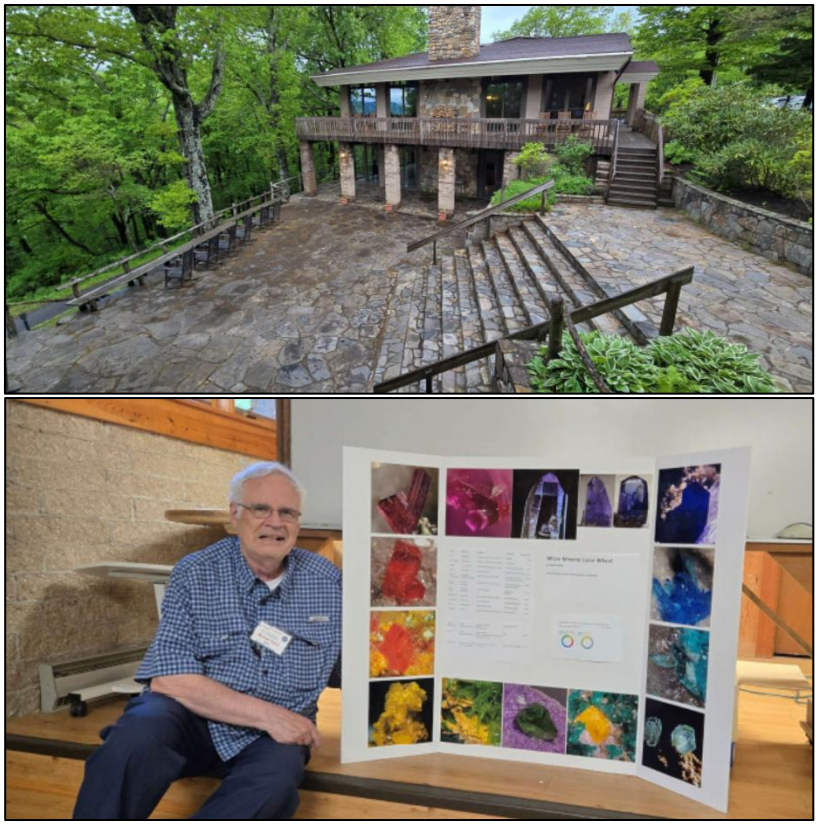
Registration went smoothly from 3 to 5:30 p.m. Everyone went to dinner and then to the auditorium for the orientation presentation. Despite some lingering flood-related issues with water pipes and running water, we made do all week long.

Classes and Presentations

Classes started on Tuesday morning right after breakfast. Our instructors included Richard Meszler (silversmithing), Bernie Emery (faceting), Rick Marshall (cabbing), Jacolyn Campbell (wire-wrapping), Susan Brooks (precious metal clay silver), Jim Hird (chainmaille), and Michael Pabst (photography).

Our busy day continued after dinner with a presentation by speaker-in-residence Martin Fuller, a well-known and highly respected gemologist and appraiser. Everyone loved Marty's six talks during the week; we appreciated his personality and his deep knowledge. Marty's presentations included behind-the-scenes appraisals of famous clients' jewelry, never before seen by the public.

Marty was accompanied by his wife Colette, and both blended in with many of the teachers and students. Marty set the speaker-in-residence bar very high!



Michael Pabst teaching a course on mineral photography at Wildacres (top) last May.

On Wednesday, we continued with two presentations by Marty—one in the morning about his recent trips to the Three Peaks Amethyst Mine in Arizona and his opal mine trips to Australia and one in the evening about the Hillwood Estate and the Merriweather Post jewelry collection. We also had classes.

Emerald Village and Mine Visit

Thursday was a "free day" when people could relax, continue working if their instructor was available, drive out on their own, or join a field trip. Due to the lingering flood effects, including fallen trees, we did not have the option of a rockhounding field trip.

Instead, we had a museum-and-mine tour of the North Carolina Mining Museum and Bon Ami Mine at Emerald Village. We had 20 participants, which gave us a group rate for a bucket to sluice. Mine owner Alan Schabillion gave us a guided tour, sharing his mine origin stories, and we all enjoyed the mineral specimens on exhibit inside the museum. Then Alan's grandson led us down to the historic Bon Ami Mine while relating the history of the mine.



