The Northern Virginia Mineral Club Inc

The Mineral Newsletter

Next meeting: April 1   Time: 7:30 p.m.

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

Bournonite on quartz

Herodsfoot Mine, Lanreath, Cornwall, England

Source: Mindat.   Photo: Rob Lavinsky.

Volume 64, No. 4
April 2024
Explore our website!

April Meeting Program:

Geology of the National Parks

Details on page 12

In this issue …

Mineral of the Month
Bournonite

by Sue Marcus and Jean-François Carpentier

Before we learn about this Mineral of Month, I would like to introduce my coauthor, Jean-François Carpentier. Jean-François is an avid mineral collector and a professor of chemistry at the Rennes Institute of Chemical Sciences in France, with many esteemed publications to his credit. When I write these columns, I often contact people who have graciously posted images on Mindat. While researching semseyite last month, I wrote to Jean-François and invited him to suggest minerals for future columns, telling him that I was interested in writing about bournonite but feared being overwhelmed by too many localities and images. He encouraged me to proceed and let us use his images. For this column, he provided so much additional information and improvements in reviewing my draft that he has earned coauthorship.

Now let's learn about bournonite. Last month, we learned about semseyite, a lead-antimony sulfosalt ($Pb_9Sb_8S_{21}$). Now we are exploring bournonite, an antimony ore with a chemical formula also containing lead and copper ($PbCuSbS_3$). It is such an attractive, photogenic, and available mineral that I have bombarded our patient editor with possible photos to illustrate this article. I had not consciously chosen to write about two antimony minerals in sequential Mineral of the Month columns, but that's what's happened.

Discovery and Naming

Philip Rashleigh initially identified the mineral in 1797 as "an ore of antimony." An article in 1941 by W.E. Wilson in *The Mineralogical Record* said that Rashleigh probably obtained a specimen from Edward Fox and that he mentioned it in a 1789 letter to his friend John Hawkins. Rashleigh described his collection in a book published in 1797.

A Cornishman and an avid mineral trader, Rashleigh curried relationships with Cornish mine owners, allowing him to acquire beautiful specimens from active mines. He lived in a stately home in Cornwall, where he displayed his collection and welcomed visitors interested in minerals.

However, Rashleigh did not scientifically describe bournonite. That task fell to a contemporary French mineralogist and crystallographer, Jacques-Louis, Comte de Bournon. In 1804, Bournon briefly described the mineral as a "sulphuret" of lead, antimony, and copper, meaning it was composed of those metals plus sulfur. The chemical analyses were done by C. Hattchett, also in 1804.

Happy Easter!

Northern Virginia Mineral Club members,

Please join our April speaker, Dr. Victor Zabielski, for dinner on April 1 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.

Bournonite, Bolivia. Source: Collector's Edge Minerals, Inc.; photo: Annette Slade.

Bournonite, Yaogangxian Mine, Chenzhou, Hunan, China. Source: Mindat; photo: Weinrich Minerals, Inc.

Bournon called the mineral *endellione* (endellionite) after the type locality near St. Endellion, Cornwall. Oddly, though, the name bournonite was bestowed by Robert Jameson in 1805 with the statement, "As it has received no name, it may, in honour of the distinguished mineralogist who first described it, be denominated *Bournonite*." A mineral name is usually given by the first person who describes it. In this case, the first person was Bournon, but the name "endellionite" didn't stick for unknown reasons.

Description

Bournonite crystallizes in the orthorhombic system. Twinning is very frequent (on {110}); untwinned crystals are rare, usually occurring as short tabular crystals, and multiple twinning is common. In fact, repeated twinning yields aggregates that are cruciform or, even more frequently, wheel-like—what early miners referred to as "cogwheel ore" (Cornwall) or *Rädlerz* (Germany). Think of a wheel with notches—or cogs—that slot into cogs in another wheel, thus turning the gears. Bournonite is the main example of this crystal form in minerals. Other crystal habits occur, including single crystals, though collectors usually prefer the cogwheels.

Bournonite is brittle; crystals chip easily. Its cleavage is imperfect and the fracture is irregular, helpful in identifying the mineral. Bournonite forms a series with its counterpart seligmannite ($PbCuAsS_3$), but

Bournonite from Bolivia. ***Top:*** *With sphalerite, Machacamarca Mine, Potosí.* ***Bottom:*** *With baryte, Viboras Mine, Potosí. Source (top): Mindat; photo: Rob Lavinsky. Source (bottom): Mindat; photo: J.F. Carpentier.*

seligmannite is much rarer; though unusual enough to be interesting, bournonite is common enough to be affordable. Bournonite forms from hydrothermal fluids rich in antimony driven upwards by plutonism or tectonism. The host rocks for the veins can vary. Antimony deposits are uncommon. They often include bournonite in small percentages among the ore minerals.

Localities

United States. Bournonite is rare in the United States, as are other antimony minerals. The Silver King Mine in Summit County, UT, is the best known

Bournonite with quartz, Noche Buena Mine, Zacatecas, Mexico. Source: Mindat; photo: Gianfranco Ciccolini.

and perhaps the only source of bournonite crystals in this country. This locality hasn't produced world-class specimens, but Mindat shows well-crystallized specimens (though no crystals); the specimens range in size from micros up to 7.5 centimeters (2.9 in).

Mexico. Mindat shows images of specimens from "Naica," probably from the Naica Mine. This mine is best known for huge gypsum (variety selenite) crystals from the famous Cave of Swords and other caves within this large mine. As mining progressed, several formerly separate deposits were exploited by the Naica Mine. The economic minerals were sulfides enriched with gold, silver, and scheelite (calcium tungstate). The metals were deposited in and between fractures, probably related to buried intrusions. Bournonite occurs in sizes ranging from micro- to macrocrystals, often associated with galena and other sulfides. Calcite and fluorite offer color contrast in some specimens.

Bournonite macros and micros have also come from the Noche Buena (Christmas Eve) Mine in Zacatecas (not the only Mexican mine by that name—another is in Sonora). The crystals are striated and can be lustrous or dull; they are occasionally coated with fine grains of another mineral. They are found together with pyrite and sometimes with quartz, calcite, and sphalerite. Specimens with crystal up to 1.7 centimeters (0.67 in) in size were recovered in the 1970s. I have not found any evidence of more specimen production.

Bolivia. The Machacamarca (also known as Colavi) Mining District in Bolivia's Potosí Department is a source of world-class bournonite crystals. These crystals have a variety of habits, including the usual bournonite cogwheels, but also twins forming elongated triangles as well as flat untwinned floaters. Pyrite, quartz, siderite, sphalerite, and tetrahedrite are associated minerals, although most specimens show bournonite alone or with pyrite. Individual crystals grew to at least 7.2 centimeters (3 in).

Bournonite with pyrite, Machacamarca Mine, Potosí, Bolivia. Source: Mindat; photo: Rob Lavinsky.

Most specimens seem to have been extracted from the Machacamarca and Viboras Mines and, to a lesser extent, from the Infiernillos Mine. The Machacamarca Mine was the most prodigious bournonite specimen producer. One lovely doorstop-size specimen weighing 9 kilograms (20 lb) came from that mine! The crystals on this specimen are perfect, so it is museum quality. Discoveries from that mine mentioned on Mindat occurred from 2000 to 2012, with additional pockets found in 2019 and 2020. The San José Mine, in the more northerly Oruro District, also produced a few fine bournonite specimens. The origin given for some specimens is only to the region, with the mine unknown.

In the Machacamarca District, Cambrian and Ordovician sedimentary rocks were fractured by transverse (strike-slip) faults. Ore-bearing fluids moved roughly horizontally through the host rocks. Later volcanism

Bournonite, Quiruvilca Mine, La Libertad, Peru. Source: Mindat; photo: Rob Lavinsky.

again fractured the rocks, intruding them with dacite (a silica-rich igneous rock) and depositing and reconcentrating some of the mineralization.

Bolivia is a major tin exporter, with most mining and smelting done by the government-owned Bolivian Mining Corporation. Cassiterite (a tin oxide) is the most economic tin ore. Bournonite is not reported from all Bolivian tin mines. Most Bolivian tin deposits are related to granodiorite intrusions. It could be that the localized pressure/temperature conditions when the fluids were introduced and crystalized favored relatively small amounts of bournonite crystallization. Another possibility is that copper and lead were present in only some of the ore-forming fluids, leading to more limited bournonite formation.