Mine owner's grandson holding a huge slab of mica.

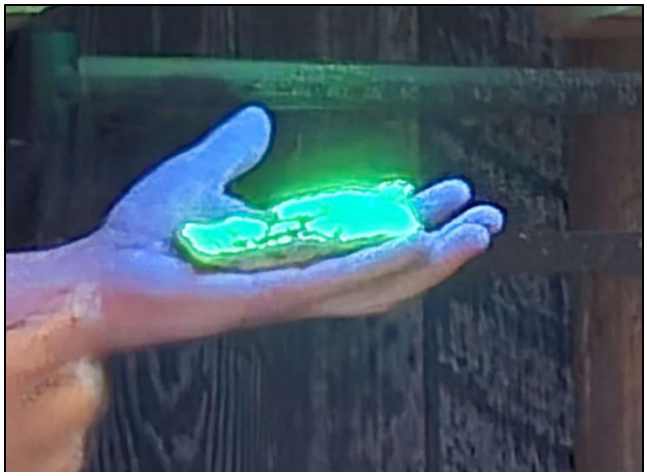
After the tour, we headed down to a second museum and the mine flume, where we sat down and sluiced the bucket of rocks (salted) that came with our museum admission. Native buckets are also available; we sluiced some during last year's mine visit.

Everyone enjoyed our museum and mine visit and learning some of the local history. We were also able to help the local mine, a gesture that was much appreciated by the mine owners after last year's flooding and this spring's wildfire calamities.

Tailgate and Future Changes

Our annual tailgate session was held as usual on Thursday afternoon; this year, it was from 1 to 4 p.m. Several people set up outside by their cars, while a number of us set up inside in the classrooms.

After the tailgate, the EFMLS Wildacres Committee met before dinner. We made several changes to the future Wildacres curriculum, including holding only 4-day classes (eliminating the 2-day classes) and holding no fall session at all next year.



Fluorescent hyalite opal at Emerald Village.

Friday Night Auction

Our annual Wildacres auction was held on Friday evening after dinner. All week long I kept promoting the auction, inspiring people to bring "good stuff" and bid high, explaining that all proceeds go towards the Wildacres Workshop Committee budget.

This year, we had a total of 162 items up for auction. Our speaker-in-residence and his wife Colette donated a number of amazing Mikimoto pearls that brought in a lot of money, and there were also many other good donations.

We enjoyed a fun night, laughing about auctioning an empty Excedrin bottle or a coon (raccoon) recipe, both for over $100—and about many people holding up their paddles and outbidding themselves! We collected a total of $8,500, bringing our Wildacres session into the black for the first time in several years.

Saturday Evening Show-and-Tell

Our week wrapped up with our Saturday evening show-and-tell. All the wonderful projects and pieces created were on display on tables for everyone to admire. Members of each class spoke about their experiences, proud of their accomplishments. At the end of the evening, we gathered at the canteen with our snacks and drinks and enjoyed our last night together.

Our amazing week wrapped up after the last breakfast on Sunday morning. Everyone had to be out of the rooms by 9 a.m. and getting on the road. You can find out more at EFLMS Wildacres.

The Rocks Beneath Our Feet

Columnar Metabasalt in the Blue Ridge

by Hutch Brown

Editor's note: *This is an updated version of an article in the January 2021 issue of* The Mineral Newsletter.

Several summers ago, I took a hike with my family in the Blue Ridge Mountains near the northern entrance to Skyline Drive in Shenandoah National Park. We started at a roadside parking lot on the eastern side of the Blue Ridge and took the Appalachian Trail, climbing a mile or two up to the divide over to the western side (overlooking Shenandoah Valley).

Our destination was a distinctive geologic formation (fig. 1): a little-known exposure of metamorphosed columnar basalt near a Blue Ridge summit called Compton Peak. The metamorphosed basalt is known as Catoctin greenstone—"Catoctin" for the Maryland ridge where the rock type was first described and "greenstone" for the greenish-gray color of the rock.