Peru. Peruvian bournonite specimens can be a beautiful addition to one's mineral collection. Cogwheel-shaped crystals attractively offset by tiny white quartz crystals or even acicular arsenopyrite, pale pink rhodochrosite, or lighter pink manganoan calcite come from the Pachapaqui Mining District in Bolognesi Province. Crystals up to 2 centimeters (0.8 in) in size have been found. Matrix specimens up to 15 centimeters (5.9 in) in size covered with bournonite crystals are huge for this species. Large (1-centimeter (0.4-in)), lustrous bournonite crystals have also come from the Mercedes Mine in the Huallanca District of Bolognesi Province.

Another Peruvian source of bournonite crystals is the Cerro de Pasco Mining District in Pasco Province. This area is still active after more than 400 years of mining. There are several mines and prospects in the district, some nowadays exploited only for collection specimens. Most specimens were collected in the 1960s-80s.

Some bournonite specimens have no specific mine as their known source; others are reported more precisely from the Milpo Mine. Miners often protect their sources of specimens by providing little or vague source information. Crystal habits include unusual "coffin-shaped" crystals and somewhat flattened non-cogwheels. Twinned cogwheels were also found. Few specimens are shown on Mindat, perhaps because the bournonite occurrences were localized or confined to a specific zone.

Scientific reports mention bournonite at the Atlante Mine in the Quebrada Honda-Vesuvio Mining District in Bo Province, although this locality is not included in Mindat.

England. The original material (type specimens) of bournonite came from the Wheal Boys Mine near Port Issac, St. Endellion, Cornwall, England. Bournon acquired samples of the odd new mineral and published a description, calling the new mineral *endellione* (endellionite). He mentioned crystals up to 2.54 centimeters (1 in) in size "and of a proportional height." Bournon conducted thorough crystallographic examination and some physical tests that showed antimony in the mineral's chemistry.

Bournonite with quartz, Herodsfoot Mine, Lanreath, Cornwall, England. Source: Mindat; photo: Rock Currier.

The Wheal Boys (or Old Trewetha) Mine produced antimony, primarily in the 1770s. Ores richest in antimony were close to surface, although a shaft also explored lower, more galena-rich parts of the deposit. Most known specimens were extracted long ago. They include cogwheel-shaped crystals that range from lustrous to somewhat tarnished.

As is typical for bournonite, it and other tin minerals formed through hydrothermal processes. The mine site is covered by grass, although small dumps or waste piles may still exist. Fans of the Doc Martin television series may recognize Port Issac as the locale where the series was filmed.

Another Cornwall locality that was relatively prolific in bournonite crystals was the Herodsfoot Mine near Lanreath. Specimen production may have peaked in the middle to late 1800s. Mindat shows images of cogwheel-style crystals and even a possibly unique "cruciform twin." Some spectacular specimens, including one with crystals up to 11 centimeters (4.3 in), are on display at the Natural History Museum in London. Many museums around the world have Herodsfoot bournonite on display. Bournonite specimens from Herodsfoot, treasured by collectors, have commanded very high prices since the late 1800s.

France. Several mines in Les Malines District, Occitanie, exploited the largest lead-zinc deposit in France. Orebodies were formed in karst topography in Cambrian to Triassic metasediments. Bournonite crystals from there show a variety of morphologies. Bournonite specimens have been collected until at least the 2010s, and some workings were still accessible in 2024. Sphalerite, barite, aragonite, calcite, and quartz are the primary minerals associated with bournonite; some bournonite crystals are covered or sprinkled with tiny lustrous tetrahedrite.

Bournonite crystals came from mines including La Sanguinede and Saint-Laurent-le-Minier. La Sanguinede was the most productive locality for bournonite. Several specimens shown on Mindat exceed 4.0 centimeters (1.6 in), and one relatively giant specimen 20 centimeters (7.9 in) across hosts a 7-centimeter (2.6-in) crystal.

At Saint-Laurent-le-Minier, one sample measured 7.1 centimeters (2.8 in), with crystals up to 2 centimeters (0.8 in) in size. Some specimens were collected when the mine was still operating in the 1980s. Jean-François Carpentier collected when La Sanguinede was still operating in the 1980s. He has assembled a fine, large collection of these beauties. His collection includes a large (16.0-centimeter (6.3-in)) specimen, with bournonite crystals up to 3.5 centimeters (1.4 in) in size attractively set off by sparkling sphalerite crystals. Specimens were still being found until at least 2010. La Sanguinede reportedly closed in 1991.

In the Les Malines District, the Les Vieux Travaux (Old Workings) Mine seems to have been the main source of lovely micromount-size bournonite crystals. Beautiful microcrystals of bournonite were also found at La Sanguinede. Bournonite crystals have been found at the Les Cedres Mine, though some specimens—and Mindat photos—are more generally labeled "Les Malines District."

Coal mines near Grenoble produced bournonite, sulfide minerals, and even barite and cinnabar. Faulting in metasedimentary rocks allowed mineralizing fluids to migrate upwards. When coal miners cut through the harder rock strata, they found sulfides and other minerals. What was waste rock to them was a boon to mineral collectors; though specimens were not abundant, bournonite veins up to 15 centimeters (6 in) wide are documented. At both the Le Mure Mine and the nearby Villaret Pit, shiny bournonite crystals, sometimes offset by siderite, quartz, calcite, or (red translucent) sphalerite occasionally exceeded 2 centimeters (0.8 in) in size. Microcrystals and rare massive bournonite were also found.

Bournonite, Les Malines District, Occitanie, France. Source: Mindat; photo: J.F. Carpentier.

Spain. Spain has not produced many bournonite specimens, though a couple of localities are worth noting. In Aragon, the Nueva Virginia Mine, also known as the Tío Jorge Mine, was mined for antimony. (This mine was mentioned in the Mineral of the Month column of semseyite.) Bournonite crystals from there are small, but at least one 1-centimeter (0.4-in) crystal was found; the mine dumps may still be accessible to collectors. The El Vagón Mine in Andalusia was primarily a copper mine that exploited more than 400 meters (1,312 ft) of veins mineralized with chalcopyrite, with associated pyrite, siderite, and other minerals. Photos on Mindat all show microcrystals.

Germany. Bournonite crystals occur with siderite at Germany's Georg Mine near Willroth, Rhineland-Palatinate, Germany. Yellow to orange siderite crystals contrast aesthetically with shiny silver bournonite crystals in some fine specimens. Bournonite from this mine features limited twinning and never appears as cogwheels; many specimens have a simple tabular prismatic morphology.

Bournonite crystals grew up to 4 centimeters (1.6 in) in size; matrix specimens of more than 10 centimeters (4 in) were recovered. An 18-centimeter (7-in) specimen shown on Mindat hosts bournonite crystals up to 2 centimeters (0.8 in) in size on matrix. Most specimens seem to have been found in the 1870s-1940s. The former iron-manganese mining property is now a "show mine" with guided tours for visitors;.

Austria. In the Hüttenberg region, famous bournonite crystals up to 5 centimeters (2 in) in size were found. The specimens, some of them in scepter position, were partially altered or fully pseudomorphed to ochres of bindheimite (also known as oxyplumboromeite) and antimony and to malachite. The mines in this region produced iron ore, with some deposits also producing copper, lead, and silver. Regional mining activity extended from Roman times intermittently through the 1970s.

In this district, the Althaus Mine appears to have produced microcrystals of bournonite. Specimens of bournonite from the Felixbau Mine show larger crystals at least partly pseudomorphed to bindheimite and malachite. Similarly, the Hüttenberger Erzberg produced bournonite mostly to completely pseudomorphed to bindheimite and possibly to malachite. Both this deposit, mined underground, and the Althaus Mine are now "show" or tourist mines.

Bournonite with siderite, Georg Mine, Rhineland-Palatinate, Germany. Source: Mindat; photo: J.F. Carpentier.

Micromount-sized bournonite crystals were collected at the long-abandoned lead mines on Kühberg mountain near Obernberg am Brenner in Tyrol, Austria. Based on Mindat photos, the bournonite was nestled in cavities of tiny quartz crystals.

Italy. Léssolo (the Brosso Mine) near Turin is the source of lustrous microcrystals of bournonite, along with a few larger specimens and crystals up to 1 centimeter (0.4 in) in size. Specimens were extracted at least as recently as 2001.

Czech Republic. Příbram, an ancient mining district in the central Bohemian region of the Czech Republic, has been active for centuries. The district has many localities. Silver was extracted first, then lead-zinc ores, and finally uranium. Příbram produced nice bournonite specimens from the 18th into the 20th century, with older specimens on display in many museums. The specimens often show isolated bournonite crystals up to 2-3 centimeters (0.8-1.2 in) in size, although most are about 1 centimeter (0.4 in). Most crystals are simple, often untwinned or with limited twining and a flattened habit. Associates are siderite, quartz, and sometimes calcite.