The rocks in our area are generally very old; some (such as Old Rag granite in the Blue Ridge) are more than a billion years in age. Rocks that old have usually been through multiple mountain-building events. Compressed, fractured, folded, and metamorphosed, they often bear little semblance to their original appearance.

The Compton Peak exposure is a remarkable exception. Unlike most Catoctin greenstone in our area, the Compton metamorphic rock retains some of the unique features of its basaltic parent rock.

How did that parent rock come about? And how does it fit into the geologic history of the Blue Ridge?

Building Blocks of the Blue Ridge

Like most geologic formations in our area, the Blue Ridge Province trends from northeast to southwest (fig. 2). The province is about 20 miles wide, with ridges on both sides. In Virginia, the western ridge forms the line of the Blue Ridge Mountains; the eastern side has much lower ridges with names like Bull Run Mountain and (in Maryland) Catoctin Mountain. In between is eroded granitic rock forming low hills.

The Blue Ridge rock types vary in appearance, location, and geology. Compton Peak is on the northwestern edge of the province (fig. 2, white star), where much of the bedrock is Catoctin greenstone overlying granitic rock. The greenstone is metamorphic rock that is igneous in origin and very fine-grained.



Figure 1—*Columnar metabasalt at Compton Peak, Blue Ridge Mountains. Source: Bentley (2011); photo: Tom Johnson.*

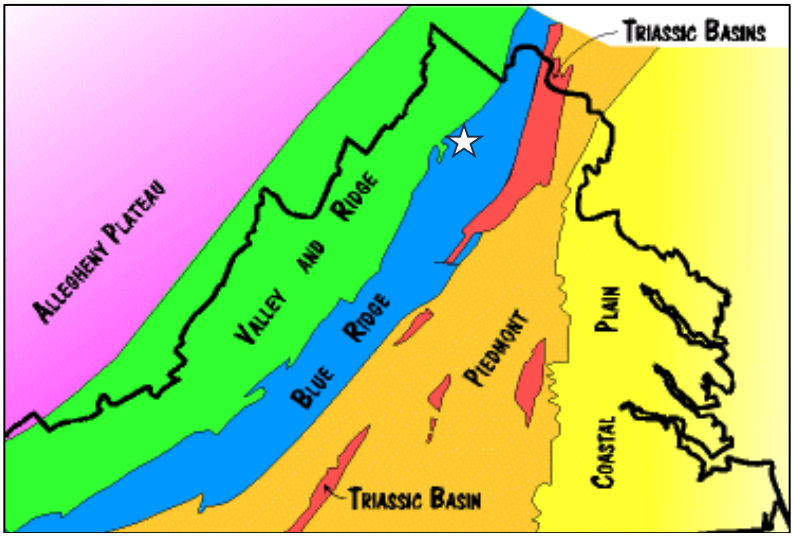


Figure 2—*Geologic provinces in Virginia. The white star shows the approximate location of the outcrop of columnar basalt. Source: Fichter and Baedke (1999).*

Geologists trace the geologic origins of our area to ancient mountain-building events known collectively as the Grenville Orogeny. Beginning about 1.3 billion

years ago, proto-North America collided with other continents to form the supercontinent Rodinia. The Grenville granitoids still underlie much of our area.

About 700 million years ago, the continental crust began to stretch and thin as the subcontinents pulled apart, forming rifts in the suture zones between them (fig. 3). Rising magma formed a "hotspot" under the weakest part of the thinning crust, with rifting on both sides.

From about 690 to 570 million years ago, great volcanoes spewed huge quantities of ash over large areas. Lithified, the ash is visible today as metarhyolite across parts of western Virginia, forming much of the bedrock near Mount Rodgers, the highest peak (at 5,729 feet) in the Blue Ridge. The upwelling magma also poured lava across enormous areas; the molten rock cooled into layers of basalt up to 2,000 feet thick.

Rifting sent great blocks of rock sliding down faults, forming ridges and valleys that filled with basalt, volcanic ash, and eroding sediments. The rifting bedrock gradually formed a trench that filled with seawater (fig. 3), the beginnings of the Iapetus Ocean (precursor of the Atlantic).