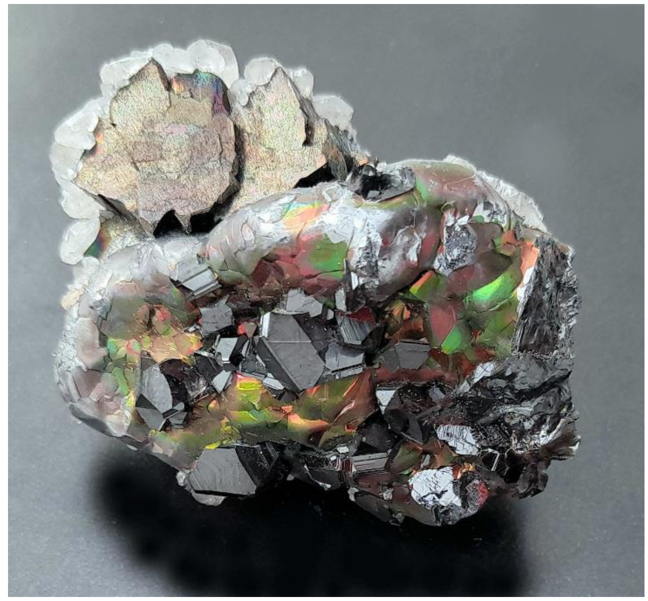
Romania. Lovely bournonite specimens from the Baia Sprie Mine display squat, chunky, deeply striated crystals. (This locality was treated more thoroughly in the Mineral of the Month column on semseyite, which summarized the history and geology of the mining area.) Bournonite crystals ranging from micros to 1 centimeter (0.4 in) in size occur with quartz, calcite, dolomite, siderite, pyrite, chalcopyrite, sphalerite, and (more rarely) semseyite and plumosite. A large specimen from Baia Sprie is 17 centimeters (4.3 in) in size. Most samples were probably bought out during active exploration and mining in the 1970s-80s, although mining began here two millennia ago.

Mines near Cavnic have produced primary lead and zinc intermittently since the 12th century. The ores were rich in gold and silver, byproducts that may have paid for the operations. Manganese and antimony were also extracted. Lustrous bournonite crystals have come from the Cavnic and Boldut Mines. Associated minerals include sphalerite, calcite, quartz, tetrahedrite, pyrite, and chalcopyrite. These minerals offer a nice color contrast in some specimens. Cabinet-sized specimens up to 25 centimeters (9.8 in) in size are pictured on Mindat; smaller samples show off the bournonite crystals without as much matrix. Odd crystal habits include roughly rounded bournonite-pyrite balls, possibly naturally etched. The mines are closed and mostly flooded, but reopening them for metal mining may be possible.

Kosovo. Kosovo is a relatively small country, smaller than Puerto Rico and larger than Delaware, but it is rich in minerals. Structurally controlled mineralization near Trepča enriched ore zones that were exploited by at least 40 mines. The Stari Trg Mine was a scarce source of bournonite in the 1950s-90s but is now a prolific source from this district. In the past 5 years, it has produced matrix specimens 30 centimeters (4 in) or more across, with crystals of at least 2 centimeters (0.8 in), so there is hope for more discoveries and specimens coming onto the market.

The crystals often appear on pyrite that has pseudomorphed pyrrhotite sheets. Most of these specimens have been acid-etched by miners/local dealers to remove carbonates covering the "interesting" sulfides; the actual lifetime of these etched specimens is unknown. "Educated" miners/dealers sometimes offer a few specimens showing highly lustrous bournonite cogwheel crystals, partly covered by calcite (fluorescent under ultraviolet light because of its manganese content). In addition to pyrite, common associates are sphalerite and galena.

Greece. The Kassandra and Lavrion mining districts are the sources of bournonite in Greece. The Madem-Lakkos Mine in the Kassandra district produced



Bournonite with galena and sphalerite, Trepča Stari Trg Mine, Mitrovica District, Kosovo. Source: Mindat; photo: J.F. Carpentier.

bournonite crystals from microcrystals to 1 centimeter (0.4 in) in size. Several mines in the Lavrion district produced minor bournonite. Specimens from these mines are usually altered superficially or totally by other minerals (probably bindheimite or malachite), although the alterations are seldom identified.

Russia. Bournonite is not reported from most Russian antimony mines, despite the large size of several antimony deposits there. That may be because there are no published research papers in English on Russian antimony deposits. In addition, collecting mineral specimens is probably quite restricted there. An exception is mention of bournonite in the Beresitovoe Deposit in a research paper. In addition, Mindat mentions bournonite at the Dalnegorsk deposit; although no pictures are associated, we are aware of a few bournonite specimens from that deposit with crystals up to 1 centimeter (0.4 in) in size.

Japan. In Japan, fine bournonite crystals occurred at the Daikoku deposit in the Chichibu Mining District. Crystals on matrix plates up to 14.2 centimeters (5.6 in) in size were brought out. One large specimen with bright bournonite crystals is now in the Japanese National Science Museum. Mining in the district extends back for 1,300 years; most bournonite specimens were probably extracted in the 20th century but not more recently.

Bournonite with quartz, Yaogangxian Mine, Chenzhou, Hunan, China. Source: Mindat; photo: Rob Lavinsky.

China. Tungsten, tin, and antimony are the primary ores extracted at the [Yaogangxian Mine] in China's Hunan Province. From the late 1990s to the early 2000s, this mine produced some of the world's most beautiful and collectible bournonite specimens. Many specimens exhibited bournonite crystals associated with quartz and sometimes fluorite and arsenopyrite. Though quite common on the market and rather inexpensive at the time, the Yaogangxian bournonites have nearly disappeared from the market because they are now highly sought by collectors, particularly Chinese. The best specimens now command very high prices.

Images of bournonite crystals up to 7.1 centimeters (2.8 in) in size and possibly up to 10 centimeters (3.9 in) are posted on Mindat. Crystals are often twinned and some are doubly terminated; most crystals are also striated. The metallic luster can appear iridescent in some specimens. There seems to be evidence of bournonite replacing tetrahedrite, making this a locality of interest to pseudomorph collectors as well.

Antimony mineralization was probably introduced by fluids related to emplacement of the Yaogangxian pluton. Mineralization throughout the deposit is zoned. The Yaogangxian deposit is huge, and mining continues. Some sources report that bournonite was found in the mine pillars—the actual pillars of ore that held up the underground workings—and that bournonite specimens were recovered when the pillars were removed, causing mine collapse in some areas. If active mining encounters another part of the antimony-rich zone, more lovely bournonite specimens may be found.

Bournonite, Yaogangxian Mine, Chenzhou, Hunan, China. Source: Mindat; photo: Rob Lavinsky.

Uses

China produces most of the world's antimony, more than twice the amount of the next largest producer, Russia. These two countries also have the largest antimony ore reserves. China has slightly less than half of the antimony resources of the next largest source, Russia. These countries can control U.S. access to significant and critical mineral resources.

The United States does not mine any antimony ore. Production of metal in this country comes from recycling and a small amount of ore that is imported and processed here. Antimony is used to make ammunition and other lead-alloyed products, flame retardants, and some ceramic and rubber products.

Bournonite specimens, Yaogangxian Mine, Chenzhou, Hunan, China (top: with quartz; bottom: with fluorite). Source: Mindat; top photo: Collector's Edge Minerals, Inc; bottom photo: Jamison K. Brizendine.

I could not find any mention of faceted bournonite or any use of it in jewelry, probably because it is extremely brittle.

A stunning bournonite specimen with a 3-centimeter (1.2-in) crystal from the Yaogangxian Mine in China could set you back $9,500, according to one [website](). Maybe a $25 specimen (down from the original $50) featuring several euhedral crystals is more in your price range, although the piece is only 2.3 centimeters (0.9 in) in size. It is from the same mine in China, shown on a different website.

A similarly sized specimen, this one from Bolivia, was up for auction with a $5.50 bid. You are too late for that one since bidding ended on March 12, 2024 (when all of these sites and prices were checked).

Technical Details

Chemical formula	$PbCuSbS_3$
Crystal form	Orthorhombic
Hardness	2.5-3
Specific gravity	5.8-5.9
Color	Dark metallic gray to silver
Streak	Dark gray to black
Cleavage	2 imperfect
Fracture	Uneven to subconchoidal
Luster	Metallic

Acknowledgment

Our fine editor, Hutch Brown, had to determine which of the dozens of lovely images that I sent him would work best in our newsletter. Thanks as always for your patience, Hutch.

Sources

Bodenlos, A.J.; Ericksen, G.E. 1955. Lead-zinc deposits of Cordillera Blanca and northern Cordillera Huayhuash, Peru, USGS Bull. 1017.

Bournon, J.L. 1804. Description of a triple sulpfuret, of lead, antimony, and copper, from Cornwall; with some observations upon the various modes of attraction which influence the formation of mineral substances, and upon the different kinds of sulphuret of copper. Royal Society of London, Philosophical Transactions 94: 30-62.

Bournon, J.L. 1813. Catalogue de la collection mineralogique du Comte de Bournon: 409.

Cook, R.B. 2005. Connoisseur's choice: Bournonite, Yaogangxian Mine, Chenzhou, Hunan Province, China. Rocks and Minerals 80: 40-44.

The Free Library. 1994. Philip Rashleigh (1729-1811).

Harada, K.; Sakamoto, O.; Nakao, K.; Nagashima, K. 1970. Bournonite from Daikoku, Chichibu Mine, Saitama, Japan. Mineralogical Journal 6(3): 186-188.

Itos Silver. N.d. Geology and history of the San José Mine.

Bournonite with quartz, Yaogangxian Mine, Chenzhou, Hunan, China. Source: Mindat; photos: Rob Lavinsky.

Jameson R. 1805. Bournonite. System of Mineralogy II. Edinburgh, UK: Bell and Bradfute: 579-582.

Klochko, K. 2024. Antimony in mineral commodity summaries. U.S. Geological Survey.

Mindat. N.d. (no date). Bournonite.

Minerals.net. N.d. The mineral bournonite.

National Gem Lab. N.d. Bournonite.

Royal Cornwall Museum.

Spencer, L.J. 1911. Bournonite. Encyclopædia Britannica, vol. 4.

Starkey, R. 2012. The Herodsfoot Mine, Lanreath, Cornwall, England. Mineralogical Record 43(4): 411-486.

Rashleigh, P. 1797. Specimens of British minerals selected from the cabinet of Philip Rashleigh, of Menabilly, in the County of Cornwall. London, UK: W. Bulmer and Co.

Rivas, S. 1979, Geology of the principal tin deposits of Bolivia, Bulletin of the Geological Society of Malaysia 11: 14.

Vakh, A.S.; Avchenko, O.V.; Goryachev, N.A. [and others]. 2017, Minerals of the bournonite-seligmannite series in ore of the Beresitovoe Deposit, Upper Amur Region, Russia. Geology of Ore Deposits 59(8): 738-744.

Wikipedia. N.d. Bournonite.

Wilson, W.E. 1941. The history of mineral collecting: 1530-1799. The Mineralogical Record.

Zippe, F.X.M. 1859. Lehrbuch der Mineralogie mit Naturhistorischer Grundlage. Vienna, Austria: Wilhelm Braumüller & K.K. Hofbuchhändler.

Bournonite with quartz, Yaogangxian Mine, Chenzhou, Hunan, China. Source: Mindat; photo: Jeffrey A. Scovil.

Erratum: "Baia" Means Bath, Not Bathroom

by Sue Marcus

Thanks to club member Hendrik van Oss for sharing information related to my Mineral of the Month article on semseyite in our March newsletter.

Hendrik wondered why the Romanian place name "Baia" should receive "the seemingly dubious translation of 'bathroom.'" He noted that Baia refers to "bath," as in the thermal springs so beloved by Romans, who often established settlements there.

Of course, many areas with natural hot springs also had hydrothermal mineralization in the vicinity, resulting in mining operations over the centuries. At Baia Mare and Baia Sprie in Romania, the mines produced lead ores containing semseyite.

Keep those comments coming, Hendrik and others!

President's Collected Thoughts

by Jason Zeibel

April showers are here, as is, apparently, full-on spring. It is a beautiful 72-degree day as I write this, and my calendar still says it should be winter. I'm not too upset though because spring always has a way of springing new hope. I look forward to getting outside more this spring and hopefully finding some new treasures directly from Mother Nature!

I certainly hope that everyone who came to our spring auction on March 4 left with some nice treasures! Our family scored a huge pile of Australian opal to go into our collection together with ones that we found fossicking ourselves. The auction action was spirited, and it included club donations, with 100 percent of the sales going to the club! We can all look forward to our next club auction in October.

We will return to hybrid meetings on April 1, when Dr. Victor Zabielski from Northern Virginia Community College's Geology Department comes to give us a talk. We will go to dinner with Dr. Zabielski before the April meeting, so please join us! The details are on page 2.

On May 6, our own Kathy Hrechka will give a very entertaining talk about her experiences trying to get rich at Crater of Diamonds State Park in Arkansas. Since I didn't see her in the news, I'm guessing that she didn't find any 10-plus-carat diamonds while there, but I am still very much looking forward to her presentation.

As always, I big thanks to our club VP, Craig Moore, for coordinating with all of our speakers. If you have a topic that you are excited about and feel motivated to speak to our club about, then let Craig know!

I hope everyone had a chance to go to Gaithersburg, MD, for the annual GLMSMC mineral show in late March. The Zeibels have made the trek for many years, as the photos show. It's always a good time, and I'd like to send a big shoutout to the folks who help up with it. They have a lot of good educational opportunities in addition to some wonderful dealers. This year, the show date fell on St. Patrick's Day again, so I hope everyone took the opportunity to find some new green mineral treasures!

Left: *The Zeibel family checks out the offerings at one of the annual GLMSMC club shows in Gaithersburg, MD.* **Right:** *Maybe the Easter Bunny will bring you something appropriate in your basket this spring ...*

Please consider bringing in something for our Rock-n-Talk segment in April. Any of our young geologists who do so get extra credit! It doesn't have to be a long speech or cover the entire geologic history of our area—just a cool rock, mineral, or fossil and where/when you found it!

Please try to bring a friend to the meeting. Until then, keep an eye out for bunny-shaped rocks in your Easter basket!

Jason

April 1 Program

Geology of the National Parks

Victor Zabielski

North America has diverse landscapes of mountains, deserts, coastlines, and unique sites of geologic interest. Many of the most dramatic landscapes have been preserved through the National Park System in the United States and Parks Canada, ensuring their protection and accessibility to visitors. This talk will cover a sampling of parks in their geologic context, revealing aspects that are often overlooked and giving us a broader appreciation of these landscapes.

Dr. Victor Zabielski has been a professor of geology at the Alexandria Campus of Northern Virginia Community College since 2003. Before that, he was a research/teaching post-doctoral fellow at the University of Minnesota in Minneapolis, where he worked on stable isotope modeling of watershed drainage in northern Minnesota. He received a Ph.D. from the Brown University Department of Geology in 2001 after studying intermediate water circulation in the northern Arabian Sea on glacial to interglacial cycles. He earned an M.S. degree in marine science at the University of North Carolina, Chapel Hill, where he studied the geologic history of Storr's Lake, San Salvador, Bahamas. His B.S. degree was in geology from Rensselaer Polytechnic University in Troy, NY. He also worked 3 years as a consulting geologist with George Marshall Consulting Geologists in Averill Park, NY, working mainly with the surface mining industry.

Meeting Minutes
March 4

by Almas Eftekhari, Secretary

President Jason Zeibel kicked off our March NVMC meeting with a short business meeting before we got to the main event—our spring club auction of rocks, minerals, and fossils.

After Jason reminded us to pay our club dues, he asked visitors and new members to introduce themselves. They included Samantha and Matt Roth, Kristen Erickson, and Jonathon Diesel. Katy Johnson, our field trip co-coordinator, reminded everyone of our trip to the Luckstone quarry in Culpeper, VA, on March 28.

Treasurer Roger Haskins reminded us that you *must be a club member* to go on club field trips. Our insurance will not cover nonmembers, so pay your dues if you'd like to come! Our club can now accept credit cards.

Vice President Craig Moore announced that Kathy Hrechka will be our May speaker. Kathy will tell us about searching for treasure at Crater of Diamonds in Arkansas.

Our club officers noted that they are discussing opportunities for outreach to the community to share knowledge and resources related to our hobby. Club members have been holding meetings with kids at Kings Park Library in Burke, VA, to stimulate their natural interest in rocks and minerals.

We have also been reaching out to local schools to offer talks about rocks and minerals and to help in other ways. We've made progress with several schools in Fairfax—more to come on what our partnerships will entail.