As the continents spread apart and the Iapetus Ocean grew, the basalts were covered by marine sands and muds that hardened into alternating layers of sandstone and siltstone—the origins of the quartzites and phyllites in what geologists call the Chilhowee Group. By about 500 million years ago, the Iapetus Ocean had fully formed.

Mountain Building

Tectonic calm followed until about 474 million years ago, when a volcanic island arc known as the Taconian (or Taconic) Terrane slammed into proto-North America, followed about 50 million years later by a second terrane, called the Acadian. Each collision formed a mountain chain that weathered away within a few tens of millions of years, leaving the terrane sutured onto the continent and forming the roots of our Piedmont and Coastal Plain geologic provinces.

About 320 million years ago, the Iapetus Ocean closed as proto-Africa (part of a larger continent that geologists call Gondwana) collided with proto-North America (fig. 4), contributing to the formation of the supercontinent Pangaea. The dipping subduction zone acted as a ramp, allowing proto-Africa to slide up over proto-North America. No one knows how far inland it went,

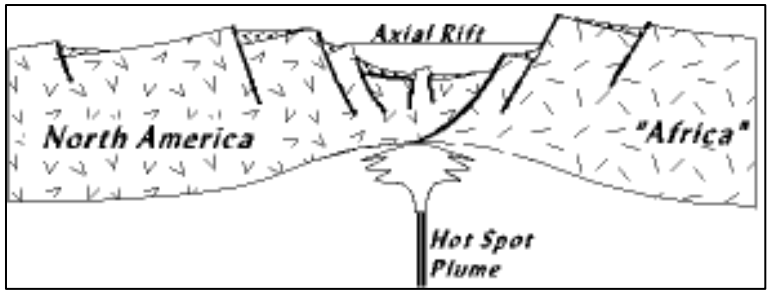


Figure 3—*Breakup of Rodinia about 700-570 million years ago, with proto-Africa splitting away from proto-North America. Magma rises as the crust domes and thins, forming a hotspot and erupting with lava flows. The sinking central bedrock is covered by seawater as an ocean forms. Source: Fichter and Baedke (1999).*

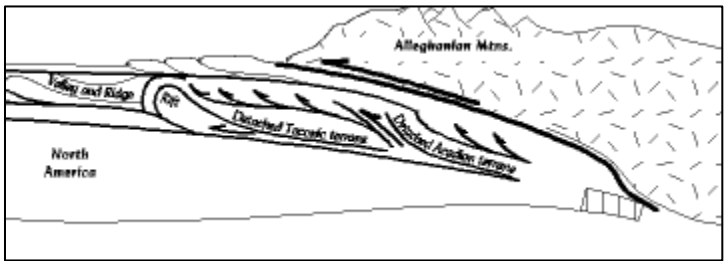


Figure 4—*The Alleghanian Orogeny about 320-280 million years ago. As proto-Africa rides up over proto-North America, massive thrust faulting pushes the Grenville, Catoctin, and other rocks westward while folding and faulting the sedimentary rocks beyond. Source: Fichter and Baedke (1999).*

but the effects went as far as the Allegheny Front (fig. 2, purple), where they abruptly stop.

The overlying Alleghanian Mountains, as high as the Himalayas today, have long since eroded away, leaving no trace of proto-Africa but exposing its tremendous impacts on the underlying rocks. The force of the collision between continental plates displaced the preexisting rocks, pushing them into the places where we see them today. In the process, large sheets of rock detached and slid westward along great, nearly horizontal thrust faults (fig. 4).

In addition, rock layers that had been relatively flat were crumpled together like folds in a rug, with downturns alternating with upturns. Geologists call them synclines and anticlines, such as the Blue Ridge anticline (fig. 5) and the adjacent Massanutten Mountain syncline in Shenandoah Valley.