If you're interested in helping out, please contact Jason or Roger (see their contact information on the last page of this newsletter).

Addendum: On behalf of the club, Vice President Craig Moore would like to acknowledge club member Fred Gillis for so generously donating a collection of labradorite specimens at our February meeting. Thank you so much, Fred!

Giant Dinosaur Skeleton Found Connected from Skull to Tail

by Taylor Nicioli

Editor's note: *The article is from CNN on 7 March 2024. Thanks to Mike Kaas for the reference!*

A chance discovery made in southern France has revealed a rare specimen—an almost complete dinosaur skeleton found connected from its hind skull to its tail.

The massive fossil came to light in May 2022 after now 25-year-old amateur paleontologist Damien Boschetto and his dog stumbled across something unusual while walking in a forest in Montouliers, France. Boschetto had noticed a cliff edge that had recently collapsed and decided to take a closer look, when he spotted an exposed bone sticking out of the ground.

The Archaeological and Paleontological Cultural Association at the Cruzy Museum, in collaboration with the French National Center for Scientific Research, identified the nearly 10-meter-long (32.8-ft-long) fossil as a Titanosaur skeleton. Boschetto, who has been a member of the association for 8 years, told CNN that, although unearthing dinosaur remains is "always exciting and interesting for scientific research and the understanding of the ecosystems of that time," finding the bones in their almost original anatomical position is what makes this find extraordinary. … *Read more*.

The "Dolomite Problem"—Scientists Resolve 200-Year-Old Geology Mystery

by Derek Smith

Editor's note: *The article is from SciTechDaly, 6 January 2024. Thanks to Tom Burke for the reference!*

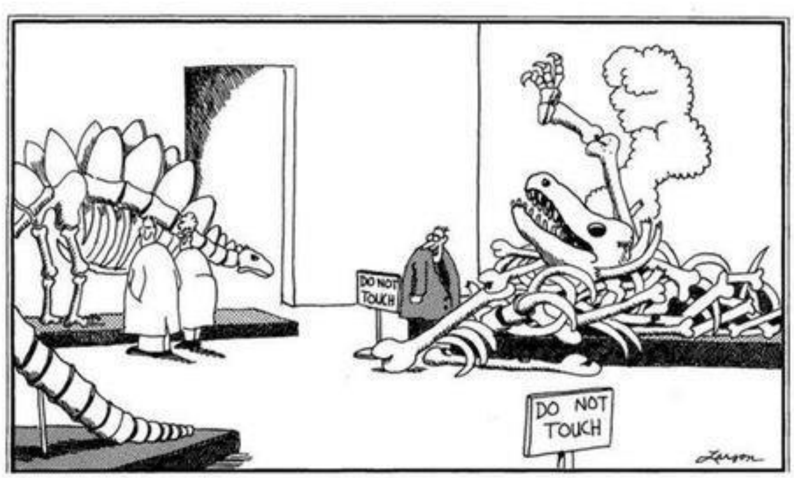
To create mountains from dolomite ($CaMg(CO_3)_2$), a common mineral, it must periodically dissolve. This seemingly paradoxical concept could help make new defect-free semiconductors and more.

For 2 centuries, scientists have failed to grow a common mineral in the laboratory under the conditions believed to have formed it naturally. Now a team of researchers from the University of Michigan and Hokkaido University in Sapporo, Japan, have finally pulled it off, thanks to a new theory developed from atomic simulations.

Their success resolves a longstanding geology mystery called the Dolomite Problem. Dolomite—a key mineral in Italy's Dolomite Mountains, Niagara Falls, and Utah's Hoodoos—is very abundant in rocks older than 100 million years but nearly absent in younger formations.

The secret to finally growing dolomite in the lab was removing defects in the mineral structure as it grows. When minerals form in water, atoms usually deposit neatly onto an edge of the growing crystal surface. However, the growth edge of dolomite consists of alternating rows of calcium and magnesium. In water, calcium and magnesium will randomly attach to the growing dolomite crystal, often lodging into the wrong spot and creating defects that prevent additional layers of dolomite from forming. This disorder slows dolomite growth to a crawl, meaning that it would take 10 million years to make just one layer of ordered dolomite.

Luckily, these defects aren't locked in place. Because the disordered atoms are less stable than atoms in the correct position, they are the first to dissolve when the mineral is washed with water. Repeatedly rinsing away these defects—for example, with rain or tidal cycles—allows a dolomite layer to form in only a matter of years. Over geologic time, mountains of dolomite can accumulate. … *Read more*.



Appreciation—Barry (Sumner) Remer *(1940-2024)*

by Sue Marcus

On March 18, our friend and fellow club member Barry Remer walked on. I like the euphemism "walked on" because it comforts me.

Born in Hartford, CT, Barry was an avid mineral collector who was generous in so many ways. He contributed generously to many causes, such as the welfare of Native Americans and of the environment. He gave his time and energy to our club as president (2010-11), vice president (2009 and 2012), treasurer (2001-2006), and official greeter (2002-2001).

Barry was great with children, as shown in many aspects of his life. In retirement, he worked part-time for nature centers in northern Virginia. He enjoyed putting on programs for kids and taking care of the animals that lived at the centers.

He worked at the Long Branch Nature Center in Arlington, VA, where his presence allowed the Northern Virginia Mineral Club to meet there for many years until the Covid shutdown. He honed his skills as a naturalist and interpreter, sharing his joy of the natural world with nature center visitors of all ages. With his ongoing enjoyment of geology, including fossils and minerals, the nature center was a wonderful match for his interests and abilities.

Barry was also a retired teacher who worked in the Fairfax public school system for almost 40 years. He taught a variety of subjects, including science and math. He also spent several years as a teacher in the Fairfax School Age Child Care Program. At the Emory Rucker Shelter in Reston, he enjoyed reading to children.

Barry was always a great help at club auctions, working with the club treasurer to track who had bought what and ensuring that payments were collected and disbursed. If there were children present and he had some extra minerals left, he would give them to the kids. He was also a fixture at our club's annual mineral shows, often having a table of minerals for sale and pricing them so that anyone could afford something to take home.
Barry organized one memorable collecting trip to Danville, KY, many years ago. Through his contact at the quarry, Barry joined Frank Hissong and Sue Mar

Barry at a meeting of the Micromineralogists of the National Capital Area at the Long Branch Nature Center. Photo: Kathy Hrechka.

cus in collecting lovely fluorite, barite, sphalerite, and calcite specimens. Some of the pieces weighed at least 20 pounds, with crystals covering their surfaces. At additional stops along the way, we found geodes lines with quartz crystals. Unfortunately, a roadcut where millerite had been found revealed too few crystals for us to pry from a very hard host rock.

Barry picked up micromounting later in his collecting career, joining the Micromineralogists of the National Capital Area. He donated his micromounts to the micromounter club, where David Fryauff photographed some of his specimens and posted them on Mindat, citing Barry as the collector. Many of his minerals were given to young collectors just starting out in our hobby.

Barry was a caring friend to people and animals alike. He loved his pets, and he loved minerals. Much of his collection was donated to the Northern Virginia Mineral Club for sale to raise funds for scholarships.

Barry's generosity, his enthusiasm for science, his patience in explaining science to children, and his wonderful smile will be greatly missed.

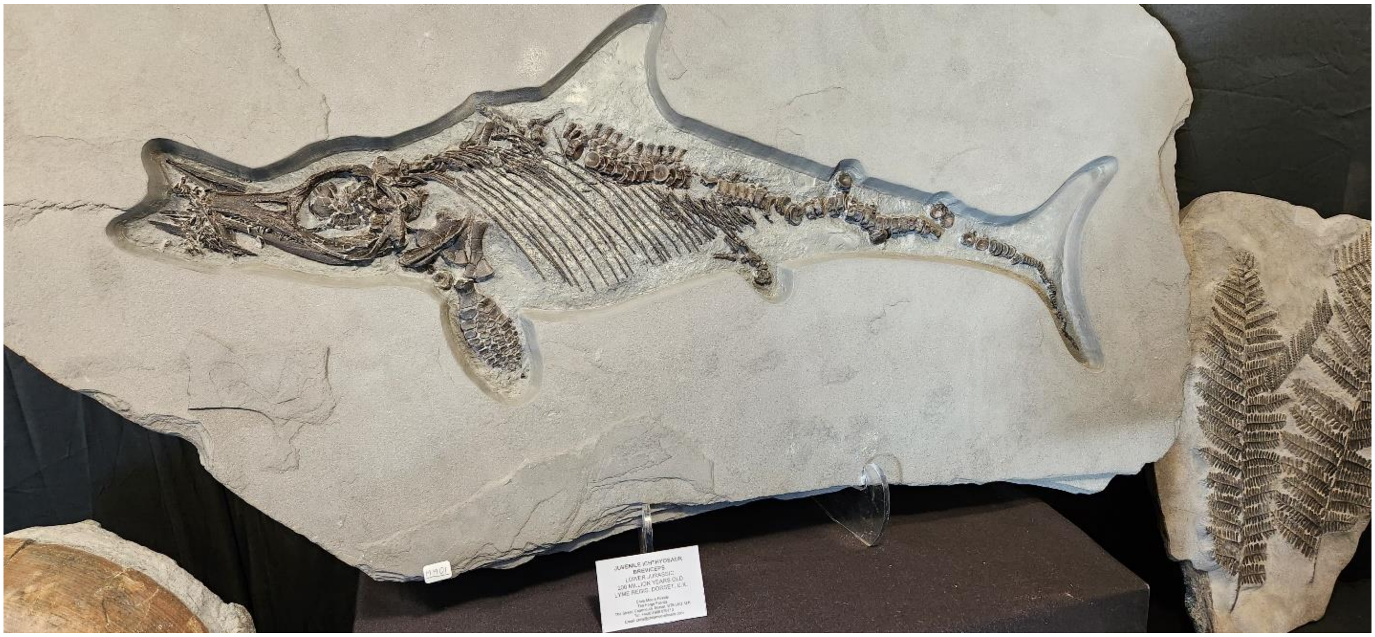
Fossils at the Tucson Show

Tom Taaffe, who attended this year's Tucson Gem & Jewelry Show in January/February in Tucson, AZ, sent these photos of fossils on display and for sale at the show. Some of his photos appeared in the March issue of this newsletter; more are here. (The photos were taken by Tom or by Beth Smith.)

Ceratopsian dinosaur. Triceratops is the best known of these horned, frilled dinosaurs. The show had 60 Ceratopsians on display.

Triassic fish, Austria.

Eryops megacephalus, Pennsylvanian/Permian boundary, Middle Moran Formation, Young County, TX. Eryops was a large temnospondyl amphibian averaging 6 feet long, a lurking predator much like a crocodile.



Juvenile Ichthyosauros from the lower Jurassic Period, Approximately 4-1/2 feet long, the specimen was collected in Lyme Regis, Dorset, England.

Ammolite is the name for one of the rarest fossil gemstones. These specimens, with their exceptional colors, were found in one small part of southern Alberta, Canada; with Beth Smith for scale, they were 70 million years in the making (from the Cretaceous Period).

This specimen is approximately 18 inches across.

The Rocks Beneath Our Feet

Geologic History of Maui, Hawai‘i

by Hutch Brown

A few years ago, my wife and I bought a condominium on the Hawaiian island of Maui near Lahaina, her home town. Lava formations on Maui, such as Dragon’s Teeth (fig. 1), inspired me to explore the geologic history of the Hawaiian Islands.

Figure 1—*Dragon’s Teeth, an unusual lava formation on West Maui’s Makaluapuna Point. Source:* Wikimedia; *photo: Christopher Michel.*

Plate Tectonics

The Earth’s surface is covered by solid pieces of rocky crust called tectonic plates. The plates, both oceanic and continental, “float” on the underlying mantle of molten rock. Driven by convection currents in the mantle, the plates collide at their margins, with the heavier plates subducting (sliding) under lighter plates and melting into the mantle.

Figure 2 shows the Pacific Plate (deep blue) in relation to surrounding plates (demarcated by blue-black deep-sea trenches and light blue plate margins). The Pacific Plate is moving in a northwesterly direction (fig. 2, red arrows) as it collides with other plates; to the north, for example, it subducts under the North American Plate, forming the Aleutian Trench and a volcanic island arc known as the Aleutians.

Most earthquakes and volcanic eruptions result from similar tectonic collisions. Mount Vesuvius in Italy, for example, formed from the African Plate colliding with and subducting under the Eurasian Plate. So did other volcanoes and volcanic islands across the Mediterranean region.

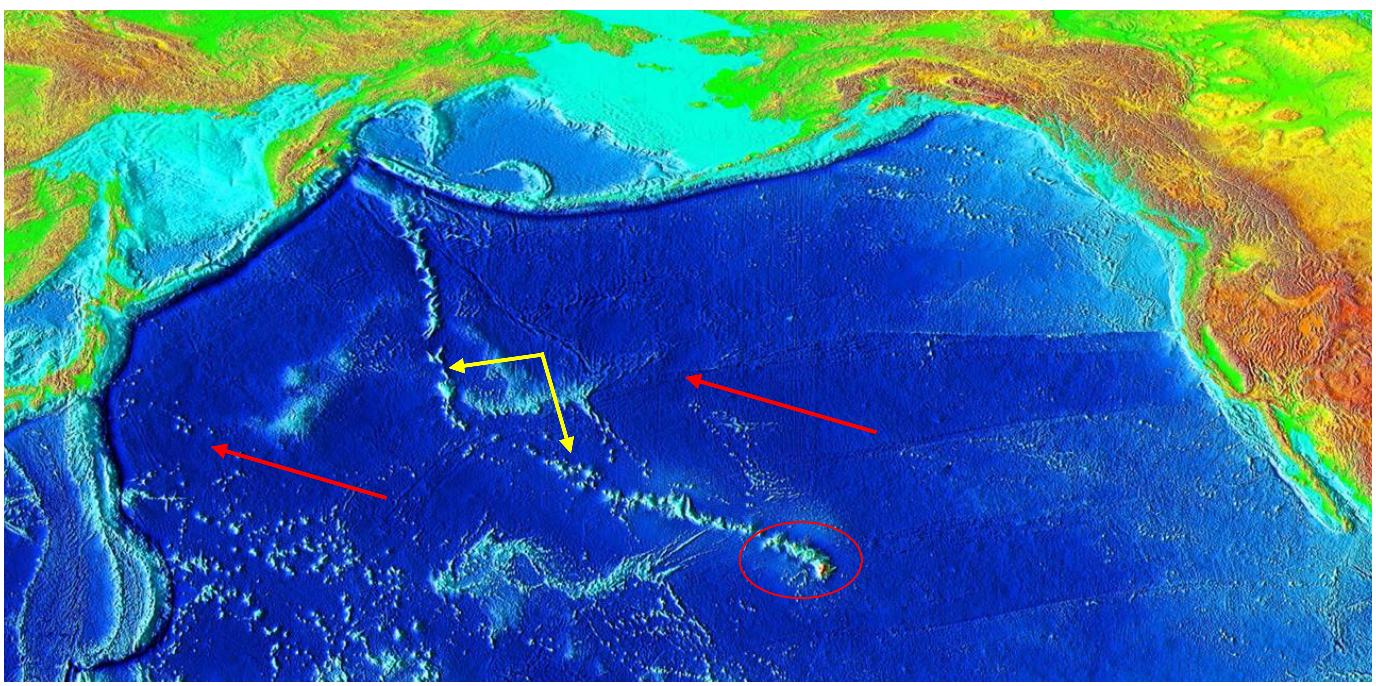


Figure 2—*Pacific Plate (dark blue) rimmed by deep-sea trenches (blue-black) and the margins of other plates (light blue). Driven by convection currents in the Earth’s mantle, the Pacific Plate moves in a northwesterly direction (red arrows), subducting under other plates. The Hawaiian Islands (circled) are on a hotspot, where rising magma surfaces to form eroding islands and seamounts in the same line as plate movement, which shifted directions tens of millions of years ago (yellow arrows). Source: [Wikipedia](); author: National Geophysical Data Center, USGS.*

Hawai‘i is different. (The diacritic mark ‘ in Hawai‘i indicates what linguists call a glottal stop—a brief stop before pronouncing a vowel, as in “uh-oh;” I use it out of respect for native Hawaiian culture.) Hawai‘i is the island chain farthest from a continental land mass; that’s because it is located deep within the oceanic Pacific Plate (fig. 2, circle), far from any plate margins or subduction zones.

Chain of Volcanoes

The Hawaiian Islands are the tops of giant oceanic volcanoes—some more than 30,000 feet high—formed by countless lava flows over millions of years. The volcanic peaks are the visible part of an immense submarine ridge with more than 80 volcanoes (fig. 2, yellow arrows); it’s called the Hawaiian Ridge-Emperor Seamount Chain. The chain stretches for thousands of miles from Hawai‘i northwestward to the Aleutian Islands, changing direction at a point where, tens of millions of years ago, the Pacific Plate started moving in a less northerly direction.