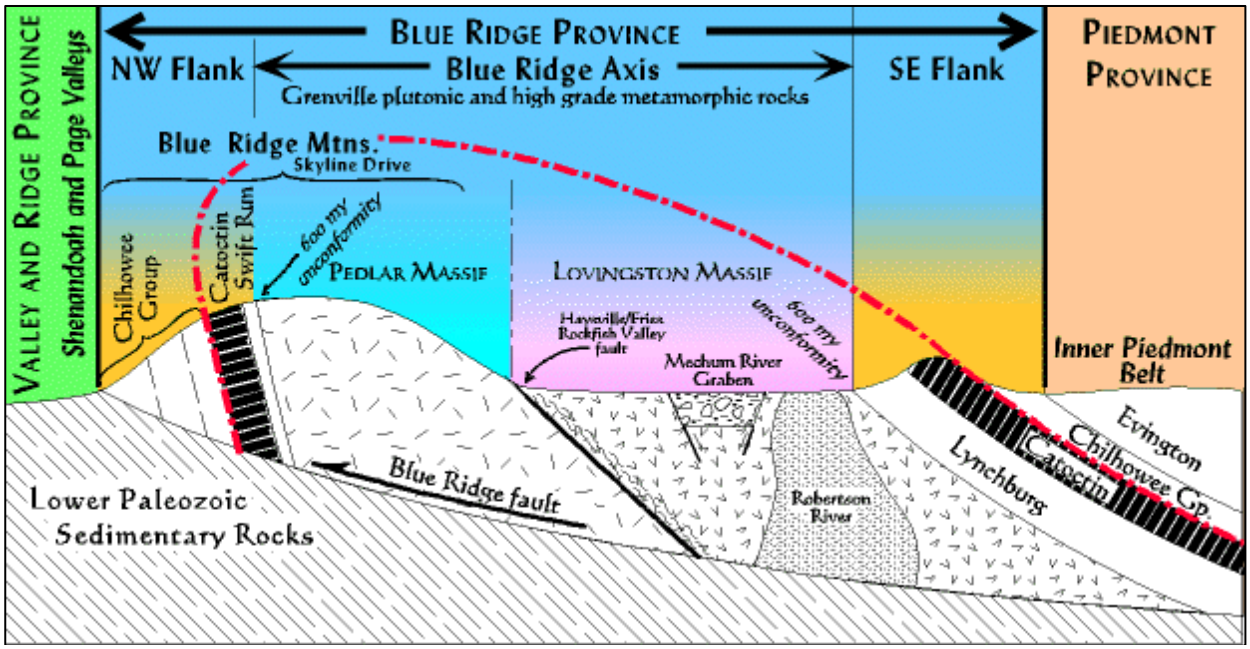


Figure 5—*The Blue Ridge Province, a giant overturned anticline. The anticline core is made up of Grenville basement rocks, intrusive granitoids, and diabase dikes. The eastern and western limbs largely mirror each other, comprising (in part) the originally overlying Catoctin greenstone and Chilhowee rocks. Erosion has breached the anticline, leaving a low eastern ridge and a higher complex of granitic and greenstone ridges and peaks in the west, the Blue Ridge Mountains. Source: Fichter and Baedke (1999).*

Blue Ridge Anticline

John McPhee's classic work on the geology of the Northeast and Upper Midwest (*In Suspect Terrain*), explains synclines and anticlines as follows:

> *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.*

Before the Alleghanian Orogeny, the Catoctin basalt and the overlying Chilhowee Group were relatively flat rock layers overlying the Grenville bedrock. The great Alleghanian rock train transported them many miles inland and buckled them, together with the granitoids, into a single giant anticline about 20 miles across (fig. 5). The leading edge of the anticline was overturned, resting on the edge of younger sedimentary rocks to the west—the limestones and dolomites of Shenandoah Valley.

The Alleghanian Orogeny folded and faulted the Blue Ridge basalts and Chilhowee rocks while metamorphosing them into metabasalts, quartzites, and phyllites. In the process, the tremendous heat and pressure altered the chemical composition of the basalt. Minerals in the original igneous rock—olivine, pyroxene, and plagioclase—changed into chlorite, actinolite, and epidote, giving the Catoctin greenstone its distinctive greenish color.

The Blue Ridge anticline was breached long ago by erosion, but geologists can still reconstruct its shape (fig. 5, red line). The core of the anticline is the Grenville basement rock, along with intrusive granites and diabase dikes (both came from upwelling magma that cooled underground, possibly during the Taconian Orogeny). Catoctin greenstone forms just one of several overlying layers of metamorphic rock (fig. 5).