The Hawaiian Islands form one end of the chain, beginning with the island of Hawai‘i (the Big Island, as the locals call it) and extending northwest to Ni‘ihau (fig. 3). Hawai‘i lies over a “hotspot,” a point in the Pacific Plate where magma rising from the Earth’s mantle erupts in vast lava flows on the seafloor. The accumulating lava forms huge “shield” volcanoes (relatively flat but rounded upward like a warrior’s shield). The Hawaiian shield volcanoes are so massive that the Earth’s crust subsides under their tremendous weight (fig. 4). The resulting Hawaiian Trough, which offsets the swell over the buoyant hotspot, is about 18,000 feet deep and 18 miles across. The trough in turn is offset by rims (the Hawaiian Arch) rising about 660 feet above the seafloor.

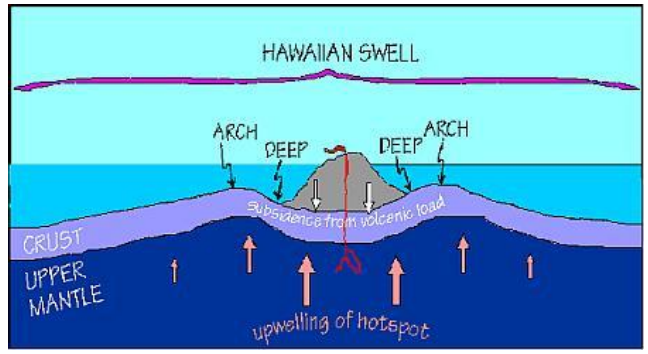


Figure 4—*Upwelling magma pushes the Earth’s crust upward, causing the Hawaiian Swell; but the weight of the volcanoes causes the crust to subside over the hotspot into a trough rimmed by an arch on each side. Source: Oregon State University.*

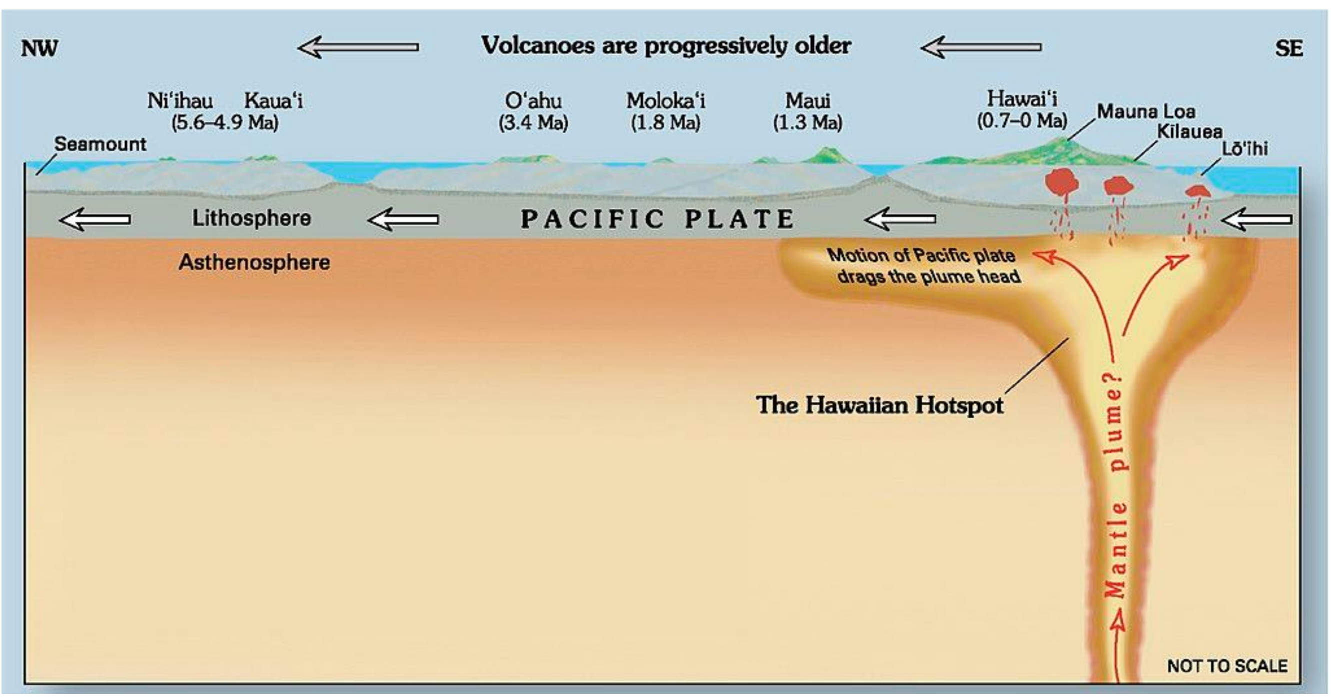


Figure 3—*The Hawaiian Islands by age, showing the direction of motion of the Pacific Plate over the Hawaiian hotspot and the corresponding formation of the islands, with two active volcanoes on the island of Hawai‘i and a new volcano forming. The plume head, dragged by plate motion, still underlies part of Maui, resulting in eruptions of the Haleakalā Volcano within the past millennium. Source: Tilling and others (2010).*

As the Pacific Plate moves over the Hawaiian hotspot, the volcanoes go through phases. They form mainly during the "shield phase," which lasts for about a million years and emplaces 80 to 95 percent of a volcano's volume. The "postshield phase" delivers the final lava flows before a volcano moves far enough away from the hotspot to stop erupting altogether. Meanwhile, a new volcanic seamount emerges behind the last volcano in the chain.

Figure 3 shows the process. The Big Island has the most recent volcanoes, with the Lōʻihi seamount coming up behind (the diacritic "ō" indicates a long vowel, so the pronunciation is low-EE-hee). The weight of the volcanoes offsets the buoyancy of the hotspot, causing the island to subside by 0.08 to 0.12 inches per year. As the older islands move away from the hotspot, they slightly rebound, with the greatest uplift currently happening on Oʻahu (fig. 3). However, the islands also weather away, ultimately becoming coral atolls and then underwater seamounts. The smallest of the Hawaiian Islands—Niʻihau, approaching 6 million years in age—is only about 2 percent the size of the Big Island.

Maui Nui

After Hawaiʻi, the island of Maui, with its two volcanoes connected by a flat isthmus (fig. 5), has the most recent volcanic activity. Because the Pacific Plate drags the plume head from the hotspot as it moves (fig. 3), the plume is thought to still underlie Maui's Haleakalā Volcano.

The total volume of lava produced along the Hawaiian chain has been generally increasing for the past 50 million years, a trend that has peaked in the last 3 million years. Unlike most older islands in the chain, Maui and Hawaiʻi both have multiple volcanoes due to the rising frequency of eruptions.

About a million years ago, Maui was 50 percent larger than the Big Island is today. Maui Nui ("Greater Maui") encompassed four of today's Hawaiian Islands plus areas in between (red/orange in figure 5). Seven volcanoes made up Maui Nui, starting with Penguin Bank and the two volcanoes on Molokaʻi in the northwest. The sequence of volcanoes then progressed to the southeast, from Lānaʻi to West Maui (now made up of eroded volcanic peaks up to 5,800 feet high (fig. 6)), to Kahoʻolawe, and finally to Haleakalā on East Maui (about 10,000 feet in elevation). Most volcanoes on Maui Nui were short-lived, going extinct after many eruptions in the shield stage, with few postshield eruptions. Most were extinct by about 1 million years ago; since then, they have undergone extensive erosion, including massive landslides.

Maui's Geologic Future

The West Maui Volcano persisted longer, with postshield eruptions up to about 320,000 years ago that formed spectacular lava peninsulas. Makaluapuna Point, for example, juts out about a quarter mile from the beach on West Maui's northern coast (fig. 7).

Haleakalā on East Maui is thought to be in a long postshield phase of volcanism, with the most recent eruption taking place about 400 years ago. The eruption left fields of reddish-brown ʻaʻā (jagged) lava.

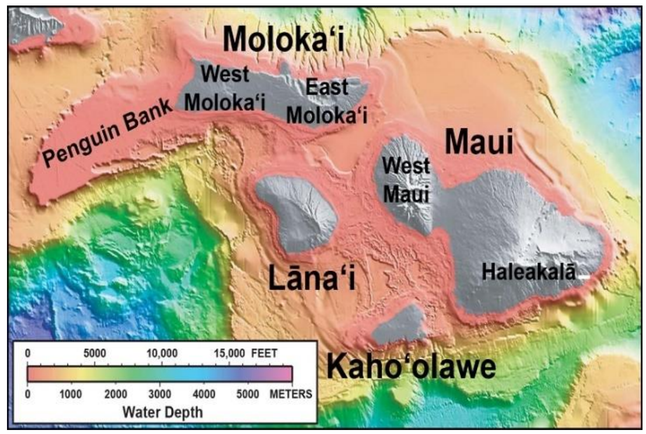


Figure 5—*Maui, with its two volcanoes, is connected across shallow seas to the nearby volcanic islands of Lāna'i, Moloka'i, and Kaho'olawe. Source: Tilling and others (2010).*

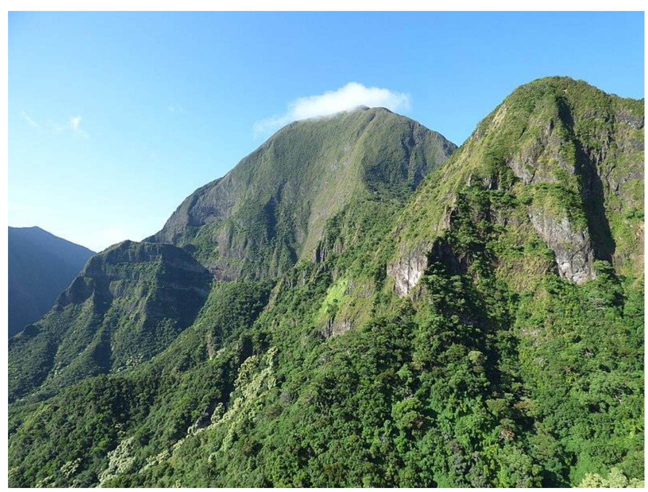


Figure 6—*The West Maui Volcano has eroded into peaks with steep slopes, locally known as the West Maui Mountains. Source: [Wikipedia](); photo: Forest and Kim Starr.*

Figure 7—*West Maui's Makaluapuna Point. Lovely D.T. Fleming Beach is on the left, with the West Maui Volcano in the background. Source: [Dreamstime](#).*

The lava fields are traversed by King's Highway (fig. 8, top), a trail around the island. Built and used by the ancient Hawaiians, the trail still partly exists.

Future eruptions at Haleakalā are considered likely, so the USGS Hawaiian Volcano Observatory maintains a monitoring network there. However, erosion has worn Haleakalā away for the past million years, creating magnificent valleys, including the "crater" accessible from Haleakalā's summit (fig. 8, bottom).

Maui is subsiding due to the weight of its two volcanoes on the seafloor and their transport away from the buoyant hotspot now under the Big Island. The subsidence, coupled with erosion and rising sea levels, flooded the land between most of Maui Nui's volcanoes, forming the separate islands we see today. With ongoing subsidence and erosion, East Maui could become separated from West Maui by a seaway within another 10,000 to 20,000 years.

Sources

Geology.com. N.d. Plate tectonics and the Hawaiian hot spot.

Hawaii Volcano Observatory. 2016. A geologic tour of the Hawaiian Islands: Maui. U.S. Geological Survey.

Sherrod, D.R.; Sinton, J.M.; Watkins, S.E.; Brunt, K.M. 2021. Geologic map of the state of Hawai'i: USGS Sci. Investig. Map 3143 Pamphl. Vancouver, WA: U.S. Geological Survey, Volcano Science Center.

Figure 8—*Top:* *King's Highway (a brutal hike in the hot sun) traverses lava fields left by the most recent eruption of Haleakalā about 400 years ago.* **Bottom:** *A trail (lower left, barely visible) descends from the Haleakalā summit into a "crater" carved by erosion. Photo (top): Hutch Brown; source (bottom): Wikimedia, photo—Michael Oswald.*

Sinton, J.M.; Sherrod, D.R. 2021. Geology of the Hawaiian Islands. Vancouver, WA: U.S. Geological Survey, Volcano Science Center.

Tilling, R.I.; Heliker, C.; Swanson D.A. 2010. Eruptions of Hawaiian volcanoes—past, present, and future. USGS Gen. Inf. Prod. 117. Reston, VA: U.S. Geological Survey.

AFMS Code of Ethics

A large measure of the enjoyment of our hobby consists of collecting in the field. For that reason, the members are proud to endorse the following:

1. I will respect both private and public property and will do no collecting on privately owned land without permission from the owner.
2. I will keep informed of all laws, regulations, or rules governing collecting on public lands and will observe them.
3. I will, to the best of my ability, ascertain the boundary lines of property on which I plan to collect.
4. I will use no firearms or blasting material in collecting areas.
5. I will cause no willful damage to property of any kind, such as fences, signs, buildings, etc.
6. I will leave all gates as found.
7. I will build fires only in designated or safe places and will be certain they are completely extinguished before leaving the area.
8. I will discard no burning material—matches, cigarettes, etc.
9. I will fill all excavation holes that might be dangerous to livestock.
10. I will not contaminate wells, creeks, or other water supplies.
11. I will cause no willful damage to collecting material and will take home only what I can reasonably use.
12. I will practice conservation and undertake to utilize fully and well the materials I have collected and will recycle my surplus for the pleasure and benefit of others.
13. I will support the rockhound project H.E.L.P. (Help Eliminate Litter Please) and will leave all collecting areas devoid of litter, regardless of how found.
14. I will cooperate with field trip leaders and those in designated authority in all collecting areas.
15. I will report to my club or federation officers, the Bureau of Land Management, or other authorities any deposit of petrified wood or other materials on public lands that should be protected for the enjoyment of future generations or for public educational and scientific purposes.
16. I will appreciate and protect our heritage of natural resources.
17. I will observe the Golden Rule, will use good outdoor manners, and will at all times conduct myself in a manner that will add to the stature and public image of rockhounds everywhere.

April 2024—Upcoming Events in Our Area/Region (see details below)

Sun	Mon	Tue	Wed	Thu	Fri	Sat
	1 NVMC mtg	2	3 MSDC mtg	4	6	6
7	8 GLMSMC mtg	9	10	11	12 Show, Raleigh, NC	13 Show, Raleigh, NC
14 Show, Raleigh, NC	15	16	17	18	19	20 Show, W Friendship, MD
21	22	23	24 MNCA mtg	25	26 Show, Richmond, VA	27 Show, Richmond, VA
28 Show, Richmond, VA	29	30				

Event Details

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

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

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

12-14: Raleigh, NC—Annual show; Tar Heel Gem & Mineral Club; Kerr Scott Bldg, NC Fairgrounds, 1025 Blue Ridge Rd; Fri 3-7, Sat 10-6, Sun 10-5; charge for admission; info: Cyndy Hummel, 919-779-6220, mchummel@mindspring.com, tarheelclub.org.

20: West Friendship, MD—Annual show; Chesapeake Gem and Mineral Society; Howard County Fairgrounds, 2210 Fairgrounds Rd; Sat 10-4; free admission; info: Lynne Emery, chesapeakegemandmineral@gmail.com.

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

26-28: 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, sixteen and under free; info: Ellen White, 804-642-2011, Ellen.White@TreasuresOfTheEarth.com, www.TreasuresOfTheEarth.com.

Bournonite with quartz, Yaogangxian Mine, Chenzhou, Hunan, China. Source: Mindat; photo: Rob Lavinsky.

The Northern Virginia Mineral Club

Visitors are always welcome at our club meetings!

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

Please send your newsletter articles to:
Hutch Brown, editor
4814 3rd Street North
Arlington, VA 22203
hutchbrown41@gmail.com

RENEW YOUR MEMBERSHIP!

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

OR

Bring your dues to the next meeting.

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

THE NORTHERN VIRGINIA MINERAL CLUB INC

2024 Club Officers

President: Jason Zeibel
president@novamineral.club
Vice President: Craig Moore
vicepresident@novamineral.club
Secretary: Almas Eftekhari
secretary@novamineral.club
Treasurer: Roger Haskins
treasurer@novamineral.club
Communication: Vacant
Editor: Hutch Brown
editor@novamineral.club
Field Trip Co-Chairs: Katy/Mickey Johnson
fieldtrips@novamineral.club
Greeter/Door Prizes: Vacant
Historian: Kathy Hrechka
historian@novamineral.club
Show Chair: Tom Taaffe
show@novamineral.club
Tech Support: Tom Burke
tech@novamineral.club
Webmaster: Casper Voogt
webmaster@novamineral.club

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).

Meetings: At 7:30 p.m. on the first Monday of each month (except January and September) 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.*