Most of the anticline has weathered away, leaving low ridges of Catoctin greenstone and Chilhowee rocks in the east (such as Bull Run Mountain); higher ridges and peaks of granite, metarhyolite, and Catoctin greenstone in the west (the Blue Ridge Mountains); and, in between, hills and outcrops of the Grenville granitoids.

Compton Peak

Compton Peak (elevation 2,910 feet) has a bedrock of granodiorite gneiss (a Grenville granitoid) overlain by



Figure 6—*Catoctin greenstone outcrops near Compton Peak showing signs of columnar basalt, such as flat angular surfaces (top) and parallel vertical joints (bottom). Photos: Hutch Brown.*

Catoctin greenstone. As I hiked with my family up to the Compton divide along the crest of the Blue Ridge, we passed outcrops of metabasalt with indications of columnar formations, such as parallel angular surfaces and evenly spaced, nearly vertical joints (fig. 6).

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

You can find unmistakable signs of columnar basalt in many parts of the Blue Ridge Province across multiple states. Elsewhere, however, the columnar basalt is mostly deformed, without the relatively even hexagonal shapes you see at Compton Peak. Despite all the

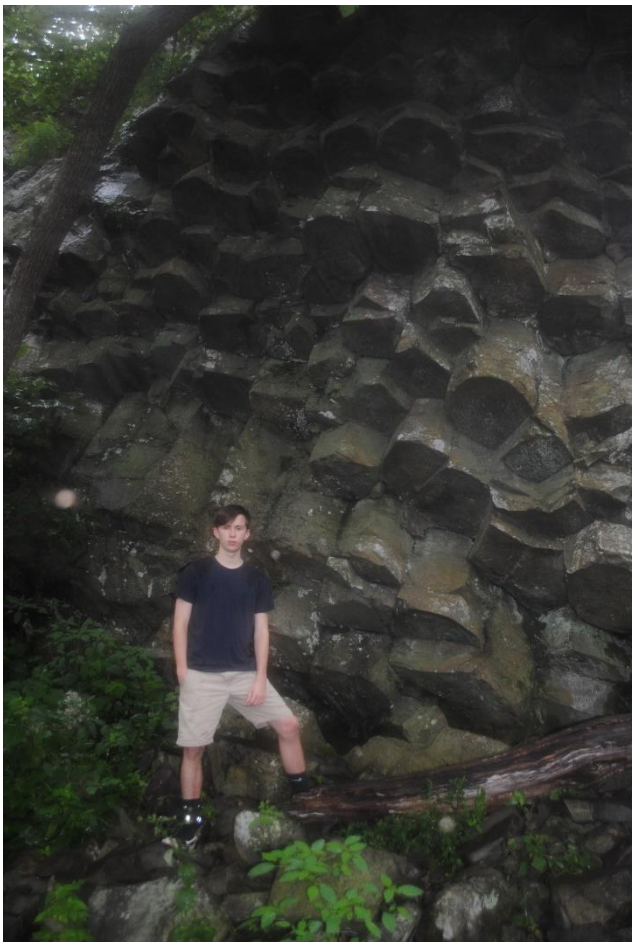


Figure 7—*Compton Peak columnar metabasalt, with one of my kids (Alex) for scale. Note the uptilt in the rock. (Blur in photo caused by misty rain.) Photo: Hutch Brown.*

pressures associated with Alleghanian mountain building—which clearly uptilted the greenstone at Compton Peak (fig. 7)—the columns must have moved in tandem rather than being compressed or pulled apart. The formation thereby stayed relatively intact.

A Caution

The columnar metabasalt at Compton Peak is well worth seeing, but not if it is raining (which it was when we were there, as you might be able to tell from the blurry photos in figures 6-7). The Appalachian Trail is fine in any weather, but the side trail down to the hexagonal columns, though short, is steep and can be dangerous, especially if the rocks and soils are slick with rain. Even in dry weather, you should be careful and wear good boots.

If you go, another side trail from the divide (this one a short and easy hike) leads to a pair of overlooks with



Compton Peak columnar metabasalt, looking up from below. Photo: Hutch Brown.



View of Shenandoah Valley from Compton Peak. Source: Gifford (2022).

great views of distant ridges and peaks on the Shenandoah Valley side of the Blue Ridge.

It's easy to get there and only about 90 minutes away from the Washington area by car. You take Skyline Drive south from the north entrance (near Front Royal) to the Compton Gap parking lot at mile marker 10.4. The hike is on the Appalachian Trail for about 2.5 miles (round trip), with an elevation gain of about 835 feet. The trail difficulty is rated as moderate.

Note

Professor Callan Bentley, who teaches geology at Piedmont Virginia Community College, has posted annotated photos of the Compton Peak columnar basalt, helping you understand it. Check out the photos on his Mountain Beltway blog (the first source below).

Acknowledgment

I wish to thank Sue Marcus for reviewing and improving an earlier version of this article. I am responsible for any errors.

Sources

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GeoWord of the Day

(from the American Geoscience Institute)

accretionary orogeny

A period of deformation and continental growth involving suturing of exotic terrane to a continental margin during collision and convergence.

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

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

Sun	Mon	Tue	Wed	Thu	Fri	Sat
	1 Labor Day NVMC mtg	2	3 MSDC mtg, Washington, DC	4	5 Show: Winston-Salem, NC	6 Show: Winston-Salem, NC
7 Show: Winston-Salem, NC	8 GLMSMC mtg, Rockville, MD	9	10	11	12	13
14	15	16	17	18	19 Shows: NC, VA	20 Shows: NC, VA
21 Shows: NC, VA	22 Fall begins	23	24 MNCA mtg, Arlington, VA	25	26 Show: E Flat Rock, NC	27 Shows: MD, NC
28 Shows: MD, NC	29	30				

Event Details

1: Dunn Loring, VA—Northern Virginia Mineral Club; Zoom meeting only; https://www.novamineralclub.org/.

3: Washington, DC—Mineralogical Society of the District of Columbia; http://www.mineralogicalsocietyofdc.org/.

5-7: Winston-Salem, NC—Annual show; Forsyth Gem & Mineral Club, Inc; Educational Bldg, Winston-Salem Fairgrounds, 569, Fairgrounds Blvd; Fri 10-6, Sat 10-6, Sun 11-5; adults $3, kids thru grade 12 free with adult; info: Arvil Marion, mariona1@yadtel.net.

8: Rockville, MD—Gem, Lapidary, & Mineral Society of Montgomery County; https://www.glmsmc.com/.

19-21: Swannanoa, NC—Show; Mountain Area Gem and Mineral Ass'n; Land of the Sky Shrine Club, 39 Spring Cove Rd; Fri 9-6, Sat 9-6, Sun 10-4; free; info: Richard Jacquot, 828-779-4501, rickjacquot@gmail.com.

19-21: Richmond, VA—Retail show; Treasures of the Earth, Inc; Richmond Raceway Complex, 600 E Laburnum Ave; Fri 12-6, Sat 10-5, Sun 10-5; adults $8, 16/under free; info: Ellen White, 757-641-2124, Ellen@TreasuresOfTheEarth.com.

19-21: Fishersville, VA—Annual show; Shenandoah Valley Gem & Mineral Society; The Augusta Expo, 277 Expo Rd; Fri 2-6, Sat 10-6, Sun 11-5; adults $5, students/seniors $3, children 12 & under/Scouts/military in uniform free; info: Scott Gregory, 727-542-9723; sgregory357@hotmail.com.

27-28: W Friendship, MD—Show; Gem Cutters Guild of Baltimore; Howard Cty Fairgrounds, 2210 Fairgrounds Rd; St; Sat 10-6, Sun 10-6; adults $6, Scouts in uniform, kids 12/under free; info: Dave, information@gemcuttersguild.

26-28: E Flat Rock, NC—Annual show; Henderson Cty Gem and Mineral Society; Natl Guard Armory, 2025 Spartanburg Hwy; Fri 10-6, Sat 10-6, Sun 10-5; adults $5/kids 12/under free; info Terrilyn Price, 404-368-6099, https://wp.hcgms.com/gem-show/.

24: Burke, VA—Micromineralogists of the National Capital Area; http://www.dcmicrominerals.org/.

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

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

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